This document is the sole responsibility of the Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation and can in no way be taken to reflect the views of the European Union

1ST INTERIM NARRATIVE REPORT

March 01, 2011 – July 20, 2012

Prepared by Malkhaz Dzneladze – Project Regional Coordinator, WWF Caucasus

with contributions by:

Siranush Galstyan – Project Country Coordinator in Armenia, WWF Armenia ***(01 July, 2011 - 01 March, 2012)***

Nelli Sargsyan – Project Country Coordinator in Armenia, WWF Armenia ***(01 March, 2012 - 01 October, 2012)***

Elshad Askerov – Project Manager in Azerbaijan, WWF Azerbaijan

This project is funded by the EU

This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

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Thematic Programme: Environment and Sustainable Management of Natural Resources, including Energy (ENRTP)

Reference: *EuropeAid/128320/C/ACT/Multi*

Project: Increasing the resilience of forest ecosystems against climate change in the South Caucasus Countries through forest transformation

Contract : No. *DCI-ENV/2010/221391*

Interim Narrative Report *

1st Year of the Project Implementation
(March 1, 2011 – July 20, 2012)

* *prepared according to the template given in e3h5_interreport_en.doc (ANNEX VI. INTERIM NARRATIVE REPORT).*

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Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

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AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

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WWF Germany
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WWF Caucasus Programme Office
Merab Aleksidze St. 11
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Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

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Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

- *This report must be completed and signed by the Contact person.*
- *The information provided below must correspond to the financial information that appears in the financial report.*
- *Please complete the report using a typewriter or computer* ***(you can find this form at the following address <Specify>).***
- *Please expand the paragraphs as necessary.*
- ***Please refer to the Special Conditions of your grant contract and send one copy of the report to each address mentioned.***
- *The Contracting Authority will reject any incomplete or badly completed reports.*
- *The answer to all questions must cover the reporting period as specified in point 1.6.*

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Merab Aleksidze St. 11
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Tel.: + (995 32) 2-237-500
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www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
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Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

1. DESCRIPTION

1.1. **Name of beneficiary of grant contract:**

WWF Deutschland (WWF-Germany)

1.2. **Name and title of the Contact person:**

Aurel Heidelberg, Programme Manager at WWF-Germany

1.3. **Name of partners in the Action:**

Partner 1: WWF Caucasus Programme Office (WWF-Caucasus)

Partner 2: WWF-World Wide Fund for Nature Armenian Branch (WWF-Armenia)

Partner 3: Branch Office of the WWF - World Wide Fund for Nature in the Azerbaijan Republic (WWF-Azerbaijan)

1.4. **Title of the Action:**

Increasing the resilience of forest ecosystems against climate change in the South Caucasus Countries through forest transformation

1.5. **Contract number:**

DCI-ENV/2010/221391

1.6. **Start date and end date of the reporting period:**

March 1, 2011 – July 20, 2012

1.7. **Target country(ies) or region(s):**

Armenia, Azerbaijan, Georgia

1.8. **Final beneficiaries &/or target groups[1] (if different) (including numbers of women and men)**:

Final beneficiaries: Governments of Armenia, Azerbaijan and Georgia; Ministries of environment and Forestry administrations in the target countries; Local community members, local NGOs, and CBOs (*which are active in the pilot site localities*).

Target Groups: The number of people targeted by the action depends on the site location. From WWF's experience in implementing forest restoration measures in the region it is anticipated the involvement of up to 50 villagers in the planning and implementation of the measures at each site, which equals up to 300 villagers for the action as a whole. Also it is expected to involve 6 local NGOs or CBOs at the pilot sites in collecting seeds and raising seedlings (*up to 60 people from 16 to 20 organisations in the target countries*).

1.9. **Country(ies) in which the activities take place (if different from 1.7):**

Armenia, Azerbaijan, Georgia, Germany

[1] "Target groups" are the groups/entities who will be directly positively affected by the project at the Project Purpose level, and "final beneficiaries" are those who will benefit from the project in the long term at the level of the society or sector at large.

2. ASSESSMENT OF IMPLEMENTATION OF ACTION ACTIVITIES

2.1. EXECUTIVE SUMMARY OF THE ACTION

Please give a global overview of the Action's implementation for the reporting period (no more than ½ page)

The overall objective of the action (*the project*) is to increase the resilience of forest ecosystems in the Southern Caucasus against climate change impacts and to improve biodiversity and livelihoods of local populations. The specific objective of the action is to transform monoculture stands on selected model sites in Armenia, Azerbaijan and Georgia highly vulnerable to climate change and to improve related forest management. The specific objective of the proposed action contributes to the overall objective through achieving of the following results:

- Result 1 - Selected forest stands vulnerable to climate change have been transformed into highly resilient "close to nature" forest stands.
- Result 2 - Silvicultural guidelines for the transformation of monoculture stands into more resilient stands are elaborated, published in three languages and made available for relevant officials and experts.
- Result 3 - The capacities of forest administration experts to develop silvicultural strategies to transform monoculture stands into stable, site-adapted forests are increased.
- Result 4 - The awareness of local communities about the importance of forest rehabilitation with regard to mitigating negative biotic and abiotic impacts of climate change is improved.

During the reporting period (*1st year of implementation*) none of the above results were planned to be achieved as they were envisaged to be completed by the end of the project. At the same time, some important and primary results have been handed over. Namely, pilot sites in all 3 target countries of the South Caucasus have been selected and implementation of practical measures for forest transformation agreed with relevant governmental agencies. The above process turned out to be much more intensive rather than expected and took almost from 3 to 8 months instead of initially planned 3 months.

On the other hand, some of the planned activities were not implemented and/or delayed not only because of mainly circumstances beyond of the project's domination, but also for the reason that there were some definite shortcomings in planning process especially for the first year of implementation (*e.g., under the 1st year-activity-plan it was initially foreseen to spend more than 50% of the total 3-year budget*).

There were also underestimations with regard to EC requirements for project implementation standards, compliance with procurement and other procedures – along with general overestimation particularly of existing administrative capacities within implementing organizations to meet all terms and conditions under the EU financed project.

The project was also hindered by the late start, instead of January1/February 1, 2011 it officially started on March 1, 2011, thus, forcing to shift inception phase to spring time – the most favorable for field activities.

Nevertheless, all actions under the question during the 1st year of implementation currently (March/April, 2012) are either about to be completed and/or in pipeline.

2.2. ACTIVITIES AND RESULTS

Please list all the activities of the contract implemented during the reporting period as per Annex 1.

Activity #:

Title of the activity

Topics/activities covered <please elaborate>:

Reason for modification for the planned activity <please elaborate on the problems -including delay, cancellation, postponement of activities- which have arisen and how they have been addressed> (if applicable):

Results of this activity <please quantify these results, where possible; refer to the various assumptions of the Logframe>:

INCEPTION PHASE

The action started with inception phase. The following activities were carried out:

Activity IP1. Select and hire staff *(Inception phase)*

Staff members who were supposed to be assigned permanently to the action (whether full or part time) and who were not already employed by the leading and partner organizations were selected and contracted. Terms of references were prepared for all staff members who were supposed to be assigned permanently to the action. Positions created for the action were recruited as follows: Regional Coordinator and Assistant to the Regional Coordinator for WWF-Caucasus; country coordinators – by WWF-Caucasus in Georgia, WWF Armenia in Armenia and by WWF-Azerbaijan in Azerbaijan.

Organizational structure of the project by the end of the reporting period was as shown bellow:

PROJECT HEAD OFFICE IN GERMANY

International Project Leader (*Permanent Position: Caucasus Programme Officer, WWF-Germany*)

Project Financial Manager/Administrator (*Permanent Position: Financial Officer, WWF-Germany*)

PROJECT COUNTRY OFFICE IN ARMENIA

Project Manager in Armenia (*Permanent Position: Director, WWF-Armenia*)

Project Administrator in Armenia (*Permanent Position: Finance-Admin. Manager, WWF-Armenia*)

Communication Manager in Armenia (*Permanent Position: Partnership Development Manager, WWF-Armenia*)

Armenia Country Coordinator (*Staff assigned to the project*) – *changed 3 times during the reporting period*

PROJECT COUNTRY OFFICE IN AZERBAIJAN

Project Manager in Azerbaijan (*Permanent Position: Head, WWF-Azerbaijan*)

Project Administrator in Azerbaijan (*Permanent Position: Finance-Admin. Manager, WWF-Azerbaijan*)

Communication Manager in Azerbaijan - (*Part time staff assigned to the project*) – since July, 2012

Azerbaijan Country Coordinator (*Staff assigned to the project*)

PROJECT COUNTRY OFFICE IN GEORGIA

Project Manager in Georgia (*Permanent Position: Director, WWF-Caucasus*)

Project Administrator in Georgia (*Permanent Position: Finance-Admin. Manager, WWF-Caucasus*)

Communication Manager in Georgia (*Permanent Position: Communications Officer, WWF-Caucasus*)

Georgia Country Coordinator (*Staff assigned to the project*)

Two locally based Site Keepers/Watchmen for Pilot Sites #1 and #2 (*Staff assigned to the project*) – since July-2012

REGIONAL STAFF STATIONED IN WWF-CAUCASUS

International Project Advisor (*Permanent Position: Senior Forest Officer, WWF-Caucasus*)

Regional GIS Specialist (*Permanent Position: GIS Officer, WWF-Caucasus*)

Regional Assistant (*Staff assigned to the project*)

Regional Coordinator (*Staff assigned to the project*)

EXPATRIATE INTERNATIONAL CONSULTANTS

Procurement Expert/Specialist (*Fee-based international consultant / Service provider to WWF-Germany under the project*) *– since November-2011*

International Forestry Expert (*Fee-based international consultant / Service provider to WWF-Caucasus under the project*) *– since April-2012*

No Country-specific information not referred to above –Armenia

Country-specific information not referred to above – Azerbaijan

Before July 2012 this activity had been fulfilled by 80%. The project supervised by the Head of WWF-Azerbaijan. Project coordinator is also selected and hired as full time staff. Communication officer as part time project staff has been hired since July 2012.

No Country-specific information not referred to above – Georgia

Activity IP2. Initial project planning workshop *(Inception phase)*

Initial project planning workshop was organized in Tbilisi, Georgia at WWF-Caucasus from 23 March to March 24, 2011 preceded by preliminary preparatory two day working meetings.

Results of the Initial project planning workshop:

(a) activity schedule and assignment of tasks and resources were reviewed and confirmed;

(b) procurement, record keeping and accounting procedures communicate;

(c) agreed regional criteria for selecting the pilot sites for further discussion and confirmation at national levels developed (see *Annex 2. Site Selection Criteria*).

The workshop was arranged by WWF-Caucasus.

See the Workshop Report in *Annex 1. Workshop Report : WWF Inception Workshop (Initial Project Planning Workshop) - 23-24 March, 2011 – Tbilisi, Georgia.*

The workshop materials are also available from:

http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/news/?203212/Initial-Planning-WWF-Workshop-Concluded-within-a-Framework-of-EU-Financed-Project-on-Increasing-the-Resilience-of-Forest-Ecosystems-against-Climate-Change-in-the-Southern-Caucasus

PROJECT WORK PACKAGES

The project activities are structured into four work packages:

1. Research and demonstration package, which will develop and pilot silvicultural measures for transforming forest stands that are vulnerable to climate change into resilient forest stands and provide practical experience in the target countries which can be used as a basis for training materials and as demonstration sites;

2. Dissemination package for the forest administrations in the target countries that includes information and materials on forest transformation measures that can be applied to all forest stands vulnerable to climate change in the target countries. The materials will be the silvicultural guidelines, a popular report describing the activities, results and lessons learned from the Project, and the training modules;

3. Capacity-building package, which is designed to train staff of the forest administrations to develop and implement strategies for transforming forest stands more widely in the target countries after the action has been completed, and to create the supportive policy environment for the forest administrations to be able to develop and implement strategies for making forests more resilient to the impacts of climate change;

4. Awareness raising package, which is aimed at building the awareness in the communities adjacent to the pilot sites and local NGOs and CBOs active in the locality of the pilot sites about the impacts of climate change on forests and forest services and at involving them in the implementation of the action at the pilot sites.

In addition to the four main work packages the project includes an inception phase and a closure and reporting phases after the end of the project.

On project phases, work packages, thematic components and main activities see also: *http://awsassets.panda.org/downloads/project_scheme_march_2011.pdf*

WORK PACKAGE 1: RESEARCH AND DEMONSTRATION

Activity 1.1.1. Conduct research into resilience of forest stands *(Work package 1: Research and Demonstration / 1.1. Research component)*

Under the Activity 1.1.1. (*Conduct research into resilience of forest stands and prepare recommendations on transformation measures*) it was planned to review published scientific literature on forest resilience to climate change and silvicultural strategies for making forests more resilient in month 6 of the project. The review was planned to be completed in month 7 of the project along with recommendations on measures appropriate to the particular characteristics of the pilot sites. The review findings were expected to provide input to the regional conference on forest resilience (activity 1.1.2.), the preparation of transformation plans for the pilot sites (activity 1.3.4.), and the silvicultural guidelines on forest transformation strategies (activity 2.1.). The review was envisaged as a desk-based task and will to be carried out by an international forest expert with input from the International Project Advisor in WWF-Caucasus.

The action has been postponed to the first half of 2012 due to delay in procurement of services for technical assistance of the international forest expert. Tender for this service was announced in January, 2012[2] and International Forestry Expert was hired in April, 2012.

In May/June 2012 International Forestry Expert in cooperation with the project staff produced the Study on Research into resilience of forest stands and prepared recommendations on transformation measures (see in *Annex 16. Report of Research on Resilience of Forest Stands*).

Later on, in July 2012, based on the above sudy, relevant publication was prepared abd published (*Annex 17. Desk-based Study on Resilience of Forest Stands : Publication*).

Activity 1.2.1. Develop criteria for site selection *(Work package 1: Research and Demonstration / 1.1. Research component)*

The regional criteria for selecting the six pilot sites had been developed at the initial project planning workshop (*see Annex 2. Site Selection Criteria*), which later on were adopted at national level in al 3 target countries (through reviewing and conforming during the national

[2] See „Call for Expression of Interest for Technical Assistance of an International Forestry Expert under the EU financed project (with preliminary version of Tender Dossier)" at: *http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/?203210/Call-for-Expression-of-Interest-for-Technical-Assistance-of-an-International-Forestry-Expert-under-the-EU-financed-project*

introductory workshops with forestry administration staff (see activity 3.3.1.). The activity was led by WWF-Caucasus.

Regional wide specific information not reffered to above (*International Project Advisor*)

For selecting the 6 pilot sites (2 in each country) criteria were drafted by the regional project team, discussed and improved with the national coordinators during the inception workshop in March 2011.

The criteria have been reviewed during the introductory workshops with forestry administrations and other partners (e.G. Municipality of Tbilisi in Georgia) separately in Azerbaijan, Armenia and Georgia. The final version of the criteria was agreed by the project partners and afterwards has been used for assigning the pilot sites to the action.

As preconditions for selecting sites were identified:

- Current leading tree species is not in its natural distribution area
- Current forest stand is a monoculture
- Current forest stand is vulnerable to climate change

In a second step the proper site selection criteria were formulated, they consist of Nature conservation criteria, Silvicultural/Ecological criteria, Legal criteria, Social- economic criteria and others (*Annex 2*).

Country-specific information not referred to above – <u>Armenia</u>

The criteria developed regionally were provided to national offices, including WWF Armenia and discussed, revised and agreed during the national level kick-off workshop implemented on 24 June 2011 in WWF Armenia office (details see under Activity 3.3.1), as well as later with "Hayantar" SNCO prior to proceeding with selection of pilot sites.

Country-specific information not referred to above – <u>Azerbaijan</u>

No Country-specific information not referred to above – <u>Georgia</u>

Activity 1.2.2. Select and agree sites with forest administrations *(Work package 1: Research and Demonstration /1.2. Demonstration component)*

The six pilot sites (*see Annex 3. Summary Table for Selected Forest Pilot Sites in the South Caucasus Countries*) were selected by the project partners together with the forest administration responsible for assigning the pilot sites to the action (*in Armenia the "Hyantar", in Georgia Natural Resources Agency of the newly established Ministry of Energy and Natural Resources, in Azerbaijan the Forestry Department of the Ministry of Ecology and Natural Resources*) using the criteria developed in activity 1.2.1. Local government and community administrations were involved in site selection where relevant (one of the pilot sites in Georgia was selected on municipality managed forest land). The activity was led by the project partners.

See appropriate agreements with relevant governmental agencies in the following annexes:

- <u>For Pilot Site #1 in Georgia</u> - *Annex 4. Memorandum of Understanding between WWF and Tbilisi Mayor City Hall of the Municipality of Tbilisi, Georgia*

- For Pilot Site #2 in Georgia - *Annex 5. Memorandum of Understanding between WWF and Natural Resources Agency of the Ministry of Energy and Natural Resources of Georgia*

- For Pilot Sites #1and #2 in Armenia - *Annex 6. Memorandum of Understanding between WWF and Hyantar ("ArmenForest") of the Ministry of Agriculture of the Republic of Armenia*

- For Pilot Sites #1and #2 in Armenia - *Annex 7. Amendment to the Memorandum of Understanding between WWF and Hyantar ("ArmenForest") of the Ministry of Agriculture of the Republic of Armenia*

- For Pilot Site #1 in Azerbaijan - *Annex 9. Agreement between WWF and Shamakhi Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic*

- For Pilot Site #2 in Azerbaijan - *Annex 10. Agreement between WWF and Yevlakh Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic*

Result:

The following 6 pilot sites were selected and agreed with national governmental agencies:

In Armenia

Pilot Forest Site N1 – "*KOGHB*" in Tavush Region (Armenia) located on the state forest lands of the Noyemberyan State Forest Enterprise of the State Non-Commercial Organization "Hayantar" (*ArmenForest*) of the Ministry of Agriculture of the Republic of Armenia.

Pilot Forest Site N2 – "*SPITAK*" in Lori Region (Armenia) located on the state forest lands of the Gugarq State Forest Enterprise of the State Non-Commercial Organization "Hayantar" (*ArmenForest*) of the Ministry of Agriculture of the Republic of Armenia.

Detailed location and boundaries of the selected pilot forest sites already agreed with the State Non-Commercial Organization "Hayantar" (*ArmenForest*), as well as relevant agreement with the stakeholder are available at the following web-page:

For the Pilot Forest Sites N1 and N2 :
http://awsassets.panda.org/downloads/memorandum_of_understanding_dec_29_2011.pdf

http://awsassets.panda.org/downloads/addendum_to_memorandum_of_understanding_may_2_2012_pdf.pdf

In Azerbaijan

Pilot Forest Site N1 – "*AGSU*" in Shamalkhi District (Azerbaijan) located on the state forest lands of the Shamakhi Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic.

Pilot Forest Site N2 – "*YEVLAKH*" in Yevlakh District (Azerbaijan) located on the state forest lands of the Yevlakh Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic.

Detailed description of locations of the selected pilot forest sites already agreed with the relevant Forest Protection and Restoration Enterprises are available at the following web-pages:

For the Pilot Forest Site N1 :
http://awsassets.panda.org/downloads/mou_shamakhi.pdf

For the Pilot Forest Site N2 :
http://awsassets.panda.org/downloads/mou_yevlakh.pdf

In Georgia

Pilot Forest Site N1 – "*KHASHURI*" in Khashuri Municipality (Georgia) located on the state forest lands of the former Khashuri State Forestry, Forest Unit N.3, Forest Sub-Units NN.5-7 and NN.9-30 - currently under the management of Shida Kartli Service of the Natural Resources Agency of the Ministry of Energy and Natural Resources of Georgia.

Pilot Forest Site N2 – "*TSAVKISI*" in Tbilisi Municipality (Georgia) located on the former state forest lands of Kojori Forest Unit of the former Tbilisi State Forestry - currently under the management of the Municipality of Tbilisi.

Detailed location and boundaries of the selected pilot forest sites already agreed with stakeholders, as well as relevant agreements with the stakeholders are available at the following web-pages:

For the Pilot Forest Site N1 : http://awsassets.panda.org/downloads/mou_geo_site_khashuri.pdf

For the Pilot Forest Site N2 : http://awsassets.panda.org/downloads/mou_geo_site_01_tsavkisi.pdf

Regional wide specific information not reffered to above (*International Project Advisor*)

The six pilot sites have been selected by the project partners together with the forest administrations responsible for assigning the pilot sites to the action.

Base document for site selection were the criteria developed in Activity 1.2.1, the site selection criteria (*see in Annex 1*). Site selection process was led by WWF-Caucasus in Georgia, WWF Azerbaijan in Azerbaijan and WWF Armenia in Armenia.

Country-specific information not referred to above – Armenia

Selection of sites was started with some delay in September-October 2011. The site-visits were implemented by the project team (including WWF Germany, WWF CauPO and WWF-Armenia respective representatives) to potential sites suggested by "Hayantar" SNCO to collect information, check compatibility of proposed sites with the selection criteria, conditions for implementation of transformation planning and measures, willingness and readiness of respective forest enterprises to get involved, cooperate and support, and others. Meetings with respective forest enterprises of "Hayantar" SNCO as well as some community members from the potential pilot site adjacent communities were implemented.

Different sites were visited in Spitak and Margahovit districts of Gugarq Forest Enterprise (FE) and Koghb district of Noyemberyan FE of "Hayantar" SNCO to select the sites suitable for forest transformation. The forest enterprise administration (head of forest enterprise,

chief forester, respective district foresters) accompanied trip participants to preselected sites. Each proposed area was discussed to assess positive and negative aspects and come to conclusion about feasibility of their selection as pilot areas.

During the consequent meetings with "Hayantar" SNCO headquarter administration (Director General and Chief Forester) the visited areas were discussed along with a number of other project related issues.

In the result of the above mentioned activities two sites were finally selected with total area of 150 hectares in Noyemberyan (78 ha) and Gugarq (72 ha) FEs of "Hayantar" SNCO.

The Memorandum of Understanding was prepared and agreed between WWF-Armenia and "Hayantar" SNCO. It was signed on 29 December 2011 (*Annex 6*). Details also available at: http://wwf.panda.org/who_we_are/wwf_offices/armenia/newsroom/?203067/Implementing-in-Armenia-the-EU-Financed-Regional-Project-on-Increasing-the-Resilience-of-Forest-Ecosystems

On the basis of more detailed field surveys the company contracted for preparation of forest transformation plans - "Kanach Desine" LLC proposed slight modification of the previously selected areas. The justifications for modifications were as follows:

- the field surveys showed that Plot N 2 in Koghb pilot site was a rather dense natural pine and oak mixed forest where transformation measures were not needed.
- the field surveys showed that the selected Plot No 3 in Spitak pilot site was pine cultures, which needed care cuttings and planting the area with broadleaved species could be rather complicated at current stage.
  Following the proposal, an additional 2-day field trip was organized with the purpose to discuss the justifications for the proposal and make respective decision. The project team along with "Hayantar" SNCO visited both initially selected and newly proposed areas; the justifications for the modifications were duly discussed and approved (for further details, see *Annex 8. Report concerning the Amendment to the Memorandum of Understanding between WWF and Hyantar ("ArmenForest") of the Ministry of Agriculture of the Republic of Armenia***)**.
  Based on the abovementioned changes, an addendum to Memorandum of Understanding signed on December 29, 2011, was prepared and signed by "Hayantar" SNCO and WWF-Armenia on May 2, 2012 (*Annex 7. Amendment to the Memorandum of Understanding between WWF and Hyantar ("ArmenForest") of the Ministry of Agriculture of the Republic of Armenia*). The addendum is available on WWF-Armenia website at: http://wwf.panda.org/who_we_are/wwf_offices/armenia/newsroom/?203067/Implementing-in-Armenia-the-EU-Financed-Regional-Project-on-Increasing-the-Resilience-of-Forest-Ecosystems

No Country-specific information not referred to above – <u>Azerbaijan</u>

This activity has been completed. After long surveys in different natural zones of Azerbaijan 2 sites were selected for transformation measures. One of the sites is located within the boundaries of Shemakha Forestry, another one – Yevlakh Forestry. Each site covers 75 hectares, so the total area is 150 has. It was conducted workshop with forest officials and got

approval for starting transformation measures in these 2 sites. As a result it was concluded official agreements with authorities of Shemakha and Yevlakh Foretries.

No Country-specific information not referred to above – Georgia

Activity 1.2.3. Design and carry out site surveys *(Work package 1: Research and Demonstration /1.2. Demonstration component)*

The specific forest stands in which transformation measures are pllaned to be carried out had been chosen at the sites selected in activity 1.2.2.

These sites, later on, were surveyed in order for the project team to be able to select the specific stands and to provide information needed for the preparation of the transformation plans.

The outputs from the surveys are maps of the sites and the boundaries of the specific pilot stands, significant natural features of the sites, and a description of the stands including the growing stock.

The activity was led by the project partners and the work was organised and carried out by the country coordinators with the participation of local forestry administration staff and local community members close to the sites. The country coordinators were leaded and advised by the International Project Advisor and supported by Regional GIS expert.

Country-specific information not referred to above – Armenia

Brief site surveys were implemented in autumn 2011 (with some delays conditioned by late approval of pilot sites) to collect preliminary information about the pilot sites and finalize maps – all to be transferred to transformation planning organization to be hired to develop the plans. The collected information including description of sites, maps with specific boundaries of selected pilot sites, satellite images and other relevant information was passed to the hired forest transformation organization.

A brief site survey report was prepared on the basis of the mentioned field trip as well as previous field visits to the sites (see - *Annex 11. Site Survey Report - Armenia*).

Country-specific information not referred to above – Azerbaijan

This activity was started in the first half of 2011. Both sites have been repeatedly visited by senior project staff (see - *Annex 13. Pilot Site Border Demarcation in Azerbaijan - Field Report*) and now consultants are being selected for surveys in the ground.

No Country-specific information not referred to above – Georgia

See site survey report in *Annex 12. Site Survey Report – Georgia.*

Activity 1.2.4. Prepare transformation plans for the selected stands *(Work package 1: Research and Demonstration /1.2. Demonstration component)*

Preparation of transformation plans had been postponed to the first half of 2012 due to delay in completion of Activity 1.2.2 - the latest caused chain reaction effect to other activities practically in linear sequence.

In the first half of 2012 terms of reference and model regional outline for development of transformation plans for the selected pilot forest sites were prepared (see Annex 18).

Status at the time of reporting: completed in all countries by the recruited in March, 2012 service providers.

See english language transformation plans in the following annexes:

for Armenia in Annex 19 *(Transformation Plan for the Selected Pilot Forest Sites in Armenia)*

for Azerbaijan in Annex 20 *(Transformation Plan for the Selected Pilot Forest Sites in Azerbaijan)*

for Georgia in Annex 21 *(Transformation Plan for the Selected Pilot Forest Sites in Georgia)*

Country-specific information not referred to above – Armenia (*including status at the time of reporting*)

The transformation planning was started in March 2012 with the intention to be finalized by the end of May 2012 with delivery of forest transformation plans for two selected pilot areas. At present it is ongoing, there is close contact between WWF Armenia and the transformation planning NGO ("Kanach Design" NGO) to get update on the work progress, provide guidance and support to solving raising issues.

The delay in commencement of this activity was partly conditioned by some uncertainties regarding procurement procedure to be applied, which were finally clarified in February-March 2012 after which it was possible to proceed with actual procedure.

Forest Transformation Plan for selected pilot forest sites in Gugark and Noyemberyan Forest Enterprises was prepared by "Kanach Disine" LLC within March-May 2012. The delay in commencement of this activity was partly conditioned by some uncertainties regarding procurement procedure to be applied, which were finally clarified in February-March 2012 after which it was possible to proceed with actual procedure.

"Hayantar" SNCO has formally provided its opinion on the draft plans upon request by WWF-Armenia. The plan was translated into English. The plan serves as the basis for implementation of forest transformation measures (Activity 1.2.5.)

No Country-specific information not referred to above – Azerbaijan

No Country-specific information not referred to above – Georgia

Activity 1.2.5. Implement the transformation measures in the selected stands *(Work package 1: Research and Demonstration /1.2. Demonstration component)*

Implementation of the transformation measures started in June-July 2012 through implementation of supply and installation of fencing materials.

As a result contractors were hired in all 3 countries under the following engagements (see more details in section 2.4):

Contract for Supply of Fencing Materials and Installation of Fence in Georgia under the EU Financed Project (Date: 01/VI-2012) / Award procedure: Open Local[3]

Contract for Supply of Fencing Materials in Armenia under the EU Financed Project (Date: 25/VI-2012) / Award procedure: Open Local[4]

Contract for Installation of Fence in Armenia under the EU Financed Project (Date: 10/VII-2012) / Award procedure: Open Local[5]

Contract for Supply of Fencing Materials and Installation of Fence in Azerbaijan under the EU Financed Project (Date: 11/VII-2012) / Award procedure: Open Local[6]

Rest part of the transformation measures, such as supplyof planting materials and planting of seedlings is currently envisaged to be started in the 2nd half of 2012.

Forestry equipment to be used for implementation of forest transformation activities were delivered to all offices in the South Caucasus in May/June 2012.

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[3] *Information on this tender is available from:*
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/?204238/Announcement-of-Tender-for-Supply-of-Fe
and
http://24saati.ge/index.php/tenders/view/12350

[4] *Information on this tender is available from:*
http://wwf.panda.org/who_we_are/wwf_offices/armenia/announcements/tenders/
and
http://awsassets.panda.org/downloads/announcement__tender.pdf

[5] *Information on this tender is available from:*
http://wwf.panda.org/who_we_are/wwf_offices/armenia/announcements/tenders/
and
http://awsassets.panda.org/downloads/announcement__tender.pdf

[6] *Information on this tender is available from:*
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/publications/?204787/Announcement-of-Tender-for-Supply-of-Fencing-Materials-and-Installation-of-Fence-in-Azerbaijan-under-the-EU-Financed-Project *(Second Announcement)*
and
http://new.zerkalo.az/media/pdf/2012-04-17-3.pdf
and
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/?204240/Announcement-of-Tender-for-Supply-of-Fencing-Materials-and-Installation-of-Fence-in-Azerbaijan-under-the-EU-Financed-Project *(First Announcement)*

A tender procedures for Supply of seeds and seedlings and for implementation of transformation measures (exept fencing) has been initiated in July, 2012. The tender packages are planned to be uploaded on the Project website in the beginig of August 2012.

No Country-specific information not referred to above – Armenia

A tender for two award contracts for Supply and Installation of Fencing Material in Armenia was announced on April 14, 2012:
http://wwf.panda.org/who_we_are/wwf_offices/armenia/announcements/tenders/.

Respective Contracts were signed in June and July, 2012. Fencing activities were started during the reporting period with the plans to be finalised by the end of September 2012.

No Country-specific information not referred to above – Azerbaijan

No Country-specific information not referred to above – Georgia

WORK PACKAGE 3. CAPACITY BUILDING FOR FOREST ADMINISTRATIONS

Activity 3.3.1. Conduct workshops with senior ministry of environment and forestry administration staff *(Work package 3: Capacity building for forest administrations/ 3.3. Policy makers component)*

One national workshop was held in each of the target countries (June-July, 2011) to introduce the topic of climate change impacts on forests and the objectives, expected results, and activities of the action to senior staff of the countries' environment ministries and forest administrations (*see workshop reports in Annexes 14 and 15*).

The workshops targeted around 30 people in total in the target countries.

The workshops were used as a forum for discussing the draft criteria (see activity 1.2.1) for selecting the sites at which transformation measures will be piloted. The participants' knowledge of climate change impacts on forests and of strategies for increasing forest resilience was assessed at the start of the workshops by questionnaire.

The workshops were arranged and facilitated by the project partners.

Results:

The workshops strengthened participant's knowledge about climate change impacts on forests and of transformation strategies. Through participating in this action, they were able to obtain skills to develop in future policies that would increase the resilience of forests and to lobby for support of these policies from ministers and the parliaments. The selection criteria for selecting the sites at which transformation measures were supposed to be piloted were discussed, adopted to national conditions and agreed. Consensus on possible location of two pilot sites in each country were reached by reviewing the potential areas using the selection criteria developed

under the project. Actionable plan for finalization of site selection process in upcoming period and recommendations on how the WWF can be more effective in providing support on technical issues and promoting learning, including identification of key areas where additional technical support is needed were produced.

In addition, the workshops were followed up by the technical work - analyses of forestry and socio-economic information and GIS mapping for site selection in joint working groups of specialists.

Country-specific information not referred to above – Armenia

The national level kick-off workshop was implemented on June 24, 2011 in WWF Armenia office with participation of key stakeholders from concerned Ministries of Nature Protection and Agriculture, forest administration, NGOs, international organizations. Details with workshop report can be obtained from:
http://wwf.panda.org/who_we_are/wwf_offices/armenia/newsroom/?203429/EU-Financed-Regional-Project-Workshop-Kicks-off-in-Armenia

No Country-specific information not referred to above – Azerbaijan

No Country-specific information not referred to above – Georgia

2.3. LIST OF ACTIVITIES THAT WERE PLANNED BUT NOT IMPLEMENTED

Please list activities that were planned and that you were not able to implement, explaining the reasons for these.

WORK PACKAGE 1: RESEARCH AND DEMONSTRATION

Activity 1.1.2. Conduct regional conference on forest resilience and transformation *(Work package 1: Research and Demonstration / 1.1. Research component)*

Completion of the Activities 1.2.2 and 1.1.1 were preconditions for this activity.

Due to daley in conducting of Activity 1.2.2 and 1.1.1 it has been decided to postpone the Activity 1.1.2 for the 2nd half of 2012.

WORK PACKAGE 3. CAPACITY BUILDING FOR FOREST ADMINISTRATIONS

Activity 3.1.1. Training for local staff of forestry administrations *(Work package 3: Capacity building for forest administrations/ 3.1. On-the-job training component)*

Activity 3.1.1 (*Training for local staff of forest administrations responsible for the pilot sites*) had been foreseen as part of wider capacity building work package that is designed to train forest administration staff to develop and implement strategies for transforming forest stands more widely in the target countries after the action has been completed, and to create a supportive policy environment for the forest administrations to develop and implement strategies for making forests more resilient to climate change impacts. The work package has an "on-the job" training component for local forest administration staff responsible for the pilot sites, a wider training component targeting 60 forest engineers responsible for forest planning in the three countries, and a third component aimed at policy makers.

One of the main preconditions for the Activity 3.1.1 was start of implementation of the transformation measures in all pilot sites. The "on-the job" trainings were supposed to be provided by the service providers subcontracted to implement the transformation measures under the direction of WWF-Armenia, WWF-Caucasus, and WWF-Azerbaijan in Armenia, Georgia, and Azerbaijan respectively.

Implementation of the Activity 3.1.1 currently is envisaged to be coincided with the Activity 1.2.5 in the 2nd half of 2012.

No Country-specific information not referred to above – <u>Armenia</u>

No Country-specific information not referred to above – <u>Azerbaijan</u>

No Country-specific information not referred to above – <u>Georgia</u>

Activity 3.3.2. Study tour for senior ministry of environment and forest administration staff ***(****Work package 3: Capacity building for forest administrations/3.3. Policy makers component)*

Activity 3.3.2 – Study tour for senior ministry of environment and forest administration staff to be carried out in Germany was planned in the project month 12 (February, 2012) – the most unsuitable time for field trips to visit locations where transformation of monoculture conifer stands has been carried out.

Activity 3.3.2 postponed to the 2nd half of 2012.

Currentli in pipeline - Technical specification for the organization and implementation of the study tour for senior officials of relevant organizations in the target countries has been already prepared – see in Annex 28.

WORK PACKAGE 4: AWARENESS RAISING (4. LOCAL TARGET GROUPS)

Activity 4.1. Initial awareness raising workshops for local communities, NGOS, CBOs, local government *(Work package 4: Awareness raising)*

Activity 4.1 (*Initial awareness-raising events for local communities and NGOs, CBOs and local government*) postponed (due to delay in the Activity 1.2.2) until the 2nd half of 2012 to be coincided with start of the Activity 1.2.5.

Country-specific information not referred to above – Armenia

One day workshops for the communities adjacent to two pilot sites as well as active NGOs/CBOs were postponed to be implemented upon finalization of transformation plans and commencement of transformation measures in the field so that to provide the adjacent communities with more information about the activities to be implemented. Some preliminary meetings with the communities during the site-selection visits and site surveys indicate that the communities in general are motivated to have the planned activities implemented in their nearby forest areas as well as to participate and contribute their efforts to their successful implementation.

In addition, WWF Armenia has previous successful experience of cooperation with communities nearby Gugarq FE (involvement of communities in a/reforestation activities in the frame of the finalized project on Mitigating Impacts of Climate Change through the Restoration of Forest Landscapes in the Southern Caucasus, BMU-No.: II. C 59), and Noyemberyan FE (development of forest related ecotourism and fruit-berries collection point in the adjacent Koghb community in the frame of the ongoing project on Improving Forest Law Enforcement and Governance in the European Neighborhood Policy East Countries and Russia - ENPI-FLEG project).

No Country-specific information not referred to above – Azerbaijan

No Country-specific information not referred to above – Georgia

Activity 4. 2. Participation of community members in implementing transformation measures *(Work package 4: Awareness raising)*

Activity 4.2 postponed until the 2nd half of 2012 to be coincided with starting the Activity 1.2.5.

No Country-specific information not referred to above – Armenia

No Country-specific information not referred to above – Azerbaijan

No Country-specific information not referred to above – Georgia

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

2.4. ASSESSMENT OF THE RESULTS OF THE ACTION

ASSESSMENT OF THE RESULTS

What is your assessment of the results of the Action so far? Include observations on the performance and the achievement of outputs, outcomes and impact in relation to specific and overall objectives, and whether the Action has had any unforeseen positive or negative results (please quantify where possible; refer to Logframe Indicators).

Despite the fact that some of the planned activities were not implemented and/or delayed during the reporting period, overall performance for the 1st year could be assessed as in between medium to upper medium level.

During the reporting period (*1st year of implementation*) none of the project main results were planned to be achieved as this was envisaged by the end of the project.

At the same time, some important and primary results have been delivered. Namely, pilot sites in all 3 target countries of the South Caucasus have been selected and implementation of practical measures for forest transformation agreed with relevant governmental agencies.

The above achievement creates the strong ground for further successful implementation – given that relevant modifications are introduced particularly in the activity plans for upcoming 2nd and 3rd years based on realistic calculations.

Regional wide specific information not reffered to above (*International Project Advisor*)

The project implementation in general terms is on a good path with some delays.

Country-specific information not referred to above – Armenia

There were no major complications connected with project implementation so far. Forest administration and local communities are motivated to participate in the activities. There is a good working relation with "Hayantar" SNCO as well as some pilot sites adjacent communities, based on the previous successful working experience of WWF Armenia with mentioned structures.

There are some delays in implementing project activities, which can be explained by the fact that implementation of some activities take more time than initially envisaged (for example, selection of sites). Another cause of delay, which also may become the case in future, is some uncertainty about procurement procedures to be applied in different cases. The clarification of final procedures is always time-consuming, given that no procurement can be started by national offices without having clear instructions.

No Country-specific information not referred to above – Azerbaijan

No Country-specific information not referred to above – Georgia

POTENTIAL RISKS

Please list potential risks that may have jeopardized the realisation of some activities and explain how they have been tackled. Refer to logframe indicators.

In general, the risk of regional political instability is a factor common to all projects that require cooperation between the target countries. It is not possible to make a reliable assessment of the risk because much depends on the unpredictable course of diplomacy involving old and new players. However, regional cooperation projects are themselves instruments for helping to mitigate the risk.

Risk factors differ from country to country, e.g., in Georgia, the main risk factor is associated with ultra liberal governmental policies towards chaotic and environmentally not justified privatization of state forest lands that usually leads to forest fragmentation and, most importantly, to legalization of forest conversion under other types of land use.

Based on the project partners' experience from implementing other actions in the three countries, the overall level of risk is low to medium. The most significant risks which still remain are lack of motivation and shortage of financial resources of governmental agencies to extend action's results.

In addition to the above main risk factor, the following force-major circumstances could arise:

- The demonstration stands could be damaged by storms or fires (natural or man-made)
- The political situation in the region might become substantially less stable to the extent that it would be impossible to continue an action that requires cooperation between partners in the different countries of the region

Based on records of natural events in the areas where the pilot sites are situated and on the partners' experience from implementing other forestry projects in the region, it is assessed the likelihood of the first of those force-major circumstances occurring as low.

No Country-specific information not referred to above – Armenia

Country-specific information not referred to above – Azerbaijan

In Shemakha site landslides which started recently in the beginning of 2012, may jeopardize the realisation of some project activities.

No Country-specific information not referred to above – Georgia

REVISED LOGFRAME

If relevant, submit a revised logframe, highlighting the changes.

Revised logframe is due to the joint planning process with all partner organizations involved.

Revised logframe is provided along with this narrative progress report for the next reporting period from July 20, 2012 to March 1, 2013.

LOGICAL FRAMEWORK FOR THE PROJECT				
	Intervention logic	**Objectively verifiable indicators of achievement**	**Sources and means of verification**	**Assumptions**
Overall objectives	To increase the resilience of forest ecosystems in the Southern Caucasus against impacts of climate change, and to improve biodiversity and livelihoods of local populations.	By 2015, the governments of Armenia, Azerbaijan and Georgia have adopted and started to implement policies that will make forests and the services they provide highly resilient to climate change.	Published policy documents. Field based assessments of implemented measures.	Assumptions: - Environment ministries and forestry administrations are motivated to extend the results of the action. - Forest administrations have the financial resources to develop and implement forest strategies.
Specific objective	To transform monoculture stands on selected model sites in Armenia, Azerbaijan and Georgia highly vulnerable to climate change and to improve related forest management.	By the end of the action the structure of forest stands on 6 pilot sites has been transformed in such a way that they will be highly resilient to climate change. By the end of the action the potential of the forests stands on 6 pilot sites to enhance the livelihoods of neighbouring communities will have been increased. By the end of the action, the chief executives and heads of the policy and plannning departments of forest administrations and heads of relevant departments in the forest administrations show a demonstrable increase in their awaress of the climate impacts on forests and motivation to develop strategies for making forests more resilient.	Ex-post assessment of the resilience of the model forest stands and the quality of management. Ex-post assessment of the economic value of goods and services that will be provided to neighbouring communities compared with the situation ex-ante. Reports of workshops held with target groups. Assessments of awareness and motivation carried out at the workshops held with the target groups .	Assumptions: - No changes in tenure of the pilot sites during the project. - The target countries' environment ministries and forestry administrations are motivated to participate in the action. - The structure and personnel of the institutions whose co-operation is required is not subsequent to frequent change. - Local communities, NGOs, CBOs and local self-governance bodies which participate in the action are motivated to engage in follow-up activities.
Expected results	1. Selected forest stands vulnerable to climate change have been transformed into highly resilient "close to nature" forest stands.	By the final (36th) month of the action transformation measures have been carried out in 6 forest stands with a total area of at least 450 ha.	Documented results of field assessments carried out during and at the end of the action.	External conditions: - No changes in the tenure of the pilot sites before transformation meaasures have been completed.
	2. Practitioner-friendly silvicultural guidelines for ecologically sound and sustainable techniques (incl. transformation of monocultural stands into more resilient stands) are elaborated, published in three languages and distributed to relevant forest practitioners in each country.	By the final (36th) month of the action practitioner-friendly guidelines have been published in the national languages of the three countries and distributed to the 30 most relevant forest practitioners in each country.	Existence of guidelines in the appropriate language on the "bookshelves" of relevant forest administration experts.	External conditions: - None.

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

	3. The capacities of forest administration experts to develop silvicultural strategies to transform monocultural stands into stable site adapted forests are increased, leading to further forest transformation after the action has been completed.	By the final (36th) month of the action 60 forest administration engineers from the three countries have received training in forest transformation strategies and techniques.	Reports of training events. Structured "appropriateness and effectiveness of training" assessments completed by trainees.	External conditions: - Appropriate staff nominated to participate in trainings. - Staff training by the action remain in post long enough to have an impact.
		By the final (36th) month of the action, 15 senior officials in the environment ministries and forestry administrations of the target countries show a demonstrable increase in their knowledge of and interest to act on climate impacts on forests.	Structured self-assessments completed by the participants before the first awareness-raising event and after the end of the final event.	
	4. The awareness of local communities about the importance of forest rehabilitation with regard to mitigating negative biotic and abiotic impacts of climate change is improved.	By the final (36th) month of the action at least 50% of the members of each of the local communities targeted by the action show a demonstrable increase in their awareness of climate impacts on forests and forest services.	Reports of training and awareness-raising activities.	External conditions: - Members of local communities are motivated to participate in awareness-raising events.
Activities	**Activities contributing to Result 1**			
	1.1.1. Conduct research into resilience of forest stands and prepare recommendations on transformation measures.	Means: - Project international advisor, - Local office space and contribution to local office costs - Subcontracted international forestry engineer	Sources of information on progress: - Progress report from activity coordinator. - Document findings of research.	Conditions: - None.
	1.1.2. Conduct regional conference on forest resilience and transformation.	Means: - Project international advisor, - Country coordinators - Georgia communications manager - Local office space - Conference organiser (external service provider) - International flights and local transport for participants - Accommodation for participants - Venue for the conference - Translation services - Interpretation services	Sources of information on progress: - Workshop report by activity coordinator. - Documented programme, participation list, input materials.	Conditions: - None.

	1.2.1. Develop criteria for selection of pilot sites.	Means: - Project international advisor, - Project country coordinators, - local office space and contribution to local office costs, - vehicles (running costs only)	Sources of information on progress: - Regular progress reports by activity coordinators during preparation. - documented criteria.	Conditions: - None.
	1.2.2. Select and agree sites with forest administrations.	Means: - Project international advisor, - Project country coordinators - local office space and contribution to local office costs, - vehicles (running costs only)	Sources of information on progress: - documented agreement of the forest administrations to the pilot sites.	Conditions: - None.
	1.2.3. Design and carry out site surveys.	Means:- Project international advisor,- Project country coordinators,- GIS experts,- Local office space and contribution to local office costs,- Vehicles	Sources of information on progress:- Site survey reports.	Conditions:- The forestry administrations agree to the sites selected by the project team.
	1.2.4. Prepare transformation plans for the selected stands.	Means: - International advisor - Country coordinators - GIS expert - Forest planning expertise (external service providers) - Local office space and contribution to local office costs, - Vehicles	Sources of information on progress: - Documented transformation plans.	Conditions: - None.
	1.2.5. Implement the transformation plans in the selected stands.	Means: - Country coordinators - Local office space and contribution to local office costs, - Service provider to implement the transformation measures - Labour to carry out the work - Equipment and tools - Fencing materials - Seeds and plants - Vehicles	Sources of information on progress: - Regular progress reports by activity coordinators. - Documented "provisional/final acceptance certificates" approved by the country coordinators and where appropriate by international advisor.	Conditions: - Sufficient seeds and seedlings of appropriate quality available.
	Activities contributing to Result 2			

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

	2.1. Prepare and print silvicultural guidelines on forest transformation strategies and techniques in English and the languages of the target countries.	Means: - Project international advisor - International forestry expert - Local office space and contribution to local office costs - Country coordinators - Translation services - Design and printing services	Sources of information on progress: - Progress report by activity coordinator during preparation. - English text ready for translation. - National language texts ready for printing. - Printed texts ready for dissemination.	Conditions: - None.
	2.2. Disseminate the guidelines on forest transformation strategies and techniques to the relevant governmental agencies together with the training modules developed in activity 3.2.1. and the "popular report" prepared in activity 3.3.3.	Means: - Country coordinators, - Local transport	Sources of information on progress: - Confirmation of distribution by activity coordinators.	Conditions: - None.
	Activities contributing to Result 3			
	3.1.1. Training for local staff of forest administrations responsible for the pilot sites.	Means: - Country coordinators - Fencing materials - Seeds and seedlings - Vehicles	Sources of information on progress: - Progress reports by activity coordinators. - Documented "self assessments" by trainees.	Conditions: - Staff are motivated to participate.
	3.2.1. Prepare training modules in the national languages of the target countries for wider training of forest administration staff.	Means: - Project international advisor, - Project country coordinators, - Local office space - Translation services - Printing services in local offices	Sources of information on progress: - Progress report by activity coordinator. - Documented training modules and training materials.	Conditions: - None.
	3.2.2. Carry out wider trainings of forest administration staff.	Means: - Trainers (country coordinators) - Training materials - Training venues - Accommodation for trainers and trainees - Vehicles (running costs only) - Training materials	Sources of information on progress: - Reports of training events.	Conditions: - Forestry administrations nominate appropriate staff.
	3.3.1. Conduct workshops with senior ministry of environment and forest administration staff.	Means: - Project country coordinators, - Project international advisor, - Local transport - Venues (room in ministry or forest administration building)	Sources of informatio - Reports of workshops.	Conditions: - Ministries of environment and forestry administrations nominate appropriate staff..

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

	3.3.2. Study tour for senior ministry of environment and forest administration staff.	Means: - External service provider to arrange the tour in the host country - International flights for study tour participants - Accommodation for study tour participants - Appropriate demonstration areas and meeting venues - Interpretation services	Sources of information on progress: - Report of study tour.	Conditions: - Ministries and forestry administrations nominate appropriate staff.
	3.3.3. Prepare and print "popular report" of project activities, results and lessons learned in English and the languages of the target countries.	Means: - Project international advisor - Subcontracted international forest engineer - Country coordinators - Local office space - Translation services - Design and printing services	Sources of information on progress: - Progress report by activity coordinator during preparation. - Document available for translation into national languages. - Document in national languages available for printing. - Printed document available for dissemination. - Confirmation of dissemination by country coordinators.	Conditions: - None.
	3.3.4. End of project workshops with senior ministry of environment and forest administration staff.	Means: - Project country coordinators - Local transport - Venues (room in ministry or forest administration building)	Sources of information on progress: - Reports of workshops.	Conditions: - Ministries of environment and forestry administrations nominate appropriate staff.
	Activities contributing to Result 4			
	4.1. Initial awareness-raising events for local communities and NGOs, CBOs and local government.	Means: - project country coordinators - local site coordinators - vehicles for transport to venues - simple leaflet - venues (village halls or similar)	Sources of information on progress: - Regular progress reports by activity coordinators during preparation. - Reports of events.	Conditions: - Local communities and NGOs, CBOs and local government motivated to participate.
	4.2. Participation by community members in forest transformation and maintenance measures.	Means: - project country coordinators - local site coordinators - vehicles for transport to sites - tools and equipment - safety clothing	Sources of information on progress: - Regular progress reports by activity coordinators.	Conditions: - Local communities members motivated to participate.
	4.3. Mid-term workshops for local communities and NGOs, CBOs and local government.	Means: - project country coordinators - vehicles for transport to venues - venues (village halls or similar)	Sources of information on progress: - Reports of workshops.	Conditions: - Local communities and NGOs, CBOs and local government motivated to participate.

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WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

	4.4. Closing workshops for local communities and NGOs, CBOs and local government.	Means: - project country coordinators - vehicles for transport to venues - venues (village halls or similar)	- Reports of workshops.	Conditions: - Local communities and NGOs, CBOs and local government motivated to participate.
		Action costs (000 Euro)[(1)]: 1. Human resources: 2. Travel: 3. Equipment and supplies: 4. Local office: 5. Other costs and services: 6. Other: 7. Contingencies: 8. Management fee: **9. TOTAL:**	 388,762 35,180 633,730 52,800 192,800 333,500 81,839 120,303 **1,838,913**	Preconditions which must be met before the action can start: - The forestry administrations agree to make forest stands available to the project for piloting transformation measures and to participate in the measures

Note (1): The action costs include the costs of the inception phase, closure and reporting phase and communication and visibility actions.

ALL CONTRACTS (WORKS, SUPPLIES, SERVICES) ABOVE 10.000€ AWARDED DURING THE REPORTING PERIOD

Please list all contracts (works, supplies, services) above 10.000€ awarded for the implementation of the action during the reporting period, giving for each contract the amount, the award procedure followed and the name of the contractor.

The following contracts above 10,000 € were awarded during the reporting period (*March 1, 2011-March 1, 2012*):

1) Service Contract with Procurement Specialist/Expert to Provide Consulting Services under the EU financed Project (Date: 2011)

Ammount: 23,780.00 €

Award procedure: Single Tender[7] (*initial budget cost of 6,000 had been exceeded at the expense of contingency reserve with permission from EU*)

Contractihg Organization: WWF-Germany

Budget line: *6.3. Subcontracted procurement specialist (Headline: 4.Other)*

Name of the Contractor: Hans Udo Fuchs (*expatriate fee-based consultant stationed in Germany*)

[7] *Information on this tender is available from:*
http://www.wwf.de/fileadmin/fm-wwf/pdf_neu/ENRTP%20-%20Procurement%20Specialist.pdf

2) Supply Contract for Supply of Three 4-Wheel Drive Pick-up Motor Vehicles under the EU financed Project (Date: 23/II-20/III-2012)

Ammount: 68,235.00 €

Award procedure: Open Local[8]

Contractihg Organization: WWF-Germany

Budget line: *3.1. Purchase or rent of vehicles (Headline: 3. Equipment and supplies)*

Name of the Contractor: Toyota Tbilisi Center (Georgia)

3) Supply Contract for Supply of Machines and Tools (Forest Equipment) under the EU financed Project (Date: 23/II-13/III-2012)

Ammount: 92,901.90 €

Award procedure: Open Local[9]

Contractihg Organization: WWF-Germany

Budget line: *3.3. Machines, tools (Headline: 3. Equipment and supplies)*

Name of the Contractor: Grube KG (Germany)

4) Service Contract for Technical Assistance of an International Forestry Expert under the EU Financed Project (Date: 30/III-2012)

Ammount: 18,750.00 €

Award procedure: Competetive Negotiation[10]

Contractihg Organization: WWF-Caucasus

Budget line: *6.4. Subcontracted international forestry expert (Headline: 4.Other)*

Name of the Contractor: *Michael Garforth* (*expatriate fee-based consultant of UK, stationed in UK and Georgia*)

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[8] *Information on this tender is available from:*
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/publications/?202212/Announcement-of-Tender
and
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/publications/?202974/Announcement-of-Tender-for-Supply-of-Three-4-Wheel-Drive-Pick-up-Motor-Vehicles-under-the-EU-financed-Project-Tender-Dossier

[9] *Information on this tender is available from:*
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/publications/?202890/Announcement-of-Tender-for-Supply-of-Machines--and-Tools-Forest-Equipment-under-the-EU-financed-Project-Tender-Dossier

[10] *Information on this tender is available from:*
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/?203210/Call-for-Expression-of-Interest-for-Technical-Assistance-of-an-International-Forestry-Expert-under-the-EU-financed-project

5) Supply Contract for Supply of Fencing Materials and Installation of Fence in Georgia under the EU Financed Project (Date: 01/VI-2012)

Total Ammount: 66,925.50 € / of which 47,425.50 € for LOT 1 (Supply of Fencing Materials) and 19,500.00 € for LOT 2 (Installation of Fence)

Award procedure: Open Local[11]

Contractihg Organization: WWF-Caucasus

Budget lines: *for Supply of Fencing Materials (LOT 1) - 3.5.3 Fencing materials (Headline: 3. Equipment and supplies) and for Installation of Fence (LOT 2) - 6.1. Subcontracts for implementation of transformation measures (Headline: 4.Other)*

Name of the Contractor: Ltd. NEW GREENERING - "Akhali Gamtsvaneba" (Georgia)

6) Supply Contract for Supply of Fencing Materials in Armenia under the EU Financed Project (Date: 25/VI-2012)

Total Ammount: 47,250.00 € for LOT 1 (Supply of Fencing Materials)

Award procedure: Open Local[12]

Contractihg Organization: WWF- Armenia

Budget lines: *for Supply of Fencing Materials (LOT 1) - 3.5.3 Fencing materials (Headline: 3. Equipment and supplies)*

Name of the Contractor: "Magga" Production Cooperative (Republic of Armenia)

7) Contract for Installation of Fence in Armenia under the EU Financed Project (Date: 10/VII-2012)

Total Ammount: 16,950.00 € for LOT 2 (Installation of Fence)

Award procedure: Open Local[13]

Contractihg Organization: WWF-Armenia

Budget lines: *for Installation of Fence (LOT 2) - 6.1. Subcontracts for implementation of transformation measures (Headline: 4.Other)*

Name of the Contractor: "Aghavnatur" Limited Liability company (Republic of Armenia)

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[11] *Information on this tender is available from:*
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/?204238/Announcement-of-Tender-for-Supply-of-Fe
and
http://24saati.ge/index.php/tenders/view/12350

[12] *Information on this tender is available from:*
http://wwf.panda.org/who_we_are/wwf_offices/armenia/announcements/tenders/
and
http://awsassets.panda.org/downloads/announcement__tender.pdf

[13] *Information on this tender is available from:*
http://wwf.panda.org/who_we_are/wwf_offices/armenia/announcements/tenders/
and
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WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
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Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

8) Supply Contract for Supply of Fencing Materials and Installation of Fence in Azerbaijan under the EU Financed Project (Date: 11/VII-2012)

Total Ammount: 128,600.00 € / of which 75,600.00 € for LOT 1 (Supply of Fencing Materials) and 53,000.00 € for LOT 2 (Installation of Fence)

Award procedure: Open Local[14]

Contractihg Organization: WWF-Azerbaijan

Budget lines: *for Supply of Fencing Materials (LOT 1) - 3.5.3 Fencing materials (Headline: 3. Equipment and supplies) and for Installation of Fence (LOT 2) - 6.1. Subcontracts for implementation of transformation measures (Headline: 4.Other)*

Name of the Contractor: AVN GQ Ltd. (Azerbaijan Republic)

2.5. UPDATED ACTION PLAN

Please provide an updated action plan [15]

Updated action plan is due to the joint planning process with all organizations involved.

Updated action plan bellow is provided along with this narrative progress report for the next reporting period from July 20, 2012 to March 1, 2013.

Year 2 (July 20, 2012 – March 1, 2013)									
	Semester 1						*Semester 2*		
Activity	*Month 1 VII/12*	*2 VIII/12*	*3 IX/12*	*4 X/12*	*5 XI/12*	*6 XII/12*	*7 I/13*	*8 II/13*	*Implementing body*
1. Research and demonstration									
1.1.2. Conduct regional conference on forest resilience and transformation									
Preparation Activity 1 (Title: arrangements for logistics, preparation of workshop programme)									*WWF-Caucasus*

[14] *Information on this tender is available from:*

http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/publications/?204787/Announcement-of-Tender-for-Supply-of-Fencing-Materials-and-Installation-of-Fence-in-Azerbaijan-under-the-EU-Financed-Project (Second Announcement)
and
http://new.zerkalo.az/media/pdf/2012-04-17-3.pdf
and
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/?204240/Announcement-of-Tender-for-Supply-of-Fencing-Materials-and-Installation-of-Fence-in-Azerbaijan-under-the-EU-Financed-Project (First Announcement)

[15] This plan will cover the financial period between the interim report and the next report**.**

Execution Activity 1 (Title: conduct regional conference)									*WWF-Caucasus*
1.2.5. Implement the transformation measures in the selected stands									
Preparation Activity 1 (Title: arrangements for preparation of procurement documentation, announcement of tenders, contracting of sub-contractors to implement transformation measures)									*WWF-Caucasus WWF-Armenia WWF-Azerbaijan WWF-Germany*
Execution Activity 1 (Title: implementation of transformation measures)									*WWF-Caucasus WWF-Armenia WWF-Azerbaijan* Sub-contractors to implement the measures
3. Capacity building for forest administrations									
3.1.1. Training for local staff of forestry administrations									
Preparation Activity 2 (Title: arrangements for logistics, preparation of training modules)									*WWF-Caucasus WWF-Armenia WWF-Azerbaijan*
Execution Activity 2 (Title: conduct training)									*WWF-Caucasus WWF-Armenia WWF-Azerbaijan*
3.3.2. Study tour for senior ministry of environment and forest administration staff									
Preparation Activity 3 (Title: arrangements for contracting of sub-contractor)									*WWF-Germany*
Execution Activity 3 (Title: conduct the study tour)									*WWF-Germany Subcontractor to organize the Study Tour in Germany*
4. Local target groups									
4.1. Initial awareness raising workshops for local communities, NGOS, CBOs, local government									
Preparation Activity 4 (Title: arrangements for logistics and preparation of awareness raising materials)									*WWF-Caucasus WWF-Armenia WWF-Azerbaijan*

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Merab Aleksidze St. 11
0193 Tbilisi, Georgia
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Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
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Execution Activity 4 (Title: conduct initial awareness raising activities)									*WWF-Caucasus WWF-Armenia WWF-Azerbaijan*
4. 2. Participation of community members in implementing transformation measures									
Preparation Activity 5 (Title: negotiations with sub-contractors to involve community members in transformation works)									*WWF-Caucasus WWF-Armenia WWF-Azerbaijan*
Execution Activity 5 (Title: participation of community members)									*WWF-Caucasus WWF-Armenia WWF-Azerbaijan*
4 3. Mid-term workshop for local target groups									
Preparation Activity 6 (Title: arrangements for logistics, preparation of workshop materials)									*WWF-Caucasus WWF-Armenia WWF-Azerbaijan*
Execution Activity 6 (Title: conduct the workshops)									*WWF-Caucasus WWF-Armenia WWF-Azerbaijan*
Etc.									

3. PARTNERS AND OTHER CO-OPERATION

3.1. FORMAL PARTNERS

How do you assess the relationship between the formal partners of this Action (i.e. those partners which have signed a partnership statement)? Please provide specific information for each partner organisation.

WWF-Germany as leading organization is in charge overall of the project implementation and supervision and responsible for ensuring quality standards, compliance with procedures, and maintaining the project accounts. In addition, it is directly responsible for the preparation, management and implementation of the project activities with its partners and is not acting as an intermediary. WWF-Caucasus provides the project coordination at the regional level and directly implements the Georgia component of the Project. WWF-Armenia implements the Armenia component of the Project and WWF-Azerbaijan implements the Azerbaijan component of the Project.

Regional level project coordination meetings are planned every 6 months with the Regional Coordinator, International Advisor, Country Supervisors, and Country Coordinators. The International Project Leader from WWF-Germany is supposed to participate in one meeting

a year. Monthly phone conferences between all partners are held to review progress reports and to discuss and resolve problems. There are also weekly contacts between the Regional Coordinator and Country Coordinators, between the Country Supervisors and Country Coordinators.

Formal Local Partner 1 *- WWF-Caucasus : Project Partner in Georgia and Partner for Regional Actions*

- *Full legal name: WWF Caucasus Programme Office*
- *Nationality: registered in Georgia as branch of WWF-International (Switzerland) in 1994 under the name - WWF Georgia Project Office, re-registered under the current name as branch of WWF-International in 2003*
- *Legal status: non member-based branch of a foreign non-profitable organization in Georgia*
- *Governance: governed by representative (director) appointed by WWF-International*
- *EuropeAid ID number: GE-2009-GVP-0806306705*
- *www.panda.org/caucasus*

Cooperation of WWF-Caucasus (former WWF-Georgia) with WWF-Germany dates back to early 1990's. Since than number of forest conservation and forestry related projects have been implemented in close partnership with WWF-Germany.

Contractual partnership arrangements[16] were completed on April 11, 2011. However, contract with the partner has to be formally amended due to already modified regional project budget.
WWF-Caucasus acts as country project office for Georgia. At the same time project regional staff is stationed in WWF-Caucasus. Thus, WWF-Caucasus through the project regional staff is performing functions of regional coordination/guiding hub, though without formal contractual links with other formal local partners – WWF-Armenia and WWF-Azerbaijan which have established direct contractual arrangements with WWF-Germany.

Formal Local Partner 2 *- WWF-Armenia : Project Partner in Armenia*

- *Full legal name: WWF Armenian Branch*
- *Nationality: registered in Armenia as branch of WWF-International (Switzerland) in 2006*
- *Legal status: non member-based branch of a foreign non-profitable organization in Armenia*
- *Governance: governed by representative (director) appointed by WWF-International*
- *EuropeAid ID number: AM-2009-FDI-2505192407*
- *www.panda.org/armenia*

The WWF-Armenia has a very good record of cooperation with WWF-Germany under a nubmer of implemented and ongoing projects. E.g., the result of this fruitful cooperation in case of one of the forestry related projects on forest restoration (funded by the German Government) has been reflected in hundreds of hectares of restored forest areas and

[16] Grant Agreement of March 31/April 11 - 2011 between WWF-Germany and WWF Caucasus Programme Office for Implementation of the EU Financed Project (DCI ENV/2010/221391) "EU ENRTP Caucasus - Increasing the Resilience of Forest Ecosystems against Climate Change in the South Caucasus Countries through Forest Transformation" (imcluding its Attachement 1 - Primary Donor Agreement: *GRANT CONTRACT FOR EXTERNAL ACTIONS OF THE EUROPEAN UNION N0 DCI-ENV/2010/221391 OF DEC-17/28, 2010 between THE EUROPEAN UNION, REPRESENTED BY THE EUROPEAN COMMISSION and WWF-GERMANY - Including Addendums 1 and 2*).

significant contribution made to raising the level of rural employment as well as the level of public awareness in the field of climate change and its impacts on forest ecosystems.

Contractual partnership arrangements[17] were completed on April 11, 2011. However, contract with the partner has to be formally amended due to already modified regional project budget.

Proposed Formal Project Partner in Armenia- ATP

- *Full legal name: Armenia Tree Project Charitable Foundation*
- *Nationality: Registered in Armenia as local/national NGO in 1994*
- *Legal status: non-profitable national organization*
- *Governance: governed by elected board*
- *EuropeAid ID number: AM-2009-FBG-0406281843*
- *www.aremeniatree.org*

Under the project proposal ATP (along with WWF-Armenia) was proposed as project partner in Armenia. It had a positive experience in cooperating with WWF-Germany as well as with WWF-Armenia. In 2010-11 ATP underwent structural reorganization and its previous management has been changed. Due to the above circumstances partnership agreement has not been signed with ATP – given that ATPs role was not fully clear under the project proposal. Nevertheless, there is a still plan to involve the ATP (as associate) in implementation of community awareness raising events in Armenia.

Formal Local Partner 3 *- WWF-Azerbaijan : Project Partner in Azerbaijan*

- *Full legal name: Branch Office of the WWF in the Azerbaijan Republic*
- *Nationality: registered in Azerbaijan as branch of WWF-International (Switzerland) in 2006*
- *Legal status: non member-based branch of a foreign non-profitable organization in Azerbaijan*
- *Governance: governed by representative (head) appointed by WWF-International*
- *EuropeAid ID number: AZ-2009-FUT-2705213985*
- *www.panda.org/caucasus*

The WWF-Azerbaijan has positive experience in cooperation with WWF-Germany under a number of recently implemented projects (*e.g., German GAA funded regional project on forest restoration etc*).

Contractual partnership arrangements[18] were completed on April 11, 2011. However, contract with the partner has to be formally amended due to already modified regional project budget.

[17] Grant Agreement of March 31/May 05 - 2011 between WWF-Germany and WWF-World Wide Fund for Nature Armenian Branch for Implementation of the EU Financed Project (DCI ENV/2010/221391) "EU ENRTP Caucasus - Increasing the Resilience of Forest Ecosystems against Climate Change in the South Caucasus Countries through Forest Transformation" (imcluding its Attachement 1 - Primary Donor Agreement: *GRANT CONTRACT FOR EXTERNAL ACTIONS OF THE EUROPEAN UNION N0 DCI-ENV/2010/221391 OF DEC-17/28, 2010 between THE EUROPEAN UNION, REPRESENTED BY THE EUROPEAN COMMISSION and WWF-GERMANY - Including Addendums 1 and 2*).

[18] Grant Agreement of March 31/April 14 - 2011 between WWF-Germany and Branch Office of the WWF - World Wide Fund for Nature in the Azerbaijan Republic for Implementation of the EU Financed Project (DCI ENV/2010/221391) "EU

Country-specific information not referred to above – Armenia

There are good working relations between WWF-Armenia and all the formal project partners. As a national implementer, WWF Armenia is in regular contact with WWF-Caucasus and WWF-Germany to provide information on the status and progress of activities, relevant developments in the country and other issues, as well as get guidance and support on various raising issues. There is smooth communications between all engaged staff and atmosphere of mutual support and understanding.

No Country-specific information not referred to above – Azerbaijan

No Country-specific information not referred to above – Georgia

3.2. STATE AUTHORITIES

How would you assess the relationship between your organisation and State authorities in the Action countries? How has this relationship affected the Action?

On a whole, by the end of the reporting period the project has established close cooperation with all corresponding government agencies represented by relevant responsible officials.

The main governmental stakeholders (state authorities) of the project in the South Caucasus region are ministries of natural resources and environment and forestry administrations. Namely:

In Armenia

Ministry of Agriculture of the Republic of Armenia

State Non-Commercial Organization "Hayantar" (*ArmenForest*) of the Ministry of Agriculture of the Republic of Armenia

Noyemberyan State Forest Enterprise under the management of the "Hayantar"

Gugarq State Forest Enterprise under the management of the "Hayantar"

In Azerbaijan

Ministry of Ecology and Natural Resources of the Azerbaijan Republic

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office@wwfcaucasus.az
www.panda.org/caucasus

Shamakhi Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic

Yevlakh Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic

In Georgia

Ministry of Energy and Natural Resources of Georgia

Natural Resources Agency of the Ministry of Energy and Natural Resources of Georgia

Shida Kartli Service of the Natural Resources Agency of the Ministry of Energy and Natural Resources of Georgia

Tbilisi Municipality

Tbilisi City Mayor's Hall

Environmental and Green Areas Municipal Service under the Tbilisi City Mayor's Hall

WWF-Armenia and WWF-Azerbaijan have excellent and long standing relationships respectively with the Ministry of Agriculture of the Republic of Armenia and the Ministry of Ecology and Natural Resources of the Azerbaijan Republic.

In Georgia, under the structural changes of March, 2011 in government of Georgia the number of functions and responsibilities of Ministry of Environmental Protection and Natural Resources had been distributed among several institutions. The newly created Ministry of Energy and Natural Resources, appears to be the major successor to the Ministry of Energy, former Ministry of the Ministry of Environment Protection and Natural Resources and the Ministry of Economy and Sustainable Development in he field of natural resources management (*including all aspects of forest management*). It is subordinating the new legal entity of public law – Agency of Natural Resources (created based on structures of the former Forestry Agency and National Agency of Oil and Gas).

Therefore, almost all functions related to management of natural resources (minerals, water, fauna objects (hunting, fishing, forest, nontimber resources), including setting of quotas and terms of using, repairing of license/ lease objects, selling of licenses, controlling of licenses, eradicating illegal use is concentrated in hands of the current Ministry of Energy and Natural Resources. As a result of the above reform, the Ministry of Environment Protection and Natural Resources was reorganized in March, 2011 as the Ministry of Environment Protection. As it was mentioned with this reorganization rights and responsibilities related to natural resources management were transferred to the newly established Ministry of Energy and Natural Resources. However, roughly symbolic responsibilities concerning biodiversity protection and monitoring were left under the umbrella of the Ministry of Environment Protection.

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

The above institutional reform significantly reduced the regulator authority of the reorganized Ministry of Environment Protection and made biodiversity management system rather unclear.

The above institutional changes caused difficulties in establishing of a dialogue between WWF-Caucasus and the Ministry of Energy and Natural Resources and its Natural Resources Agency. Finally, by the end of 2011 minister Mr.Alexander Khetaguri (*who, in parallel, performs functions as head of Natural Resources Agency*) agreed[19] to cooperate and signed the Memorandum of Understanding with WWF-Caucasus.

Country-specific information not referred to above – Armenia

There is good partnership between WWF Armenia and "Hayantar" SNCO (state forest authority), which is partly the result of previous several-year successful cooperation within the frame of other projects implemented by WWF Armenia.

The smooth implementation of project activities significantly depends on continuous good working relations with the state forest authority, which should be maintained during the whole period of project implementation as well as afterwards. So far "Hayantar" SNCO provided all kinds of needed support and assistance in relevant activities, including visits to potential pilot sites, meetings with the staff in the Head office and branches (FE), provision of necessary information (maps, schemes, etc.) and others.

Country-specific information not referred to above – Azerbaijan

WWF-Azerbaijan's partner during the project implementation is the Ministry of Ecology and Natural Resources of AR. All forests in Azerbaijan are managed by the ministry, close cooperation with which ensures the sustainability of the project. From the very beginning it was established a fruitful cooperation with the ministry which was officially approved by the Memorandum of Understanding in 2004 signed by the Minister and WWF-Inernational. Under the umbrella of this Memorandum of Understanding 2 new agreements have been signed with the local forestry authorities for implementation of the project.

No Country-specific information not referred to above – Georgia

3.3. OTHER PARTNERSHIPS AND COOPERATION

Where applicable, describe your relationship with any other organisations involved in implementing the Action:

[19] See for more details : Regional Team for EU ENRTP Caucasus Project Hails Decision by Governmental Agency to Cooperate in the Field of Increasing the Resilience of Forest Ecosystems in Georgia (Posted on 16 January, 2012). http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/?203275/Regional-Team-for-EU-ENRTP-Caucasus-Project-Hails-Decision-by-Governmental-Agency-to-Cooperate-in-the-Field-of-Increasing-the-Resilience-of-Forest-Ecosystems-in-Georgia

- *Associate(s) (if any)*
- *Sub-contractor(s) (if any)*
- *Final Beneficiaries and Target groups*
- *Other third parties involved (including other donors, other government agencies or local government units, NGOs, etc)*

No other partnerships and cooperation had been arranged for the reporting period (*March 1, 2011-March 1, 2012*) at international, regional and/or local levels.

However, based on recommendations from *ROM Monitoring Mission*[20] which had been carried out for the Project in 23-27 January, 2012 iat the WWF-Caucasus, it was decided by the project regional team to recommend to the project partners creation of Country Steering Committees in all 3 target countries not later than by the end of the first half of 2012.

No Country-specific information not referred to above – Armenia

There was close cooperation with the Subcontractor for Preparation of Forest Transormation plans during the whole period of implementation, from field to deskwork, resulting in the quick and operative solutions of the issues raised and outputs delivered within the deadline set for the implementation of the task.

The cooperation with the Subcontractor for supply of fencing materials also run smoothly, which allowed proper coordination of contract award and commencing installation of fences in due time.

Following the recommendations from ROM monitoring report, the Project initiated establishment of Project Steering Committee. The Terms of Reference was drafted (see in Annex 27 - Steering Committee) for further improvement and approval. The Committee is estimated to be finally established in the second half of 2012.

No Country-specific information not referred to above – Azerbaijan

No Country-specific information not referred to above – Georgia

3.4. SYNERGIES WITH OTHER ACTIONS

Where applicable, outline any links and synergies you have developed with other actions.

[20] ROM had been held by the Consortium led by IBM Belgium chargeded by the European Commission Services with the Results Oriented Monitoring system of the Implementation of Projects and Programmes of external aid financed by the European Union (Lot 1 - European Neighbourhood and Partnership Instrument (ENPI). The main objective of the Monitoring System was to gather results-oriented information on projects in the field and to report on progresses in order to maintain and where possible improve the quality of external cooperation activities through timely, independent, well-targeted information on projects implementation. The main criteria to be addressed were Relevance and Quality of design, Efficiency of implementation to date, Effectiveness to date, Impact to date, Potential sustainability, with particular attention on horizontal and cross-cutting issues.

In January-February of 2012 there had been series of meetings and exchanges arranged with the two ongoing EU financed regional projects dealing with the climate change and biodiversity issues in the South Caucasus countries.

It has to be mentioned that the above projects are financed by EU under the Thematic Programme for Environment and Sustainable Management of Natural Resources, including Energy (ENRTP) / *Lot 10: Biodiversity and Climate Change in ENPI countries (ENRTP Priority 2)*/.

The meetings were held with the Mercy Corps Mercy Corps, Caucasus Environmental NGO Network (CENN) and Caucasus Regional Environmental Center (REC-Caucasus) responsible for the management of the following projects:

- Enhancing local capacity and regional cooperation for climate change adaptation and biodiversity conservation in Georgia and the South Caucasus (*EuropeAid/128320/C/ACT/Multi)*[21]
- Identification and implementation of adaptation response to Climate Change impact for Conservation and Sustainable use of agro-biodiversity in arid and semi-arid ecosystems of South Caucasus (*EuropeAid/128320/C/ACT/Multi*)[22]

Results:

As a first stage for cooperation it was decided to arrange for regular joint meetings on information and experience exchange and to develop probable formal mechanisms for further cooperation – given that the Project[23] run by Mercy Corps and CENN has some potential to be coincided with one of the FPL's location in Armenia.

[21] The overall objective of this project is to build the capacity of local authorities, improve communities' capacity and enhance regional bilateral cooperation, to understand and to cope with the environmental, social and economic impacts of climate change in the South Caucasus.The project is supposed to increase local capacity and regional cooperation for the identification and mitigation of risks likely to be exacerbated by climate change, through the lens of Disaster Risk Reduction (DRR), Climate Change Adaptation (CCA) and biodiversity conservation. The program will strengthen local and regional capacity through the development and implementation of the municipal and regional trans-boundary CCA plans for the two designated eco zones and community based CCA pilot projects. Strengthening the knowledge and skills base of local communities will play a critical role in the mitigation of risks to their livelihoods. The program will also enable local authorities to engage with national government and regional initiatives as well as help prepare the ground for, and facilitate, any future government or donor based initiatives at the municipal level. Regional level cooperation will be improved and better informed by input from the local level thereby building a foundation for the increased protection of livelihoods, local biodiversity and ecosystems.

[22] The overall objective of the project is to build adaptive capacities in three South Caucasus countries to ensure resilience of agro-biodiversity of especially vulnerable arid and semi-arid ecosystems and local livelihoods to climate change. Three specific objectives are envisaged: - to promote agro-biodiversity conservation and adaptation to Climate change through introduction of supportive policy framework at national and local level; - to improve institutional and individual capacity for sustaining agro-biodiversity in arid and semi-arid ecosystems and increasing livelihood level in face of climate change; - to support in development and implementation of coping mechanisms to improve resilience of local communities to future climate change through introduction of sustainable agricultural practices in selected regions.

[23] The project targets the following Regions:
- Samtskhe-Javakheti, Kvemo Kartli and Kakheti (Georgia).
- Lori-Marz (Armenia)
- Agsafa, Tovus, Shamkir and Samukh Rayons (Azerbaijan)

The REC's project (*Identification and implementation of adaptation response to Climate Change*) already involved WWF-Caucasus representative (Conservation Director) in its National Steering Project Committee for Georgia.

No Country-specific information not referred to above – Armenia

No Country-specific information not referred to above – Azerbaijan

No Country-specific information not referred to above – Georgia

3.5. PREVIOUS EU GRANTS IN VIEW OF STRENGTHENING THE SAME TARGET GROUPS

If your organisation has received previous EU grants in view of strengthening the same target group, in how far has this Action been able to build upon/complement the previous one(s)? (List all previous relevant EU grants).

No previous EU grants received in view of strengthening the same target groups except that of in Armenia (*see bellow Country-specific information not referred to above on Armenia*).

Country-specific information not referred to above – Armenia

At present WWF Armenia is one of the Implementing Organizations of the EU financed regional ENPI-FLEG project (will be finalized in June 2012) in Armenia with a component of alternative livelihood activity in Koghb community, which is adjacent to Noyemberyan pilot site. The activities being implemented within ENPI-FLEG project includes development of ecotourism and fruit-berries collection point in the community. The same target community will be strengthened by the current EU project.

No Country-specific information not referred to above – Azerbaijan

No Country-specific information not referred to above – Georgia

4. VISIBILITY

How is the visibility of the EU contribution being ensured in the Action?

In line with requirements of "*General Conditions applicable to European Community-financed grant contracts for external actions*", Article 6 Visibility, the Beneficiary and its partners undertook all mandatory actions for ensuring visibility of EU financial contribution for the Action.

As a first step, shortly after the start of the project, project template documents were created by the regional team – templates for project deliverables, reports, presentations etc. Two versions of templates were created for all 4 organizations (including WWF-Germany) involved: in English and bilingual (*English-Russian as intermediate language tool for the South Caucasus*). English-Russian version later on was adopted into bilingual English-National-Language versions for 3 South Caucasus countries – thus, ensuring better understanding of the project title and its funding source.

All presentations and handouts had European Union logo and textual statement about financial support from the European Union. All presentations made during reporting period specified that the Action had received EU funding.

The Project Web-page

In the second half of July, 2011 the web-page for the Project had been launched.

The project's regional team stationed in WWF-Caucasus created and is maintaining the web-page which is available from www.panda.org/caucasus (in English).

In future it is planned to create the project web-page at www.wwf.de (in German and English) as well.

In parallel, the project is also covered under WWF-Armenia's following web-pages:

www.panda.org/armenia (in English) and armenia.panda.org (in Armenian).

The main purpose of the project web-page is to accumulate all project related information from different sources and make it available for wide range of stakeholders. It will facilitate necessary information obtaining in all offices, countries and locations of the project.

The project web-page contains following folders/links: project overview, news and publications, tenders and announcements, contacts. Namely:

- for ***general project data***:

http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/projects/eu_enrtp_caucasus/

- for the ***project news and publications***:

http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/projects/eu_enrtp_caucasus/news_publications_/

- for the ***tenders and announcements***:

http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/projects/eu_enrtp_caucasus/tenders_announcements_/

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

- for the project ***contacts and organizational setup***:

http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/projects/eu_enrtp_caucasus/contacts/

There can be also found the links to EC Thematic Programme on Environment and Sustainable Management of Natural Resources including Energy (ENRTP), European Neighbourhood and Partnership Instrument (ENPI), European Neighbourhood Policy (ENP) and useful working tools for the project implementation (e.g, Practical Guide to contract procedures for EU external actions /PRAG/, Communication and Visibility Manual for EU ExternalActionsetc).

News and publications option is updated on regular basis, covering, inter alia, successful stories of the project activities and achievements.

The Project Leaflets

Project leaflets in English, Azerbaijanian and Georgian Languages, as well as other publications are from the following web-page:

http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/publications/?205870/New-Publications-Prepared-in-the-framework-of-EU-Financed-Project-on-resilience-of-forest-ecosystems-against-climate-change

See also the project leaflets in the attached annexes bellow:

- *Annex 22. Project Leaflet in English*
- *Annex 23. Project Leaflet in Armenian*
- *Annex 24. Project Leaflet in Azerbaijanian*
- *Annex 25. Project Leaflet in Georgian*

Country-specific information not referred to above – Armenia (*including the period of March-April, 2012*)

Activities planned in order to ensure the visibility of the action and the EC funding:

- A leaflet was prepared in Armenian language to explain the objectives, expected results, and activities of the Project; it is meant to be distributed at visibility events with various audiences, including media representatives. The design and content of the leaflet was prepared in accordance with the guidelines in the EC Communication and Visibility Manual and agreed with the EU Representation in Yerevan.The PDF file of the leaflet is attached to current report as *Annex 23. Project Leaflet* , as well as is available on WWF-Armenia web page at:

http://wwf.panda.org/who_we_are/wwf_offices/armenia/newsroom/?204729/EU-financed-regional-project-leaflet

- *Events for high-level officials: see 3.3.1 above, EU Delegation in Armenia was invited for the event.*
- *Regular ongoing communication of the action on the web-page and by e-letter: the project activities and events are publicised through uploading respective information on WWF-Armenia web-site (*http://wwf.panda.org/armenia/newsroom/).

Other communications activities:

- Meeting with the EU Delegation in Armenia

On 19 September 2011 the national coordinator had a meeting with the EU Delegation International Aid/Cooperation Officer Mrs.Ina Iankulova to inform about the project, its aims and objectives, activities, timeframe, stakeholders and other related issues.

It was suggested by the EU Delegation that they are informed in advance about any communications event, planned for the project so that consider their participation. It was also recommended that the events are communicated through preparation and dissemination of press releases and other similar tools to ensure visibility for the project and the donor.

It was agreed that the project (namely WWF Armenia communications officer and national coordinator) should keep in touch with the EU Delegation and inform about the developments and communications events.

Europe Day Preparations

The Project national coordinator and communications officer participated in the meeting with the EU Delegation on 19 March, and later on 7 May, 2012, to discuss details of the upcoming Europe Day celebration. The meetings were attended by the representatives of other EU funded projects in Armenia.

Communications plan and visibility events plan

The EU Delegation in Armenia requested to develop and submit the Communication and Visibility Plan and Schedule of public events for the project and for the period 1 July 2012 - 1 January 2013, which were prepared and submitted in due time (*Annex 26. Project Communication Plan - Armenia*).

Meetings with the EU Delegation in Armenia

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and the donor. It was agreed that the project (namely WWF-Armenia communications officer and national coordinator) should keep in touch with the EU Delegation and inform about the developments and communications events.

– The Project team, namely Mr. Aurel Heidelberg, International Project Leader, Mr. Hannes Neuner, Regional Forestry Advisor and Ms. Nelli Sargsyan, Project National Coordinator, had a meeting with the EU Delegation International Aid/Cooperation Officer Mrs.Ina Iankulova on July 4, 2012. The overall achievements of the project on the regional and national levels were presented and discussed along with the activities planned for the coming months. Special emphasis was given to ensuring the visibility of EU financing of the Project. It was agreed that the project national coordinator will keep regular contact with the EU Delegation and inform about the developments and communication events.

No Country-specific information not referred to above – Azerbaijan

No Country-specific information not referred to above – Georgia

The European Commission may wish to publicise the results of Actions. Do you have any objection to this report being published on the EuropeAid website? If so, please state your objections here.

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Name of the contact person for the Action: ……

Signature: ……

Location: ……

Date report due: ……..……

Date report sent: …….

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

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Annex 9. Agreement between WWF and Shamakhi Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic

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Annex 16. Report of Research on Resilience of Forest Stands

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
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office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Annex 17. Desk-based Study on Resilience of Forest Stands : Publication

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Annex 28. Technical Specification for the Organization and Implementation of the Study Tour for Senior Officials of Relevant Organizations in the Target Countries

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Annex 1. Workshop Report : WWF Inception Workshop (Initial Project Planning Workshop) - 23-24 March, 2011 – Tbilisi, Georgia

Workshop Document

WWF Inception Workshop

(*Initial Project Planning Workshop*)

Initial Project Planning Workshop within a Framework of EU Financed Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation

(23-24 March, 2011 – Tbilisi, Georgia)

Workshop Report

The workshop documents are the sole responsibility of the Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation and can in no way be taken to reflect the views of the European Union

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
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Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

WWF Inception Workshop

Initial Project Planning Workshop within a Framework of EU Financed Project

23-24 March, 2011 - Tbilisi, Georgia

WWF Caucasus Conference Hall

1. Summary

This workshop is being organized within the framework of recently started (March, 2011) EU supported Project on Increasing the resilience of forest ecosystems against climate change in the South Caucasus Countries (Georgia, Armenia, Azerbaijan) through forest transformation.

The overall objective of the project is to increase the resilience of forest ecosystems in the Southern Caucasus against climate change impacts and to improve biodiversity and livelihoods of local populations. The overall objective addresses the overarching threat of climate change to biodiversity and to forest ecosystem services which support the livelihoods of rural communities. Those services include protection of soils and water supply and quality, and timber and non-timber forest products. Objectively Verifiable Indicator (OVI) for the overall objective is that: by 2015 (two years after the proposed action's completion), the governments of Georgia, Armenia and Azerbaijan will have adopted and started to implement policies that will make forests and the services they provide highly resilient to climate change.

The specific objective of the project contributes to the overall objective by establishing the necessary conditions for the forest administrations in the target countries to develop and implement strategies for transforming monoculture forest stands into highly resilient, "close to nature" forest stands. It is proposed to do this through awareness rising about climate change impacts on forests, demonstrating practical measures to make forests more resilient, and providing forest administration staff and local community members, local NGOs, and CBOs who use or manage forests with the necessary knowledge and skills to transfer the development and implementation of transformation measures to other forest stands.

To achieve the specific objective, the following OVIs are proposed by the end of the project:

- forest stand structure has been transformed in such a way that they will be highly resilient to climate change on pilot sites;

- forest stand potential to enhance the livelihoods of neighbouring communities will have increased on 6 pilot sites (two in each of the three target countries and about 75 hectares each) in 3 countries; and

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

- the chief executives and heads of the policy and planning departments of forest administrations and heads of relevant departments in the forest administrations show a demonstrable increase in their awareness of climate change impacts on forests and motivation to develop strategies for making forests more resilient.

Expected results of the project are:

Result 1 - Selected forest stands vulnerable to climate change have been transformed into highly resilient "close to nature" forest stands;

Result 2 - Silvicultural guidelines for the transformation of monoculture stands into more resilient stands are elaborated, published in three languages and made available for relevant officials and experts;

Result 3 - The capacities of forest administration experts to develop silvicultural strategies to transform monoculture stands into stable, site-adapted forests are increased;

Result 4 - The awareness of local communities about the importance of forest rehabilitation with regard to mitigating negative biotic and abiotic impacts2 of climate change is improved.

The workshop is arranged and facilitated by WWF Caucasus Programme Office (WWF Caucasus) in partnership with the project leading organization - WWF-Germany. WWF Caucasus plays a role of the project regional office (for the South Caucasus) and the project Georgian country office.

2. Objectives of the workshop

The main objective of the workshop is to:

(a) review and confirm the activity schedule and assignment of tasks and resources;

(b) communicate procurement, record keeping and accounting procedures;

(c) develop draft criteria for selecting the pilot sites for further discussion and confirmation at national levels.

3. Outputs

Project activity schedule and assignment of tasks and resources reviewed and confirmed.

Contractual arrangements communicated.

Procurement, record keeping and accounting procedures communicated and explained.

Draft regional selection criteria for selecting the sites at which transformation measures will be piloted discussed and agreed.

Further next steps for project implementation discussed and agreed.

4. Participants

The workshop targets WWF staff involved in the project (see list of participants).

5. Contacts:

PROJECT HEAD OFFICE IN GERMANY : WWF-GERMANY

Aurel Heidelberg -International Project Leader, EU ENRTP Caucasus Project
(Permanent Position: Caucasus Programme Officer, WWF-Germany)
WWF-Germany
14 Reinhardtstraße, Berlin 10117, Germany
Fax: +49 (0)30311777 199
Tel.: +49 (0)30-311777-274
aurel.heidelberg@wwf.de

REGIONAL OFFICE IN THE SOUTH CAUCASUS : WWF CAUCASUS

Malkhaz Dzneladze - Regional Coordinator of the Project
WWF Caucasus
Merab Aleksidze Str.11, 0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237- 500 ext.118 Fax: + (995 32) 2-237-501
Mob.: + (995 99) 108 958
Email : mdzneladze@wwfcaucasus.ge
http://www.panda.org/caucasus

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

WWF Inception Workshop

Initial Project Planning Workshop within a Framework of EU Financed Project

23-24 March, 2011 - Tbilisi, Georgia

WWF Caucasus Conference Hall

Workshop Agenda

Day 1		
9.00	**Opening** • Welcoming and opening remarks • Workshop agenda	Aurel Heidelberg Group
9.30	**Introduction to the Project**	Aurel Heidelberg /Malkhaz Dzneladze
10.15	**Budget** • Explanation of the Budget • Procurements • Discussion of budget • Approval of budget	Aurel Heidelberg Group
11.15	**Project phases, project components and main activities Implementation schedule**	Malkhaz Dzneladze Group
12.00	**Contractual arrangements** • Discussion • Final agreement • Signature of contracts	Aurel Heidelberg Group
13.00	Lunch Break	
14.00	**Clarify roles, structure and communication** • Organogram • Key positions (Procurement Assistant, ….) • Role of ATP • Involvement of communities and NGOs • Visibility • Time schedule	Aurel Heidelberg /Malkhaz Dzneladze

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

16:00	**Financial reporting**	Benno Jaccobs Group
18:00	**Results of the first day**	Aurel Heidelberg /Malkhaz Dzneladze
Day 2		
9.30	**Verification documents** • Travel sheets (petrol etc) • Time sheets • Audit • TORs	Malkhaz Dzneladze Group
11.00	**Introduction technical steps** • Regional site selection criteria	Hannes Neunner Group
13.00	Lunch	
14.00	**Remarks to Project design** • Georgia site selection (only Tbilisi City Hall?) • Planting works already in autumn 2011 • 2 drilling machines per country	Group
15.00	**Other issues with regard to implementation in Armenia and Azerbaijan**	Group
16.00	**Questions, final remarks and next steps**	Aurel Heidelberg /Malkhaz Dzneladze/ Benno Jaccobs/ Hannes Neunner Group
18.00	**Closure**	

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
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List of Participants

WWF-Germany
14 Reinhardtstraße
Berlin 10117
Germany
Fax: +49 (0)30311777 199
Tel.: +49 (0)30-311777-274

Aurel Heidelberg, Mr
International Project Leader, EU ENRTP Caucasus Project
(Permanent Position: Caucasus Programme Officer, WWF-Germany)
aurel.heidelberg@wwf.de

Benno Jacobs, Mr
Project Financial Manager/Administrator, EU ENRTP Caucasus Project
(Permanent Position: Financial Officer, WWF-Germany)
benno.jacobs@wwf.de

WWF-Caucasus
11, M. Aleksidze Str.
Tbilisi 0193
Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501

Giorgi Sanadiradze, Mr
Project Manager in Georgia, EU ENRTP Caucasus Project
(Permanent Position: Director, WWF-Caucasus)
gsanadiradze@wwfcaucasus.ge

Lily Kiknadze, Mrs
Project Administrator in Georgia, EU ENRTP Caucasus Project
(Permanent Position: Finance-Admin. Manager, WWF-Caucasus)
lkiknadze@wwfcaucasus.ge

Tamaz Gamkrelidze,Mr
Communication Manager in Georgia, EU ENRTP Caucasus Project
(Permanent Position: Communications Officer, WWF-Caucasus)
tgamkrelidze@wwfcaucasus.ge

This project is funded by the EU

This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

WWF-Armenia
11 Proshyan, Str.
Yerevan 0019
Armenia
Tel/Fax: +374 (10) 58 89 83 / 54 61 56

Karen Manvelyan, Mr
Project Manager in Armenia, EU ENRTP Caucasus Project
(Permanent Position: Director, WWF-Armenia)
kmanvelyan@wwfcaucasus.am

Narine Mirakyan, Ms
Project Administrator in Armenia, EU ENRTP Caucasus Project
(Permanent Position: Accountant / since Jan-01, 2012 Finance-Admin. Manager, WWF-Armenia)
nmirakyan@wwfcaucasus.am

Arthur Alaverdyan, Mr
Armenia Country Coordinator, EU ENRTP Caucasus Project (*from March-01, 2011 to July-01, 2011*)
(Staff assigned to the project)
sgalstyan@wwfcaucasus.am

WWF-Azerbaijan
M.Mushfig Str., Blok 501, 2K
Baku AZ1073
Azerbaijan
Tel/Fax: +994 12 5385316

Elshad Askerov, Mr
Project Manager in Azerbaijan, EU ENRTP Caucasus Project
(Permanent Position: Head, WWF-Azerbaijan)
easkerov@wwfcaucasus.az

Nargiz Abdulova, Ms
Project Administrator in Azerbaijan, EU ENRTP Caucasus Project
(Permanent Position: Accountant / since Jan-01, 2012 Finance-Admin. Manager, WWF-Azerbaijan)
nabdulova@wwfcaucasus.az

Regional Project staff stationed in WWF-Caucasus
11, M. Aleksidze Str.
Tbilisi 0193
Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501

Hannes Neuner, Mr
International Project Advisor, EU ENRTP Caucasus Project
(Permanent Position: Senior Forest Officer, WWF-Caucasus)
hneuner@wwfcaucasus.ge

Giorgi Beruchashvili, Mr
Regional GIS Specialist, EU ENRTP Caucasus Project
(Permanent Position: GIS Officer, WWF-Caucasus)
gberuchashvili@wwfcaucasus.ge

Sofia Mgeladze, Mrs
Regional Assistant, EU ENRTP Caucasus Project
(Staff assigned to the project)
smgeladze@wwfcaucasus.ge

This project is funded by the EU

This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Malkhaz Dzneladze, Mr
Regional Coordinator, EU ENRTP Caucasus Project
(Staff assigned to the project)
mdzneladze@wwfcaucasus.ge

Other Project related WWF-Caucasus staff
11, M. Aleksidze Str.
Tbilisi 0193
Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501

Nugzar Zazanashvili, Mr
Conservation Director, WWF-Caucasus
nmeskhoradze@wwfcaucasus.ge

Nana Meskhoradze, Mrs
Administration & HR Manager, WWF-Caucasus
nmeskhoradze@wwfcaucasus.ge

Ia Shubladze, Ms
Accountant, WWF-Caucasus
ishubladze @wwfcaucasus.ge

Ilia Osepashvili
FLEGT Project Coordinator for WWF-Caucasus
(Permanent Position: Forest Officer, WWF-Caucasus)
iosepashvili@wwfcaucasus.ge

This project is funded by the EU

This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

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Workshop Photos



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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Annex 2. Site Selection Criteria

Table of Site Selection Criteria

1) Nature conservation criteria
a) Biodiversity indicators occurrence of endemic and/or endangered species
b) Importance to connect fragmentized habitats (eco-corridor)
2) Silvicultural/Ecological criteria
a) Canopy cover*
b) Dimension of the forest stand (average height and diameter)
c) Soil and nutrient situation
d) Hydrological situation*
e) Capacity of natural regeneration
f) Availability of site adapted planting material
g) Protective function of forest stand i) Flood water protection ii) Water protection zone iii) Erosion Protection
h) Risk factors i) Grazing ii) Fire
3) **Legal criteria**
a) Land tenure
b) Status of forest land
c) Legal restrictions for forest transformation measures*

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

4) **Social- economic criteria**	
a) Support and interest of local population and local government	
b) Possibilities of involvement of local population in work process	
c) Distance to villages	
d) Importance for recreation and environmental education	
5) Others	
a) Sustainability of the action i) Commitment of landowner ii) Capacity of land owner iii) Possibility of follow-up financing	
b) Visibility	

Explanatory notes to site selection criteria for forest transformation:

*Canopy cover: Canopy cover is the foliar cover in a forest stand consisting of one or several layers. It is measured in percentage of full cover. For example a canopy cover more than 30 % would make difficult survival capacity of oak seedlings due to their light requirements.
*Hydrological situation: The Hydrological situation of the site is decisive for the success of seeding or planting. For example extreme dry situations due to exposition or lack of water supply could make impossible survival of plants.
*Legal restrictions for forest transformation measures: For example transformation of forest stands could make necessary felling for opening up of canopy. Possibly measures like this are not covered by national forest legislation.

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Annex 3. Summary Table for Selected Forest Pilot Sites in the South Caucasus Countries

Summary Table for Selected Forest Pilot Sites in the South Caucasus Countries

Country	Name of Pilot Site	Land Tenure Status	Owner	Location	Size
Armenia					
Armenia	1. Koghb FPS (*MoU signed on 29.12.2011*) http://awsassets.panda.org/downloads/memorandum_of_understanding_dec_29_2011.pdf (*MoU amendment 02.05.2011*) http://awsassets.panda.org/downloads/addendum_to_memorandum_of_understanding_may_2_2012_pdf.pdf	*State Forest Land*	Ministry of Agriculture ⇓ State Organization "Hayantar" (*ArmenForest*) ⇓ Noyemberyan State Forest Enterprise	Tavush Region	78 ha
Armenia	2. Spitak FPS (*MoU signed on 29.12.2011*) http://awsassets.panda.org/downloads/memorandum_of_understanding_dec_29_2011.pdf (*MoU amendment 02.05.2011*) http://awsassets.panda.org/downloads/addendum_to_memorandum_of_understanding_may_2_2012_pdf.pdf	*State Forest Land*	Ministry of Agriculture ⇓ State Organization "Hayantar" (*ArmenForest*) ⇓ Gugarq State Forest Enterprise	Lori Region	72 ha
TOTAL for ARMENIA					150 ha

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Azerbaijan					
Azerbaijan	1. Agsu FPS (*MoU of 20.12.2011*) http://awsassets.panda.org/downloads/mou_shamakhi.pdf	*State Forest Land*	Ministry of Ecology and Natural Resources ⇓ Shamakhi Forest Protection and Restoration Enterprise	Shamakhi District	75 ha
Azerbaijan	2. Yevlakh FPS (*MoU of 20.12.2011*) http://awsassets.panda.org/downloads/mou_yevlakh.pdf	*State Forest Land*	Ministry of Ecology and Natural Resources ⇓ Yevlakh Forest Protection and Restoration Enterprise	Yevlakh District	75 ha
TOTAL for AZERBAIJAN					150 ha
Georgia					
Georgia	1. Tsavkisi FPS (MoU of 11.08.2011) http://awsassets.panda.org/downloads/mou_geo_site_01_tsavkisi.pdf	*Municipal Forest Land*	Tbilisi City Mayor's Hall ⇓ Environmental and Green Areas Municipal Service	Municipality of Tbilisi	75 ha
Georgia	2. Khashuri FPS (*MoU of 21.12.2011*) http://awsassets.panda.org/downloads/mou_geo_site_khashuri.pdf	*State Forest Land*	Ministry of Energy and Natural Resources ⇓ Natural Resources Agency	Khashuri Municipality	79.9 ha

This project is funded by the EU

This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

TOTAL for GEORGIA					154.9 ha
Grand TOTAL for the South Caucasus					**454.9 ha**

This project is funded by the EU

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WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
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Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Annex 4. Memorandum of Understanding between WWF and Tbilisi Mayor City Hall of the Municipality of Tbilisi, Georgia

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

კლიმატის ცვლილების პირობებში ტყის ეკოსისტემების მდგრადობის ამაღლება სამხრეთ კავკასიის ქვეყნებში

EU FINANCED PROJECT UNDER THE THEMATIC PROGRAMME ON ENVIRONMENT AND SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES, INCLUDING ENERGY

ევროკავშირის თემატური პროგრამის „გარემოს დაცვა და ბუნებრივი რესურსების მდგრადი გამოყენება – ენერგეტიკის საკითხების ჩათვლით" ფარგლებში დაფინანსებული პროექტი

EuropeAid/128320/C/ACT/Multi External Actions of the European Union No. DCI-ENV/2010/221391

წინამდებარე ურთიერთგაგების მემორანდუმის შინაარსი არ შეიძლება განხილული იქნეს, როგორც ევროკავშირის ან მისი რომელიმე ოფიციალური სტრუქტურის პოზიცია
The present Memorandum of Understanding can in no way be taken to reflect the views of the European Union

ურთიერთგაგების მემორანდუმი

ქალაქ თბილისის მერიასა

და

კავკასიაში ბუნების დაცვის მსოფლიო ფონდის კავკასიის წარმომადგენლობას

შორის

კლიმატის ცვლილების პირობებში ტყის ეკოსისტემების მდგრადობის ამაღლების მიზნით თბილისის მუნიციპალიტეტის ტერიტორიაზე (წავკისის საცდელ უბანზე) მონოკულტურული ტყეების ბუნებრივ ტყეებად ტრანსფორმირების სფეროში თანამშრომლობის შესახებ

MEMORANDUM OF UNDERSTANDING

between

THE TBILISI MAYOR'S CITY HALL

and

WWF CAUCASUS PROGRAMME OFFICE

on

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE THROUGH COOPERATION IN THE FIELD OF TRANSFORMING MONOCULTURE FOREST STANDS INTO NATURE FORESTS ON THE TERRITORY OF THE TBILISI MUNICIPALITY OF GEORGIA (TSAVKISI PILOT AREA)

ქალაქ თბილისის მერია და ბუნების დაცვის მსოფლიო ფონდის კავკასიის წარმომადგენლობა,

შეთანხმდნენ, კლიმატის ცვლილების პირობებში ტყის ეკოსისტემების მდგრადობის ამაღლების მიზნით, მჭიდროდ ითანამშრომლონ თბილისის მუნიციპალიტეტის ტერიტორიაზე არსებული მონოკულტურული ტყეების ბუნებრივ ტყეებად ტრანსფორმირების სფეროში.

The Tbilisi Mayor's City Hall and the WWF Caucasus Programme Office,

Agree to work closely together to increase the resilience of forest ecosystems against climate change through cooperation in the field of transforming monoculture forest stands into nature forests on the territory of the Tbilisi Municipality of Georgia.

ზემოთ აღნიშნულიდან გამომდინარე, ორმხრივი ურთიერთგაგებისა და თანამშრომლობის სულისკვეთების საფუძველზე, მხარეები:

1. განახორციელებენ ურთიერთთანმხვედრ ქმედებებს, რათა, შერჩეულ საცდელ სატყეო უბანზე ნახშირბადის აკუმულირებისა და კლიმატის ცვლილებით გამოწვეული ნეგატიური ზემოქმედების მიმართ ბუნებრივი მდგრადობის მაღალი დონის უზრუნველყოფის მიზნით, მოხდეს მონოკულტურული ტყეების ბუნებრივ ტყეებად ტრანსფორმირება და მდგრადი მართვის რეჟიმისთვის მათი დაქვემდებარება, და ასევე, თბილისის მუნიციპალიტეტის ფარგლებში არსებული ტყეების დაცვაზე პასუხისმგებელი ქალაქ თბილისის მერიის ეკოლოგიისა და გამწვანების საქალაქო სამსახურის შესაძლებლობების გაძლიერება თანამედროვე ტექნოლოგიების, გეგმარებითი მეთოდებისა და სქემების გამოყენების კუთხით.

2. ამ მემორანდუმის პირველი პუნქტით განსაზღვრული მიზნების მიღწევის ხელშეწყობის მიზნით:

2.1. ბუნების დაცვის მსოფლიო ფონდის კავკასიის წარმომადგენლობა:

ა) მიიღებს ზომებს რათა ამ მემორანდუმის მიზნებისათვის გამოყოფილი იქნეს ფინანსური სახსრები ევროკავშირის მხარდაჭერით 2011-2013 წწ-ში განსახორციელებლად გამიზნული რეგიონალური პროექტის „კლიმატის ცვლილების პირობებში ტყის ეკოსისტემების მდგრადობის ამაღლება სამხრეთ კავკასიის ქვეყნებში" ფარგლებში;

ბ) განახორციელებს მონოკულტურული ტყეების ბუნებრივ ტყეებად ტრანსფორმირების ღონისძიებებს ამ მემორანდუმის 2.3 პუნქტით განსაზღვრულ წავკისის საცდელ სატყეო უბანზე – შესაბამისი ტექნიკური დახმარების ღონისძიებების ჩათვლით (თანამედროვე ტექნოლოგიებისა და მეთოდების და გასაშენებელი სახეობების შერჩევა, ხანგრძლივ პერიოდზე გათვლილი მოვლისა და დაცვის ღონისძიებების

To that end, in a spirit of mutual understanding and cooperation:

1. Act in unison in particular through the smoothing progress to transform monoculture forest stands into nature forests in selected pilot forest area for increased carbon storage and enhanced resilience against climate change and to put these ecosystems under sustainable management regimes and to increase the capacity of the Environmental and Green Areas Service of the City of Tbilisi to apply advanced technologies, planning methodologies and schemes.

2. In order to facilitate fulfillment of the objectives referred to in paragraph 1:

2.1. The WWF Caucasus Programme Office:

a) Makes efforts to provide financial support for the purposes of this Memorandum of Understanding through the EU financed regional Project "On Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation" which has to be implemented in 2011-2013;

b) Provides the agreed forest transformation measures with appropriate technical support in terms of the advanced technologies and methods which have to be applied on selected pilot site (referred to in paragraph 2.3 of this Memorandum), long-term maintenance schemes (plantation design, tending schemes etc.) for reforested pilot site and training workshops.

გეგმის შემუშავება და სწავლებისა და კვალიფიკაციის ამაღლების სემინარების ორგანიზება და სხვ.).

2.2. ქალაქ თბილისის მერია:

ა) ხელს შეუწყობს ამ მემორანდუმით გათვალისწინებულ ღონისძიებათა დაგეგმვასა და განხორციელებაში შესაბამისი უწყებებისა და ხელისუფლების ორგანოების, არასამთავრობო და სამეცნიერო-კვლევითი ორგანიზაციებისა და ადგილობრივი მოსახლეობის წარმომადგენელთა ჩართვას;

ბ) საკუთარ შესაძლებლობათა ფარგლებში საცდელ უბანზე მოახდენს ხანგრძლივ პერიოდზე გათვლილი მოვლისა და დაცვის ღონისძიებების წინასწარ შეთანხმებული გეგმის განხორციელებას;

გ) იზრუნებს საცდელი უბნის ბუნებრივ-რეკრეაციული სტატუსის შენარჩუნებაზე;

დ) ამ მემორანდუმის განხორციელების მიზნებისათვის შეარჩევს ქალაქ თბილისის მერიის ეკოლოგიისა და გამწვანების საქალაქო სამსახურს, როგორც კოორდინირებულ ქმედებათა განხირციელებაზე პასუხისმგებელ სტრუქტურულ ქვედანაყოფს;

ე) სწავლებისა და კვალიფიკაციის ამაღლების სემინარებში მონაწილეობის მისაღებად შეარჩევს შესაბამის პერსონალს;

ვ) ტყეების ტრანსფორმირების ღონისძიებების დასრულებიდან სამი წლის განმავლობაში ბუნების დაცვის მსოფლიო ფონდის კავკასიის წარმომადგენლობას მიაწვდის ინფორმაციას საცდელ უბანზე არსებული მდგომარეობის შესახებ.

2.3. თბილისის მუნიციპალიტეტის საზღვრების ფარგლებში მოქცეული მონოკულტურული ტყის მასივების შესახებ არსებული ფონური ინფორმაციის ანალიზისა და ერთობლივი საველე შესწავლების საფუძველზე, მონოკულტურული ტყეების ბუნებრივ ტყეებად ტრანსფორმირების ღონისძიებების განსახორციელებლად

2.2. The Tbilisi City Hall:

a) Contributes to the involvement of relevant stakeholders (government agencies, other authorities, non-governmental, academic organizations and local population) within the framework of this Memorandum of Understanding;

b) Within the scope of existed capacities implements agreed long-term maintenance schemes for selected pilot site;

c) Promotes maintenance of nature-recreational status of the selected pilot site;

d) Assigns the Environmental and Green Areas Service of the City of Tbilisi as focal structural unit responsible for coordinated actions related to the implementation of the Memorandum of Understanding;

e) Designates the staff to be trained during the implementation and participation in workshops defining lessons learned;

f) Provides monitoring information to the WWF Caucasus Programme Office on selected pilot site for three more years after full completion of transformation measures.

2.3. Based on undertaken baseline analyses and joint field surveys (in combination with participatory planning) – the Tbilisi Mayor's City Hall and the WWF Caucasus Programme Office have selected the Tsavkisi pilot site in Tbilisi Municipality for implementation of forest transformation measures consisting of the land plot with total area of 75 hectares out of the former State Forest Lands

შერჩეული იქნა თბილისის მუნიციპალიტეტის ადმინისტრაციული საზღვრების ფარგლებში მოქცეული წავკისის საცდელი უბანი, რომელიც მოიცავს ყოფილი თბილისის სატყეო მეურნეობის კოჯრის სატყეოს ნაწილს – საერთო ფართობით 75 ჰექტარი.

(Location: former Tbilisi State Forest, Kojori Forest Unit).

საცდელი ფართობის ზუსტი ადგილმდებარეობა მოცემულია დანართში (იხ დანართი 1).

More particularly location of boundaries of the pilot site is described in Annex 1.

შესრულებულია ორ ეგზემპლარად, თითოეული ქართულ და ინგლისურ ენებზე.

Done in two originals, each in Georgian and English languages.

11/VIII-ჯვაკურთ - 2011

თარიღი / Date

ქალაქ თბილისის მერიის სახელით

გიორგი უგულავა
თბილისის მერი

ჯ. შარტავას ქ. 7, 0160 თბილისი, საქართველო
ტელ.: +995 (32) 237-82-09 / ფაქსი: +995 (32) 237-82-21
ელ-ფოსტა: egd@tbilisi.gov.ge / ვებ-გვერდი: www.tbilisi.gov.ge

on behalf of the Tbilisi Mayor's City Hall

Giorgi Ugulava
Mayor of Tbilisi

7 Shartava Str., 0160 Tbilisi, Georgia
Tel: +995 (32) 237-82-09 / Fax: +995 (32) 237-82-21
Email: egd@tbilisi.gov.ge / web-site: www.tbilisi.gov.ge

ხელმოწერა / Signature

ბუნების დაცვის მსოფლიო ფონდის კავკასიის წარმომადგენლობის სახელით

გიორგი სანადირაძე
დირექტორი

მ. ალექსიძის ქ. 11, 0193 თბილისი, საქართველო
ტელ.: +995 (32) 223-75-00 / ფაქსი: +995 (32) 223-75-01
ელ-ფოსტა: office@wwfcaucasus.ge / ვებ-გვერდი:
www.panda.org/caucasus

on behalf of the WWF Caucasus Programme Office

Giorgi Sanadiradze
Director

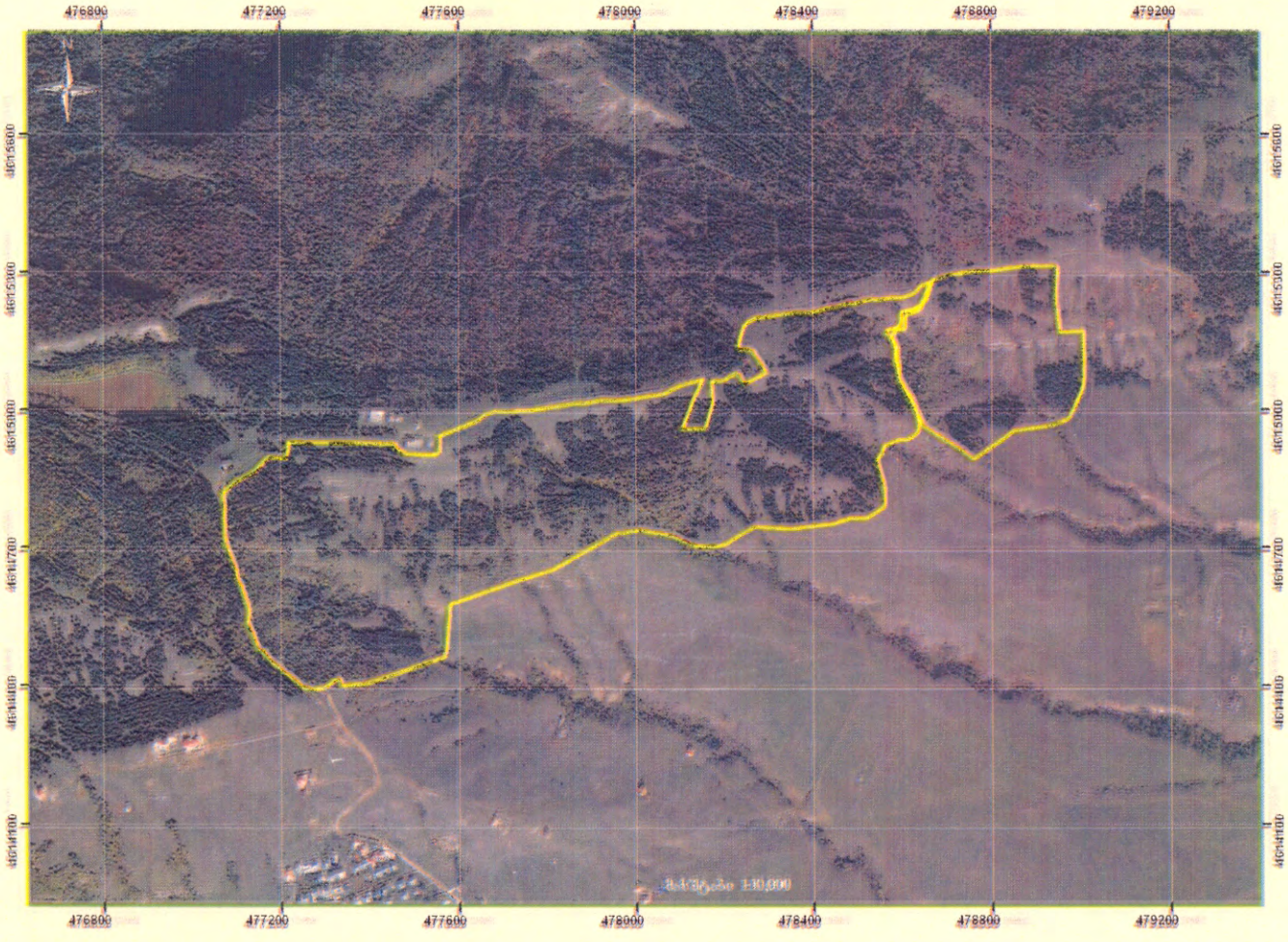
11 M. Aleksidze Str., 0193 Tbilisi, Georgia
Tel: + 995 (32) 223-75-00 / Fax: + 995 (32) 223-75-01
Email: office@wwfcaucasus.ge / web-site: www.panda.org/caucasus

ხელმოწერა / Signature

დანართი 1
Annex 1

წავკისის საცდელი უბნის გეოგრაფიული ადგილმდებარეობა
(თბილისის მუნიციპალიტეტი)

Geographical Location of Tsavkisi Pilot Site
(Tbilisi Municipality)



Annex 5. Memorandum of Understanding between WWF and Natural Resources Agency of the Ministry of Energy and Natural Resources of Georgia

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

კლიმატის ცვლილების პირობებში ტყის ეკოსისტემების მდგრადობის ამაღლება სამხრეთ კავკასიის ქვეყნებში

EU FINANCED PROJECT UNDER THE THEMATIC PROGRAMME ON ENVIRONMENT AND SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES, INCLUDING ENERGY

ევროკავშირის თემატური პროგრამის „გარემოს დაცვა და ბუნებრივი რესურსების მდგრადი გამოყენება – ენერგეტიკის საკითხების ჩათვლით" ფარგლებში დაფინანსებული პროექტი

EuropeAid/128320/C/ACT/Multi External Actions of the European Union No. DCI-ENV/2010/221391

წინამდებარე ურთიერთგაგების მემორანდუმის შინაარსი არ შეიძლება განხილული იქნეს, როგორც ევროკავშირის ან მისი რომელიმე ოფიციალური სტრუქტურის პოზიცია
The present Memorandum of Understanding can in no way be taken to reflect the views of the European Union

ურთიერთგაგების მემორანდუმი

საქართველოს ენერგეტიკისა და ბუნებრივი რესურსების სამინისტროს საჯარო სამართლის იურიდიულ პირ „ბუნებრივი რესურსების სააგენტოსა"

და

ბუნების დაცვის მსოფლიო ფონდის (WWF) კავკასიის პროგრამ ოფისს

შორის

კლიმატის ცვლილების პირობებში ტყის ეკოსისტემების მდგრადობის ამაღლების მიზნით
სახელმწიფო ტყის ფონდის ტერიტორიაზე (ხაშურის საცდელ უბანზე)
მონოკულტურული ტყეების ბუნებრივ ტყეებად ტრანსფორმირების სფეროში

თანამშრომლობის შესახებ

Memorandum of Understanding

On Increasing the Resilience of Forest Ecosystems against Climate Change

through Cooperation in the field of Transforming Monoculture Forest Stands into Nature Forests on the Territory of State Forest Lands
(Khashuri Pilot Area)

between

Legal Body of Public Law – the Natural Resources Agency of the Ministry of Energy and Natural Resources of Georgia
and

WWF Caucasus Programme Office

საქართველოს ენერგეტიკისა და ბუნებრივი რესურსების სამინისტროს საჯარო სამართლის იურიდიული პირი ბუნებრივი რესურსების სააგენტო (*შემდგომში – სააგენტო*) და ბუნების დაცვის მსოფლიო ფონდის (*WWF*) კავკასიის პროგრამ ოფისი (*შემდგომში –WWF-კავკასია*),

Legal body of public law – the Natural Resources Agency of the Ministry of Energy and Natural Resources of Georgia (hereafter referred to as "Agency") and the WWF Caucasus Programme Office (hereafter referred to as "WWF- Caucasus"),

შეთანხმდნენ, კლიმატის ცვლილების პირობებში ტყის ეკოსისტემების მდგრადობის ამაღლების მიზნით, მჭიდროდ ითანამშრომლონ სახელმწიფო ტყის ფონდის ტერიტორიაზე არსებული მონოკულტურული ტყეების ბუნებრივ ტყეებად ტრანსფორმირების სფეროში.

AGREE to work closely together to increase the resilience of forest ecosystems against climate change through cooperation in the field of transforming monoculture forest stands into nature forests on the territory of the Satet Forest Lands.

ზემოთ აღნიშნულიდან გამომდინარე, ორმხრივი ურთიერთგაგებისა და თანამშრომლობის სულისკვეთების საფუძველზე, მხარეები:

To that end, in a spirit of mutual understanding and cooperation:

1. განახორციელებენ ურთიერთთანმხვედრ ქმედებებს, რათა, შერჩეულ საცდელ სატყეო უბანზე ნახშირბადის აკუმულირებისა და კლიმატის ცვლილებით გამოწვეული ნეგატიური ზემოქმედების მიმართ ბუნებრივი მდგრადობის მაღალი დონის უზრუნველყოფის მიზნით, მოხდეს მონოკულტურული ტყეების ბუნებრივ ტყეებად ტრანსფორმირება და მდგრადი მართვის რეჟიმისთვის მათი დაქვემდებარება.

1. *Act in unison in particular through the smoothing progress to transform monoculture forest stands into nature forests in selected pilot forest area for increased carbon storage and enhanced resilience against climate change and to put these ecosystems under sustainable management regimes.*

2. ამ მემორანდუმის პირველი პუნქტით განსაზღვრული მიზნების მიღწევის ხელშეწყობის მიზნით:

2. *In order to facilitate fulfillment of the objectives referred to in paragraph (1):*

2.1. <u>WWF-კავკასია:</u>

2.1. <u>*The WWF-Caucasus:*</u>

ა) მიიღებს ზომებს რათა ამ მემორანდუმის მიზნებისათვის გამოყოფილი იქნეს ფინანსური სახსრები ევროკავშირის მხარდაჭერით 2011-2013 წწ-ში განსახორციელებლად გამიზნული რეგიონალური პროექტის „კლიმატის ცვლილების პირობებში ტყის ეკოსისტემების მდგრადობის ამაღლება სამხრეთ კავკასიის ქვეყნებში" ფარგლებში;

a) *Makes efforts to provide financial support for the purposes of this Memorandum of Understanding through the EU financed regional Project "On Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation" which has to be implemented in 2011-2013;*

ბ) კანონმდებლობით დადგენილი წესით განახორციელებს მონოკულტურული ტყეების ბუნებრივ ტყეებად ტრანსფორმირების შეთანხმებულ ღონისძიებებს ტყის აღდგენის გზით, ამ მემორანდუმის 2.3 პუნქტით განსაზღვრულ საცდელ სატყეო უბანზე – შესაბამისი ტექნიკური დახმარების ღონისძიებების ჩათვლით (თანამედროვე ტექნოლოგიებისა და მეთოდების და გასაშენებელი სახეობების შერჩევა, ხანგრძლივ პერიოდზე გათვლილი მოვლისა და დაცვის ღონისძიებების გეგმის შემუშავება და სწავლებისა და კვალიფიკაციის ამაღლების სემინარების ორგანიზება და სხვ.);

b) *In accordance with established statutory requirements implements the agreed forest transformation measures by the means of forest restoration measures with appropriate technical support in terms of the advanced technologies and methods which have to be applied on selected pilot forest site (referred to in paragraph 2.3 of this Memorandum), including development of long-term maintenance schemes (plantation design, tending schemes) for reforested pilot site, organizing of training workshops etc;*

გ) ტყეების ტრანსფორმირების ღონისძიებების დასრულების შემდგომ სააგენტოს მიაწვდის ინფორმაციას საცდელ უბანზე არსებული მდგომარეობის შესახებ.

c) Provides monitoring information to the Agency on conditions of the selected pilot site after completion of transformation measures.

2.2. <u>სააგენტო:</u>

2.2. <u>*The Agency:*</u>

<u>ა) მისთვის მინიჭებული უფლებამოსილების ფარგლებში ხელს შეუწყობს *WWF*-კავკასიას ამ მემორანდუმით გათვალისწინებული ტყის აღდგენის ღონიძიებების განხორციელებაში;</u>

a) *Within its legal competencies contributes to the WWF-Caucasus in implementation of forest restoration measures that are envisiged under this Memorandum of Understanding;*

ბ) სწავლებისა და კვალიფიკაციის ამაღლების სემინარებში მონაწილეობის მისაღებად შეარჩევს შესაბამის პერსონალს;

b) *Designates the staff to be trained during the implementation and participation in workshops defining lessons learned;*

2.3. სახელმწიფო ტყის ფონდის მიწებზე არსებული მონოკულტურული ტყის მასივების შესახებ არსებული ფონური ინფორმაციის წინასწარი ანალიზისა და ერთობლივი საველე შესწავლების საფუძველზე, მონოკულტურული ტყეების ბუნებრივ ტყეებად ტრანსფორმირების ღონისძიებების განსახორციელებლად შერჩეული იქნა ხაშურის საცდელი უბანი, რომელიც მოიცავს <u>სააგენტოს შიდა ქართლის სამსახურის მართვას დაქვემდებარებული ხაშურის სატყეოს</u> მე-3 კვარტლის ნაწილს (*სატაქსაციო უბნები /ლიტერები/: №№5-7 და №№9-30*) – საერთო ფართობით 79,7 ჰექტარი.

2.3. *Based on preliminary undertaken baseline analyses and joint field surveys (in combination with participatory planning) – Khashuri pilot site has been selected on the territory of the state forest lands for implementation of transformation measures aimed at transforming monoculture forest stands into nature forests. The pilot site includes part of the territory of Forest Unit N3 of the Khashuri Forestry under management of the Agency's Shida Kartli Service (Forest Sub-Units NN5-7 and NN9-30) – with total area of 79.7 hectares.*

საცდელი ფართობის ზუსტი ადგილმდებარეობა და გეოგრაფიული კოორდინატები მოცემულია დანართში (იხ დანართი 1).

More particularly location of boundaries and geographical coordinates of the pilot site are described in Annex 1.

წინამდებარე მემორანდუმი შედგენილია ქართულ და ინგლისურ ენებზე, თანაბარი იურიდიული ძალის მქონე ორ იდენტურ ეგზემპლიარად, რომელთაგან თითოეული ეგზემპლიარი ქართულ და ინგლისურ ენაზე შედგენილი ინახება მხარეებთან.

Done in two originals, each in Georgian and English languages.

21.12.2011

თარიღი / *Date*

საჯარო სამართლის იურიდიული პირის ბუნებრივი რესურსების სააგენტოს სახელით

ალექსანდრე ხეთაგური
სააგენტოს უფროსი

გულუას ქ. 6, 0114 თბილისი, საქართველო

ტელ.: 2-72-72-87

ელ-ფოსტა: *info@anr.ge* / ვებ-გვერდი: *www.menr.gov.ge*

on behalf of the legal body of public law – The Natural Resources Agency

Alexander Khetaguri
Head of Agency

Gulua Str. 6 , 0114 Tbilisi, Georgia

Tel: 2-72-72-87

Email: info@anr.ge / www.menr.gov.ge

ხელმოწერა
Signature

ბუნების დაცვის მსოფლიო ფონდის (WWF)
კავკასიის პროგრამ ოფისის სახელით

გიორგი სანადირაძე
დირექტორი

მერაბ ალექსიძის ქ. 11, 0193 თბილისი, საქართველო

ტელ.: 2-23-75-00 ფაქსი: 2-23-75-01

ელ-ფოსტა: office@wwfcaucasus.ge / ვებ-გვედრი: www.panda.org/caucasus

on behalf of
WWF Caucasus Programme Office

Giorgi Sanadiradze
Director

Aleksidze Str. 11, 0193 Tbilisi, Georgia

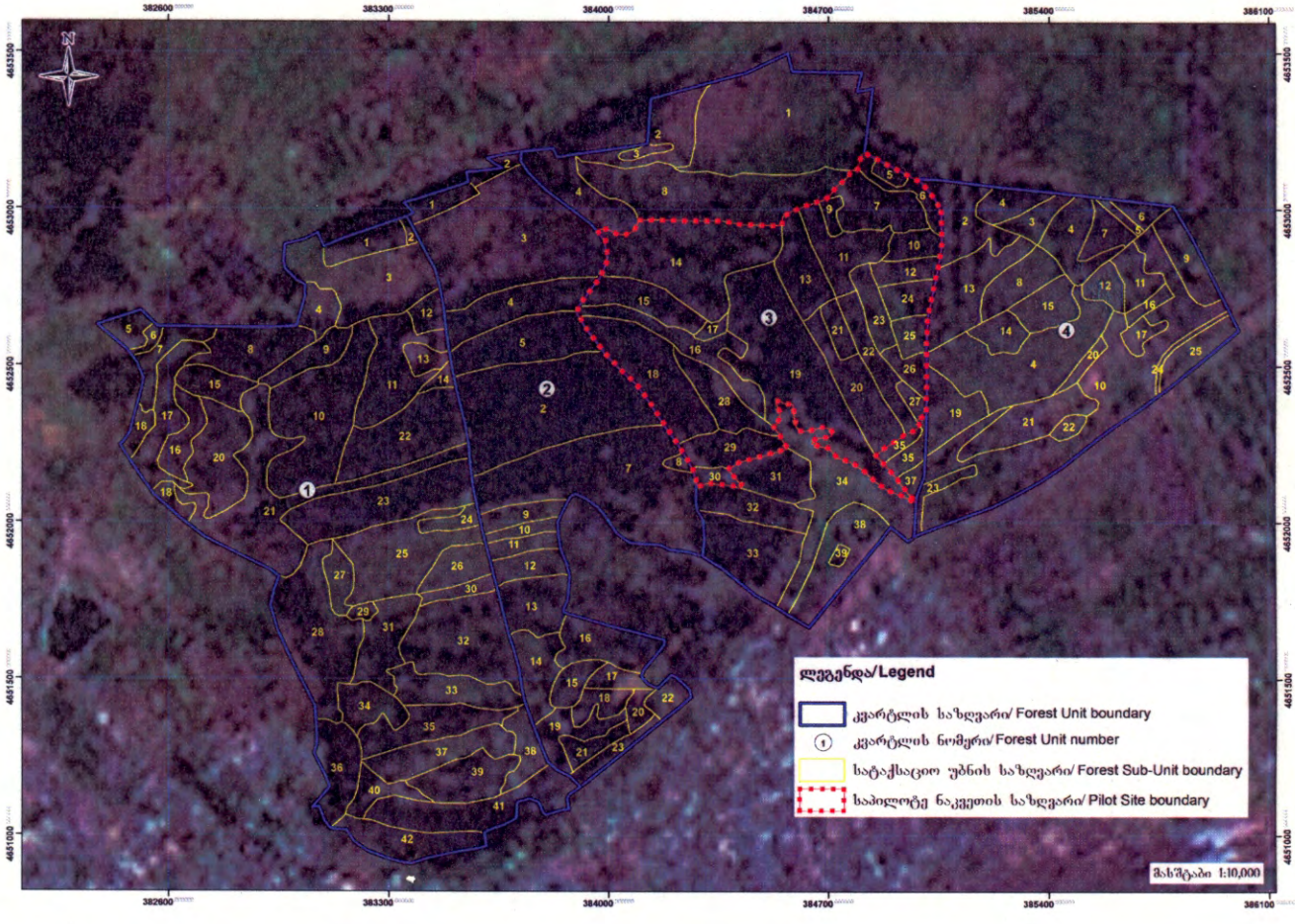
Tel: + (995 32) 2-23-75-00
Fax: + (995 32) 2-23-75-01

Email: office@wwfcaucasus.ge / Internet: www.panda.org/caucasus

ხელმოწერა
Signature

დანართი 1
Annex 1

ხაშურის საცდელი უბნის გეოგრაფიული ადგილმდებარეობა
(ხაშურის მუნიციპალიტეტი)
Geographical Location of Khashuri Pilot Site
(Khashuri Municipality)



Annex 6. Memorandum of Understanding between WWF and Hyantar ("ArmenForest") of the Ministry of Agriculture of the Republic of Armenia

Սույն Փոխըմբռնման հուշագիրը որևէ ձևով չի արտահայտում Եվրոպական միության տեսակետները
The present Memorandum of Understanding can in no way be taken to reflect the views of the European Union

WWF

Փոխըմբռնման հուշագիր

Բնության համաշխարհային հիմնադրամի հայաստանյան մասնաճյուղի

(WWF Հայաստան)

և

ՀՀ գյուղատնտեսության նախարարության "Հայանտառ" պետական ոչ առևտրային կազմակերպության ("Հայանտառ" ՊՈԱԿ)

միջև

Հաշվի առնելով, որ WWF Հայաստանը հանդիսանում է Եվրամիության կողմից ֆինանսավորվող "Հարավային Կովկասի երկրներում անտառների տրանսֆորմացիայի միջոցով անտառային էկոհամակարգերի կայունության բարձրացում կլիմայի փոփոխության նկատմամբ" տարածաշրջանային ծրագրի իրականացնողը Հայաստանում,

Ելնելով այն հանգամանքից, որ ծրագրի շրջանակներում նախատեսվում է ընտրված պիլոտային տարածքներում իրականացնել միատարր անտառտնկարկների տրանսֆորմացիա՝ կլիմայի փոփոխության նկատմամբ դրանց կայունության բարձրացման

Memorandum of Understanding

between

WWF Armenian Branch
(WWF-Armenia)

and

"Hayantar" State Non-Commercial Organization ("Hayantar" SNCO)
of the Ministry of Agriculture of the Republic of Armenia

Considering that WWF-Armenia is the implementing partner of the EU funded regional project "On Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation" in Armenia,

Based on the fact that in the frame of the project it is envisaged to transform selected monoculture forest stands to increase their resilience against climate change,

Taking into consideration that "Hayantar" SNCO recognizes the importance of increasing resilience of forest ecosystems against climate change,

նպատակով,

Նկատի ունենալով այն, որ "Հայանտառ" ՊՈԱԿ-ը կարևորում է կլիմայի փոփոխության նկատմամբ անտառային էկոհամակարգերի կայունության բարձրացման նշանակությունը,

Կողմերը ՀԱՄԱՁԱՅՆՎՈՒՄ ԵՆ սերտորեն աշխատել միասին կլիմայի փոփոխության նկատմամբ անտառային էկոհամակարգերի կայունության բարձրացման ուղղությամբ՝ համագործակցելով "Հայանտառ" ՊՈԱԿ-ի Նոյեմբերյանի և Գուգարքի անտառտնտեսությունների տարածքներում ընտրված միատարր անտառտնկարկները տրանսֆորմացիայի ենթարկելու ոլորտում:

THE PARTIES AGREE to work closely together to increase the resilience of forest ecosystems against climate change through cooperation in the field of transforming selected monoculture forest stands on the territory of Noyemberyan and Gugarq Forest Enterprises of "Hayantar" SNCO.

Այդ նպատակով, փոխըմբռնման և համագործակցության ոգով.

To that end, in a spirit of mutual understanding and cooperation:

1. Գործել համաձայնեցված, մասնավորապես, սահուն առաջընթացով ընտրված պիլոտային տարածքներում տրանսֆորմացիայի ենթարկել միատարր անտառտնկարկները՝ ածխածնի կուտակման ավելացման և կլիմայի փոփոխության նկատմամբ կայունության բարձրացման նպատակով, և կայուն կառավարել այդ էկոհամակարգերը, ինչպես նաև բարելավել "Հայանտառ" ՊՈԱԿ-ի հզորություններն առաջադեմ տեխնոլոգիաների, պլանավորման մեթոդների և սխեմաների կիրառման համար:

1. Act in unison in particular through the smoothing progress to transform monoculture forest stands in selected pilot forest area for increased carbon storage and enhanced resilience against climate change and to put these ecosystems under sustainable management regimes and to increase the capacity of "Hayantar" SNCO to apply advanced technologies, planning methodologies and schemes.

2. Պարբերություն 1-ում նշված նպատակների իրականացմանն աջակցելու համար.

2. In order to facilitate fulfillment of the objectives referred to in paragraph (1):

2.1. <u>WWF Հայաստանը.</u>

2.1. <u>WWF-Armenia:</u>

ա) Ջանքեր է գործադրում սույն Փոխըմբռնման հուշագրի նպատակների համար ֆինանսական աջակցություն տրամադրելու ուղղությամբ՝ Եվրամիության կողմից ֆինանսավորվող "Հարավային Կովկասի երկրներում անտառների տրանսֆորմացիայի միջոցով անտառային էկոհամակարգերի կայունության բարձրացում կլիմայի փոփոխության նկատմամբ" տարածաշրջանային ծրագրի շրջանակներում, որն իրականացվելու է 2011-2014 թթ-ի ընթացքում:

a) Makes efforts to provide financial support for the purposes of this Memorandum of Understanding through the EU financed regional Project "On Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation" which has to be implemented in 2011-2014;

բ) Անտառի տրանսֆորմացիայի համաձայնեցված միջոցառումների իրականացման համար ապահովում է համապատասխան տեխնիկական աջակցություն՝ առաջադեմ տեխնոլոգիաների և մեթոդների առումով, որոնք պետք է կիրառվեն ընտրված պիլոտային տարածքներում (նշվում են սույն Հուշագրի 2.3 կետում), ինչպես նաև երկարաժամկետ պահպանության սխեմաներ (տնկարկի նախագիծ, խնամքի սխեմաներ և այլն) վերականգնված պիլոտային տարածքների համար և ուսուցողական աշխատանքային հանդիպումներ:

b) Provides the agreed forest transformation measures with appropriate technical support in terms of the advanced technologies and methods which have to be applied on selected pilot site (referred to in paragraph 2.3 of this Memorandum), long-term maintenance schemes (plantation design, tending schemes etc.) for reforested pilot sites and training workshops.

2.2. <u>"Հայանտառ" ՊՈԱԿ-ը.</u>

2.2. <u>The "Hayantar" SNCO:</u>

ա) Աջակցում է համապատասխան շահագրգիռ կողմերի՝ այլ կառավարական գործակալությունների, տեղական լիազոր մարմինների, ոչ կառավարական և ակադեմիական կազմակերպությունների և տեղական բնակչության ներգրավմանը սույն Փոխըմբռնման հուշագրի շրջանակներում,

a) Contributes to the involvement of relevant stakeholders (government agencies, local authorities, non-governmental, academic organizations and local population) within the framework of this Memorandum of Understanding;

բ) Առկա հնարավորությունների շրջանակում ընտրված պիլոտային տարածքներում իրականացնում է երկարաժամկետ պահպանության ապահովում Եվրամիության կողմից ֆինանսավորվող ծրագրի ավարտից հետո,

b) Within the scope of existed capacities implements agreed long-term maintenance for selected pilot sites after the completion of the EU financed Project;

գ) Նպաստում է ընտրված պիլոտային տարածքներում բնական արժեքների պահպանությանը,

c) Promotes maintenance of natural values of the selected pilot site;

դ) Նշանակում է Նոյեմբերյանի և Գուգարքի անտառտնտեսությունները որպես տեղական կազմակերպչական միավորներ, որոնք պատասխանատու են սույն Փոխըմբռնման հուշագրի իրականացմանն առնչվող համակարգված գործողությունների համար,

d) Assigns the Noyemberyan and Gugarq Forest Enterprises as focal structural units responsible for coordinated actions related to the implementation of the Memorandum of Understanding;

ե) Նշանակում է անձնակազմ, որն ուսուցանվելու է ծրագրի իրականացման, ինչպես նաև քաղած դասերին վերաբերվող ուսուցողական աշխատանքային հանդիպումներին մասնակցելու ընթացքում,

e) Designates the staff to be trained during the implementation and participation in workshops defining lessons learned;

զ) WWF Հայաստանին տրամադրում է մոնիթորինգային տեղեկություններ ընտրված պիլոտային տարածքների վերաբերյալ տրանֆորմացիայի միջոցառումների ավարտից

f) Provides monitoring information to the WWF-Armenia on selected pilot site for three more years after full completion of transformation measures.

հետո ևս երեք տարվա ընթացքում:

2.3 Հիմնվելով ներկա վիճակի վերլուծության և համատեղ դաշտային ուսումնասիրությունների վրա՝ Հայաստանի անտառներում տրանսֆորմացիայի միջոցառումների իրականացման համար ընտրել են պիլոտային տարածքներ Նոյեմբերյանի (78 հա) և Գուգարքի (72 հա) անտառտնտեսություններում՝ ընդհանուր 150 հա:

2.3. Based on undertaken baseline analyses and joint field surveys, in the forests of Armenia pilot sites have been selected for implementation of forest transformation measures with total area of 150 hectares in Noyemberyan (78 ha) and Gugarq (72 ha) Forest Enterprises of "Hayantar" SNCO

Պիլոտային տարածքների տեղադրությունը և սահմանները ներկայացվում են Հավելված 1-ում:

More particularly locations and boundaries of the pilot sites is described in Annex 1.

Սույն հուշագրի ներքո համագործակցությունը կմեկնարկի կողմերի ստորագրման պահից և կգործի մինչև ստանձնած պարտավորությունների ողջ ծավալով կատարումը, եթե մինչ այդ կողմերից որևէ մեկը չդադարեցնի այն՝ մեկ ամիս առաջ այդ մասին գրավոր տեղեկացնելով հակառակ կողմին:

The cooperation in the frame of this Memorandum will start upon its signing by the Parties and will continue till complete fulfillment of undertaken obligations, if before that any of the Parties does not terminate it by informing the other Party in writing one month prior to termination.

Կողմերը կարող են գրավոր համաձայնության գալ՝ երկարաձգելու եւ ընդլայնելու սույն հուշագիրը:

The parties can have written agreement to prolong and extend this Memorandum.

Սույն հուշագրի գործողության դադարեցման դեպքում դրա ներքո կնքված այլ համաձայնագրերը նույնպես կարող են լուծվել՝ նման համաձայնագրերում պարունակվող լուծման մասին դրույթների համապատասխան:

In case of termination of this Memorandum the other agreements made under it can also be terminated in accordance to the relevant provisions in such agreements.

Սույն հուշագիրը կազմվել է երկու բնօրինակից՝ յուրաքանչյուրը հայերեն և անգլերեն լեզուներով:

This Memorandum was done in two originals, each in Armenian and English languages.

Հուշագրի մեկնաբանման ժամանակ տարաձայնություններ առաջանալու դեպքում նախապատվությունը տրվում է հայերեն լեզվով տեքստին:

In case of disagreement during interpretation of this Memorandum the preference should be given to the Armenian language text.

29 դեկտեմբերի/december 2011

Ամսաթիվ / Date

WWF հայաստանյան մասնաճյուղի անունից

Կարեն Մանվելյան
Տնօրեն

Պռոշյան 11, Երևան 0019, Հայաստանի Հանրապետություն

Հեռ./Ֆաքս. + (37410) 54 61 56, 58 89 83

Էլ-հասցե. office@wwfcaucasus.am / վեբ-կայք. www.panda.org/armenia

on behalf of WWF Armenian Branch

Karen Manvelyan
Director

Proshyan Str. 11, Yerevan 0019, Republic of Armenia

Tel/Fax: + (37410) 54 61 56, 58 89 83

Email: office@wwfcaucasus.am / Internet: www.panda.org/armenia

Ստորագրություն
Signature

"Հայանտառ" պետական ոչ առևտրային կազմակերպության անունից

Մարտուն Մաթևոսյան
Տնօրեն

Արմենակյան 129, Երևան 0047 Հայաստանի Հանրապետություն

Հեռ. + (37410) 65 17 38, Ֆաքս 65 02 70

Էլ-հասցե: arm_forest@yahoo.com / վեբ-կայք: www.hayantar.am

on behalf of "Hayantar" State Non-Commercial Organization

Martun Matevosyan
Director

Armenakyan 129, Yerevan 0047, Republic of Armenia

Tel: + (37410) 65 17 38 Fax: 65 02 70

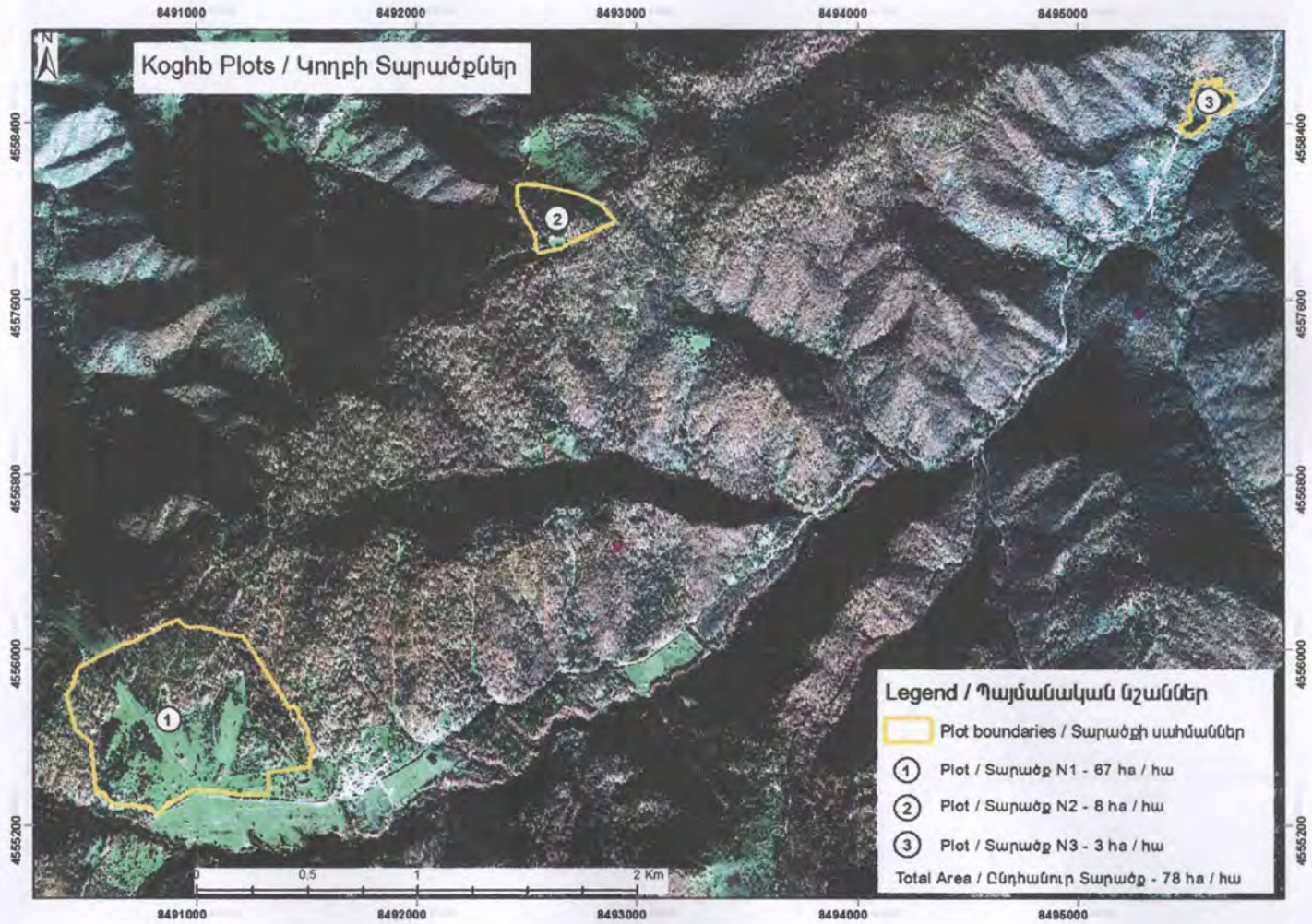
Email: arm_forest@yahoo.com / www.hayantar.am

Ստորագրություն
Signature

Հավելված 1
Annex 1

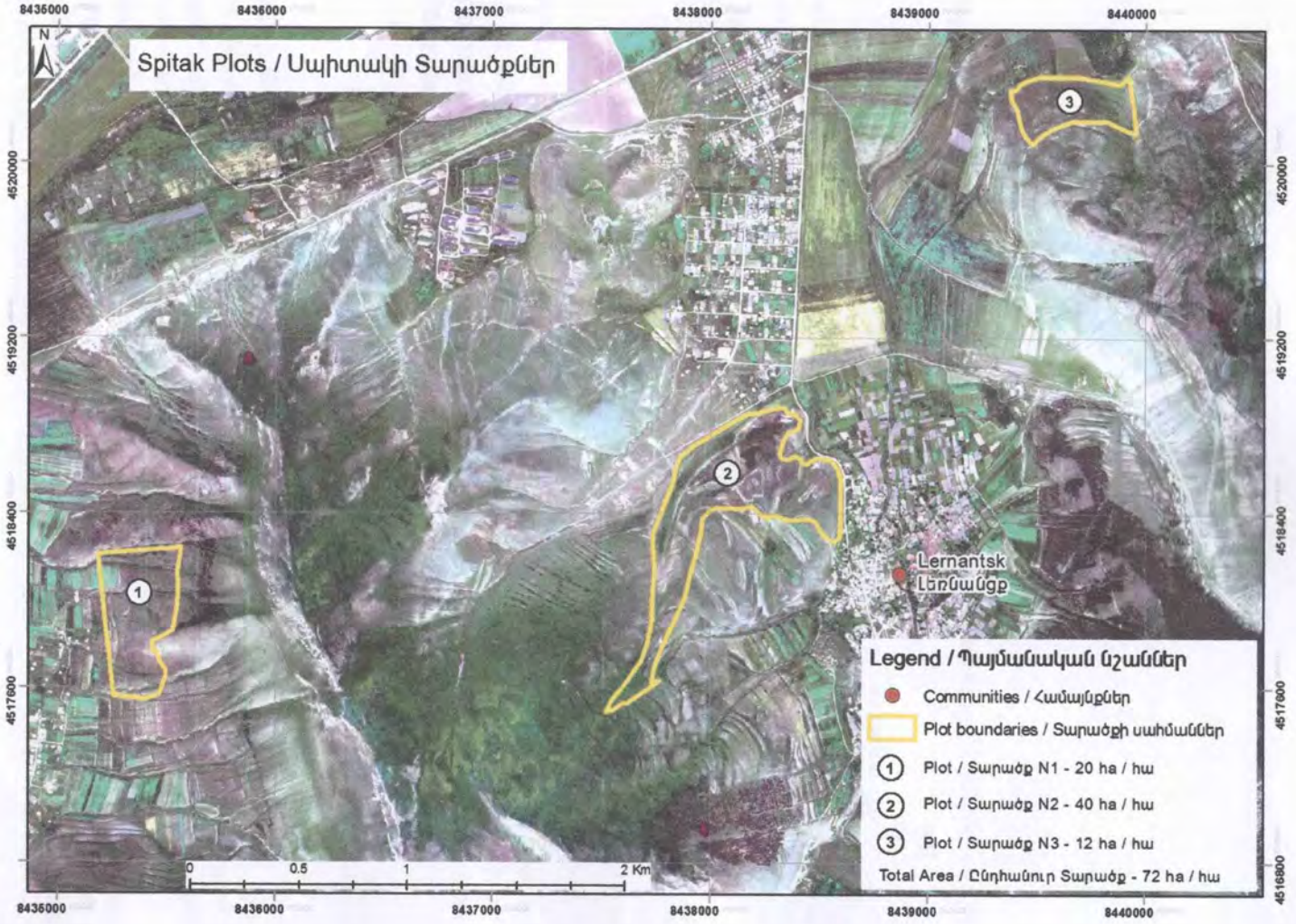
"Հայանտառ" ՊՈԱԿ-ի Նոյեմբերյանի անտառտնտեսության Կողբի անտառպետությունում ընտրված տարածքների աշխարհագրական տեղադրությունը

Geographical location of pilot sites in Koghb forest district of Noyemberyan Forest Enterprise of "Hayantar" SNCO



“Հայանտառ” ՊՈԱԿ-ի Գուգարքի անտառտնտեսության Սպիտակի անտառպետությունում ընտրված տարածքների աշխարհագրական տեղադրությունը

Geographical location of pilot sites in Spitak forest district of Gugarq Forest Enterprise of “Hayantar” SNCO



Annex 7. Amendment to the Memorandum of Understanding between WWF and Hyantar (“ArmenForest”) of the Ministry of Agriculture of the Republic of Armenia

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

ՀԱՐԱՎԱՅԻՆ ԿՈՎԿԱՍԻ ԵՐԿՊԵՐՈՒՄ ԱՆՏԱՌՆԵՐԻ ՏՐԱՆՍՖՈՐՄԱՑԻԱՅԻ ՄԻՋՈՑՈՎ ԱՆՏԱՌԱՅԻՆ ԷԿՈՀԱՄԱԿԱՐԳԵՐԻ ԿԱՅՈՒՆՈՒԹՅԱՆ ԲԱՐՁՐԱՑՈՒՄ ԿԼԻՄԱՅԻ ՓՈՓՈԽՈՒԹՅԱՆ ՆԿԱՏՄԱՄԲ

EU FINANCED PROJECT UNDER THE THEMATIC PROGRAMME ON ENVIRONMENT AND SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES, INCLUDING ENERGY

ԵՄ ՖԻՆԱՆՍԱՎՈՐՎՈՂ ԾՐԱԳԻՐ ՇՐՋԱԿԱ ՄԻՋԱՎԱՅՐԻ ԵՎ ԲՆԱԿԱՆ ՊԱՇԱՐՆԵՐԻ ԱՅԴ ԹՎՈՒՄ ԵՆԵՐԳԻԱՆ ԿԱՅՈՒՆ, ԴԱՌԱՎԱՐՄԱՆ, ԹԵՄԱՏԻԿ ԾՐԱԳՐԻ ՇՐՋԱՆԱԿՆԵՐՈՒՄ

EuropeAid/128320/C/ACT/Multi External Actions of the European Union No. DCI-ENV/2010/222391

Սույն Փոխըմբռնման հուշագիրը որևէ ձևով չի արտահայտում Եվրոպական միության տեսակետները
The present Memorandum of Understanding can in no way be taken to reflect the views of the European Union

ԼՐԱՑՈՒՄ N1/ ADDENDUM N° 1 TO

Փոխըմբռնման հուշագրի

Բնության համաշխարհային հիմնադրամի հայաստանյան մասնաճյուղի

(WWF Հայաստան)

և

ՀՀ գյուղատնտեսության նախարարության "Հայանտառ" պետական ոչ առևտրային կազմակերպության ("Հայանտառ" ՊՈԱԿ)

միջև

Memorandum of Understanding

between

WWF Armenian Branch (WWF-Armenia)

and

"Hayantar" State Non-Commercial Organization ("Hayantar" SNCO) of the Ministry of Agriculture of the Republic of Armenia

Կողմերը համաձայնվում են փոփոխություն կատարել Հավելված 1-ում;

Հավելված 1-ի լրացված տարբերակը կցված է սույն փոփոխությանը:

Փոխըմբռնման հուշագրի մնացյալ կետերն ու պայմանները մնում են անփոփոխ:

Սույն լրացումն ուժի մեջ է մտնում Կողմերի ստորագրման հաջորդ օրվանից:

The Parties have agreed to change Annex 1.The new version of Annex 1 is attached to this addendum.

All other terms and conditions of the Memorandum of Understanding remain unchanged.

This addendum shall enter into force on the later date of signature by the Parties.

2 Մայիս/May 2012
Ամսաթիվ / Date

WWF հայաստանյան մասնաճյուղի անունից

Կարեն Մանվելյան
Տնօրեն

Պռոշյան 11, Երևան 0019, Հայաստանի Հանրապետություն

Հեռ./Ֆաքս. + (37410) 54 61 56, 58 89 83

Էլ-հասցե. office@wwfcaucasus.am / վեբ-կայք: www.panda.org/armenia

Ստորագրություն
Signature

on behalf of WWF Armenian Branch

Karen Manvelyan
Director

Proshyan Str. 11, Yerevan 0019, Republic of Armenia

Tel/Fax: + (37410) 54 61 56, 58 89 83

Email: office@wwfcaucasus.am / Internet: www.panda.org/armenia

"Հայանտառ" պետական ոչ առևտրային կազմակերպության անունից

Մարտուն Մաթևոսյան
Տնօրեն

Արմենակյան 129, Երևան 0047 Հայաստանի Հանրապետություն

Հեռ. + (37410) 65 17 38, Ֆաքս 65 02 70

Էլ-հասցե: arm_forest@yahoo.com / վեբ-կայք: www.hayantar.am

Ստորագրություն
Signature

on behalf of "Hayantar" State Non-Commercial Organization

Martun Matevosyan
Director

Armenakyan 129, Yerevan 0047, Republic of Armenia

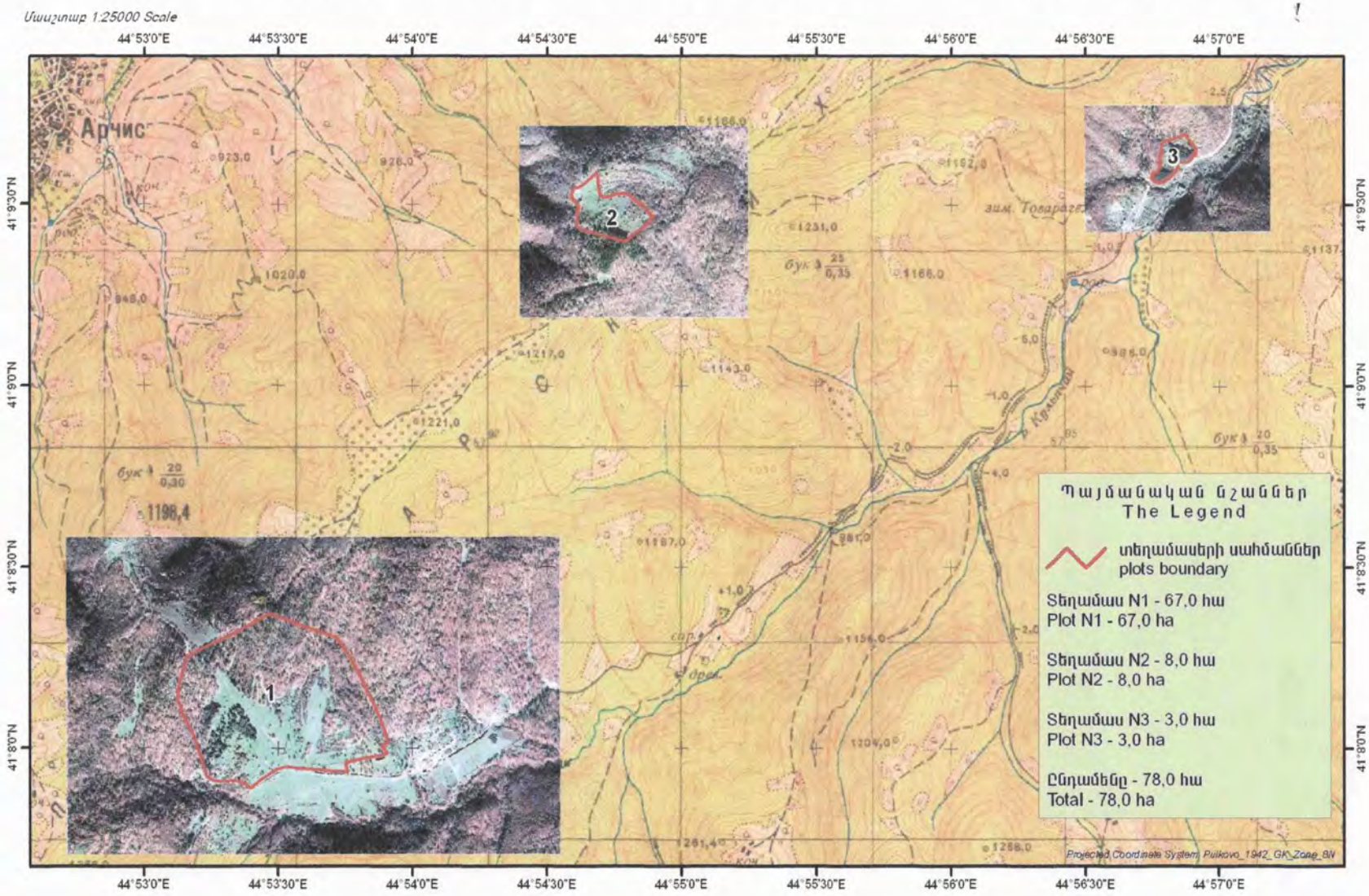
Tel: + (37410) 65 17 38 Fax: 65 02 70

Email: arm_forest@yahoo.com / www.hayantar.am

Հավելված 1/ Annex 1

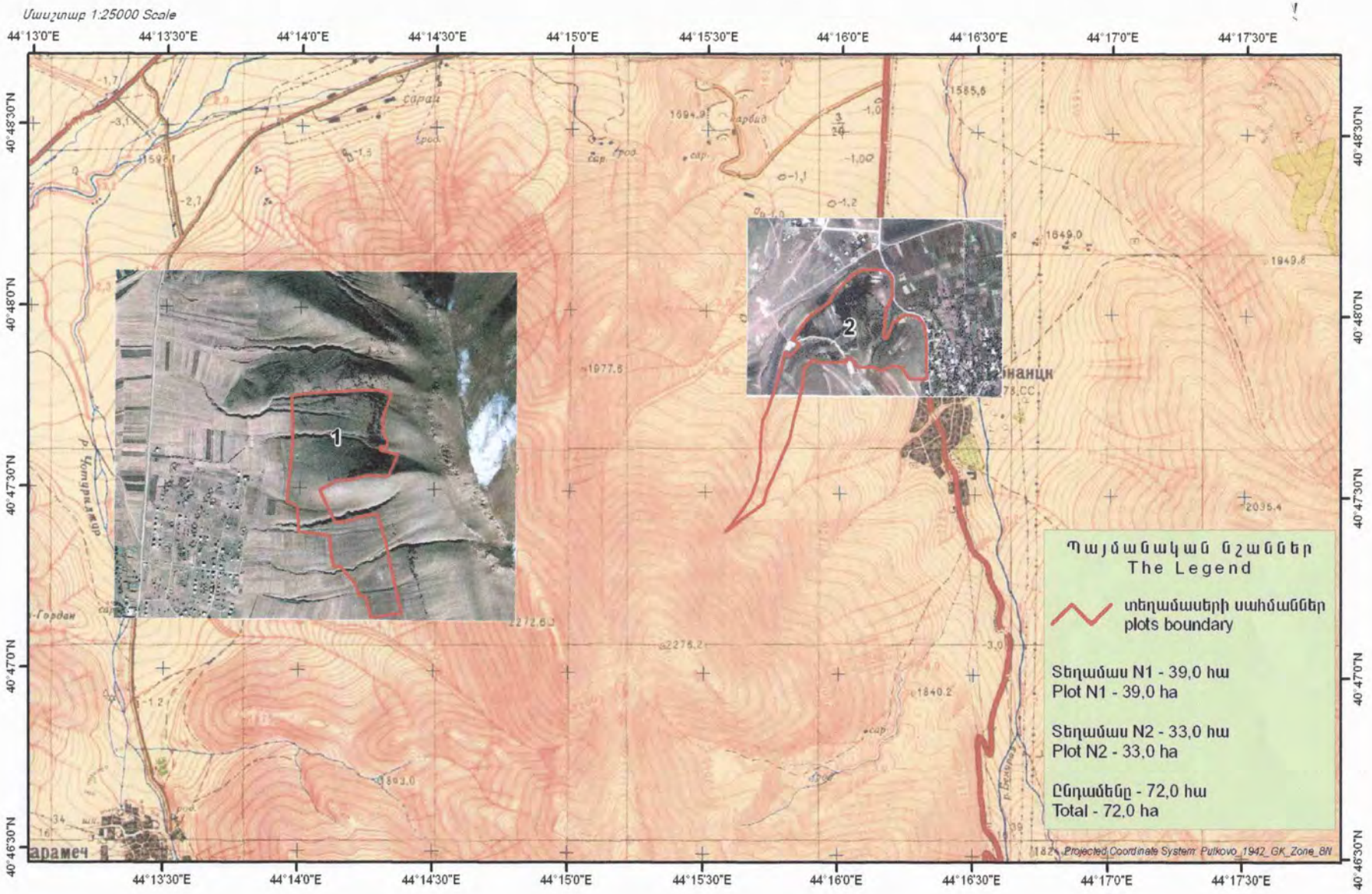
"Հայանտառ" ՊՈԱԿ-ի Նոյեմբերյանի անտառտնտեսության Կողբի անտառպետությունում ընտրված տարածքների աշխարհագրական տեղադրությունը

Geographical location of pilot sites in Koghb forest district of Noyemberyan Forest Enterprise of "Hayantar" SNCO



“Հայանտառ” ՊՈԱԿ-ի Գուգարքի անտառտնտեսության Սպիտակի անտառպետությունում ընտրված տարածքների աշխարհագրական տեղադրությունը

Geographical location of pilot sites in Spitak forest district of Gugarq Forest Enterprise of “Hayantar” SNCO



Annex 8. Report concerning the Amendment to the Memorandum of Understanding between WWF and Hyantar (“ArmenForest”) of the Ministry of Agriculture of the Republic of Armenia

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

EC THEMATIC PROGRAMME ON ENVIRONMENT AND SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

EuropeAid/128320/C/ACT/Multi External Actions of the European Union No. DCI-ENV/2010/221391

This document is the sole responsibility of the Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation and can in no way be taken to reflect the views of the European Union

Technical Field Trip Report

Field Trip Report

30.04.2012-01.05.2012, Lori Marz, Tavush Marz, Armenia

Authors: Nelli Sargsyan, Armenia Country Coordinator, EU ENRTP Caucasus Project
Hannes Neuner, International Project Advisor, EU ENRTP Caucasus Project

This project is funded by the EU

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Armenia:
WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
11, Proshyan, Str.
0019 Yerevan
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

1. DESCRIPTION OF THE FIELD TRIP

2-day field trip was organized within the Project to the selected forest transformation pilot areas in Spitak Forest District of Gugark FE and Koghb Forest District of Noyemberyan FE of "Hayantar" SNCO.
Prior to the field visit a short meeting with the director of Noyemberyan FE was arranged in Noyemberyan FE branch office. Upcoming field trip was planned along with other project issues discussed.

1.1. Corresponding Project Activities

- Design and carry out site surveys (1.2.3.)
- Prepare transformation plans for the selected stands (1.2.4)

1.2. Duration of the Field Trip

The field trip was organized for 30 April- 1 May, 2012.

1.3. Place of the Field Trip

Day 1- Project Pilot areas in Koghb district within Noyemberyan FE area
Day 2- Project Pilot areas in Spitak district within Gugark FE area

1.4. Purpose of the Field Trip

The purpose of the visit was to make final decisions on the proposed change of pilot areas in Koghb District and Gugark District by "Kanach Disine" LLC contracted for the preparation of forest transformation plans for the selected pilot areas. Secondly site conditions and transformation strategies for the selected sites should be discussed.
Unfortunately "Kanach Disine" LLC was not able to participate in the field trip due to urgent family matters, however since it worked closely with both "Hayantar" SNCO and National Project Coordinator, their concerns could be communicated and duly discussed.

1.5. Field Trip Program/Agenda

Day 1

12:00	Meeting with Mr. Vasil Chilingaryan, director of Noyemberyan Forest Enterprise Branch of "Hayantar" SNCO at Enterprise office, discussion of project, ongoing activities and transformation plans
12.30	Visit to Project pilot sites
16.00	Lunch
5.00	Discussions

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
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Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Armenia:
WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
11, Proshyan, Str.
0019 Yerevan
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Day 2

10:00 Meeting with Mr. Gagik Amiryan, head of Gugark Forest Enterprise Branch of "Hayantar" SNCO at Enterprise office, discussion of project, ongoing activities and transformation plans
11.00 Visit to Project pilot sites
16.00 Lunch

1.6. List of Organizers and Participants

Name	Position	Organization
Karen Manvelyan	Director	WWF Armenia
Nelli Sargsyan	Armenia Country Coordinator, EU ENRTP Caucasus Project	WWF Armenia
Hannes Neuner	International Project Advisor, EU ENRTP Caucasus Project	WWF Caucasus
Ruben Petrosyan	Chief forester	"Hayantar" SNCO
Vasil Chilingaryan	Director of Novemberyan FE	"Hayantar" SNCO
Gagik Amiryan	Senior forester of Gugark FE	"Hayantar" SNCO

2. FIELD TRIP COMPONENTS

2.1. Field Observations and Actions

Koghb district:

Plots 2 and 3 of the pilot sites were visited. The director of forest enterprise accompanied trip participants to selected pilot sites.
It is important to note, that during the field surveys in Koghb areas by "Kanach Disine" LLC, it was revealed, that the selected Plot No 2 is a natural pine and oak mixed forest of high density where transformation measures were not needed. Thus, it was proposed by the head of the LLC to replace it with the neighboring site, which was more suitable for the implementation of transformation measures. The team visited both initially selected and proposed areas, the justifications for the change of selected plots were duly discussed and approved.



Fig 1: Representatives of “Hayantar” SNCO and WWF Armenia discussing transformation measures (Koghb pilot site)

Spitak district:

Plot 1, 2 and 3 of the pilot sites were visited. The senior forester of Gugark FE accompanied trip participants to selected pilot sites.

During the field surveys in Spitak areas by “Kanach Disine” LLC, it was revealed, that the selected Plot No 3 was pine cultures, which needed care cuttings and planting the area with broadleaved species would be rather complicated at current stage. It was proposed to extend the 3rd plot, with young pine stand, where establishment of broadleaved species and implementation of transformation measures will be more successful and demonstrative as pilot area.
The team visited both initially selected and proposed areas, the justifications for the change of selected plots were duly discussed and approved.

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
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Fax: +49 (0)69-79144 4166
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Project office in Armenia:
WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
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0019 Yerevan
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Fig. 2: Overview of Spitak pilot site (Plot 1)

2.2. Results

Project Team and representatives of “Hayantar” SNCO agreed to the proposed area changes in Plot 2 in Koghb forest district by “Kanach Desine” LLC. WWF Armenia in cooperation with the subcontractor for Transformation Plan elaborated the new map. The three plots in Koghb cover 78 ha in total.

Project Team and representatives of “Hayantar” SNCO agreed to area changes of pilot sites in Spitak forest district. Plot 3 will be deleted and Plot 1 will be extended. The new area of the pilot sites (Plot 1 and 2) cover 72 ha in total. WWF Armenia in cooperation with the subcontractor for Transformation Plan elaborated the new map.
The areas of the finally approved pilot plots (along with pre-selected areas) are shown in **Table 1**.

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
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www.wwf.de

Project office in Armenia:
WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
11, Proshyan, Str.
0019 Yerevan
Tel.: + 374 (10) 58 89 83
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Table 1 The areas of selected Pilot Plots

Plot	Area in ha (pre-selected)	Area in ha (approved 01.05.2012)	Remarks
Spitak 1	20	39	19 ha was added
Spitak 2	40	33	7 ha was excluded
Spitak 3	**12**	-	**the whole plot was excluded**
Total	**72**	**72**	
Koghb 1	67	67	clarification of boundaries
Koghb 2	8	8	clarification of boundaries
Koghb 3	3	3	clarification of boundaries
Total	**78**	**78**	

The maps of the new transformation areas are attached to the current report as Annex 1.

Memorandum of Understanding

The changes of selected pilot areas were also discussed in the light of MoU signed between WWF-Armenia and "Hayantar" SNCO December 29, 2011. It was decided, that the Annex of MoU will be updated and the document will be uploaded on the WWF- Armenia website.

3.

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
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CONCLUSIONS AND RECOMMENDATIONS

3.1. Conclusions

The transformation plans to be elaborated by the subcontractor will consider the following:

- Forest transformation is a process of decades and will continue after project end on the pilot sites.
- The Transformation Plan will contain measures for areas without, low and high canopy density on the pilot sites.

3.2. Recommendations

It was strongly recommended to "Kanach Desine" LLC to maintain close contact both with the Project Team and respective branches of "Hayantar" SNCO during the preparation of transformation plan as to the progress and possible difficulties.
National Project Coordinator will make sure, that the results of the field visits are communicated to the representatives of "Kanach Desine" LLC to ensure smooth implementation of the project.
WWF Armenia (Country Coordinator) will continue supervision of the preparation of transformation plans; WWF CauPo (International adviser) is ready to participate in an additional field trip with the planning organization to discuss technical details - if necessary.

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Fax: + 374 (10) 54 61 56
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www.panda.org/armenia

Abbreviations

FE	Forest Enterprise (branch of «Hayantar» SNCO)
LLC	Limited Liability Company
SNCO	State non Commercial Organization
MoU	Memorandum of Understanding

References

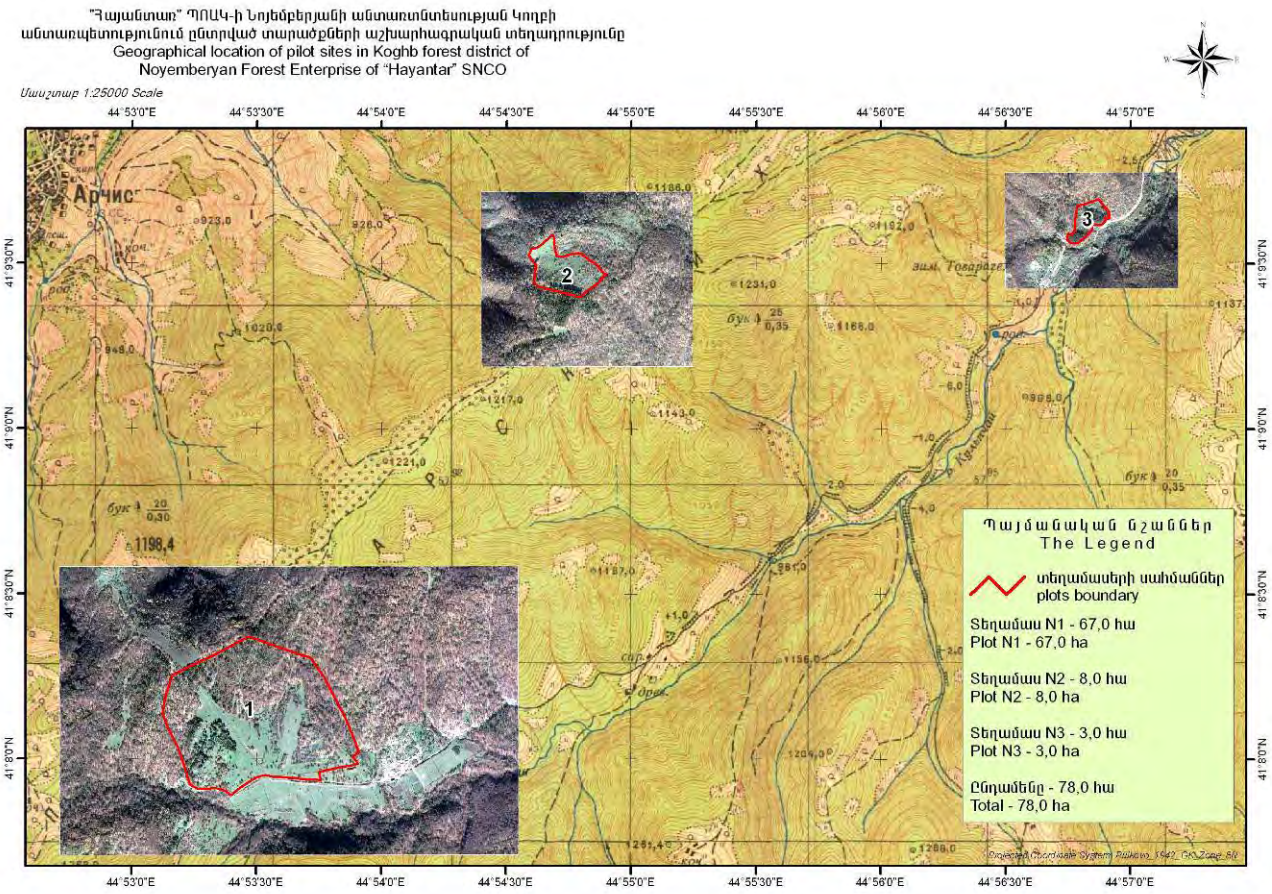
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10117 Berlin
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WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
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0019 Yerevan
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www.panda.org/armenia

Annex 1 :
Map of Transformation site: Koghb



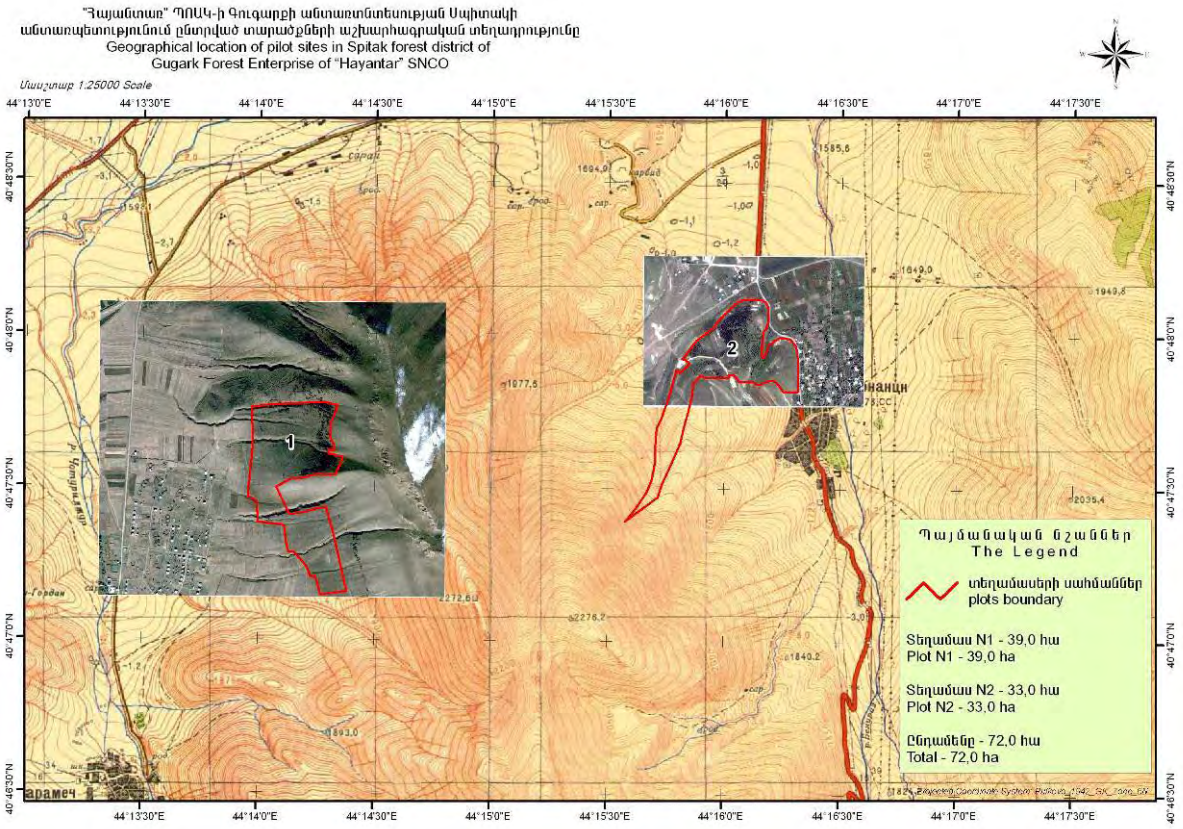
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0019 Yerevan
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Map of Transformation site: Spitak



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Annex 9. Agreement between WWF and Shamakhi Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic

Azərbaycan Respublikası Ekologiya və Təbii Sərvətlər Nazirliyi Şamaxı Meşə Mühafizəsi və Bərpası Müəssisəsi

və

WWF Qafqaz Proqram Ofisi

arasında

Azərbaycan Respublikasında monokultura meşələrin "təbii hala yaxın" meşələrə transformasiyası yolu ilə iqlim dəyişmələrinin təsirinin azaldılması

üzrə

RAZILAŞMA

Azərbaycan Respublikası Ekologiya və Təbii Sərvətlər Nazirliyi, Şamaxı Meşə Mühafizəsi və Bərpası Müəssisəsi (Şamaxı MMBM) və WWF Qafqaz Proqram Ofisi (bundan sonra WWF Qafqaz) 12 oktyabr 2004 –cü il tarixdə Azərbaycan Respublikası Ekologiya və Təbii Sərvətlər Nazirliyi və WWF arasında imzalanmış Azərbaycan Respublikasında digər məsələlərlə yanaşı iqlim dəyişməsi məsələlərini və təsirə məruz qalmış meşə ekosistemlərinin bərpasını da nəzərdə tutan Təbiəti Mühafizə Sahəsində Əməkdaşlığa dair Memorandumu rəhbər tutaraq

Azərbaycan Respublikasında monokultura meşələrin "təbii hala yaxın" meşələrə transformasiyası yolu ilə iqlim dəyişmələrinin təsirinin azaldılması sahəsində birgə çalışmağa RAZILAŞDILAR.

Sonacan qarşılıqlı anlaşma və əməkdaşlıq şəraitində

AGREEMENT

on

Increasing the Resilience of Forest Ecosystems Against Climate Change in the Southern Caucasus through Transformation of Monoculture Forest Stands into "Close to Nature" Forests

between

the Shamakhi Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic

and

WWF Caucasus Programme Office

The Shamakhi Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic, hereafter refered to as "Shamakhi FPRE" and the WWF Caucasus Programme Office, hereafter refered to as "WWF-Caucasus", guided by the Memorandum of Understanding of October 12, 2004 between the WWF and the Ministry of Ecology and Natural Resources of the Azerbaijan Republic on Collaboration in Nature Conservation in the Azerbaijan Republic, that, among others, covers areas of joint activities such as climate change issues and restoration of affected forest ecosystems,

AGREE to work closely together in the field of adaptation to impacts of climate change through transformation of monoculture forest stands into "close to nature" forests in the Azerbaijan Republic.

To that end, in a spirit of mutual understanding and cooperation:

1. seçilmiş pilot ərazilərdə monokultura meşələrinin "təbii hala yaxın" meşələrə transformasiyası yolu ilə karbon udulmasını artırmaq iqlim dəyişməsinə qarşı davamlılığı yüksəltmək, bu meşələri dayanıqlı idarəetmə altına almaq, meşə transformasiyası tədbirlərini həyata keçirməkdə Şamaxı MMBM-in imkanlarını artırmaq üçün əlbir işləmək.

2. paraqraf 1-də göstərilmiş vəzifələrin həyata keçirilməsini asanlaşdırmaq üçün:

2.1 WWF Qafqaz:

a) bu Razılaşmanın məqsədləri üçün öz partnyor (WWF Almaniya) və xarici donor təşkilatları (Avropa Komissiyası ilə təmsil olunmuş Avropa Birliyi) ilə maliyə (qrant) dəstəyi göstərir;

b) pilot ərazi üçün uzunmüddətli texniki xidmət sxemləri (əkin dizaynı, qulluq etmə və s.), bu ərazilərdə tətbiq olunan metodlarla müvafiq texniki dəstəkdən ibarət razılaşdırılmış meşə transformasiyası tədbirləri ilə təmin edir

2.2 Şamaxı MMBM:

a) bu Razılaşma çərçivəsində müvafiq maraqlı tərəfləri (dövlət təşkilatları, yerli təşkilatlar, akademik təşkilatlar, QHT-lər və yerli əhali) cəlb edir;

b) mövcud imkanlar çərçivəsində pilot ərazinin material və işçi qüvvəsi ilə təmin olunmasında daxili imkanlarından istifadə edir.

1. Act in unison in particular through the transformation of monoculture forest stands into "close to nature" forests in selected pilot areas for enhanced resilience against climate change and increased carbon storage, and to put these forests under sustainable management and to increase the capacity of the Shamakhi FPRE to apply forest transformation measures

2. In order to facilitate fulfillment of the objectives referred to in paragraph (1):

2.1 The WWF-Caucasus:

a) Makes efforts to provide financial support (grants) for the purposes of this Agreement through its partners (WWF-Germany) and WWF's external donor organization (the European Union, represented by the European Commission);

b) Provides the agreed forest transformation measures with appropriate technical support in terms of the methods which have to be applied on pilot sites, long-term maintenance schemes (plantation design, tending etc.) for these sites and training workshops

2.2 The Shamakhi FPRE:

a) Contributes to the involvement of relevant stakeholders (government agencies, local authorities, non-governmental, academic organizations and local population) within the framework of this Agreement;

b) Within the scope of existed capacities provides the pilot sites with contributions in kind related to material and human resources;

c) pilot ərazidə razılaşdırılmış uzunmüddətli texniki xidmət işləri aparır;

c) Implements agreed long-term maintenance schemes for pilot sites.

d) layihə dövründə təlim keçmək və işçi görüşlərdən çıxarılmış nəticələri müəyyən etmək üçün işçilər təyin edir

d) Designates the staff to be trained during project implementation and participation in workshops defining lessons learned;

2.3 aparılmış ilkin tədqiqatlara əsasən Şamaxı MMBM və WWF Qafqaz transformasiya tədbirləri aparmaq üçün monokultura meşələri olan aşağıdakı pilot ərazini seçmişdir:

2.3 Based on undertaken baseline surveys the Shamakhı FPRE and the WWF-Caucasus have selected the following pilot sites with monoculture forest stands for implementation of transformation measures:

Ağsu meşəbəyliyi, 34-cü meşə kvartalı, ümumi ərazisi 75 hektar

Agsu Forest Division, forest unit number 34, total area of about 75 hectares

Iki orijinal nüsxədə hazırlanmışdır, hər biri Azərbaycan və İngilis dillərindədir

Done in two originals, each in Azerbaijan and English languages.

İmza/Signature

Azərbaycan Respublikası Ekologiya və Təbii Sərvətlər Nazirliyi Şamaxı MMBM adından

Arif Şirinov

Direktor

Azərbaycan Respublikası Ekologiya və Təbii Sərvətlər Nazirliyi
Şamaxı MMBM
Şamaxı şəh., N.Nərimanov, 108.
AZ 5600, Azərbaycan
Tel/Faks: + 994 (176) 5 29 56

on behalf of the Shamakhi FPRE of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic

Arif Shirinov

Director

Şamaxı FPRE, Ministry of Ecology and Natural Resources of the Azerbaijan Republic
108, N. Narimanov str. Shamakhi
AZ 5600 Baku, Azerbaijan Republic
Tel/Faks: + 994 (176) 5 29 56

İmza / Signature

WWF Qafqaz Proqram Ofisi adından

Georgi Sanadiradze

Direktor

WWF Qafqaz Proqram Ofisi
Aleksidze küç. 11, 0193 Tbilisi, Gurcustan
Tel: + 995 (32) 33 01 54 / 55
Faks + 995 (32) (32) 33 01 90

on behalf of WWF Caucasus Programme Office

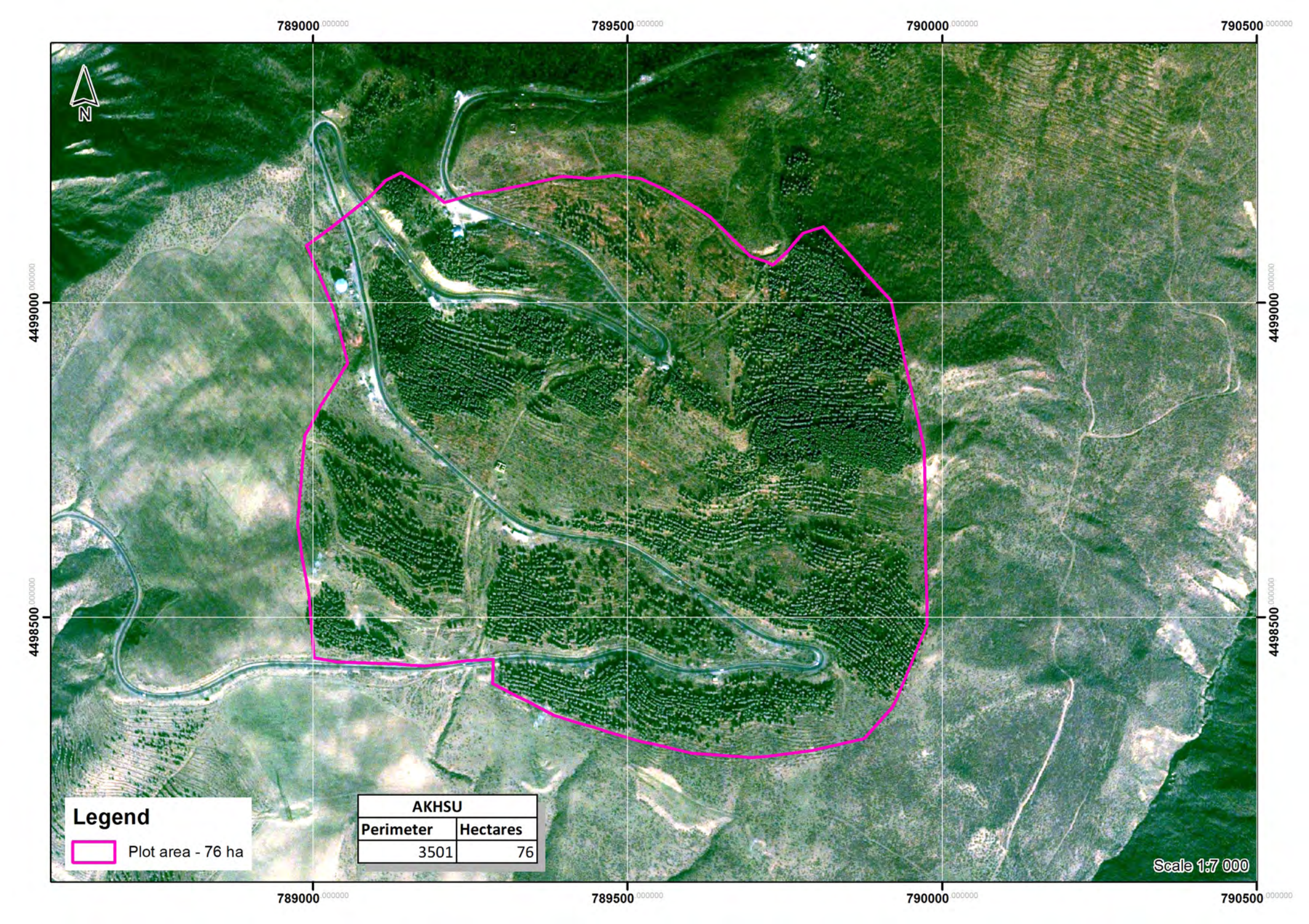
Giorgi Sanadiradze

Director

WWF Caucasus Programme Office
Aleksidze Str. 11 0193 Tbilisi Georgia
Tel +995 (32) 223 75 00
Fax: +995 (32) 223 75 01

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789000
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AKHSU
Perimeter
Hectares
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Annex 10. Agreement between WWF and Yevlakh Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic

Azərbaycan Respublikası Ekologiya və Təbii Sərvətlər Nazirliy
Yevlax Meşə Mühafizəsi və Bərpası Müəssisəsi

və

WWF Qafqaz Proqram Ofisi

arasında

Azərbaycan Respublikasında monokultura meşələrin "təbii hala yaxın" meşələrə transformasiyası yolu ilə iqlim dəyişmələrinin təsirinin azaldılması

üzrə

RAZILAŞMA

Azərbaycan Respublikası Ekologiya və Təbii Sərvətlər Nazirliyi, Yevlax MMBM (Yevlax MMBM) və WWF Qafqaz Proqram Ofisi (bundan sonra WWF Qafqaz) 12 oktyabr 2004 –cü il tarixdə Azərbaycan Respublikası Ekologiya və Təbii Sərvətlər Nazirliyi və WWF arasında imzalanmış Azərbaycan Respublikasında digər məsələlərlə yanaşı iqlim dəyişməsi məsələlərini və təsirə məruz qalmış meşə ekosistemlərinin bərpasını da nəzərdə tutan Təbiəti Mühafizə Sahəsində Əməkdaşlığa dair Memorandumu rəhbər tutaraq

Azərbaycan Respublikasında monokultura meşələrin "təbii hala yaxın" meşələrə transformasiyası yolu ilə iqlim dəyişmələrinin təsirinin azaldılması sahəsində birgə çalışmağa RAZILAŞDILAR

Sonacan qarşılıqlı anlaşma və əməkdaşlıq şəraitində

AGREEMENT

on

Increasing the Resilience of Forest Ecosystems Against Climate Change in the Southern Caucasus through Transformation of Monoculture Forest Stands into "Close to Nature" Forests

between

the Yevlakh Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic

and

WWF Caucasus Programme Office

The Yevlakh Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic, hereafter refered to as "Yevlakh FPRE" and the WWF Caucasus Programme Office, hereafter refered to as "WWF-Caucasus", guided by the Memorandum of Understanding of October 12, 2004 between the WWF and the Ministry of Ecology and Natural Resources of the Azerbaijan Republic on Collaboration in Nature Conservation in the Azerbaijan Republic, that, among others, covers areas of joint activities such as climate change issues and restoration of affected forest ecosystems,

AGREE to work closely together in the field of adaptation to impacts of climate change through transformation of monoculture forest stands into 'close to nature' forests in the Azerbaijan Republic.

To that end, in a spirit of mutual understanding and cooperation:

1. seçilmiş pilot ərazilərdə monokultura meşələrinin "təbii hala yaxın" meşələrə transformasiyası yolu ilə karbon udulmasını artırmaq, iqlim dəyişməsinə qarşı davamlılığı yüksəltmək, bu meşələri dayanıqlı idarəetmə altına almaq, meşə transformasiyası tədbirlərini həyata keçirməkdə Yevlax MMBM-in imkanlarını artırmaq üçün əlbir işləmək

1. Act in unison in particular through the transformation of monoculture forest stands into "close to nature" forests in selected pilot areas for enhanced resilience against climate change and increased carbon storage, and to put these forests under sustainable management and to increase the capacity of the Yevlakh FPRE to apply forest transformation measures.

2. paraqraf 1-də göstərilmiş vəzifələrin həyata keçirilməsini asanlaşdırmaq üçün:

2. In order to facilitate fulfillment of the objectives referred to in paragraph (1)

2.1 WWF Qafqaz

2.1 The WWF-Caucasus:

a) bu Razılaşmanın məqsədləri üçün öz partnyor (WWF Almaniya) və xarici donor təşkilatları (Avropa Komissiyası ilə təmsil olunmuş Avropa Birliyi) ilə maliyə (qrant) dəstəyi göstərir;

a) Makes efforts to provide financial support (grants) for the purposes of this Agreement through its partners (WWF-Germany) and WWF's external donor organization (the European Union, represented by the European Commission);

b) pilot ərazi üçün uzunmüddətli texniki xidmət sxemləri (əkin dizaynı, qulluq etmə və s.) bu ərazilərdə tətbiq olunan metodlarla müvafiq texniki dəstəkdən ibarət razılaşdırılmış meşə transformasiyası tədbirləri ilə təmin edir

b) Provides the agreed forest transformation measures with appropriate technical support in terms of the methods which have to be applied on pilot sites long-term maintenance schemes (plantation design, tending etc.) for these sites and training workshops

2.2 Yevlax MMBM:

2.2 The Yevlakh FPRE:

a) bu Razılaşma çərçivəsində müvafiq maraqlı tərəfləri (dövlət təşkilatları, yerli təşkilatlar, akademik təşkilatlar, QHT-lər və yerli əhali) cəlb edir;

a) Contributes to the involvement of relevant stakeholders (government agencies, local authorities, non-governmental, academic organizations and local population) within the framework of this Agreement;

b) mövcud imkanlar çərçivəsində pilot ərazinin material və işçi qüvvəsi ilə təmin olunmasında daxili imkanlarından istifadə edir;

b) Within the scope of existed capacities provides the pilot sites with contributions in kind related to material and human resources.

c) pilot ərazidə razılaşdırılmış uzunmüddətli texniki xidmət işləri aparır;

c) Implements agreed long-term maintenance schemes for pilot sites;

d) layihə dövründə təlim keçmək və işçi görüşlərdən çıxarılmış nəticələri müəyyən etmək üçün işçilər təyin edir;

d) Designates the staff to be trained during project implementation and participation in workshops defining lessons learned;

2.3 aparılmış ilkin tədqiqatlara əsasən Yevlax MMBM və WWF Qafqaz transformasiya tədbirləri aparmaq üçün monokultura meşələri olan aşağıdakı pilot ərazini seçmişdir

Cırdaxan meşəbəyliyi, 17 və 21 saylı meşə kvartalları, ümumi ərazisi 75 hektar

2.3 Based on undertaken baseline surveys the Yevlakh FPRE and the WWF-Caucasus have selected the following pilot sites with monoculture forest stands for implementation of transformation measures:

Jirdakhan forest division, forest units 17 and 21 total area of about 75 hectares

İki orijinal nüsxədə hazırlanmışdır, hər biri Azərbaycan və İngilis dillərindədir.

Done in two originals, each in Azerbaijan and English languages.

İmza / Signature

Azərbaycan Respublikası Ekologiya və Təbii Sərvətlər Nazirliyi Yevlax MMBM adından

Səttar Səttarov

Direktor

Azərbaycan Respublikası Ekologiya və Təbii Sərvətlər Nazirliyi
Yevlax MMBM
Yevlax şəh., H. Əliyev pr, 45
Az 6600 Azərbaycan
Tel/Faks + 994 (166) 6 04 88

on behalf of the Yevlakh FPRE of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic

Sattar Sattarov

Director

Yevlakh FPRE, Ministry of Ecology and Natural Resources of the Azerbaijan Republic
45, H. Aliyev ave. AZ 6600 Azerbaijan Republic
Tel/Faks: + 994 (166) 6 04 88

İmza / Signature

WWF Qafqaz Proqram Ofisi adından

Georgi Sanadiradze

Direktor

WWF Qafqaz Proqram Ofisi
Aleksidze küç. 11, 0193 Tbilisi, Gürcüstan
Tel: + 995 (32) 33 01 54 / 55
Faks: + 995 (32) (32) 33 01 90

on behalf of WWF Caucasus Programme Office

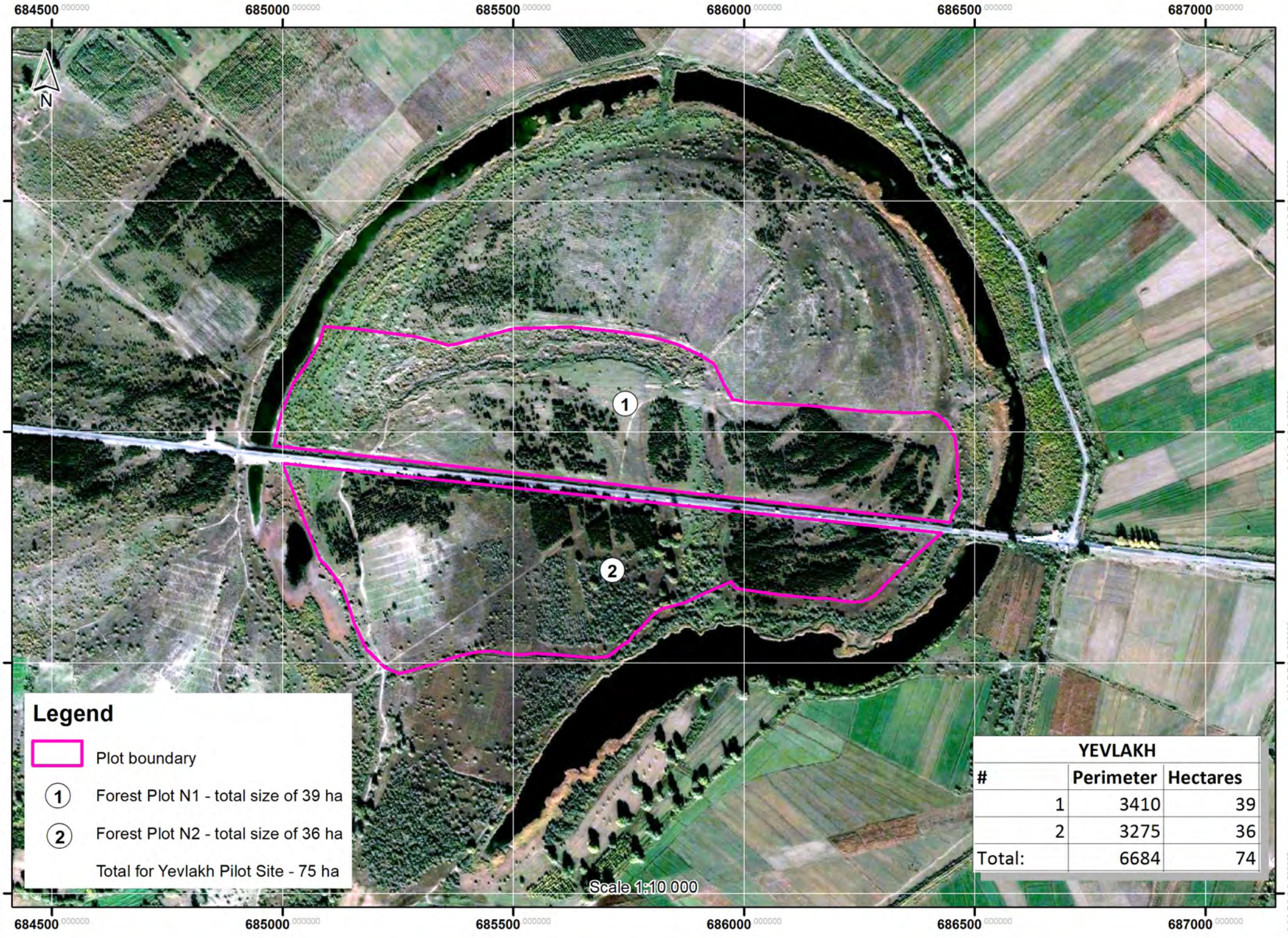
Giorgi Sanadiradze

Director

WWF Caucasus Programme Office
Aleksidze Str. 11, 0193 Tbilisi, Georgia
Tel: +995 (32) 223 75 00
Fax: +995 (32) 223 75 01

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YEVLAKH		
#	Perimeter	Hectares
1	3410	39
2	3275	36
Total:	6684	74

Annex 11. Site Survey Report - Armenia

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

EC THEMATIC PROGRAMME ON ENVIRONMENT AND SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

EuropeAid/128320/C/ACT/Multi External Actions of the European Union No. DCI-ENV/2010/221391

Site Survey Report

Lori Marz, Tavush Marz, Armenia

September 2011

This project is funded by the EU

This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:

WWF Germany
Reinhardtstr. 14

10117 Berlin

Tel.: +49 (0)30-311777-274

Project office in Armenia:
WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
11, Proshyan, Str.
0019 Yerevan
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

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2 BRIEF INFORMATION ON SELECTIED PILOT STANDS.....3

Brief Information: Pilot site N 1- Koghb.....3
Map of Pilot site N 1- Koghb.....4
Brief Information: Pilot site N 2- Spitak.....5
Map of Pilot site N 2- Spitak.....6

1 Introduction

The site-visits were implemented by the project team (including WWF Germany, WWF CauPO and WWF Armenia respective representatives) to potential sites suggested by "Hayantar" SNCO to collect information, check compatibility of proposed sites with the selection criteria, conditions for implementation of transformation planning and measures, willingness and readiness of respective forest enterprises to get involved, cooperate and support, and others. Meetings with respective forest enterprises of "Hayantar" SNCO as well as some community members from the potential pilot site adjacent communities were implemented.

Different sites were visited in Spitak and Margahovit districts of Gugarq Forest Enterprise (FE) and Koghb district of Noyemberyan FE of "Hayantar" SNCO to select the sites suitable for forest transformation. The forest enterprise administration (head of forest enterprise, chief forester and respective district foresters) accompanied trip participants to preselected sites. Each proposed area was discussed to assess positive and negative aspects and come to conclusion about feasibility of their selection as pilot areas.

Based on the abovementioned visits and discussions, the following sites were selected for further forest transformation activities:

- Pilot Site N 1- Koghb Forest District of Noyemberyan Forest Enterprise (FE) Branch of "Hayantar" State Non Commercial Organization (SNCO)
- Pilot Site N 2- Spitak Forest District of Gugark FE Branch of "Hayantar" State Non Commercial Organization (SNCO)

The Report provides brief information on the selected sites and maps, showing the location and boundaries.

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Project head office in Germany:

WWF Germany
Reinhardtstr. 14

10117 Berlin

Tel.: +49 (0)30-311777-274

Project office in Armenia:
WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
11, Proshyan, Str.
0019 Yerevan
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Brief Information: Pilot site N 1- Koghb

Project Site	**Koghb**
Coordination of transformation measures	WWF- Armenia
Location	Koghb Forest District of Noyemberyan FE branch of "Hayantar" SNCO, Tavush Marz, Republic of Armenia
Total area	78 ha
Ownership	State Forest Land; Noyemberyan FE branch of Hayantar SNCO, Ministry of Agriculture of the Republic of Armenia
Structure	Forest Compartments No 13, 19, 23 of Koghb Forest District
Climatic conditions	
General	The area belongs to the 6th (temperate warm) and 7th (temperate cold) climatic zones
Mean annual temperature	+10.4 ^{0}C
Min temperature	-23.8°C
Annual precipitation	550-600 mm
Site conditions	
Altitude	875-1225 m
Inclination	up to 20º
Exposition	S, SE, SW
Soil type	Grey mountainous, dark brown forest soils
Vegetation	
Existing tree species	hornbeam, pine, oak, ash, walnut and others
Other	
Surrounding Communities	Koghb, Lchkadzor and Archis

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Project head office in Germany:

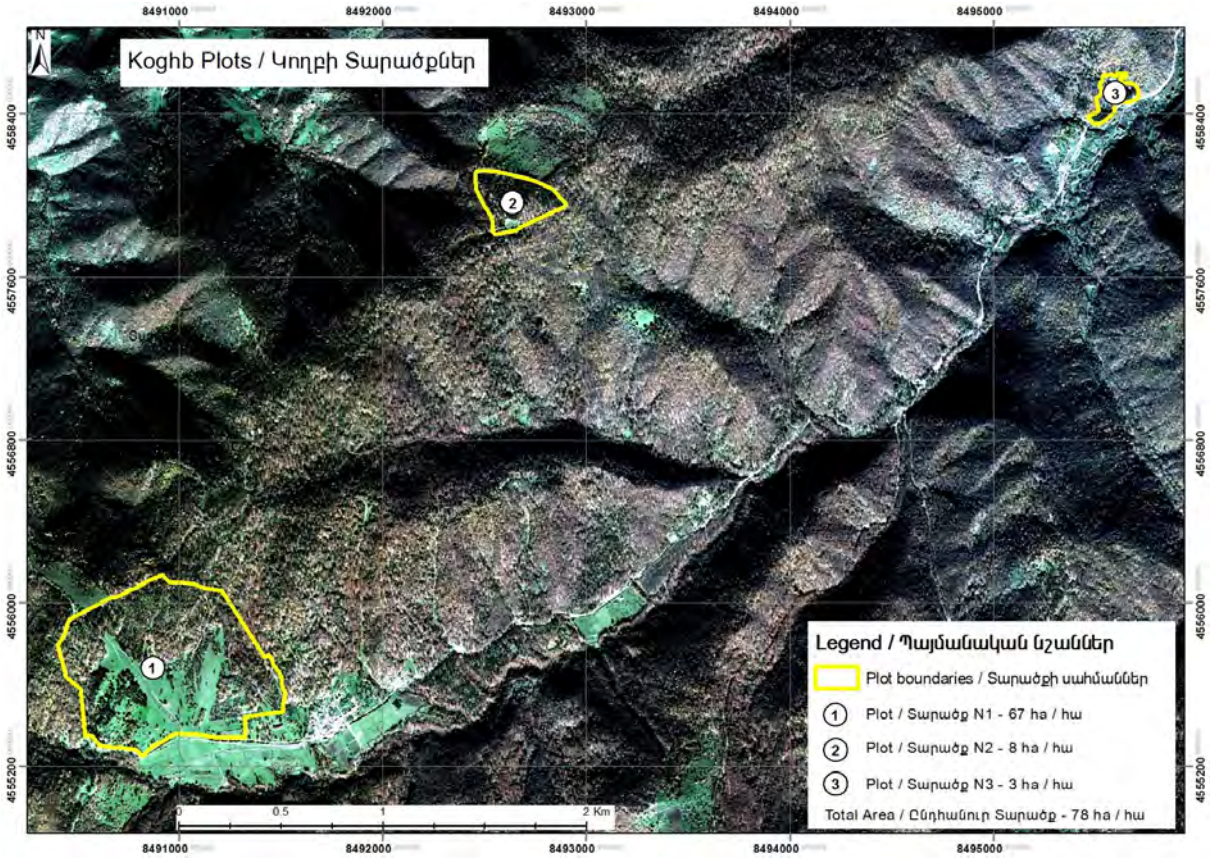
WWF Germany
Reinhardtstr. 14

10117 Berlin

Tel.: +49 (0)30-311777-274

Project office in Armenia:
WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
11, Proshyan, Str.
0019 Yerevan
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Map of Pilot site N 1- Koghb



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This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:

WWF Germany
Reinhardtstr. 14

10117 Berlin

Tel.: +49 (0)30-311777-274

Project office in Armenia:
WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
11, Proshyan, Str.
0019 Yerevan
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Brief Information: ***Pilot site N 2- Spitak***

Project Site	**Koghb**
Coordination of transformation measures	WWF- Armenia
Location	Spitak Forest District of Gugark FE branch of "Hayantar" SNCO, Lori Marz, Republic of Armenia
Total area	72 ha
Ownership	State Forest Land; Gugark Forest Enterprise branch of Hayantar SNCO, Ministry of Agriculture of the Republic of Armenia
Structure	Forest Compartments No 31 of Spitak Forest District
Climatic conditions	
General	The area belongs to the 7th (temperate cold) zone
Mean annual temperature	+7.4°C
Min temperature	- 20°C
Annual precipitation	550-600 mm
Site conditions	
Altitude	1650-1900m
Inclination	up to 30º
Soil type	Brown mountainous, dark brown sylvan and mountain-meadow soils
Exposition	N, NW, E, SE, NE
Vegetation	
Existing tree species	pine
Other	
Surrounding Communities	Spitak, Lernantsk, Jrashen and Saramej

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Project head office in Germany:

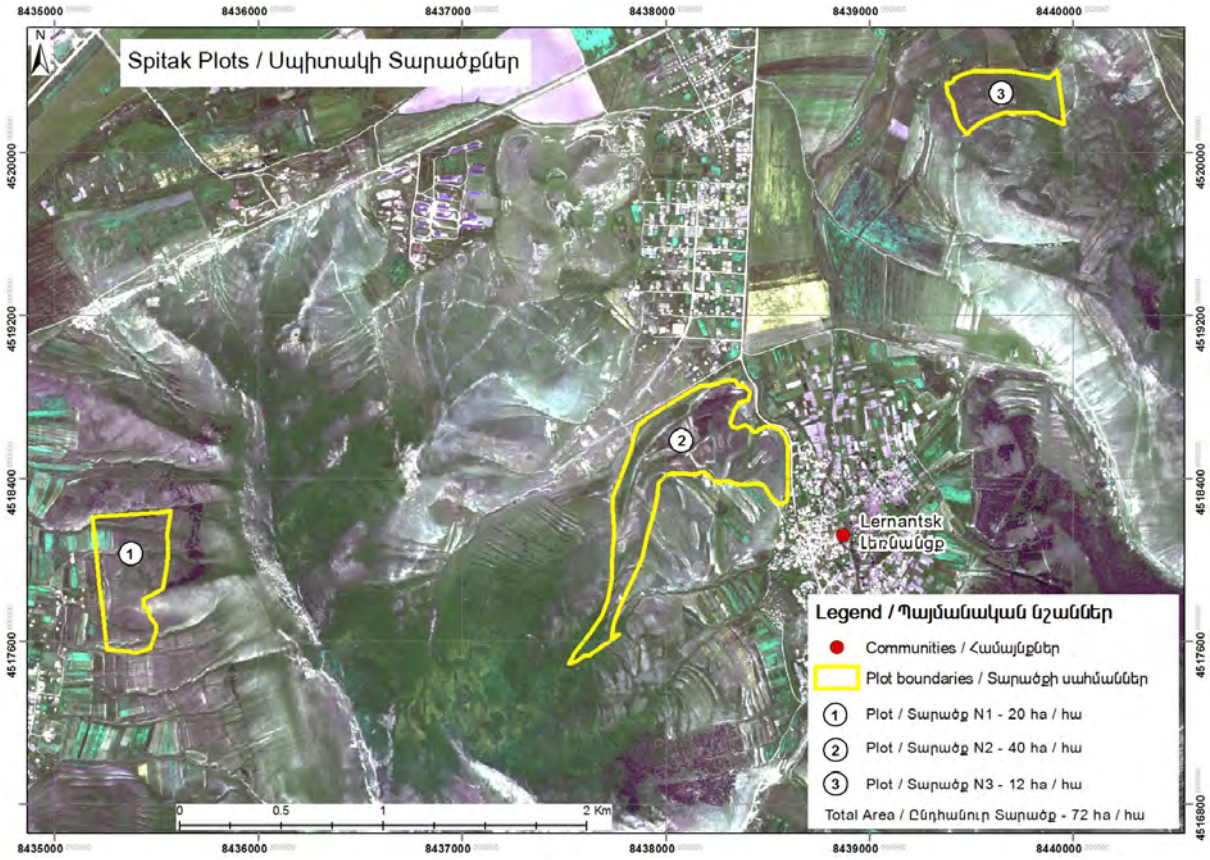
WWF Germany
Reinhardtstr. 14

10117 Berlin

Tel.: +49 (0)30-311777-274

Project office in Armenia:
WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
11, Proshyan, Str.
0019 Yerevan
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Map of Pilot site N 2- Spitak



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This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:

WWF Germany
Reinhardtstr. 14

10117 Berlin

Tel.: +49 (0)30-311777-274

Project office in Armenia:
WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
11, Proshyan, Str.
0019 Yerevan
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Annex 12. Site Survey Report – Georgia

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

EC THEMATIC PROGRAMME ON ENVIRONMENT AND SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

EuropeAid/128320/C/ACT/Multi External Actions of the European Union No. DCI-ENV/2010/221391

Site Survey Report

Georgia

(2011)

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This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

1. Introduction

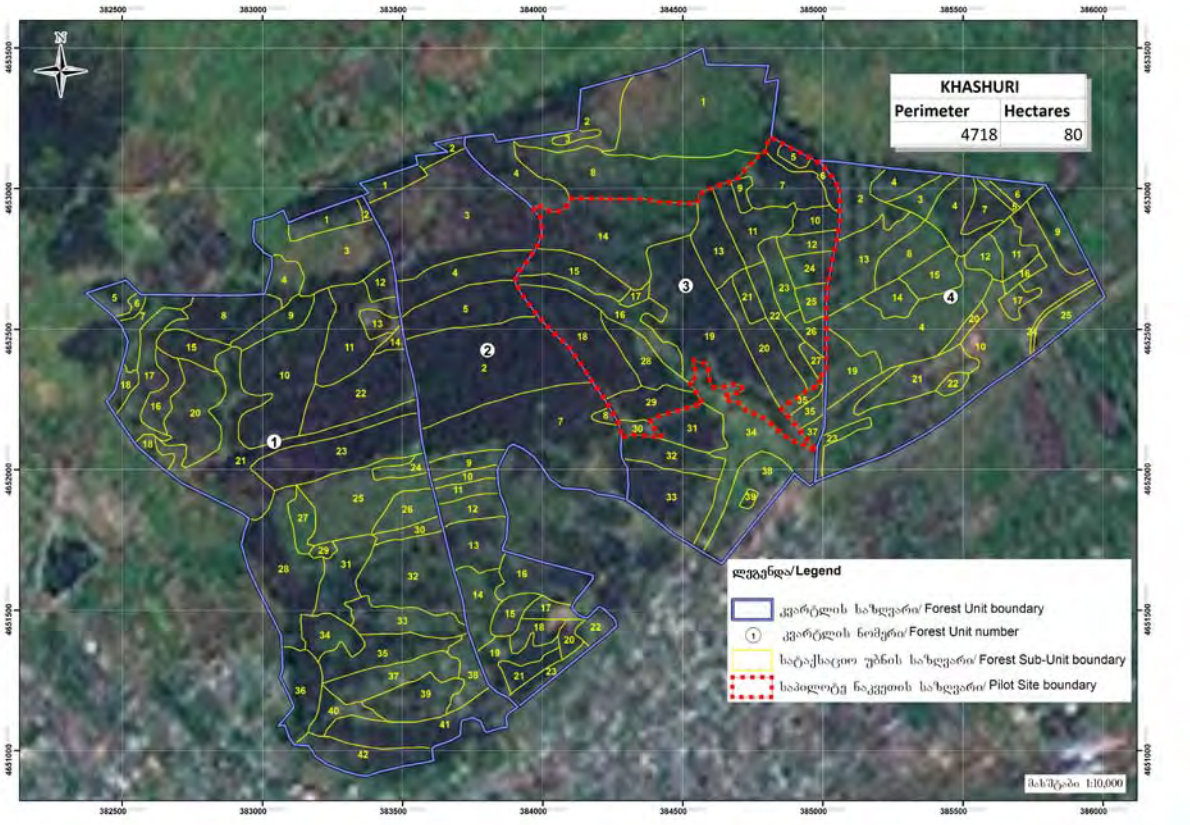
The pilot sites in which transformation measures will be carried out, have been chosen according to specific site selection criterias (see activity 1.2.2) together with the responsible forest administrations. In Georgia the following to Pilot sites have been selected:

Pilot Forest Site N1 – "*KHASHURI*" in Khashuri Municipality (Georgia) located on the state forest lands of the former Khashuri State Forestry, Forest Unit N.3, Forest Sub-Units NN.5-7 and NN.9-30 - currently under the management of Shida Kartli Service of the Natural Resources Agency of the Ministry of Energy and Natural Resources of Georgia.

Pilot Forest Site N2 – "*TSAVKISI*" in Tbilisi Municipality (Georgia) located on the former state forest
lands of Kojori Forest Unit of the former Tbilisi State Forestry - currently under the management of
the Municipality of Tbilisi.
The site maps (scale 1:6000) in this report show the boundaries of the pilot sites in Khashuri and Tsavkisi and give an impression of the forest cover and open areas. In the site surveys in tabular form the current natural features of the Georgian sites and in particular the forest vegetation is described.

2. Khashuri

2.1. Site Map Khashuri



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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

2.2. Site Survey Khashuri

Project Site	**Khashuri**
Coordination of transformation measures	WWF Caucasus Programme Office
Country **Location** **Grid references**	**Georgia** Georgia, Khashuri **W**-383851, 4652727; **N**-384789, 4653250; **E**-385119, 4652463; **S**-384880, 4652122
Total area	**71 ha**
Ownership	**Forest Fund, Agency of Natural Resources of the Ministry of energy and Natural Resources of Georgia**
Climatic conditions	
Mean annual temperature	9.6 ^{0}C
Mean temperature vegetation period (April-October)	^{0}C
Min / Max temperatures	-29 ^{0}C / 37^{0}C
Annual precipitation	700 mm
Precipitation in vegetation period (April-October)	mm
Site conditions	
Altitude	720 - 830 m a.s.l
Soil type	Brown leached soils, with brown-grey color, with grainy-granular structure, medium to low depth
Natural nutrient situation	Low humus content
Hydrological situation (ground water level, flooding, wind)	No rivers, dry trenches (water only as a result of snow melting or rain), temporary slope water
Exposition	S, S-W, S-E, N-E, N-W

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Vegetation	
Potential Natural Vegetation	Middle mountain zone – Oak forest 1. *Quercus iberica* 2. *Carpinus caucasica* 3. *Carpinus orientalis* 4. *Acer campestre* 5. *Acer laetum* 6. *Fraxinus excelsior* 7. *Pyrus caucasica* 8. *Malus orientalis* 9. *Tilia caucasica* 10. *Ulmus carpinifolia* 11. *Cornus mas* 12. *Corylus avellana* 13. *Svida australis* 14. *Rhamnus catartica* 15. *Crataegus* 16. *Ligustrum vulgare* 17. *Euonymus verrucosa* 18. *Rosa canina* 19. *Mespilus germanica*
Actual vegetation/ land use type	Over 90% of Khashuri site is represented by areas covered with forest. Out of it, about 80% of areas are represented by artificial forests of black pine (Pinus nigra) of the age up to 45 years; in small quantities, in groups and singly, Caucasian pine (Pinus hamata) is mixed therein. Relatively small areas are occupied by sprout-originated Georgian oak stands with hawthorn and other shrubs. Almost

	half of pine stands have low and medium density. Natural regeneration with pine (black and caucasian), Georgian oak, field maple, ash-tree and other wood species (trees and shrubs) actively proceeds there. High voltage power transmission line goes through the territory in the south of the site for the distance o 180 m. It is remarkable that the test site is located near the resort Surami.
History of the area	
	Wood use and and land use wasn't performed on the test site for the last 10 years. It shall be mentioned that excessive grazing occurs on the territory, negatively affecting the development of sprouts and young growth of deciduous species. Natural regeneration proceeds satisfactorily, fencing of the territory is required for its maintenance.

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

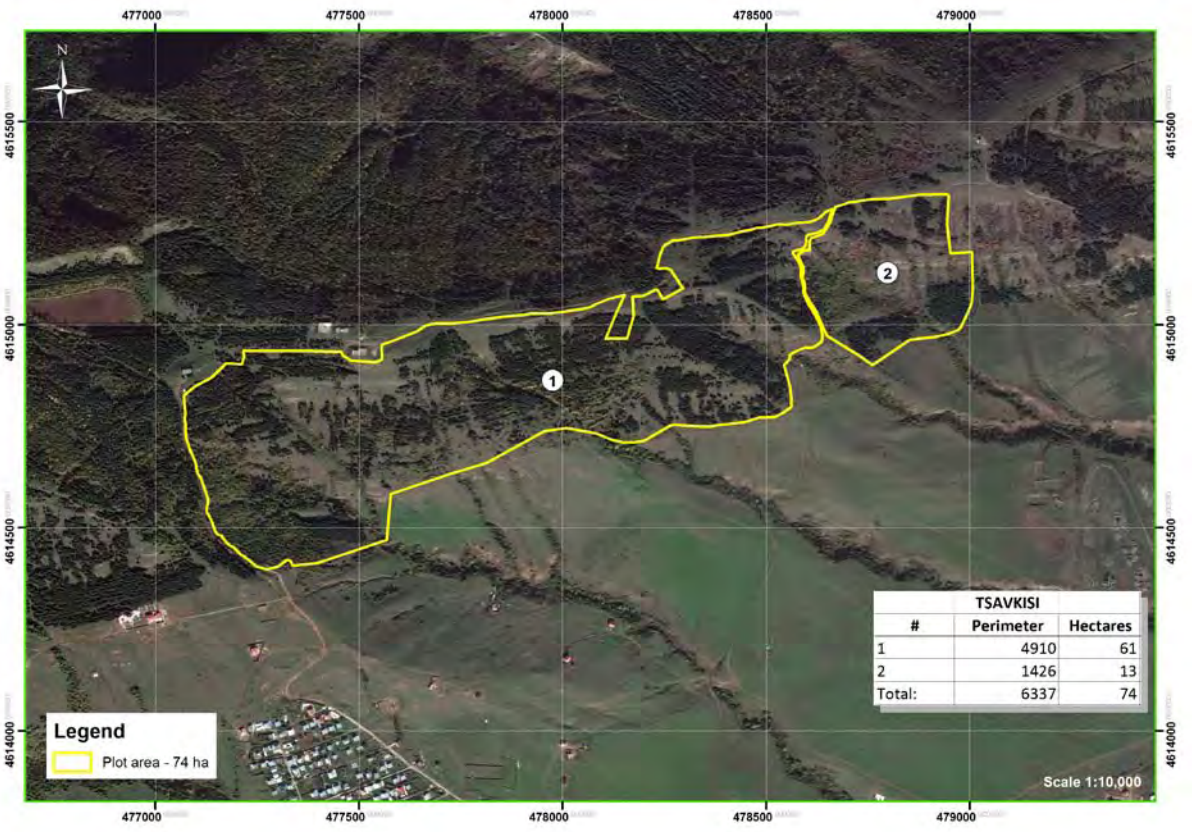
Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

3. Tsavkisi

3.1. Site Map Tsavkisi



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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

3.2. Site Survey Tsavkisi Georgia

Project Site	**Tsavkisi**
Coordination of transformation measures	WWF Caucasus Programme Office
Country **Location** **Grid references**	**Georgia** Georgia, Tbilisi City **W**-477071, 4614826; **N**-478254, 4615198; **E**-479005, 4615179; **S**-478173, 4614711
Total area	**74 ha**
Ownership	**Tbilisi Mayor's Office**
Climatic conditions	
Mean annual temperature	12.7 ^{0}C
Mean temperature vegetation period (April-October)	?^{0}C
Min / Max temperatures	-23 ^{0}C / 40 ^{0}C
Annual precipitation	560 mm
Precipitation in vegetation period (April-October)	? mm
Site conditions	
Altitude	900 - 1125 m a.s.l
Soil type	Brown soils, medium to low depth
Natural nutrient situation	Low humus content
Hydrological situation (ground water level, flooding, wind)	No rivers, dry trenches (water only as a result of snow melting or rain), temporary slope water
Exposition	S, SE, SW

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Vegetation	
Potential Natural Vegetation	Middle mountain zone – Oak forest *20. Quercus iberica* *21. Carpinus caucasica* *22. Carpinus orientalis* *23. Acer campestre* *24. Fraxinus excelsior* *25. Euonymus verrucosa* *26. Rosa canina* *27. Mespilus germanica*
Actual vegetation/ land use type	Almost half of Tsavkisi site is covered with forest. About 70% is of artificial origin (black pine, wild apricot, almond, soap tree, golden-chain). Natural stands are represented by prevalence of Georgian oak, with mixture of hornbeam, oriental hornbeam, ash-tree, maple, wild pear, wild apple, wild cherry, elm, at the same time – lime-tree, nettle tree. Natural regeneration of black pine doesn't occur at all. It allows to conclude that black pine has less prospects for this specific region and it shall be replaced by native species in relatively short time.
History of the area	
	Wood use and land use wasn't performed on the test site for the last 10 years. It shall be mentioned that excessive grazing occurs on the territory, negatively affecting the development of sprouts and young growth of deciduous species. Natural regeneration proceeds satisfactorily, fencing of the territory is required for its maintenance.

Annex 13. Pilot Site Border Demarcation in Azerbaijan - Field Report

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Field Trip Report

07.11.201-08.11.2011,
Yevlakh District, Shamalkhi District
Azerbaijan

Author: Hannes Neuner, International Project Advisor, EU ENRTP Caucasus Project

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-70144 4166
info@wwf.de
www.wwf.de

Project office in Azerbaijan:
Branch Office of the WWF - World Wide Fund for Nature in the Azerbaijan Republic (WWF Azerbaijan)
M.Mushfag Str., Blok 105, 2K
AZ 1073 Baku
Tel/Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

1. DESCRIPTION OF THE FIELD TRIP

2-day field trip was organized within the Project to the selected forest transformation pilot areas:

- Pilot Forest Site N1 – "*AGSU*" in Shamalkhi District (Azerbaijan) located on the state forest lands of the Shamakhi Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic.

- Pilot Forest Site N2 – "*YEVLAKH*" in Yevlakh District (Azerbaijan) located on the state forest lands of the Yevlakh Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic.

1.1. Corresponding Project Activities

Design and carry out site surveys (1.2.3.)
Prepare transformation plans for the selected stands (1.2.4)

1.2. Duration of the Field Trip

The field trip was organized from 7 November to 8 November, 2011.

1.3. Place of the Field Trip

Day 1- Pilot Forest Site N2 – "*YEVLAKH*" in Yevlakh District
Day 2- Pilot Forest Site N1 – "*AGSU*" in Shamalkhi District

1.4. Purpose of the Field Trip

The purpose of the visit was to make final decisions on the borderlines of pilot areas "*YEVLAKH*"and "*AGSU*". Secondly site conditions and transformation strategies for the selected sites should be discussed.

1.5. List of Organizers and Participants

Name	Position	Organization
Elshad Askerov	Director	WWF Azerbaijan
Giorgi Beruchashvili	GIS Expert, EU ENRTP Caucasus Project	WWF Caucasus
Hannes Neuner	International Project Advisor, EU ENRTP Caucasus Project	WWF Caucasus

2. FIELD TRIP COMPONENTS

2.1. Field Observations and Actions

Pilot Forest Site N1 – "*AGSU*"



Fig 1: Director of WWF Azerbaijan and WWF GIS Expert discussing border line of Pilot Forest Site N1 – "*AGSU*" and respective transformation measures

Pilot Forest Site N2 – "*YEVLAKH*" in Yevlakh District

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Azerbaijan:
Branch Office of the WWF - World Wide Fund for Nature in the Azerbaijan Republic (WWF Azerbaijan)
M.Mushfag Str., Blok 105, 2K
AZ 1073 Baku
Tel/Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus



Fig. 2: Determination of borderline Pilot Forest Site N2 – "*YEVLAKH*"

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Azerbaijan:
Branch Office of the WWF - World Wide Fund for Nature in the Azerbaijan Republic (WWF Azerbaijan)
M.Mushfag Str., Blok 105, 2K
AZ 1073 Baku
Tel/Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

2.2. Results

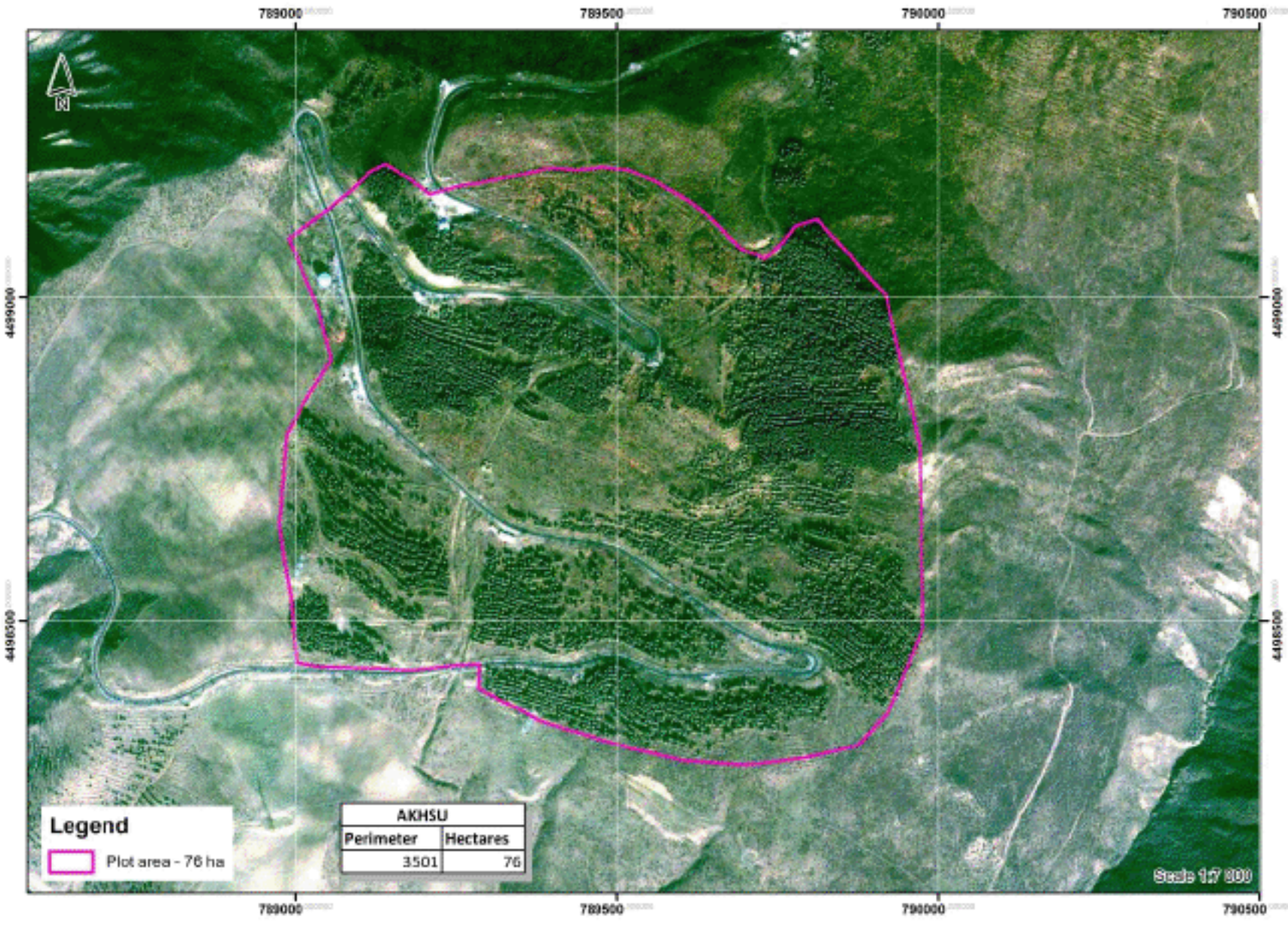
WWF Project Team (Director WWF Azerbaijan, WWF GIS Expert and International Adviser) carried out a site survey of the two pilot sites. The team walked along the potential borderline of the sites and discussed and corrected unclear parts of borderline.

The area of the pilot site Pilot Forest Site N1 – "*AGSU*" covers 76 ha and the perimeter adds up to 3501m (see Annex 1). At the northern part of the site vital, ongoing natural regeneration with broadleaf species could be observed.

The area of the pilot site Pilot Forest Site N2 – "*YEVLAKH*" consists of two plots and covers 75 ha in total. The perimeter adds up to 6684 m (see Annex 2). The conditions on this site are very dry and no natural regeneration is in place.

Annex 1 :

Map of Pilot Forest Site N1 – "*AGSU*" in Shamalkhi District



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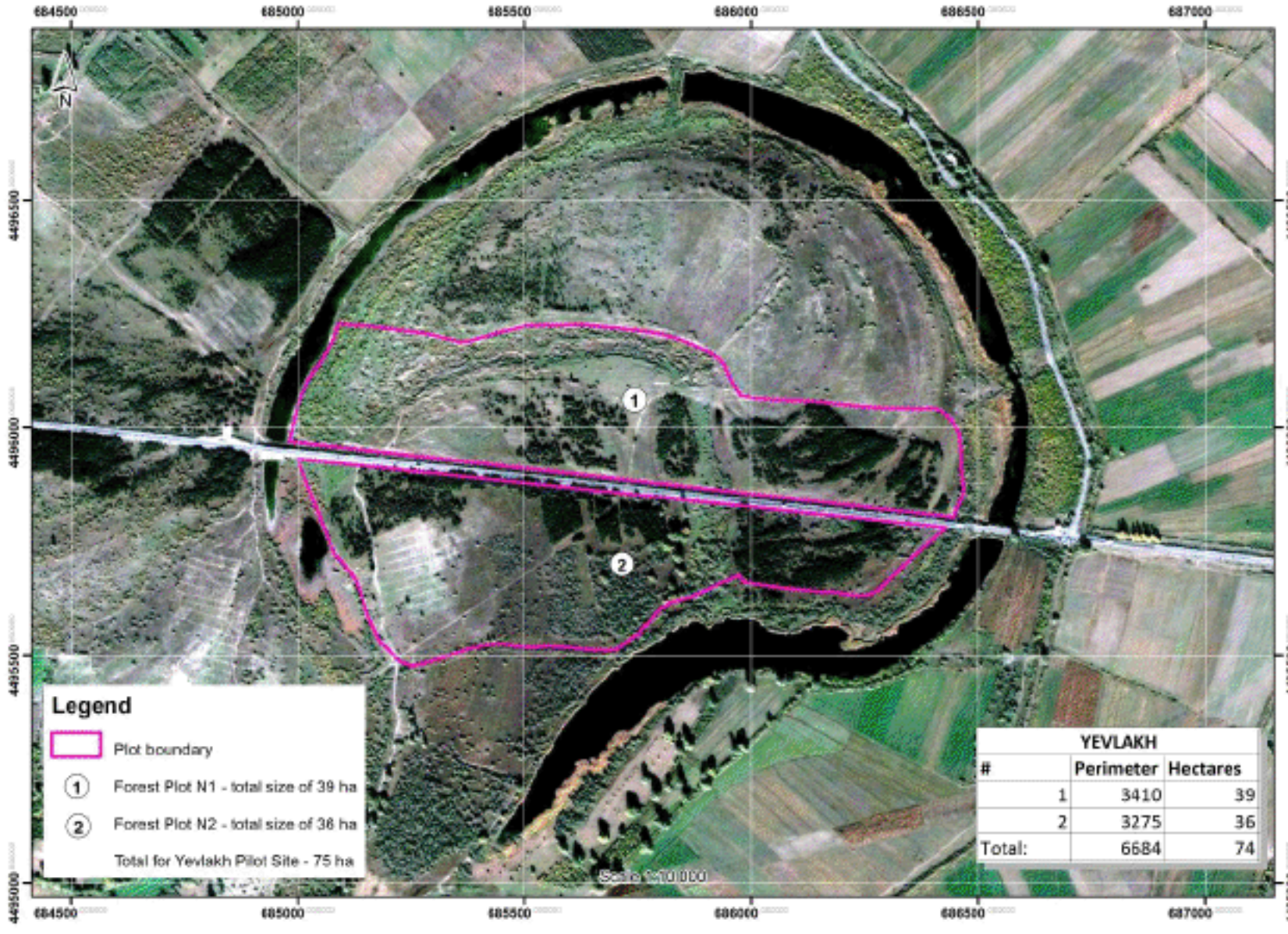
This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Azerbaijan:
Branch Office of the WWF - World Wide Fund for Nature in the Azerbaijan Republic (WWF Azerbaijan)
M.Mushfag Str., Blok 105, 2K
AZ 1073 Baku
Tel/Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Annex 2:

Map of Pilot Forest Site N2 – "*YEVLAKH*" in Yevlakh District



YEVLAKH		
#	Perimeter	Hectares
1	3410	39
2	3275	36
Total:	6684	74

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Azerbaijan:
Branch Office of the WWF - World Wide Fund for Nature in the Azerbaijan Republic (WWF Azerbaijan)
M.Mushfag Str., Blok 105, 2K
AZ 1073 Baku
Tel/Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Annex 14. Workshop Report : National Workshop with Decision-Makers from the Forestry related Government Agencies - Armenia

Workshop Program Documents

National Workshop

with participation of key forestry stakeholders

(Armenia)

Introduction to Climate Change Impacts on Forests and of Transformation Strategies and the Objectives, Expected results, and Activities of the EU financed Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation

(24 June, 2011 – Yerevan, Armenia)

The workshop documents are the sole responsibility of the Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation and can in no way be taken to reflect the views of the European Union

24 June, 2011, Yerevan

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project national office in Armenia:
WWF Armenian Branch (WWF-Armenia)
Proshyan St. 11
0019, Yerevan, Armenia
Tel.: + (37410) 54-61-56
Fax: + (37410) 58-89-83
office@wwfcaucasus.am
www.panda.org/armenia

Program

1. Summary

This workshop was organized within the framework of recently started (March, 2011) EU supported Project on Increasing the resilience of forest ecosystems against climate change in the South Caucasus Countries (Georgia, Armenia, Azerbaijan) through forest transformation.

The overall objective of the project is to increase the resilience of forest ecosystems in the Southern Caucasus against climate change impacts and to improve biodiversity and livelihoods of local populations. The overall objective addresses the overarching threat of climate change to biodiversity and to forest ecosystem services which support the livelihoods of rural communities. Those services include protection of soils and water supply and quality, and timber and non-timber forest products. Objectively Verifiable Indicator (OVI) for the overall objective is that: by 2015 (two years after the proposed actions completion), the governments of Georgia, Armenia and Azerbaijan will have adopted and started to implement policies that will make forests and the services they provide highly resilient to climate change.

The specific objective of the project contributes to the overall objective by establishing the necessary conditions for the forest administrations in the target countries to develop and implement strategies for transforming monoculture forest stands into highly resilient, “close to nature” forest stands. It is proposed to do this through awareness raising about climate change impacts on forests, demonstrating practical measures to make forests more resilient, and providing forest administration staff and local community members, local NGOs, and CBOs who use or manage forests with the necessary knowledge and skills to transfer the development and implementation of transformation measures to other forest stands.

To achieve the specific objective, the following OVIs are proposed by the end of the project:

- forest stand structure has been transformed in such a way that they will be highly resilient to climate change on pilot sites;

- forest stand potential to enhance the livelihoods of neighbouring communities will have increased on 6 pilot sites (two in each of the three target countries and about 75 hectares each) in 3 countries; and

- the chief executives and heads of the policy and planning departments of forest administrations and heads of relevant departments in the forest administrations show a demonstrable increase in their awareness of climate change impacts on forests and motivation to develop strategies for making forests more resilient.

Expected results of the project are: Result 1 - Selected forest stands vulnerable to climate change have been transformed into highly resilient "close to nature" forest stands; Result 2 - Silvicultural guidelines for the transformation of monoculture stands into more resilient stands are elaborated, published in three languages and made available for relevant officials and experts; Result 3 - The capacities of forest administration experts to develop silvicultural strategies to transform monoculture stands into stable, site-adapted forests are increased; Result 4 - The awareness of local communities about the importance of forest rehabilitation with regard to mitigating negative biotic and abiotic impacts of climate change is improved.

The workshop was arranged and facilitated by WWF Armenian Branch (WWF-Armenia) which is a partner organization of the project leading organization - WWF-Germany. WWF-Armenia plays a role of the project Armenian country office.

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project national office in Armenia:
WWF Armenian Branch (WWF-Armenia)
Proshyan St. 11
0019, Yerevan, Armenia
Tel.: + (37410) 54-61-56
Fax: + (37410) 58-89-83
office@wwfcaucasus.am
www.panda.org/armenia

2. Objectives of the workshop

The main objective of the workshop was to introduce to Climate Change Impacts on Forests and of Transformation Strategies and the Objectives, Expected Results, and Activities of the EU financed Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation.

The workshop was used as a forum for discussing the selection criteria for selecting the sites at which transformation measures will be piloted in Armenia.

3. Workshop Outputs

The workshop strengthened participant's knowledge about climate change impacts on forests and of transformation strategies. Participation in the workshop contributed to their ability to develop policies that increase the resilience of forests in Armenia and to lobby for support of these policies.

The selection criteria for selecting the sites at which transformation measures will be piloted in Armenia were discussed and agreed.

Consensus on possible location of two pilot sites in Armenia will be reached by reviewing the potential areas using the criteria developed under the project.

The conclusions of the workshop include the following main items:

- It was highlighted by the workshop participants that forest transformation is an important tool to make monoculture forest stands more resilient to climate change;
- It was agreed that it is worth thinking about selecting pilot sites having various natural-climatic conditions;
- It was mentioned that as monoculture it probably should be thought about pine stands planted in the past and damaged due to being non-resilient to climatic conditions or young planted pine stands, which needs transformation to grow into a resilient to climate change stands;
- It was mentioned that preparation of transformation plans is an important step toward having proposed measures properly implemented;
- It was agreed that for transformation the local aborigine species should be used, which will ensure improvement of forest stands and resilience to climate change;
- It was mentioned that involvement of local communities in the project activities is important for success of the project as well as for awareness raising about climate change and ways to tackle it.

4. Participants

The workshop was attended by the key forestry stakeholders in Armenia (see the list of participants below).

This project is funded by the EU

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project national office in Armenia:
WWF Armenian Branch (WWF-Armenia)
Proshyan St. 11
0019, Yerevan, Armenia
Tel.: + (37410) 54-61-56
Fax: + (37410) 58-89-83
office@wwfcaucasus.am
www.panda.org/armenia

5. Contacts:

PROJECT NATIONAL OFFICE IN ARMENIA: WWF ARMENIA
Mr. Karen Manvelyan – Director
WWF-Armenia
Proshyan Str.11, 0019, Yerevan, Armenia
Tel.: + (37410) 54-61-56, ext.12
Fax: + (37410) 58-89-83
Email : kmanvelyan@wwfcaucasus.am
http://www.panda.org/armenia

Mrs. Siranush Galstyan – National Coordinator
WWF Caucasus
WWF-Armenia
Proshyan Str.11, 0019, Yerevan, Armenia
Tel.: + (37410) 54-61-56, ext.15
Fax: + (37410) 58-89-83
Email : sgalstyan@wwfcaucasus.am
http://www.panda.org/armenia

6. Venue:

The workshop was held at WWF-Armenia Conference Hall.

This project is funded by the EU

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project national office in Armenia:
WWF Armenian Branch (WWF-Armenia)
Proshyan St. 11
0019, Yerevan, Armenia
Tel.: + (37410) 54-61-56
Fax: + (37410) 58-89-83
office@wwfcaucasus.am
www.panda.org/armenia

AGENDA
24 June 2011
WWF Armenian Branch
Yerevan

15.00- 15.10	Welcome	Karen Manvelyan, Director WWF Armenia
15.10-15.20	Opening remarks and agenda	Arthur Alaverdyan, Project Coordinator WWF Armenia
15.20-15.30	Role of WWF Armenia in development of forest sector in Armenia	Siranush Galstyan, Conservation Programme Manager WWF Armenia
15.30-15.40	Presentation of the project	Arthur Alaverdyan, Project Coordinator WWF Armenia
15.40-16.00	Site selection criteria	Arthur Alaverdyan, Project Coordinator WWF Armenia
16.00 – 16.30	Coffee break	
16.30 – 18.00	Discussion, Q&A	All

List of participants

N	Name	Organization
1	Nune Hovhannisyan	RA Ministry of Nature Protection, International Department
2	Rosa Margaryan	RA Ministry of Nature Protection, Biodiversity Policy Department
3	Armen Nalbandyan	"Hayantar" SNCO of the RA Ministry of Agriculture
4	Andranik Ghulijanyan	"Forest Research-Experimental Center" SNCO under the Ministry of Nature Protection
5	Arman Kandaryan	Armenia Tree Project
6	Ayser Ghazaryan	"Sustainable Management of Biodiversity in the South Caucasus" project (GIZ)
7	Diana Harutyunyan	UNDP, Climate Change portfolio
8	Aram Ter-Zakaryan	UNDP, Climate Change portfolio
9	Hovhannes Ghazaryan	UNDP/GEF SGP National Coordinator
10	Karen Manvelyan	WWF-Armenia, Director
11	Arthur Alaverdyan	WWF-Armenia, EU Project Coordinator
12	Siranush Galstyan	WWF-Armenia, Project Coordinator

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project national office in Armenia:
WWF Armenian Branch (WWF-Armenia)
Proshyan St. 11
0019, Yerevan, Armenia
Tel.: + (37410) 54-61-56
Fax: + (37410) 58-89-83
office@wwfcaucasus.am
www.panda.org/armenia

Annex 15. Workshop Report : National Workshop with Decision-Makers from the Forestry related Government Agencies - Georgia

National Workshop

with representatives/decision-makers from the forestry related government agencies

(Georgia)

Introduction to Climate Change Impacts on Forests and of Transformation Strategies and the Objectives, Expected results, and Activities of the EU financed Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation

(21 June, 2011 – Tbilisi, Georgia)

Workshop Report

The workshop documents are the sole responsibility of the Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation and can in no way be taken to reflect the views of the European Union

14 June, 2011, Tbilisi

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This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

National Workshop

with representatives/decision-makers from the forestry related government agencies (Georgia)

Introduction to Climate Change Impacts on Forests and of Transformation Strategies and the Objectives, Expected Results, and Activities of the EU financed Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation

21 June, 2011 - Tbilisi, Georgia

WWF Caucasus Conference Hall

Programme

1. Summary

This workshop is being organized within the framework of recently started (March, 2011) EU supported Project on Increasing the resilience of forest ecosystems against climate change in the South Caucasus Countries (Georgia, Armenia, Azerbaijan) through forest transformation.

The overall objective of the project is to increase the resilience of forest ecosystems in the Southern Caucasus against climate change impacts and to improve biodiversity and livelihoods of local populations. The overall objective addresses the overarching threat of climate change to biodiversity and to forest ecosystem services which support the livelihoods of rural communities. Those services include protection of soils and water supply and quality, and timber and non-timber forest products. Objectively Verifiable Indicator (OVI) for the overall objective is that: by 2015 (two years after the proposed action.s completion), the governments of Georgia, Armenia and Azerbaijan will have adopted and started to implement policies that will make forests and the services they provide highly resilient to climate change.

The specific objective of the project contributes to the overall objective by establishing the necessary conditions for the forest administrations in the target countries to develop and implement strategies for transforming monoculture forest stands into highly resilient, “close to nature” forest stands. It is proposed to do this through awareness raising about climate change impacts on forests, demonstrating practical measures to make forests more resilient, and providing forest administration staff and local community members, local NGOs, and CBOs who use or manage forests with the necessary knowledge and skills to transfer the development and implementation of transformation measures to other forest stands.

To achieve the specific objective, the following OVIs are proposed by the end of the project:
- forest stand structure has been transformed in such a way that they will be highly resilient to climate change on pilot sites;

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

- forest stand potential to enhance the livelihoods of neighbouring communities will have increased on 6 pilot sites (two in each of the three target countries and about 75 hectares each) in 3 countries; and
- the chief executives and heads of the policy and planning departments of forest administrations and heads of relevant departments in the forest administrations show a demonstrable increase in their awareness of climate change impacts on forests and motivation to develop strategies for making forests more resilient.

.

Expected results of the project are: Result 1 - Selected forest stands vulnerable to climate change have been transformed into highly resilient "close to nature" forest stands; Result 2 - Silvicultural guidelines for the transformation of monoculture stands into more resilient stands are elaborated, published in three languages and made available for relevant officials and experts; Result 3 - The capacities of forest administration experts to develop silvicultural strategies to transform monoculture stands into stable, site-adapted forests are increased; Result 4 - The awareness of local communities about the importance of forest rehabilitation with regard to mitigating negative biotic and abiotic impacts2 of climate change is improved.

The workshop will be arranged and facilitated by WWF Caucasus Programme Office (WWF Caucasus) which is a partner organization of the project leading organization - WWF-Germany. WWF Caucasus plays a role of the project regional office (for the South Caucasus) and the project Georgian country office.

2. Objectives of the workshop

The main objective of the workshop with representatives/decision-makers from the forestry related government agencies is introduction to Climate Change Impacts on Forests and of Transformation Strategies and the Objectives, Expected Results, and Activities of the EU financed Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation.

The workshop will be used as a forum for discussing the selection criteria for selecting the sites at which transformation measures will be piloted in Georgia.

3. Outputs

The workshop will strengthen participant's knowledge about climate change impacts on forests and of transformation strategies. Through participating in this action, they will be able to develop policies that increase the resilience of forests in Georgia and to lobby for support of these policies from ministers and the parliaments.

The selection criteria for selecting the sites at which transformation measures will be piloted in Georgia will be discussed and agreed.

Consensus on possible location of two pilot sites in Georgia will be reached by reviewing the potential areas using the criteria developed under the project.

Actionable plan for finalization of site selection process in upcoming one month and recommendations on how the WWF can be more effective in providing mutual support on technical issues and

promoting learning, including identification of key areas where additional technical support is needed will be produced.

4. Participants

The workshop action will target policy makers in the environment ministries and forestry administrations of Georgia (see tentative list of participants).

The targeted institutions are:

- Standing Comitteee on Environment Protection and Natural Resources of the Parliament;
- the Ministry of Energy and Natural Resources and the ministry's Natural Resources Agency/Forest Management Department;
- the Ministry of Environment Protection;
- Tbilisi Municipality.

5. Contacts:

PROJECT REGIONAL OFFICE IN THE SOUTH CAUCASUS : WWF CAUCASUS

Giorgi Sanadiradze – Director
WWF Caucasus
Merab Aleksidze Str.11, 0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237- 500 ext.121 Fax: + (995 32) 2-237-501
Email : gsanadiradze@wwfcaucasus.ge
http://www.panda.org/caucasus

Malkhaz Dzneladze - Regional Coordinator of the Project
WWF Caucasus
Merab Aleksidze Str.11, 0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237- 500 ext.118 Fax: + (995 32) 2-237-501
Mob.: + (995 99) 108 958
Email : mdzneladze@wwfcaucasus.ge
http://www.panda.org/caucasus

This project is funded by the EU

This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

National Workshop

with representatives/decision-makers from the forestry related government agencies (Georgia)

Introduction to Climate Change Impacts on Forests and of Transformation Strategies and the Objectives, Expected Results, and Activities of the EU financed Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation

21 June, 2011 - Tbilisi, Georgia

WWF Caucasus Conference Hall

Workshop Agenda

June 21, 2011

I. Decision-makers part

10:00 – 10:05	Opening	
10:05 – 10:15	Welcoming and introductory speeches	Michal Nekvasil – EC Delegation to Georgia, Deputy Head of Operations Zaza Gamtsemlidze – First Deputy Chairman of the Environment Protection and Natural Resources Committee of the Parliament of Georgia Giorgi Sanaditadze – WWF Caucasus, Director
10:15 – 10:20	Description of main objectives of the Workshop and adoption of the agenda	Malkhaz Dzneladze – WWF Caucasus, the Project Regional Coordinator
10:20 – 10:40	Objectives, Expected Results, and Activities of the EU financed Project	Malkhaz Dzneladze – WWF Caucasus, the Project Regional Coordinator
10:40 – 11:10	Discussion	Workshop participants
11:10 – 11:20	Coffee break	
11:20 – 11:45	Introduction to Climate Change Impacts on Forests, Transformation Strategies, and of Site Selection Criteria for Transformation	Hannes Neuner – WWF Caucasus, Senior Forest Officer / the Project Regional Advisor

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

11:45 – 12:00	Discussion	Workshop participants
12:00 – 12:20	Presentation on potential sites in Georgia (review and general analyses)	Hannes Neuner – WWF Caucasus, Senior Forest Officer / the Project Regional Advisor Malkhaz Dzneladze – WWF Caucasus, the Project Regional Coordinator
12:20 – 12:40	Discussion	Workshop participants
12:40 – 12:55	Recommendations for finalization of site selection process in Georgia (June-July)	Hannes Neuner – WWF Caucasus, Senior Forest Officer / the Project Regional Advisor Malkhaz Dzneladze – WWF Caucasus, the Project Regional Coordinator
12:55 – 13:00	Next steps and closure of decision-makers part of the workshop	Malkhaz Dzneladze – WWF Caucasus, the Project Regional Coordinator
13:00 – 14:00	Lunch	

II. Technical part

14:00 – 17:30	Continuation of technical work (analyses of forestry and socio-economic information and GIS mapping) in joint working group of specialists	WWF project team and representatives of the forest related agencies
17:30 – 17:45	Adoption of the technical ways on finalization of work for site selection	Workshop participants
17:45 – 17:55	Evaluation of the technical part of the Workshop and next steps	Malkhaz Dzneladze – WWF Caucasus, the Project Regional Coordinator
17:55 – 18:00	Closure	

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

National Workshop

with representatives/decision-makers from the forestry related government agencies (Georgia)

Introduction to Climate Change Impacts on Forests and of Transformation Strategies and the Objectives, Expected Results, and Activities of the EU financed Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation

21 June, 2011 - Tbilisi, Georgia

WWF Caucasus Conference Hall

List of Participants

	NAME	ORGANIZATION	POSITION	ADDRESS	PHONE/ FAX, E-MAIL
1.	Mr. Michal NEKVASIL	EC Delegation to Georgia	Second Secretary, Deputy Head of Operations	38 Nino Chkheidze St., 0102 Tbilisi, Georgia	Tel.: +995 32 943 763 Fax: +995 32 943 768 michal.nekvasil@ec.europa.eu
2.	Mr. Zaza GAMTSEMLIDZE	Environment Protection and Natural Resources Committee, Parliament of Georgia	Firest Deputy Chairman	Rustaveli ave 18	Tel.: +995 32 2-284-205 zaza.gamtsemlidze@parliament.ge
3.	Mr. Giorgi SANADIRADZE	WWF Caucasus	Director	Aleksideze Str.11 0193 Tbilisi Georgia	gsanadiradze@wwfcaucasus.ge
4.	Mr. Giorgi KORKASHVILI	Environmental and Green Areas (incl. Forests) Service of the City of Tbilisi	Head	Kostava Str. I turn 33 0179 Tbilisi	Tel.: +(995 32) 2-37-82-38 Fax : +(995 32) 2-37-82-21
5.	Mr. Vasil CHALADZE	Environmental and Green Areas (incl. Forests) Service of the City of Tbilisi	Deputy Head	Kostava Str. I turn 33 0179 Tbilisi	Tel.: +(995 32) 2-37-82-38 Fax : +(995 32) 2-37-82-21 v.chaladze@tbilisi.gov.ge
6.	Mr. Josef KARTSIVADZE	Ministry of Environment Protection	Head of Biodiversity Service	Gulia Str. 6, 0114 Tbilisi, Georgia	
7.	Ms. Nona KHELAIA	Ministry of Environment Protection	Biodiversity Service	Gulia Str. 6, 0114 Tbilisi, Georgia	-
8.	Ms. Tea SIPRASHVILI	Natural Resources Agency of the Ministry of Energy and Natural Resources	Head of Int.Relations	Gulia Str. 6, 0114 Tbilisi, Georgia	-
9.	Mr. Giorgi KIKNAVELIDZE	Forest Management Department, Natural Resources Agency, Ministry of Energy and Natural Resources	Head	Gulia Str. 6, 0114 Tbilisi, Georgia	-

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

10.	Natia IORDANISHVILI	Forest Management Department, Natural Resources Agency, Ministry of Energy and - Natural Resources	Head of Unit	Gulia Str. 6, 0114 Tbilisi, Georgia	-
11.	Nana SUJASHVILI	Forest Management Department, Natural Resources Agency, Ministry of Energy and Natural Resources	Sen.Specialist	Gulia Str. 6, 0114 Tbilisi, Georgia	
12.	Mr. Hannes NEUNER	WWF Caucasus	Senior Forest Officer	Aleksideze Str.11 0193 Tbilisi Georgia	hneuner@wwfcaucasus.ge
13.	Mr. Malkhaz DZNELADZE	WWF Caucasus	Project regional coordinator	Aleksideze Str.11 0193 Tbilisi Georgia	mdzneladze@wwfcaucasus.ge
14.	Mr. Zviad GOTSIRIDZE	WWF Caucasus	Project national coordinator for Georgia	Aleksideze Str.11 0193 Tbilisi Georgia	zgotsiridze@wwfcaucasus.ge
15.	Mr. Ilia OSEPASHVILI	WWF Caucasus	Forest Officer	Aleksideze Str.11 0193 Tbilisi Georgia	iosepashvili@wwfcaucasus.ge

Workshop Support Group

16.	Ms. Sophiko MGELADZE	WWF Caucasus	Project assisstant	Aleksideze Str.11 0193 Tbilisi Georgia	smgeladze@wwfcaucasus.ge
17.	Mr. Giorgi BERUCHASHVILI	WWF Caucasus	GIS spesialist	Aleksideze Str.11 0193 Tbilisi Georgia	gberuchashvili@wwfcaucasus.ge
18.	Mr. Tamaz GAMKRELIDZE	WWF Caucasus	Communication officer	Aleksideze Str.11 0193 Tbilisi Georgia	tgamkrelidze@wwfcaucasus.ge

This project is funded by the EU

This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

National Workshop

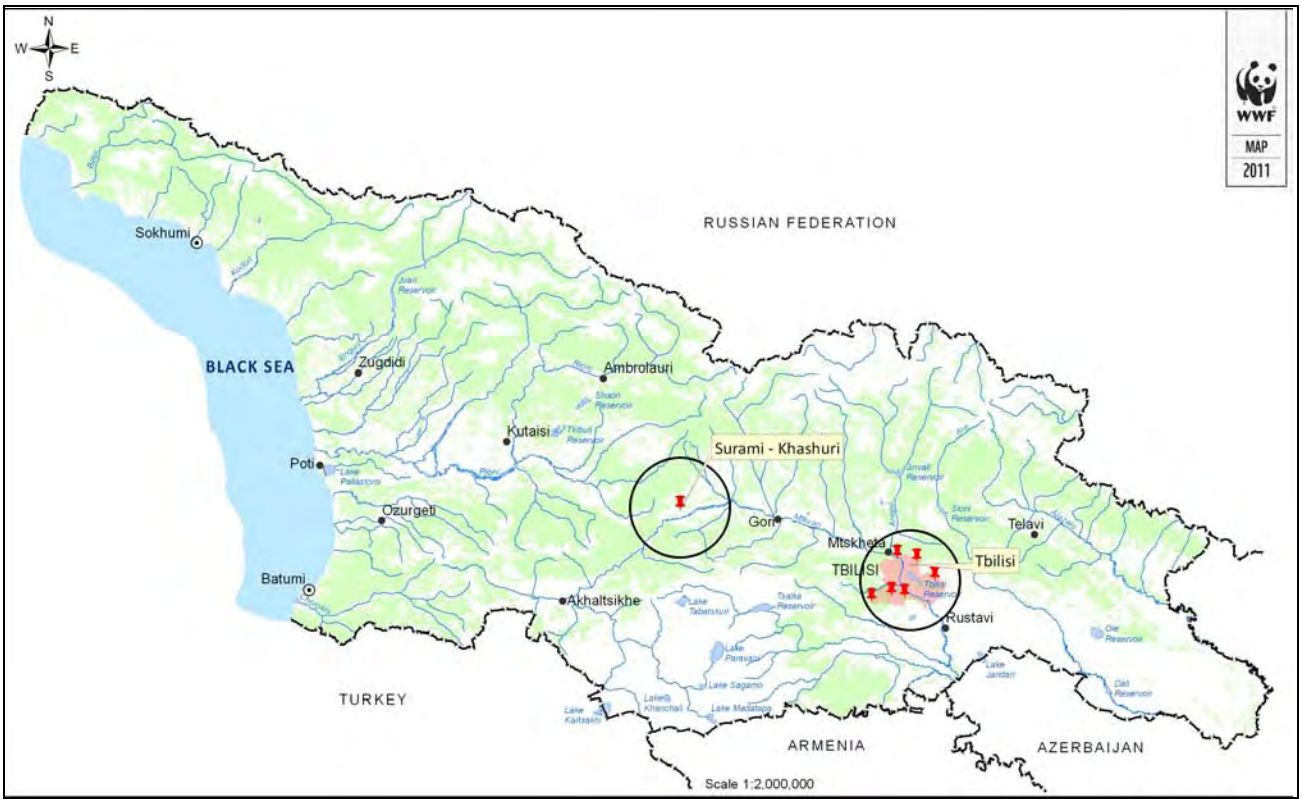
with representatives/decision-makers from the forestry related government agencies (Georgia)

21 June, 2011 - Tbilisi, Georgia
WWF Caucasus Conference Hall

Main Workshop Output:

Principal Locations of the Potential Pilot Site Agreed with Stakeholders

(Municipality of Khashuri and Municipality of Tbilisi)



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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

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National Workshop

with representatives/decision-makers from the forestry related government agencies (Georgia)

21 June, 2011 - Tbilisi, Georgia, WWF Caucasus Conference Hall

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Workshop Photos

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Annex 16. Report of Research on Resilience of Forest Stands

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SERVICE CONTRACT No.WWF-CAUCASUS-01/01-SRV-REG-2011/ENRTP
SERVICES OF TECHNICAL ASSISTANCE OF AN INTERNATIONAL FORESTRY EXPERT TO THE PROJECT "INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION"
(EuropeAid/128320/C/ACT/Multi External Actions of the European Union No. DCI-ENV/2010/221391)

ADAPTATION OF FORESTS TO CLIMATE CHANGE

REPORT OF DESK-BASED RESEARCH ON RESILIENCE OF FORESTS TO CLIMATE CHANGE AND TRANSFORMATION MEASURES

Final Version
May 24, 2012

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

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Annex II. Site Selection Criteria

Acronyms and Abbreviations

CCF	Continuous Cover Forestry / Continuous Cover Forest Management
CNF	Close to Nature Forestry
CO_2	Carbon dioxide
ENRTP	Thematic Programme of the European Union on Environment and Sustainable Management of Natural Resources including Energy
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FSC	Forest Stewardship Council
GCM	General Circulation Model
GHG	Greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
MENR-AZ	Ministry of Ecology and Natural Resources of Azerbaijan
MEPNR-GE	Ministry of Environment Protection and Natural Resources of Georgia (*since Feb-2011 the Ministry of Environment Protection of Georgia*)
MNP-AM	Ministry of Nature Protection of Armenia
PEFC	Programme for the Endorsement of Forest Certification
UK	United Kingdom
UKWAS	UK Woodland Assurance Scheme
UN	United Nations
UNDP	United Nations Development Programme
UNFCC	United Nations Framework Convention on Climate Change
WWF	Worldwide Fund for Nature

Units of Measurement

m	metres
masl	metres above sea level
^oC	degrees centigrade
Gg	Gigagramme (10^9 grammes)
tonne	metric tonne (10^3 kilogrammes)

1. Introduction

This report forms the first deliverable under the contract between Mike Garforth (the Expert) and WWF-Caucasus made in the framework of the project *Increasing the resilience of forest ecosystems against climate change in the Southern Caucasus Countries (Armenia, Azerbaijan, Georgia) through forest transformation* (the Project). The Project is financed by the European Union (EU) in the framework of the EU's Thematic Programme on Environment and Sustainable Management of Natural Resources including Energy (ENRTP).

The purpose of the Project is to establish the necessary conditions for the national forest administrations of the south Caucasus countries to develop and implement strategies for transforming monoculture forest stands into highly resilient, "close to nature" forest stands. The project purpose is to be achieved through raising awareness about climate change impacts on forests, demonstrating practical measures to make forests more resilient, and providing staff of forest administrations and local community members who use forests with the necessary knowledge and skills to transfer the development and implementation of transformation measures to other forest stands.

1.1. The Expert's assignment

The purpose of the Consultant's assignment in general terms is to assist in achieving the project's expected results, which are:

- selected forest stands in Armenia, Azerbaijan and Georgia that are vulnerable to climate change are transformed into highly resilient, "close to nature" forest stands;
- regional silvicultural guidelines for the transformation of monoculture stands into more resilient stands are elaborated and published;
- capacities of forest administration experts to develop silvicultural strategies to transform monoculture stands into stable, site-adapted forests are increased;
- awareness of local communities about the importance of forest rehabilitation with regard to mitigating negative biotic and abiotic impacts of climate change is improved.

The Consultant's terms of reference specify seven tasks:

1. Conduct desk-based broad-spectrum research into the resilience of forest stands and prepare recommendations on transformation measures appropriate to the Project's pilot sites.
2. Revise and edit the country forest transformation plans prepared by the national forest planning organizations for the pilot forest sites.
3. Participate in the preparation of the programme for a study tour for senior governmental agencies and forest administration staff and local authorities which will take place in 2012.
4. Participate in annual technical reviews of the Project implementation by analyzing and compiling national and regional information and reports into a draft version of technical annual review.

5. Prepare draft regional silvicultural guidelines on forest transformation strategies and techniques in English in the form of a practical handbook.
6. Prepare a draft of a popular report of the Project's activities, results and lessons learned in English.
7. Participate in and moderate the regional conference on forest resilience and transformation to be held in Tbilisi in 2012.

The present report presents the results of Task 1.

The report was prepared in parallel with the preparation of the transformation plans for the pilot sites and will serve as a practical narrative guide to finalize those plans.

1.2. Structure of the report

Chapter 2 of this report presents a short overview of the forests of Armenia, Azerbaijan and Georgia, their importance, and the pressures and threats that they face.

Chapter 3 presents information about changes in the climate in the region up to the present day and predicted future changes from modelling studies.

Chapter 4 describes the impacts of changes in the climate on forests generally and the impacts that we should expect on forests in the South Caucasus

Chapter 5 describes strategies for mitigating the impacts of climate change on forests including adaptation of forests to climate change.

Chapter 6 discusses resilience and close to nature forest management and recommends a process for elaborating transform plans for the pilot sites.

Chapter 7 provides a brief outlook for the pilot sites in the face of the uncertainty surrounding the predictions about the future climate.

2. Forests of the South Caucasus Countries

2.1. Extent and types

Forests[1] cover 4 million hectares of the Southern Caucasus countries, which makes up 22% of the countries' combined land and inland water surfaces: Armenia 307 thousand hectares (10.3%), Azerbaijan 990 thousand hectares (11.4%), Georgia 2,793 thousand[2] hectares (40.7%) (FAO, 2010a).

[1] In this context "forest cover" means the area under "forest" and "other wooded land" as defined by the Food and Agriculture Organisation (FAO, 2010). FAO defines "forest" as "Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use." FAO defines "other wooded land" as "Land not classified as "Forest", spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5–10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use."

[2] In this report commas are used to denote thousands, full stops (periods) are used to denote decimal points.

The region's present day forest cover is much less than when human beings first started to clear forests on a substantial scale for agriculture and settlements. It has been estimated[3] that the former area of forests may have been as much as 9 million hectares, from which we could deduce that 55% (5 million ha) of former forest cover has been cleared.

The region's wide variety of climatic zones[4] in combination with variation in soils and relief has provided conditions for the development of a wide variety of vegetation formations. All of the six forest formations identified in the Caucasus Ecoregion (Bohn et al, 2007) are found in the Southern Caucasus. The following description is adapted from Zazanashvili et al, 2011.

Forests dominated by beech (*Fagus orientalis*) are the largest in area. In the Colchic region of western Georgia beech forests occur almost from sea level to the upper forest boundary. At 1,000-1,400 masl, beech is partially substituted with spruce and fir. In less humid areas of the South Caucasus the lower boundary of the beech forests moves higher in mountains; here beech mainly grows on northern slopes, leaving more lighted slopes to oak, oak-hornbeam, and hornbeam forests.

Oak forests used to be widespread but clearance for agriculture, viticulture and fruit growing and pressure of grazing have substantially reduced their range. They have survived mainly in hard-to-access ravines, on comparatively poor soils and on steep rocky slopes. In the lower and middle parts of the forest zone the main species is *Quercus iberica*. Lowland/riverside and flood plain forests in the eastern part of the region are formed mainly from *Q. pedunculiflora*. The prevailing species in the Talysh forests is *Q. castaneifolia* prevails, in the foothills of Colchic region *Q. hartwissiana*, and *Q. imtretina*, and *Q. dschorochensis* prevail in Adjara on drier valley slopes. The relict and Colchic endemic *Q. pontica* is common in the lower subalpine belt in the western part of Colchic region. Usually oak is mixed with hornbeam forming oak-hornbeam forests (with *Carpinus orientalis, C. caucasica*).

Chestnut, frequently together with hornbeam and beech, forms forests on mountain yellow soils and acidic brown soils in the mountains and foothills of Colchis and in some places in the Eastern Greater Caucasus (e.g. on the slopes of the watershed ridge towards the Alazani-Agrichay depression). In Colchis, chestnut is found from the sea level to 1,200-1,300 masl, and in the eastern Southern Caucasus between 500 and 1,100 masl. As one of the most precious species of the Caucasus, chestnut historically has been felled intensively, which has resulted in the chestnut area shrinkage and significantly deteriorated health of the trees.

Dark coniferous forests composed of fir (*Abies nordma*nniana), spruce (*Picea orientalis*) and spruce with beech occur in the mountains of Colchis and in western areas of Eastern Georgia, where they are found in the middle and upper parts of the forest zone (from 900-1,100 to 2,000-2,150 masl), though optimally in the altitudinal range 1,400 to 1,750 masl. Light coniferous forest formed from pine (*Pinus kochiana*) occurs mainly in the upper reaches of the Kura river catchment.

[3] Zazanashvili et al (2011).

[4] The region's climate zones range from north subtropical humid in the west of Georgia (average annual temperature 12 - 16^{o}C, annual precipitation 1,600 - 2,000 mm) to subtropical arid extending from south-east Georgia towards the Caspian Sea coast of Azerbaijan (average annual temperature 12 - 16^{o}C, annual precipitation less than 200 mm), and from cold moderate mountain in parts of the Greater Caucasus and West Lesser Caucasus mountain ranges (average annual temperature 7-10^{o}C, annual precipitation 800-1,600 mm) to temperate arid mountain extending from central Armenia through Nakhchivan (Azerbaijan) (average annual temperature 7-10^{o}C, annual precipitation <200-400 mm) (Zoi Network, 2011).

A number of other distinct forest types occur in the region but form only a small part of the total area of forest. They include forests formed from maple (*Acer campestre*), maple and elm (*Ulmus minor*), lime (*Tilia cordata*) and alder (*Alnus* spp.). "Crooked forests" growing at the upper forest boundaries include birch (*Betula* spp.), mountain ash (*Sorbus caucasigena*), beech (*Fagus orientalis* in the western Caucasus), oriental oak (*Quercus macranthera* in the east and southern Caucasus), high-mountain maple (*Acer trautvetteri*), and occasionally pine (*Pinus kochiana*). Forests formed from species adapted to low soil moisture levels are found in the drier eastern and south-eastern parts of the region; these forests typically have a much more open canopy. Species which form these so-called arid, sparse forests include juniper (*Juniperus spp.)* and pistachio (*Pistacia mutica),* willow-leaf pear (*Pyrus salicifolia*), Georgian maple (*Acer ibericum*) and pomegramate (*Punica granatum*). In the past, arid sparse forests occupied a much larger area but gradual conversion to grassland as a result of cattle and sheep grazing has substantially reduced its extent. Floodplain forests are found in the lowlands on low river terraces, generally growing on alluvial, swampy or moist soils. Many types formed from a variety of species, including black poplar (*Populus nigra*) and white (or silver) poplar (*Populus alba*), alder (*Alnus barbata*), ash (*Fraxinus excelsior*), pedunculate oak (*Quercus pedunculiflora*) and field elm (*Ulmus minor*).

In addition to natural forest types described above, in the beginning of 1990s there were 198 thousand hectares (4.8% of the total forest area) of artificially propagated plantations. The area of plantation in each of the three countries and the percentage of the country's total forest cover were: Armenia 55 thousand hectares (18%); Azerbaijan 59 thousand hectares (6%); Georgia 84 thousand hectares (3%).

2.2. Importance of the region's forests

Forests in the region fulfil a variety of functions and provide a number of products and services.

Biodiversity

Armenia, Azerbaijan and Georgia lie in the Caucasus ecoregion - one of WWF's 35 "priority places" and one of 34 "biodiversity hotspots" identified by Conservation International as being the richest and at the same time most threatened reservoirs of plant and animal life on Earth. Forests are the most important biome for biodiversity in the region, harbouring many endemic and relic species of plants and providing habitats for globally rare and endangered animals (Williams et al 2006).

Carbon sequestration

Forests contribute significantly to climate change mitigation through their carbon sink and carbon storage functions. Conversely, forest degradation and deforestation result in increased net emissions of carbon dioxide. In the Southern Caucasus countries the picture is a mixed one. In 2010 forests (excluding other wooded land) in Armenia, Azerbaijan and Georgia respectively held 10.2, 46.3 and 168.4 million tones of carbon in above ground biomass (FAO 2010c). Based on the data reported in the Second National Communications to the UNFCC (MNP-AM 2010; MENR-AZ 2010; MEPNR-GE 2009), in the year 2000 Georgia's forests absorbed a volume of CO_2 equal to 25% of the country's gross CO_2 equivalent GHG emissions; for Azerbaijan the percentage was between 7% and 8%. In contrast, there were net emissions of CO_2 of 1,563.6 Gg from Armenia's forest, largely as a result of high levels of logging. Although the data is 12 years out of date, it illustrates the importance of forests, and the importance of responsible stewardship of forests, in the regional carbon balance. The picture in 2012 will be different because the GHG emissions of all three countries have

increased on year 2000 levels and carbon sequestration by the countries' forests will have changed, though it is highly unlikely that carbon sequestration will have increased in the same proportion as the increase in GHG emissions.

Soil and water protection

Forests play an essential role in the protection of soils and water resources. Loss of forest often leads to erosion, increased risk of flooding and water shortage. The services provided by forests become even more important with climate change, which is likely to result in more irregular rainfall patterns and extended drought periods.

Forest products

Many households in the region use wood from the region's forests as fuel; for example one study reported that in Armenia 61% of all households still used wood as fuel in 2010 in spite of a substantial increase in the number of households being connected to the gas distribution network (Junger and Fripp 2011). Rural households harvest nuts, berries and mushrooms from forests for domestic consumption and for sale. Georgia's forests support a relatively small (in comparison with most other European countries) but locally important wood processing industry; according to FAO 2011a about 100,000 cum of industrial roundwood were harvested in 2009.[5]

Culture and health

The region's forests provide opportunities for recreation, education and other social activities.

2.3. Pressures on forests in the region

Apart from the negative impacts of climate change, which are discussed in Chapter 3, the region's forests are under pressure from unsustainable logging for industrial wood and fuel wood and grazing by domestic livestock (which prevents regeneration). Official data on the amount of unsustainable and illegal logging is not reliable because it is based on reported cases, which in many cases are not complete and/or recorded in accurate manner. A recent survey in Armenia indicated that illegal logging for fuel wood could be several times more than the annual allowable cut set by the state forest agency (ICare 2011).

3. Climate change in the region

3.1. Observed changes in the region's climate

Climate change is already occurring in the South Caucasus. According to a recent study on climate trends in the region led by UNDP (UNDP 2011), Armenia, Azerbaijan and Georgia all show statistically increasing trends in mean annual temperature, mean daily minimum temperature and mean daily maximum temperature over the last century. About half of the meteorological stations in Armenia and Azerbaijan and about one quarter in Georgia show statistically significant trends in annual temperature. Almost all the meteorological stations have recorded increases in the duration of warm spells – either consecutive days above 25 ºC or consecutive nights higher than 20 ºC.

According to the same report the evidence for trends in annual precipitation is less convincing, although there are stations in Armenia and Azerbaijan that have experienced

[5] In Azerbaijan logging of industrial roundwood is not sanctioned officially. In Armenia officially sanctioned logging of industrial roundwood amounts to only 10,000 - 15,000 cum a year (Junger and Fripp 2011).

precipitation declines. Armenia's 2nd national communication to the UNFCC reported that annual precipitation decreased by 6% during the previous 80 years (MNP-AM 2010). Azerbaijan reported that average annual precipitation was below the long term norm in almost all regions and on average had fallen by 9.9%; differences seemed more significant in the Kura-Aras Lowland (a decrease of 14.3%), in Ganja-Gazakh (a decrease of 17.7%) and in Nakhchivan (a decrease of 17.1%) (MENR-AZ 2010).

Armenia has reported an increase in the intensity and frequency of hazardous hydro-meteorological phenomena. In the period 1975-2005 the total number of hazardous hydro-meteorological phenomena increased by 1.2 cases per year, and in the last 20 years of the same period (i.e 1985-2005) the increase was 1.8 cases per year (MNP-AM 2010).

3.2. Scenarios for the future climate of the region

In their 2nd national communications to the UNFCC, all three countries presented projections for changes in precipitation and temperature based on the results of modelling. All the projections indicated that the mean annual temperature will increase significantly by the end of the present century. Projections based on the A2 emission scenario[6] were: 1.8 ºC-5.2 ºC and 3.5 ºC-4.9 ºC, in western and eastern Georgia, respectively; 4 ºC - 5.1 ºC in Armenia; and 3 ºC-6 ºC in Azerbaijan. While the projections for temperature appear clear cut, there were discrepancies in the projections for precipitation. One model projected increases in mean annual precipitation in western Georgia and Azerbaijan, while other models for Georgia project declines.

A subsequent study (UNDP 2011) using projections from four General Circulation Models[7] (GCM) which simulate historical climate reasonably well projected declines in precipitation for all three countries: 20-31% in Armenia, 5-23% in Azerbaijan, and 0-24% in Georgia by the end of the century under the A2 emissions scenario. Across the four selected GCMs and using the A2 emissions scenario the projected changes in mean annual temperature by 2050 are: Armenia 1.1 ºC – 1.9 ºC, Azerbaijan 1.0 ºC – 1.6 ºC, Georgia 0.9 ºC – 1.9 ºC. By 2100, the projected increase is more dramatic: Armenia 4.4 ºC - 5.5 ºC, Azerbaijan 3.6 ºC - 4.1 ºC, and Georgia 4.1 ºC - 5.5 ºC.

4. Impacts of climate change on forests

4.1. How climate change affects forests

Before discussing the impacts of climate change on forests it is important to consider that the main driver of human-induced climate change – the concentration of CO_2 in the atmosphere - affects the growth of trees directly. Current concentrations of CO_2 are not optimum for photosynthesis and CO_2 emissions would therefore be expected to enhance growth rates assuming all other environmental conditions remained constant. Controlled environment

[6] GHG emissions scenarios are alternative images or "storylines" of how the future might unfold and are used to analyse how driving forces may influence future emission outcomes and to assess the associated uncertainties. The A2 storyline and scenario family describes a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in a continuously increasing global population. Economic development is primarily regionally oriented and per capita economic growth and technological change are more fragmented and slower than in other storylines. (IPCC 2000)

[7] General Circulation Models (GCMs) are spatially-explicit, dynamic models that simulate the three-dimensional climate system using as first principles the laws of thermodynamics, momentum, conservation of energy and the ideal gas law. (UNDP 2011)

experiments on young trees typically show that biomass production increases by 30–50% when the CO_2 concentration is doubled (Broadmeadow and Ray 2005). Although mature trees are unlikely to respond as much in a forest environment (Oren *et al*., 2001), some increase in productivity is likely and will be accompanied by a range of other effects including lower stomatal conductance leading to reduced water use on a leaf area basis (Medlyn *et al*., 2001), an increase in leaf area (Broadmeadow and Randle, 2002), possible changes in timber quality (Savill and Mather, 1990) and in the nutritional quality of foliage to insect herbivores (Watt *et al*., 1996). However, since all other environment conditions will not remain constant we can expect any increases in productivity resulting from higher levels of CO_2 in the atmosphere to be offset, and in many situations completely cancelled, by changes in the climate resulting from higher levels of CO_2 and other GHGs.

4.1.1 Changes in temperature, rainfall, wind and humidity

Changes in temperature, rainfall, wind and humidity affect forest trees in many ways, including photosynthesis and respiration (and therefore growth), reproduction, pollination, seed dispersal, phenology, pest and disease resistance and competitive ability (Broadhead, Durst and Brown 2009; Maroschek et al. 2009). The response of individual trees determines the way in which the forest responds. If changes in the climate exceed a species' physiological tolerances the rates of biophysical forest processes will be altered (Olesen et al. 2007, Kellomaki et al. 2008, Malhi et al. 2008). After a certain point the vegetation will reach a threshold beyond which it no longer comprises a forest; it will have changed its state. Under severe drying conditions, forests may be replaced by savannahs or grasslands (or even desert).

4.1.2 More frequent extreme weather events

Strong winds can cause severe damage to forests by uprooting and breaking the stems of trees. Heavy rain can cause soil erosion and landslides. The disturbances caused by such events reduce productivity in the short term and can make forests more vulnerable to pests and diseases.

4.1.3 More frequent and more devastating fires

Prolonged dry and hot weather will increase the risk of forest fires. Severe fires destroy organic matter and nutrients are lost by volatilization. Frequent fires can also increase soil erosion, reduce regeneration and in dry areas may accelerate desertification (Kolström, Vilén and Lindner 2011).

4.1.4 More frequent and more severe outbreaks of pests and diseases

Increases in precipitation favour many forest pathogens by enhancing sporulation, dispersal and host infection (Lucier et al 2009 citing Garrett et al. 2006). Warm climate conditions have clearly contributed to some recent insect epidemics: e.g. bark beetles in North America (Lucier et al 2009 citing Berg et al. 2006, Tran et al. 2007, Raffa et al. 2008), defoliators in Scandinavia (Lucier et al 2009 citing Jepsen et al. 2008), aphids in the United Kingdom (Lucier et al 2009 citing Lima et al. 2008) and the processionary moth in continental Europe (Lucier et al 2009 citing Battisti et al. 2005, 2006). The drought stress of trees will make forests more vulnerable to infestation by insect herbivores and fungal diseases (Kolström, Vilén and Lindner 2011).

4.1.5 More favourable conditions for invasive species

Climate change can affect forests by altering environmental conditions and increasing niche availability for invaders (Lucier et al 2009 citing McNeely 1999, McNeely et al. 2001, Hunt et al. 2006, Ward and Masters 2007, Dukes et al. 2009, Logan and Powell 2009). As a result

of climate change, dominant endemic species may no longer be adapted to the changed environmental conditions of their habitat, affording the opportunity for introduced species to invade, and to alter successional patterns, ecosystem function and resource distribution (Lucier et al 2009 citing McNeely 1999, Tilman and Lehman 2001).

4.2. Impacts of climate change on forests in the South Caucasus

A recent study of the impacts of climate change on forests in the South Caucasus predicts that conditions will become less suitable for most of the forest types that occur in the region at present (Zazanashvili et al 2011). Under an ecologically less unfavourable GHG emissions scenario there could be a reduction of 8% in the area suited to the forest types that occur in the region today compared with actual forest cover in 2011. Under an ecologically more unfavourable emissions scenario there could be a reduction of 33%. The models run in the study predict that impacts will vary between bioclimatic zones and countries with Georgia being affected less overall than Armenia and Azerbaijan.

The impacts of climate change on forests in the region will take many years to show and while some forest formations may benefit overall from climate change, most formations will become stressed and lose vigour. Unless species or genotypes that are better adapted to the changing conditions are able to colonize the site the forest will gradually disappear. Modelling based on an ecologically more favourable GHG emissions scenario predicts that conditions will become more suitable over a larger part of the region for dry woodlands, *Buxus*, *Castanea*, *Parrotia* and *Zelkova*. Under the ecologically less favourable scenario conditions will become more suitable over a larger part of the region only for dry woodlands and *Zelkova*.

The study predicts different impacts in the three countries. Under the ecological more favourable GHG scenario, in Georgia conditions become more favourable overall for the forest types that occur in the country today, while in Armenia conditions become slightly less favourable and in Azerbaijan conditions become a lot less favourable. Under the ecologically less favourable climate scenario, the area suitable for existing forest formations in Armenia and Azerbaijan will fall substantially (by 52% and 62% respectively) and several forest types will disappear. In Georgia the predicted impact is less than in Armenia and Azerbaijan - a reduction of 11% in the area suitable for existing forest types.

The impact of long term climate change on forests predicted by the study will take many years to show. Forest formations occupying sites which will become less suitable for them will gradually become more and more stressed; the most vulnerable tree species in the formation will lose vigour and may die prematurely; seed production and the formation's capacity for natural regeneration will be reduced.

This does not mean that forests will disappear. Forests and their biological components respond autonomously to long term climate change. The distribution of forests and of different forest types in the south Caucasus 5,000 years ago, before human activity started to cause the deforestation of large areas, was very different from what it was immediately after the end of the last ice age. Sedjo 2010 citing Shugart et al. 2003 notes that forests have responded to past climate change with alterations in the ranges of important tree species. However a critical issue is the rate at which tree species migrate. After the last glacial period, tree species migrated at rates of a few kilometres per decade or less, but the projected rate of shift in climate zones of 50 kilometres per decade could lead to massive loss of natural forests

The capacity for long-distance migration of plants by seed dispersal is particularly important in the event of rapid environmental change. Most, and probably all, species are capable of long-distance seed dispersal, despite morphological dispersal syndromes that would indicate morphological adaptations primarily for short-distance dispersal (Cwyner and MacDonald 1986, Higgins et al. 2003). Assessments of mean migration rates found no significant differences between wind and animal dispersed plants (Wilkinson 1997, Higgins et al. 2003). Long-distance migration can also be strongly influenced by habitat suitability (Higgins and Richardson 1999) suggesting that rapid migration may become more frequent and visible with rapid changes in habitat suitability under scenarios of rapid climate change. The discrepancy between estimated and observed migration rates during re-colonization of northern temperate forests following the retreat of glaciers can be accounted for by the underestimation of long-distance dispersal rates and events (Brunet and von Oheimb 1998, Clark 1998, Cain et al. 1998, 2000). Nevertheless, concerns persist that potential migration and adaptation rates of many tree species may not be able to keep pace with projected global warming (Davis 1989, Huntley 1991, Dyer 1995, Collingham et al. 1996, Malcolm et al. 2002). However, these models refer to fundamental niches and generally ignore the ecological interactions that also govern species distributions.

There is also potential for natural evolutionary change, which has been demonstrated in numerous long term programmes based on artificial selection (Falconer 1989). In the face of rapid environmental change genetic diversity and adaptive capacity of forested ecosystems depends largely on in situ genetic variation within each population of a species (Bradshaw 1991). Populations exposed to a rate of environmental change exceeding the rate at which populations can adapt, or disperse, may be doomed to extinction (Lynch and Lande 1993, Burger and Lynch 1995). Genetic diversity determines the range of fundamental eco-physiological tolerances of a species. It governs inter-specific competitive interactions, which, together with dispersal mechanisms, constitute the fundamental determinants of potential species responses to change (Pease et al. 1989, Halpin 1997).

In the light of the evidence presented in the preceding paragraphs we can conclude that if we take no action to mitigate the impact of climate change on forests we can expect changes in forest health, vitality and productivity caused by changes in climatic variables and the increased risks of damaging events to have significant consequences for people living in the region. Those consequences will include:

- an overall reduction in the quantity of timber and non-wood forest products such as mushrooms, berries and nuts from the forest types present in the region today, though production may increase in the Colchic bio-climatic region;
- an overall reduction in the value of environmental services provided by the region's forests, including regulation of water quality and water flow, prevention of erosion, landslides and avalanches;
- changes in biodiversity and the special values of the region's protected areas;
- changes in the visual landscape.

5. Strategies for mitigation and adaptation of the impacts of climate change on the region's forests

If we want to avoid the consequences of climate change described in Chapter 4.2 we must intervene to help forests adapt. There are two possible approaches open to us: reactive adaptation and planned adaptation.

Reactive adaptation is action taken after climate change impacts have already occurred and been observed; for example changing the tree species after the existing species have shown signs of loss of vigour and early mortality, salvage harvesting after storms, recalculation of allowable cuts in response to declining productivity. Reactive adaptation may lessen some of the long term impacts of climate change on forests that would occur in a no intervention scenario but the long time scales required to bring about changes in forest formations will delay any positive impacts of reactive intervention.

Planned adaptation involves redefining forestry goals and practices in anticipation of climate change-related risks. Planned adaption is made difficult by the fact that our knowledge about the vulnerability of ecosystems and species, and the spatial and temporal resolution of the future climate, are poor and the exact nature and scale of the impacts of climate change on forests impossible to predict. In spite of the high degree of uncertainty it is possible to develop adaptation strategies now, and we need to start now: the impacts are likely to be substantial, and the negative impacts many times greater than any positive impacts (Bernier and Schoene 2009); and adaptation to climate change in forest management requires a planned response well in advance of the impacts of climate change (Spittlehouse and Stewart 2003).

Ways in which we can help forests adapt to climate change include the following:

Increasing the natural adaptive capacity of forests

Adaptation theory suggests that more diverse natural systems are more resilient to short term shocks and long term changes in environmental parameters; e.g. forest ecosystems with greater diversity usually show a greater adaptive capacity (SCBD 2003; Fontaine et al. 2005; Stokes and Kerr 2009), as they are able to adapt in a variety of ways to different changes. Increasing the diversity of species and provenances in forest stands provides insurance against the risk that forest health and productivity will decline as a result of climate change.

While the scientific evidence supports the hypothesis that mixed-species forest ecosystems are more resilient than monotypic stands, some natural monotypic, or nearly monotypic, forests do occur. In the boreal forest zone, natural stands of jack pine (*Pinus banksiana*), Scots pine (*P. sylvestris*), lodgepole pine (*P. contorta*), and Dahurian larch (*Larix gmelinii*) are commonly dominated by single species. These stands self-replace usually following fire over large landscapes, with no change in production over time. Similarly, in wet boreal systems where fire is absent, monotypic stands of a single species of fir (*Abies* spp.) occur and generally self-replace following insect-caused mortality. Generally, these monodominant boreal forest ecosystems tend to be relatively shortlived and are prone to fire or insect infestation. (Thompson et al 2009)

Planting species and provenances that are more resilient or promoting them in naturally regenerated stands by selective tending and thinning. In Germany the use of provenances of native and non-native tree species (e.g. Douglas fir) from regions with a climate corresponding to future climate in Germany is an important element of active adaptation

(Bolte and Degen 2010). Species and provenance selection needs to be informed by research into the responses of species and genotypes to climate, for example to identify drought-tolerant genotypes (Spittlehouse and Stewart 2003 citing Farnum 1992). Trees can be bred for pest resistance and for a wider tolerance to a range of climate stresses and extremes in specific genotypes (Spittlehouse and Stewart 2003 citing Namkoong 1984 and Wang et al. 1995).

Alternative provenances or species could be planted to respond positively to the predicted warmer climate (see Cannell et al., 1989). However, the adoption of new varieties or the wider use of some that are already planted will require careful balancing against commitments to the use of native species and origins. Furthermore, where species or provenances originating from hotter, drier climates are planted, performance under a future climate must be balanced with performance under the current climate.

Increasing the resilience and natural adaptive capacity of forests at a landscape level

Reducing fragmentation and creating ecological corridors facilitates the natural movement of species, and strengthens and extends regimes of forest preserves to reduce anthropogenic impacts that compound the negative effects of climate change (Robledo and Forno, 2005).

Adaptation of fire prevention and control practices

Adaptation of fire prevention and control practices include altering forest structure (e.g., tree spacing and density, standing dead trees, or coarse woody debris on the forest floor) to reduce the risk and extent of disturbance (Spittlehouse and Stewart 2003 citing Dale et al. 2001); increasing the use of prescribed burning to minimize fuel loading (Spittlehouse and Stewart 2003 citing Wheaton 2001); developing "fire-smart" landscapes by using harvesting, regeneration, and stand-tending activities that manage fuels to control the spread of wildfire (Spittlehouse and Stewart 2003 citing Hirsch and Kafka 2001 and Climate Change Impacts and Adaptation Directorate 2002); focusing on the protection of areas with high economic or social value, while in other areas allowing fire to run its course (Spittlehouse and Stewart 2003 citing Stocks et al. 1998 and Parker et al. 2000).

Adaptation of pest and disease prevention and control practices

Examples of adapting pest and disease prevention and control strategies include: partial cutting or thinning to increase stand vigour and lower the susceptibility to attack (Spittlehouse and Stewart 2003 citing Wargo and Harrington 1991 and Gottschalk 1995); reducing disease losses through sanitation cuts that remove infected trees; shortening the rotation length to decrease the period of stand vulnerability to damaging insects and diseases (Spittlehouse and Stewart 2003 citing Gottschalk 1995) and facilitating change to more suitable species (Spittlehouse and Stewart 2003 citing Lindner et al. 2000); using insecticides and fungicides in situations where silvicultural activities for insect pest management are ineffective or inappropriate (Spittlehouse and Stewart 2003 citing Parker et al. 2000); controlling undesirable plant species, which become more competitive in a changed climate, through vegetation management treatments (Spittlehouse and Stewart 2003 citing Parker et al. 2000).

Adaptation of silvicultural practices to manage declining and disturbed stands

Adaptation of silvicultural practices include: selectively removing suppressed, damaged, or poor quality individuals to increase light, water, and nutrient availability to the remaining trees (Spittlehouse and Stewart 2003 citing Smith et al.1997 and Papadopol 2000); reducing vulnerability to future disturbances by managing tree density, species composition, forest structure (e.g., under-planting; planting late-successional species), and location and timing of management activities (Spittlehouse and Stewart 2003 citing Dale et al. 2001); reducing the

rotation age followed by planting to speed the establishment of better-adapted forest types (Spittlehouse and Stewart 2003 citing Lindner et al. 2000 and Parker et al. 2000).

Implementing adaptive management

Forest managers need to prepare forest management plans in the face of increasing uncertainty about climate and the response of trees and forest formations to climate change. Former certainties underlying classical tools such as yield tables no longer hold true in the face of climate change and the tools are no longer valid (Spittlehouse and Stewart 2003). Adaptive management is a management approach that acknowledges the lack of unequivocal and definitive knowledge about the ways in which forest ecosystems work, and the uncertainty that dominates interactions with them (Robledo and Forno, 2005 citing Borrini-Feyerabend, 2000). It is a formal process for continually improving management policies and practices by learning from their outcomes (Robledo and Forno, 2005 citing Taylor *et al.*, 1997). The key characteristics of adaptive management include (Robledo and Forno, 2005 citing Sit and Taylor, 1998):

- acknowledgement of uncertainty about what policy or practice is "best" for the particular management issue;
- thoughtful selection of the policies or practices to be applied;
- careful implementation of a plan of action designed to reveal critical knowledge;
- monitoring of key response indicators;
- analysis of the outcome in terms of the original objectives;
- incorporation of the results into future decisions.

Since scientific research results take many years to become applicable and operational on local sites, the notion of adaptive management postulates that forest managers themselves integrate applied research and experimentation in their daily work to generate data for immediate use (Robledo and Forno, 2005 citing Nyberg, 1999). This entails local assessments of climate change impacts and vulnerability studies of forest ecosystems, results of which would then feed into the initial stages of the adaptive management cycle, i.e. the problem assessment and the design of implementation measures. An essential element of adaptive forest management is that knowledge generated by learning is reintegrated into the project/working cycle and hence leads to adjustment and improvement of the forest management approach (Robledo and Forno, 2005).

A summary of ecological principles for maintaining the long term resilience of forests ecosystems is presented in Box 1 below.

Box 1 – *Ecological principles to maintain and enhance long term forest resilience (from Thompson et al 2009)*

Thompson et al 2009 suggest the following as ecological principles that can be employed to maintain and enhance long term forest resilience, especially under climate change (a list of adaptation responses similar to these principles can be found on pages 4 and 5 of FAO 2011b):

1. Maintain genetic diversity in forests through practices that do not select only certain trees for harvesting based on site, growth rate, or form, or practices that depend only on certain

genotypes (clones) for planting (see e.g., Schaberg et al. 2008) .

2. Maintain stand and landscape structural complexity using natural forests as models and benchmarks.
3. Maintain connectivity across forest landscapes by reducing fragmentation, recovering lost habitats (forest types), and expanding protected area networks (see 8. below).
4. Maintain functional diversity (and redundancy) and eliminate conversion of diverse natural forests to monotypic or reduced species plantations.
5. Reduce non-natural competition by controlling invasive species and reduce reliance on non-native tree crop species for plantation, afforestation, or reforestation projects.
6. Reduce the possibility of negative outcomes by apportioning some areas of assisted regeneration with trees from regional provenances and from climates of the same region that approximate expected conditions in the future.
7. Maintain biodiversity at all scales (stand, landscape, bioregional) and of all elements (genetic, species, community) and by taking specific actions including protecting isolated or disjunct populations of organisms, populations at margins of their distributions, source habitats and refugia networks. These populations are the most likely to represent pre-adapted gene pools for responding to climate change and could form core populations as conditions change.
8. Ensure that there are national and regional networks of scientifically designed, comprehensive, adequate, and representative protected areas (Margules and Pressey 2000). Build these networks into national and regional planning for large-scale landscape connectivity.

6. Increasing the resilience of the region's artificially propagated forests to climate change (including general recommendations for the selected pilot sites)

6.1. Transformation aims

The silvicultural focus of the project is the transformation of **monoculture forest stands** in the region into **highly resilient**, **"close to nature"** forest stands. There are therefore two conditions that the transformation measures have to meet: the transformed stands must be highly resilient to climate change; and they must be "close to nature".

The term "resilient" is used with different meanings in the literature about climate change and forest adaptation.[8] The definition used in the United Kingdom's guidelines on forests and climate change (Forestry Commission, 2011) is probably closest to the meaning that applies in the context of the project: "Resilience [is] the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change". According to this definition a forest, a form of ecological system, can undergo changes in some of its characteristics, for example genetic composition of a species, species composition of a stand,

[8] For example, Holling (1973) defines resilience as "The capacity of an ecosystem to return to the pre-condition state following a perturbation, including maintaining its essential characteristics taxonomic composition, structures, ecosystem functions, and process rates". Gunderson (2000) distinguishes between "ecological resilience" (the ability of a system to absorb impacts before a threshold is reached where the system changes into a different state) and "engineering resilience" (the capacity of a system to return to its pre-disturbance state).

and still meet the definition of resilient provided that the system is still recognisably a forest in terms of its physical structure and the variety of goods and services that it provides. Within the meaning of resilient such scope for change in the genetic character of the forest as has just been described is probably going to be essential: no change or only a small change is almost certainly unrealistic given the increases in temperature and decreases in precipitation that are expected in the region.

"Close to nature forestry" is generally understood to mean a system of forest management which provides continuous regeneration, development and treatment of stands that are similar in species composition, structure and dynamic to forests occurring naturally in the specific site conditions (Box 2).

Thus we can summarise the aims of transformation in the following way:

- **Resilient to climate change.** The stand will continue as a forest formation (i.e it will not transform into another state such as grassland). The stand will continue to provide the range of goods and services that we currently associate with forests but the volumes/quantities of individual goods and services and their volumes/quantities relative to each other may change (e.g. the forest will continue to produce harvestable timber but may do so in smaller amounts than now, and it will continue to provide soil and water regulation services).
- **Close to nature forest stand**. The tree species which form the stand are native to the South Caucasus. The tree species are mixed in proportion to each other and arranged spatially in a way that resembles the structure of the forest that we would expect to develop naturally on the site. The question of how far we should take account of predicted future climate change and our idea of the forest that would develop naturally on the site under those predicted future conditions is discussed later in this report.

Box 2 – *Close to Nature Forestry (adapted from Slovenia Forest Service, 2008)*

The following description of "close to nature forestry" is taken from a publication by the Slovenia Forest Service which is a long standing follower and promoter of the approach:

"*Close to nature forestry uses forest management methods that promote conservation of nature and forests, as its most complex creation, while deriving tangible and intangible benefits from a forest in a way to preserve it as a natural ecosystem of all its diverse life forms and relations formed therein. Close to nature forestry is based on forest management plans adapted to individual site and stand conditions as well as forest functions, and considering natural processes and structures specific to natural forest ecosystems. Natural processes are altered as little as possible, while still maintaining the financial profitability and social sustainability of forest management. Similarly to natural processes, close to nature forestry also contains inbuilt mechanisms for continual internal checks (controls) providing timely response to modify measures adapted in accordance with developmental characteristics of single forest stands and a forest as a whole.*

Characteristics of close-to-nature forest management are:

- *Preservation of the natural environment and the ecological balance of the landscape;*
- *Sustainability of all forest functions;*
- *Integrated approach to a forest ecosystem;*
- *Imitation of natural processes and forms;*

- *Tree species suited to site conditions;*
- *Based on [the adaptive] approach – constant monitoring and learning;*
- *Based on long-term economic efficiency;*
- *Plans designed at a broader and more detailed level.*

Close-to-nature forest management is, therefore, a forest management practice where the goals of sustainable and multifunctional forest management are achieved through preservation of natural forest and silvicultural approach mimicking natural disturbances and processes. In this sense, close-to-nature forest management combines the principles of sustainable forest management and the ecosystem approach."

6.2. Experience of transforming forest stands in EU countries

Transformation of forest stands has become increasingly widespread in EU countries during the last 20 years as more and more forest managers have seen that traditional silvicultural practices have resulted in forest stands that are ecologically unstable.

In continental west and central Europe at least 6 to 7 million hectares of pure Norway spruce (*Picea abies*) are located outside the species' natural range; at least 4 to 5 million hectares are located on sites naturally dominated by broadleaved species or mixed tree species. These forests have with time resulted in a higher exposure to forest decline, windthrows, pests, drought and soil deterioration. The transformation of these stands into mixed forests has become one of the most important strategic silvicultural targets and biggest challenges in forest policy and practice in EU countries.

In the UK and Ireland, large areas of forest plantations were established with conifer monocultures using non-native species such as sitka spruce (*Picea sitchensis*), Norway spruce and lodgepole pine (*Pinus contorta*). Now there is an increasing movement towards transforming these plantations into mixed "continuous cover" forests (see section 6.2.2 below).

It is an interesting point that the movement towards forest transformation in Europe developed before concern about the impacts of climate change on forest became widespread; the movement was inspired more by concerns about resistance to pests and diseases, the long term effects of monoculture silviculture on the site, and aesthetic considerations.

In EU countries we can distinguish the following standard situations and transformation concepts:

Monocultures of Norway spruce (*Picea abies*) – Transformation through underplanting of beech; e.g. the German States of Bavaria and Hesse (Bayerische Landesanstalt für Wald und Forstwirtschaft 2009; Hessen-Forst 2008):

1. Monocultures of Pine (*Pinus sylvestris*) – Transformation through introduction of oak (and other broadleaf species) after opening up the canopy cover of pine; e.g. the German State of Brandenburg (Ministerium für Ländliche Entwicklung, Umwelt und Verbraucherschutz des Landes Brandenburg und Landesforstanstalt Eberswalde 2006).
2. Enrichment of Douglas fir monocultures; e.g. the German State of Hesse (Hessen-Forst 2008).

3. Enrichment of pure beech stands; e.g. the German state of Hesse (Hessen-Forst 2008).

The experience of the German state of Brandenburg is particularly relevant because, as in the Southern Caucasus, the initial situation is usually a monocultural stand of artificially propagated pine that are not adapted to the site. The experience of the UK is also interesting. Although the initial situation is very different from that in the South Caucasus, the goal of transformation is the same, and the forestry administration has developed process guidelines for deciding how to transform conifer monocultures into more resilient forests.

6.2.1 German state of Brandenburg

The Brandenburg state forestry administration aims to increase the proportion of broadleaf forests and to reduce the proportion of pine forests significantly in the next decades. The reason behind this policy is the evidence that oak and other broadleaf trees have an comparatively lower risk to get affected by insect pests, forest fires and other negative impacts intensified through climate change. Guidelines published by the Brandenburg state forestry administration provide advice to forest managers on how to transform pine plantations.

The most common silvicultural method for growing oak and other broadleaf species is planting or seeding them under the existing pine stand; the main advantages of this method are:

- with the help of the pine canopy the sensitive young oak and broadleaf seedlings are protected from damaging weather extremes (frost , heat)
- competition of aggressive grass and/or blackberry *(Rubus)* is prevented
- the existing pine stand can be harvested over a longer period producing continuous timber or fuelwood yields

Referring to oak underplanting it is crucial to consider the light requirements of oak seedlings: To ensure a good development of the seedlings the percentage of canopy cover (of the pine stand) should be below 70 %. On the other hand it is recommended to maintain a canopy cover percentage of more than 40 % to safeguard the protection function of the canopy against frost impacts on the seedlings.

6.2.2 United Kingdom

A large proportion of the UK's forest have been created in the last 90 years by planting mainly non-native conifers, mostly as monocultures and sometimes in mixtures. The main silvicultural system is patch clearfelling followed by planting or occasionally natural regeneration. This system is probably employed in at least 90% of managed forests with an average size of clearfelled coupe of between 5 and 10 hectares, although there is appreciable regional variation (Mason et al., 1999).

The state forest administration now requires forest managers to "*identify areas which are, or will be, managed under a continuous cover forestry system and to build them into the forest design*" (Forestry Commission, 1998). The UK forest certification standard (UKWAS, 2000), which is the standard used in FSC and PEFC certification of UK forests, requires forest managers to favour lower impact silvicultural systems, which include continuous cover forestry.

Continuous Cover Forestry (CCF) is an approach to forest management that results in the development of diverse forests with a range of different structures and often a variety of species (Mason et al., 1999). Initial interest in CCF was not associated with concerns about the impacts of climate change on forests: the attraction lay in the belief that the CCF approach was suited to an era of multi-purpose forestry where environmental, recreational, aesthetic and other objectives are as important as timber production; in particular, CCF was seen as a means of reducing the impact of clearfelling and the associated changes that it produces in forest landscapes and habitats (Mason et al., 1999). Now, though, CCF is seen as a way of adapting forests to the risks of climate change (Stokes and Kerr 2009).

CCF is not synonymous with close to nature forestry but some forms of CCF can be classed as CNF. CCF does not rule out the use of non-native species and it allows the use of any silvicultural system that does not create large areas that are completely open to the sky. In contrast, generally in CNF only species that are native to the locality are acceptable and there is an emphasis on management mimicking nature; therefore irregular silvicultural systems (single stem selection, group selection, irregular shelterwood) are favoured over regular systems (uniform shelterwood, strip shelterwood)[9].

UK guidelines for transforming even-aged conifer and mixed species stands in continuous cover forests (Mason and Kerr 2004) recommend a three stage process (Box 3). Key points of the guidelines are:

- The importance of management objectives in the development of the transformation plan (i.e. forest managers should decide the objectives which the transformed forest will serve before deciding transformation measures).
- Transformation measures that are taken in the stand are decided only after deciding the future stand structure - i.e. simple (one or two storeys) or complex (more than two storeys) - and silvicultural system.
- The guidelines assume that the introduction of young trees will be by natural regeneration and recommend planting only when natural regeneration has failed. This limits the scope for increasing the resilience of the stand by introducing other species and/or different provenances. However, the guidelines state that under-planting can also be used, particularly if one aim is to introduce either desired species that are absent from the site or improved genotypes.
- There is no particular emphasis on native species.

Box 3 – *UK guidelines for transforming even-aged conifer and mixed species stands into continuous cover forests (adapted from Mason and Kerr 2004)*

- Stage 1: Assess the feasibility of transformation.
  - Site appraisal (risk of windthrow, soil fertility and potential vegetation competition, species suitability)
  - Detailed stand appraisal (stand structure and quality, advance regeneration, ground

[9] Regular stands are ones where all the trees are of similar height (but not necessarily of the same age) whereas irregular ones contain a mixture of sizes. Systems which promote regular structures require the removal of the overstorey once regeneration is established whereas in irregular systems there will always be some components of the overstorey retained in the stand.

flora, litter, animals, access and topography)

- Stage 2: Select the desired structure and appropriate silvicultural system
  - Decide upon the stand structure (simple or complex) that will best achieve management objectives (a simple structure will be produced by the uniform or group shelterwood systems, whereas a complex structure will result from an irregular shelterwood or a selection system).
- Stage 3: Choose a thinning regime that will favour the desired stand structure, taking into account the current stage of stand development. (The Guidelines provide recommendations for thinning regimes for two age groups of stand (young, 20-40; older, >40) and two desired types of structure (simple and complex).

6.3. Transformation of conifer plantations in the Southern Caucasus

In contrast to EU countries artificially propagated conifer forests cover only a very limited area in the Southern Caucasus (data covering, *inter alia*, artificially propagated conifer forests is presented in section 2.1 above). Often these plantations were created in the surroundings of cities in order to protect soil or for recreational purposes. In Armenia artificially propagated pine forests were established in otherwise treeless regions so that they had at least some forest cover. Thus, plantations in the Southern Caucasus often have positively valued landscape and recreational functions. Nevertheless their transformation into close to nature forests could improve correspondence to the mentioned functions at the same time as increasing their resilience to the impacts of climate change.

6.3.1 General description of the pilot sites

The six pilot sites (see the summary table in Annex I) were selected by the project partners together with the forest administration responsible for assigning the pilot sites to the action. The sites were selected using the criteria that were developed at the initial project planning stage and which later on were adopted at national level in all 3 target countries (through review and conformation during the national introductory workshops with forestry administration staff). The criteria are set out in Annex II.

The site selection preconditions were identified as follows:

- Current leading tree species is not in its natural distribution area
- Current forest stand is a monoculture
- Current forest stand is vulnerable to climate change

As a result the following 6 pilot sites were selected and agreed with national governmental agencies:

In Armenia

Pilot Forest Site N1 – "*KOGHB*" in Tavush Region (Armenia) located on the state forest lands of the Noyemberyan State Forest Enterprise of the State Non-Commercial Organization "Hayantar" (*ArmenForest*) of the Ministry of Agriculture of the Republic of Armenia.

Pilot Forest Site N2 – "*SPITAK*" in Lori Region (Armenia) located on the state forest lands of the Gugarq State Forest Enterprise of the State Non-Commercial Organization "Hayantar" (*ArmenForest*) of the Ministry of Agriculture of the Republic of Armenia.

Detailed location and boundaries of the selected pilot forest sites already agreed with the State Non-Commercial Organization "Hayantar" (*ArmenForest*), as well as relevant agreement with the stakeholder are available at the following web-page:

For the Pilot Forest Sites N1 and N2 :
http://awsassets.panda.org/downloads/memorandum_of_understanding_dec_29_2011.pdf

In Azerbaijan

Pilot Forest Site N1 – "*AGSU*" in Shamalkhi District (Azerbaijan) located on the state forest lands of the Shamakhi Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic.

Pilot Forest Site N2 – "*YEVLAKH*" in Yevlakh District (Azerbaijan) located on the state forest lands of the Yevlakh Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic.

Detailed description of locations of the selected pilot forest sites already agreed with the relevant Forest Protection and Restoration Enterprises are available at the following web-pages:

For the Pilot Forest Site N1 :
http://awsassets.panda.org/downloads/mou_shamakhi.pdf

For the Pilot Forest Site N2 :
http://awsassets.panda.org/downloads/mou_yevlakh.pdf

In Georgia

Pilot Forest Site N1 – "*KHASHURI*" in Khashuri Municipality (Georgia) located on the state forest lands of the former Khashuri State Forestry, Forest Unit N.3, Forest Sub-Units NN.5-7 and NN.9-30 - currently under the management of Shida Kartli Service of the Natural Resources Agency of the Ministry of Energy and Natural Resources of Georgia.

Pilot Forest Site N2 – "*TSAVKISI*" in Tbilisi Municipality (Georgia) located on the former state forest lands of Kojori Forest Unit of the former Tbilisi State Forestry - currently under the management of the Municipality of Tbilisi.

Detailed location and boundaries of the selected pilot forest sites already agreed with stakeholders, as well as relevant agreements with the stakeholders are available at the following web-pages:

For the Pilot Forest Site N1 :
http://awsassets.panda.org/downloads/mou_geo_site_khashuri.pdf

For the Pilot Forest Site N2 :
http://awsassets.panda.org/downloads/mou_geo_site_01_tsavkisi.pdf

The pilot sites are located in different natural forest vegetation zones of the South Caucasus and they are mainly represented by artificially propagated non-native pine forests (e.g., by *Pinus nigra* in Georgia).

Currently, transformation plans for the selected sites are being prepared in all 3 countries. These plans will specify in detail the measures to be carried out on each of the pilot forest sites. The measures will include a variety of silvicultural operations: fencing, preparation of sites, seeding and planting, and clearing of competing vegetation from around the seeded and planted trees. The transformation plans will serve as a base for developing best practices and to obtain reliable information about costs and results.

The main silvicultural idea is to transform the pine stands at the pilot sites into close to nature forests by using the existing pine cover as a nurse crop to introduce tree and shrub species by under-planting and, in addition, to reforest open areas. A common example is where a slower-growing, shade-tolerant species forms the lower layer beneath a canopy of a faster-growing, shade-intolerant species.

The factors that have to be considered in planning process include, but are not limited to:

- tree and shrub species that can be used for under-planting (which will depend on species composition natural for the pilot site area, existing vegetation, and existing canopy density;
- soil preparation methods;
- planting and seeding techniques and spacing;
- methods assisting natural regeneration;
- clearing of competing vegetation from around the seeded and planted trees;
- physical protection (fencing of the pilot sites and if necessary single tree protection).

6.3.2 Scenarios for the future climate of the pilot sites

In the time assigned for the preparation of this report it has not been possible to analyse in detail the results of the climate projections for the region prepared by, for example, UNDP (UNDP 2011) and the governments of the three countries (MENR-AZ 2010; MEPNR-GE 2009; MNP-AM 2010). The following projections for temperature and precipitation are interpreted from data presented in a report by Zoï Environment Network (Zoï Network 2011), specifically the maps of current average annual temperature and average annual precipitation on pages 10 and 11 and the maps of forecast average annual temperature and average annual precipitation on pages 22 and 23. The project team should consider whether it would be worthwhile carrying out more precise projections for the purposes of planning transformation measures.

The Armenian pilot sites at Spitak and Noyemberyan lie in a zone in which present day average annual air temperature is 10-13 ^{o}C and present day average annual precipitation is between 200-600 mm. The projections presented in the Zoï Network report are that average annual air temperature where the pilot sites are situated will increase by 1.5 ^{o}C by 2040, by 3 ^{o}C by 2070 and by 5 ^{o}C by the end of this century. Average annual precipitation is projected to fall by 5% by 2040, by 5-10% by 2070, and 10-15% by the end of this century.

The Azerbaijan pilot sites at Yevlakhi and Shamlakhi lie in the zone with the highest present day average annual temperature in the Southern Caucasus (13-16 ^{o}C) and lowest average annual precipitation (less than 200 mm). The projections presented in the Zoï Network report are that average annual air temperature where the pilot sites are situated will increase by 1.5 ^{o}C by 2040, by 1.5-3 ^{o}C by 2070 and by 4-5 ^{o}C by the end of this century. Average annual

precipitation is projected to fall by 0-5% by 2040, by 5-10% by 2070, and 15-20% by the end of this century.

The Georgian pilot sites lie in zones in which average annual air temperature is 7-10 ^{o}C in the case of Khashuri and 10-13 ^{o}C in the case of Tsavkisi, and average annual precipitation is 400-600 mm in the case of Khashuri and 200-400 mm in the case of Tsavkisi. The projections presented in the Zoï Network report are that average annual air temperature where the pilot sites are situated will increase by 1.5 ^{o}C by 2040, by 3 ^{o}C by 2070 and by 5 ^{o}C by the end of this century. Average annual precipitation is projected to fall by 0-5% by 2040, by 0-5% by 2070, and 10-15% by the end of this century.

There are huge uncertainties around these projections but all of the studies – the study that produced the data included in the Zoï Network report (UNDP 2011), the national studies that are reported in the countries 2nd national communications to the UNFCC (MENR-AZ 2010; MEPNR-GE 2009; MNP-AM 2010) – predict continuously increasing average annual temperatures and (with one exception) a decrease in annual average precipitation.

6.3.3 General recommendations for the pilot sites

This section of the report provides recommendations on the process for preparing transformation plans for the pilot sites. The report does not make specific recommendations on the species and the provenance of species or on the silvicultural measures that should be used at the pilot sites. These decisions should be taken following a comprehensive site assessment, which is one step in the process described in the rest of this section.

The UK process guidelines described in section 6.2.2. above include references to the objectives of the stands and the silvicultural system which will applied to the stands. These two considerations are not included in the recommendations for the pilot sites. For the purpose of this report its is assumed that the objective for all of the sites is that they will continue to provide the range of goods and services that we currently associate with forests and that no specific objective (e.g. wood production) is favoured over another (e.g. regulation of water resources). The silvicultural system which will be applied to the stands can be decided once the stands have been transformed.

The recommended process for deciding measures for transforming the stands at the pilot sites is pictured in Figure 1 below. The steps in the process are explained in the following paragraphs.

Step 1. Delineate the perimeter of the forest that is to be transformed

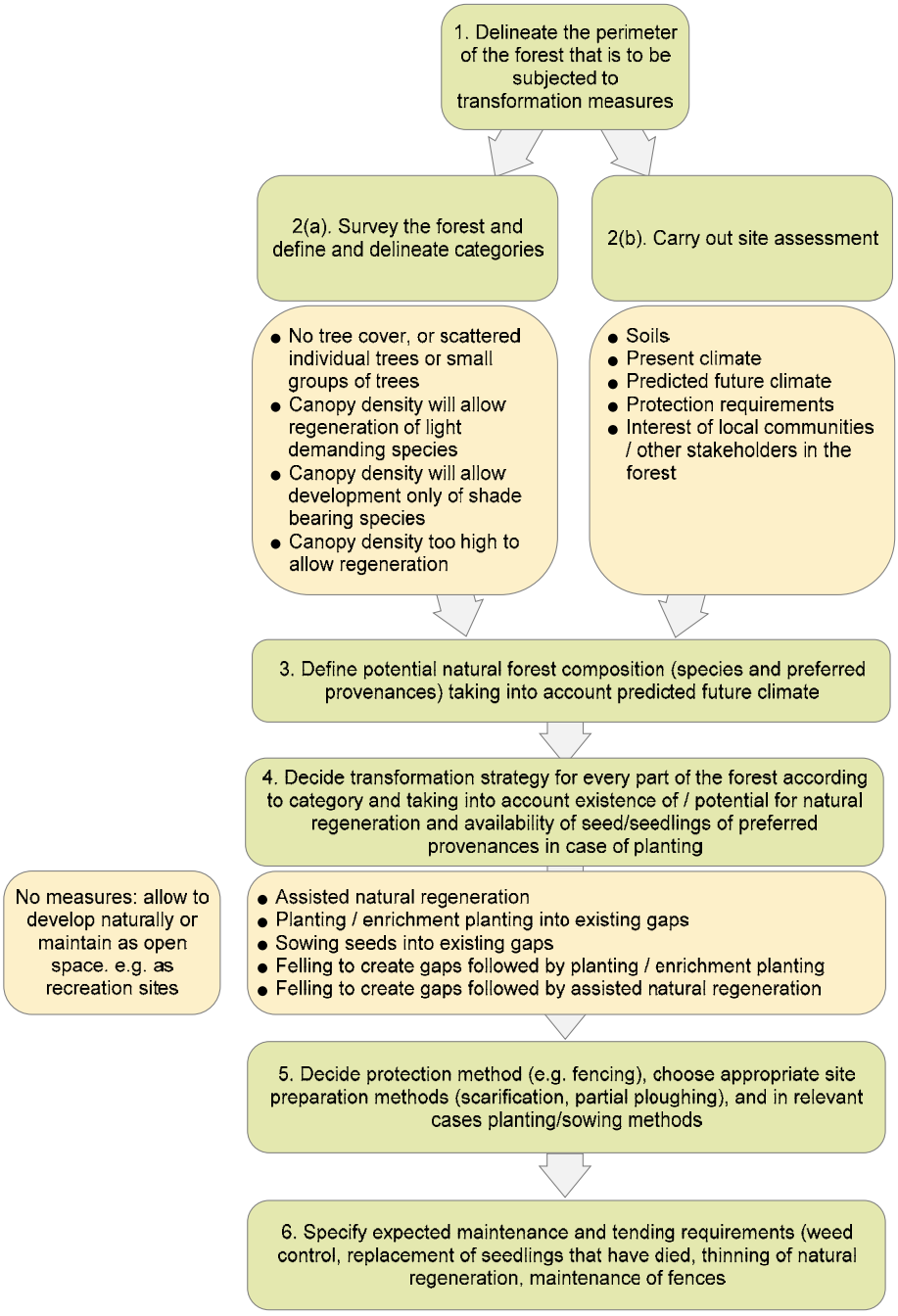
In some situations the outer boundary of the area in which transformation measures will be taken will be quite easy to determine. If the plantation has a “hard edge” against land that is not under trees, the plantation edge can be taken as the perimeter. In many situations, where the plantation has been subject to illegal felling, grazing, or trees have simply been unable to establish themselves and have dies, the edges of the plantation are not distinct. The boundary of a plantation may even be disputed by neighbouring land owners and users. In such situations the boundary will have to be negotiated. The output from this step is a map or aerial photo on which an undisputed boundary is marked.

2(a). Survey the forest and define and delineate categories

Dividing the stand into categories is the basis for planning the specific transformation measures that will be carried out. The categories listed in the diagram reflect factors that will be important in deciding the measures that should be taken, i.e the density and distribution of

tree cover. The presence of or potential for natural regeneration could be included at this stage in the process but is included in step 4 as a more logical point at which to take it into account.

Figure 1 – *Recommended process for deciding measures for transforming artificially propagated pine stands into close to nature forest stands*



2(b). Carry out site assessment

The site assessment includes mapping of soils, which is for deciding which species and the proportions of the chosen species that might be planted in different parts of the stand, and the present and predicted future climate. Assessment of protection requirements – in particular whether it will be necessary to erect a fence around the stand to prevent grazing of young trees by livestock – can also be carried out at this stage. The need for protection measures will

usually be determined by pressures on the stand from neighbouring communities and it is important to find out the interest of local people in the stand and the products and services that it provides now and could provide in the future.

3. Define potential natural forest composition

If we consider only the species that would form the natural vegetation under present day conditions we could be guided by the fact that in the Southern Caucasus in the zone between 350 and 1,800 m hornbeam-oak (*Carpinus betulus, Quercus iberica*) forests are the dominating natural forests, while beech (*Fagus orientalis*) forests form a distinguishably separate zone between 1000 and 1500m. However, it is important to consider the future climate in which the trees will be growing.

The projected changes in temperature over the next 30 years discussed in section 6.3.2 above are large enough to have significant impacts on the functioning of forest ecosystems that are adapted to present day conditions. The projected changes by the middle of the century are large enough to raise concerns about the performance of tree species and provenances that are adapted to present day conditions at the sites. Therefore serious thought needs to be given to using species that are adapted to conditions similar to those projected for the pilot sites and at the very least to using provenances that show the greatest tolerance of high temperature; in any case, adaptive management should be implemented – the health and vitality of the species established on the site should be monitored and enrichment with better adapted species considered if health and vitality deteriorate.

4. Decide the transformation strategy

In this step the transformation strategy for every part of the stand is worked out in terms whether to establish the future trees by using natural regeneration, by planting or sowing, or a combination of methods, and whether to open the canopy of the existing trees in order to provide enough light for the future trees.

5. Choose appropriate site preparation methods

The specific techniques that will be used to establish the future trees are decided in this step. They include preparation of the site to promote natural regeneration and to provide positions for sowing and planting that are as free as possible from grasses, herbs and other plants that could compete with the future trees for water and nutrients. The Forest Restoration Guidelines published by WWF (Heidelberg et al 2011) provide detailed advice about choosing site preparation methods. Protection methods should be decided in this step if they have not already been decided in step 2(b); the Forest Restoration Guidelines provide detailed specifications for fencing.

6. Specify expected maintenance and tending requirements

The final step before starting to implement the transformation measures is to specify the maintenance and tending measures that will be necessary to ensure successful establishment and development of the future trees. It is important to know what measures are likely to be necessary so that the work can be planned and budgeted and arrangements made for it to be carried out. Measures will include removal of competing vegetation, replacing planting seedlings that have died and enriching natural regeneration with planted seedlings. Contingency plans should be made for watering planted seedlings in the event of lengthy hot,

dry spells likely to cause a high rate of mortality (watering adds significantly to the costs of establishment and should be used only in exceptional circumstances).

7. Outlook

There is a lot of uncertainty around predictions of the future climate of the South Caucasus; however, the results of climate modelling indicate that we should expect a continuous increase in average annual temperatures and lower average annual precipitation. We should also expect more frequent extreme weather events. The Project will implement measures to transform artificially propagated conifer stands which will become increasingly stressed into close to nature stands that are more resilient to predicted climate change. Techniques for establishing the trees that will form the future forests stands at the pilot sites have already been tried and tested in the region and are described in detail in the Forest Restoration Guidelines referred to above. The most difficult aspect of transformation is the choice of species and provenances. That choice must take into account the predicted future climate at the pilot sites. However, the uncertainty around the predictions and the limitations on the availability of native species and provenances that are well adapted to the predicted future climate, will inevitably cause a high level of uncertainty about the resilience of the transformed stands. Further action may need to be taken many years after the transformation measures have been implemented in order to reinforce resilience, including planting species that are better adapted to the future climate at the sites. Those responsible for taking care of the transformed forests after the project has ended will therefore need to implement an adaptive management approach and continuously monitor the health of the stands and be ready to implement further adaptation measures if they become necessary.

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Annex I. Summary Table for Selected Forest Pilot Sites in the South Caucasus Countries

Country	Name of Pilot Site	Land Tenure Status	Owner	Location	Size
Armenia					
Armenia	1. Koghb FPS (*MoU signed on 29.12.2011*) http://awsassets.panda.org/downloads/memorandum_of_understanding_dec_29_2011.pdf	*State Forest Land*	Ministry of Agriculture ⇓ State Organization "Hayantar" (*ArmenForest*) ⇓ Noyemberyan State Forest Enterprise	Tavush Region	78 ha
Armenia	2. Spitak FPS (*MoU signed on 29.12.2011*) http://awsassets.panda.org/downloads/memorandum_of_understanding_dec_29_2011.pdf	*State Forest Land*	Ministry of Agriculture ⇓ State Organization "Hayantar" (*ArmenForest*) ⇓ Gugarq State Forest Enterprise	Lori Region	72 ha
TOTAL for ARMENIA					150 ha
Azerbaijan					
Azerbaijan	1. Agsu FPS (*MoU of 20.12.2011*) http://awsassets.panda.org/downloads/mou_shamakhi.pdf	*State Forest Land*	Ministry of Ecology and Natural Resources ⇓ Shamakhi Forest Protection and Restoration Enterprise	Shamakhi District	75 ha
Azerbaijan	2. Yevlakh FPS (*MoU of 20.12.2011*) http://awsassets.panda.org/downloads/mou_yevlakh.pdf	*State Forest Land*	Ministry of Ecology and Natural Resources ⇓ Yevlakh Forest Protection and Restoration Enterprise	Yevlakh District	75 ha
TOTAL for AZERBAIJAN					150 ha

Georgia					
Georgia	1. Tsavkisi FPS (MoU of 11.08.2011) http://awsassets.panda.org/downloads/mou_geo_site_01_tsavkisi.pdf	*Municipal Forest Land*	Tbilisi City Mayor's Hall ⇓ Environmental and Green Areas Municipal Service	Municipality of Tbilisi	75 ha
Georgia	2. Khashuri FPS (*MoU of 21.12.2011*) http://awsassets.panda.org/downloads/mou_geo_site_khashuri.pdf	*State Forest Land*	Ministry of Energy and Natural Resources ⇓ Natural Resources Agency	Khashuri Municipality	79.9 ha
TOTAL for GEORGIA					154.9 ha
Grand TOTAL for the South Caucasus					**454.9 ha**

Annex II. Table for Site Selection Criteria

1) Nature conservation criteria
- a) Biodiversity indicators occurrence of endemic and/or endangered species
- b) Importance to connect fragmentized habitats (eco-corridor)

2) Silvicultural/Ecological criteria
- a) Canopy cover*
- b) Dimension of the forest stand (average height and diameter)
- c) Soil and nutrient situation
- d) Hydrological situation*
- e) Capacity of natural regeneration
- f) Availability of site adapted planting material
- g) Protective function of forest stand
  - i) Flood water protection
  - ii) Water protection zone
  - iii) Erosion Protection
- h) Risk factors
  - i) Grazing
  - ii) Fire

3) **Legal criteria**
- a) Land tenure
- b) Status of forest land
- c) Legal restrictions for forest transformation measures*

4) **Social- economic criteria**
- a) Support and interest of local population and local government
- b) Possibilities of involvement of local population in work process
- c) Distance to villages
- d) Importance for recreation and environmental education

5) Others
- a) Sustainability of the action
  - i) Commitment of landowner
  - ii) Capacity of land owner
  - iii) Possibility of follow-up financing
- b) Visibility

Explanatory notes to site selection criteria for forest transformation:

*Canopy cover: Canopy cover is the foliar cover in a forest stand consisting of one or several layers. It is measured in percentage of full cover. For example a canopy cover more than 30 % would make difficult survival capacity of oak seedlings due to their light requirements.
*Hydrological situation: The Hydrological situation of the site is decisive for the success of seeding or planting. For example extreme dry situations due to exposition or lack of water supply could make impossible survival of plants.
*Legal restrictions for forest transformation measures: For example transformation of forest stands could make necessary felling for opening up of canopy. Possibly measures like this are not covered by national forest legislation.

Annex 17. Desk-based Study on Resilience of Forest Stands : Publication



The European Union's Thematic Programme on Environment and Sustainable Management of Natural Resources including Energy (ENRTP)

Adaptation Of Forests To Climate Change

Report Of Desk-based Research On Resilience of Forests To Climate Change and Transformation Measures

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTH CAUCASUS COUNTRIES THROUGH FOREST TRANSFORMATION

PROJECT NO. DCI-ENV/2010/221391

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ADAPTATION OF FORESTS TO CLIMATE CHANGE :
REPORT OF DESK-BASED RESEARCH ON RESILIENCE OF FORESTS TO CLIMATE CHANGE AND TRANSFORMATION MEASURES - 52 p.

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WWF Deutschland (WWF-Germany)

Aurel Heidelberg, WWF-Germany : Project Leader
Hannes Neuner, WWF-Caucasus/CIM : Advisor
Mike Garforth, Consultant/ WWF-Caucasus : Author
Malkhaz Dzneladze, WWF-Caucasus : Editor

ADAPTATION OF FORESTS TO CLIMATE CHANGE

Report of Desk-Based
Research on Resilience of
Forests to Climate Change
and
Transformation Measures

WWF Caucasus Programme Office (WWF-Caucasus)
WWF Deutschland (WWF-Germany)
Tbilisi-Berlin

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Acronyms and Abbreviations

CCF - Continuous Cover Forestry / Continuous Cover Forest Management
CNF - Close to Nature Forestry
CO2 - Carbon dioxide
ENRTP - Thematic Programme of the European Union on Environment and Sustainable Management of Natural Resources including Energy
EU - European Union
FAO - Food and Agriculture Organisation of the United Nations
FSC - Forest Stewardship Council
GCM - General Circulation Model
GHG - Greenhouse gas
IPCC - Intergovernmental Panel on Climate Change
MENR-AZ - Ministry of Ecology and Natural Resources of Azerbaijan
MEPNR-GE - Ministry of Environment Protection and Natural Resources of Georgia *(since Feb-2011 the Ministry of Environment Protection of Georgia)*
MNP-AM - Ministry of Nature Protection of Armenia
PEFC - Programme for the Endorsement of Forest Certification
UK - United Kingdom
UKWAS - UK Woodland Assurance Scheme
UN - United Nations
UNDP - United Nations Development Programme
UNFCC - United Nations Framework Convention on Climate Change
WWF - Worldwide Fund for Nature

Units of Measurement

ha - hectare
m - metres
masl - metres above sea level
^{o}C - degrees centigrade
Gg - Gigagramme (10^{9}grammes)
tonne - metric tonne (10^{3} kilogrammes)

1. INTRODUCTION

This report was prepared in the framework of the project *Increasing the resilience of forest ecosystems against climate change in the South Caucasus Countries (Armenia, Azerbaijan, Georgia) through forest transformation* (the Project). The Project is financed by the European Union (EU) in the framework of the EU's Thematic Programme on Environment and Sustainable Management of Natural Resources including Energy (ENRTP).

The purpose of the Project is to establish the necessary conditions for the national forest administrations of the south Caucasus countries to develop and implement strategies for transforming monoculture forest stands into highly resilient, "close to nature" forest stands. The project purpose is to be achieved through raising awareness about climate change impacts on forests, demonstrating practical measures to make forests more resilient, and providing staff of forest administrations and local community members who use forests with the necessary knowledge and skills to transfer the development and implementation of transformation measures to other forest stands.

Structure of the report

Chapter 2 of this report presents a short overview of the forests of Armenia, Azerbaijan and Georgia, their importance, and the pressures and threats that they face.

Chapter 3 presents information about changes in the climate in the region up to the present day and predicted future changes from modelling studies.

Chapter 4 describes the impacts of changes in the climate on forests generally and the impacts that we should expect on forests in the South Caucasus.

Chapter 5 describes strategies for mitigating the impacts of climate change on forests including adaptation of forests to climate change.

Chapter 6 discusses resilience and close to nature forest management and recommends a process for elaborating transform plans for the pilot sites.

Chapter 7 provides a brief outlook for the pilot sites in the face of the uncertainty surrounding the predictions about the future climate.

2. FORESTS OF THE SOUTH CAUCASUS COUNTRIES

2.1. Extent and types

Forests[1] cover 4 million hectares of the South Caucasus countries, which makes up 22% of the countries' combined land and inland water surfaces: Armenia 307 thousand hectares (10.3%), Azerbaijan 990 thousand hectares (11.4%), Georgia 2,793 thousand[2] hectares (40.7%) (FAO, 2010a).

The region's present day forest cover is much less than when human beings first started to clear forests on a substantial scale for agriculture and settlements.

It has been estimated[3] that the former area of forests may have been as much as 9 million hectares, from which we could deduce that 55% (5 million ha) of former forest cover has been cleared.

The region's wide variety of climatic zones in combination with variation in soils and relief has provided conditions for the development of a wide variety of vegetation formations[4]. All of the six forest formations identified in the Caucasus Ecoregion (Bohn et al, 2007) are found in the South Caucasus. The following description is adapted from Zazanashvili et al, 2011.

Forests dominated by beech *(Fagus orientalis)* are the largest in area. In the Colchic region of western Georgia beech forests occur almost from sea level to the upper forest boundary. At 1,000-1,400 masl, beech is partially substituted with spruce and fir. In less humid areas of the South Caucasus the lower boundary of the beech forests moves higher in mountains; here beech mainly grows on northern slopes, leaving more lighted slopes to oak, oak-hornbeam, and hornbeam forests.

1. In this context "forest cover" means the area under "forest" and "other wooded land" as defined by the Food and Agriculture Organisation (FAO, 2010). FAO defines "forest" as *"Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use."* FAO defines "other wooded land" as *"Land not classified as "Forest", spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5–10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use."*

2. In this report commas are used to denote thousands, full stops (periods) are used to denote decimal points.

3. Zazanashvili et al (2011).

4. The region's climate zones range from north subtropical humid in the west of Georgia (average annual temperature 12 - 16°C, annual precipitation 1,600 - 2,000 mm) to subtropical arid extending from south-east Georgia towards the Caspian Sea coast of Azerbaijan (average annual temperature 12 - 16°C, annual precipitation less than 200 mm), and from cold moderate mountain in parts of the Greater Caucasus and West Lesser Caucasus mountain ranges (average annual temperature 7-10°C, annual precipitation 800-1,600 mm) to temperate arid mountain extending from central Armenia through Nakhchivan (Azerbaijan) (average annual temperature 7-10°C, annual precipitation <200-400 mm) (Zoi Network, 2011).

Oak forests used to be widespread but clearance for agriculture, viticulture and fruit growing and pressure of grazing have substantially reduced their range.

They have survived mainly in hard-to-access ravines, on comparatively poor soils and on steep rocky slopes. In the lower and middle parts of the forest zone the main species is *Quercus iberica.* Lowland/riverside and flood plain forests in the eastern part of the region are formed mainly from *Q. pedunculiflora*. The prevailing species in the Talysh forests is *Q. castaneifolia* prevails, in the foothills of Colchic region *Q. hartwissiana*, and *Q. imtretina*, and *Q. dschorochensis* prevail in Adjara on drier valley slopes. The relict and Colchic endemic *Q. pontica* is common in the lower subalpine belt in the western part of Colchic region. Usually oak is mixed with hornbeam forming oak-hornbeam forests *(with Carpinus orientalis, C. caucasica).*

Chestnut, frequently together with hornbeam and beech, forms forests on mountain yellow soils and acidic brown soils in the mountains and foothills of Colchis and in some places in the Eastern Greater Caucasus (e.g. on the slopes of the watershed ridge towards the Alazani-Agrichay depression). In Colchis, chestnut is found from the sea level to 1,200-1,300 masl, and in the eastern South Caucasus between 500 and 1,100 masl. As one of the most precious species of the Caucasus, chestnut historically has been felled intensively, which has resulted in the chestnut area shrinkage and significantly deteriorated health of the trees.

Dark coniferous forests composed of fir *(Abies nordmanniana)*, spruce *(Picea orientalis)* and spruce with beech occur in the mountains of Colchis and in western areas of Eastern Georgia, where they are found in the middle and upper parts of the forest zone (from 900-1,100 to 2,000-2,150 masl), though optimally in the altitudinal range 1,400 to 1,750 masl. Light coniferous forest formed from pine *(Pinus kochiana)* occurs mainly in the upper reaches of the Kura river catchment.

A number of other distinct forest types occur in the region but form only a small part of the total area of forest. They include forests formed from maple *(Acer campestre)*, maple and elm *(Ulmus minor)*, lime *(Tilia cordata)* and alder *(Alnus spp.)*. “Crooked forests” growing at the upper forest boundaries include birch *(Betula spp.)*, mountain ash *(Sorbus caucasigena)*, beech *(Fagus orientalis* in the western Caucasus), oriental oak *(Quercus macranthera* in the east and South Caucasus), high-mountain maple *(Acer trautvetteri)*, and occasionally pine *(Pinus kochiana)*. Forests formed from species adapted to low soil moisture levels are found in the drier eastern and south-eastern parts of the region; these forests typically have a much more open canopy. Species

which form these so-called arid, sparse forests include juniper *(Juniperus spp.)* and pistachio *(Pistacia mutica)*, willow-leaf pear *(Pyrus salicifolia)*, Georgian maple *(Acer ibericum)* and pomegramate *(Punica granatum)*.

In the past, arid sparse forests occupied a much larger area but gradual conversion to grassland as a result of cattle and sheep grazing has substantially reduced its extent.

Floodplain forests are found in the lowlands on low river terraces, generally growing on alluvial, swampy or moist soils. Many types formed from a variety of species, including black poplar *(Populus nigra)* and white *(or silver)* poplar *(Populus alba)*, alder *(Alnus barbata)*, ash (*Fraxinus excelsior)*, pedunculate oak *(Quercus pedunculiflora)* and field elm *(Ulmus minor)*.

In addition to natural forest types described above, in the beginning of 1990s there were 198 thousand hectares (4.8% of the total forest area) of artificially propagated plantations. The area of plantation in each of the three countries and the percentage of the country's total forest cover were: Armenia 55 thousand hectares (18%); Azerbaijan 59 thousand hectares (6%); Georgia 84 thousand hectares (3%).

2.2. Importance of the region's forests

Forests in the region fulfil a variety of functions and provide a number of products and services.

Biodiversity

Armenia, Azerbaijan and Georgia lie in the Caucasus ecoregion - one of WWF's 35 "priority places" and one of 34 "biodiversity hotspots" identified by Conservation International as being the richest and at the same time most threatened reservoirs of plant and animal life on Earth. Forests are the most important biome for biodiversity in the region, harbouring many endemic and relic species of plants and providing habitats for globally rare and endangered animals (Williams et al 2006).

Carbon sequestration

Forests contribute significantly to climate change mitigation through their carbon sink and carbon storage functions. Conversely, forest degradation and deforestation result in increased net emissions of carbon dioxide. In the South Caucasus countries the picture is a mixed one. In 2010 forests (excluding other wooded land) in Armenia, Azerbaijan and Georgia respectively held 10.2, 46.3 and 168.4 million tones of carbon in above ground biomass (FAO 2010c).

Based on the data reported in the Second National Communications to the UNFCC (MNP-AM 2010; MENR-AZ 2010; MEPNR-GE 2009), in the year 2000 Georgia's forests absorbed a volume of CO2 equal to 25% of the country's gross CO2 equivalent GHG emissions; for Azerbaijan the percentage was between 7% and 8%. In contrast, there were net emissions of CO2 of 1,563.6 Gg from Armenia's forest, largely as a result of high levels of logging. Although the data is 12 years out of date, it illustrates the importance of forests, and the importance of responsible stewardship of forests, in the regional carbon balance. The picture in 2012 will be different because the GHG emissions of all three countries have increased on year 2000 levels and carbon sequestration by the countries' forests will have changed, though it is highly unlikely that carbon sequestration will have increased in the same proportion as the increase in GHG emissions.

Soil and water protection

Forests play an essential role in the protection of soils and water resources. Loss of forest often leads to erosion, increased risk of flooding and water shortage. The services provided by forests become even more important with climate change, which is likely to result in more irregular rainfall patterns and extended drought periods.

Forest products

Many households in the region use wood from the region's forests as fuel; for example one study reported that in Armenia 61% of all households still used wood as fuel in 2010 in spite of a substantial increase in the number of households being connected to the gas distribution network (Junger and Fripp 2011). Rural households harvest nuts, berries and mushrooms from forests for domestic consumption and for sale. Georgia's forests support a relatively small (in comparison with most other European countries) but locally important wood processing industry; according to FAO 2011a about 100,000 cum of industrial roundwood were harvested in 2009[5].

Culture and health

The region's forests provide opportunities for recreation, education and other social activities.

2.3. Pressures on forests in the region

Apart from the negative impacts of climate change, which are discussed in Chapter 3, the region's forests are under pressure from unsustain-

5. In Azerbaijan logging of industrial roundwood is not sanctioned officially. In Armenia officially sanctioned logging of industrial roundwood amounts to only 10,000 - 15,000 cum a year (Junger and Fripp 2011).

able logging for industrial wood and fuel wood and grazing by domestic livestock (which prevents regeneration). Official data on the amount of unsustainable and illegal logging is not reliable because it is based on reported cases, which in many cases are not complete and/or recorded in accurate manner. A recent survey in Armenia indicated that illegal logging for fuel wood could be several times more than the annual allowable cut set by the state forest agency (ICare 2011).

3. CLIMATE CHANGE IN THE REGION

3.1. Observed changes in the region's climate

Climate change is already occurring in the South Caucasus. According to a recent study on climate trends in the region led by UNDP (UNDP 2011), Armenia, Azerbaijan and Georgia all show statistically increasing trends in mean annual temperature, mean daily minimum temperature and mean daily maximum temperature over the last century. About half of the meteorological stations in Armenia and Azerbaijan and about one quarter in Georgia show statistically significant trends in annual temperature. Almost all the meteorological sta¬tions have recorded increases in the duration of warm spells – either consecutive days above 25 ^{o}C or consecutive nights higher than 20 ^{o}C.

According to the same report the evidence for trends in annual precipitation is less convincing, although there are stations in Armenia and Azerbaijan that have experienced precipitation declines. Armenia's 2nd national communication to the UNFCC reported that annual precipitation decreased by 6% during the previous 80 years (MNP-AM 2010). Azerbaijan reported that average annual precipitation was below the long term norm in almost all regions and on average had fallen by 9.9%; differences seemed more significant in the Kura-Aras Lowland (a decrease of 14.3%), in Ganja-Gazakh (a decrease of 17.7%) and in Nakhchivan (a decrease of 17.1%) (MENR-AZ 2010).

Armenia has reported an increase in the intensity and frequency of hazardous hydro-meteorological phenomena. In the period 1975-2005 the total number of hazardous hydro-meteorological phenomena increased by 1.2 cases per year, and in the last 20 years of the same period (i.e 1985-2005) the increase was 1.8 cases per year (MNP-AM 2010).

3.2. Scenarios for the future climate of the region

In their 2nd national communications to the UNFCC, all three countries presented projections for changes in precipitation and temper¬ature

based on the results of modelling. All the projections indicated that the mean annual temperature will increase significantly by the end of the present century. Projections based on the A2 emission scenario[6] were: 1.8 ºC-5.2 ºC and 3.5 ºC-4.9 ºC, in western and eastern Georgia, respectively; 4 oC - 5.1 ºC in Armenia; and 3 ºC-6 ºC in Azerbaijan. While the projections for temperature appear clear cut, there were discrepancies in the projections for precipitation.

One model projected increases in mean annual precipitation in western Georgia and Azerbaijan, while other model for Georgia projected declines.

A subsequent study (UNDP 2011) using projections from four General Circulation Models[7] (GCM) which simulate historical climate reasonably well projected declines in precipitation for all three countries: 20-31% in Armenia, 5-23% in Azerbaijan, and 0-24% in Georgia by the end of the century under the A2 emissions scenario. Across the four selected GCMs and using the A2 emissions scenario the projected changes in mean annual temperature by 2050 are: Armenia 1.1 ºC – 1.9 ºC, Azerbaijan 1.0 ºC – 1.6 ºC, Georgia 0.9 ºC – 1.9 ºC. By 2100, the projected increase is more dramatic: Armenia 4.4 ºC - 5.5 ºC, Azerbaijan 3.6 ºC - 4.1 ºC, and Georgia 4.1 ºC - 5.5 ºC.

4. IMPACTS OF CLIMATE CHANGE ON FORESTS

4.1. How climate change affects forests

Before discussing the impacts of climate change on forests it is important to consider that the main driver of human-induced climate change – the concentration of CO2 in the atmosphere - affects the growth of trees directly. Current concentrations of CO2 are not optimum for photosynthesis and CO2 emissions would therefore be expected to enhance growth rates assuming all other environmental conditions remained constant. Controlled environment experiments on young trees typically show that biomass production increases by 30–50% when the CO2 concentration is doubled (Broadmeadow and Ray 2005). Although

6. GHG emissions scenarios are alternative images or “storylines” of how the future might unfold and are used to analyse how driving forces may influence future emission outcomes and to assess the associated uncertainties. The A2 storyline and scenario family describes a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in a continuously increasing global population. Economic development is primarily regionally oriented and per capita economic growth and technological change are more fragmented and slower than in other storylines. (IPCC 2000)

7. General Circulation Models (GCMs) are spatially-explicit, dynamic models that simulate the three-dimensional climate system using as first principles the laws of thermodynam¬ics, momentum, conservation of energy and the ideal gas law. (UNDP 2011)

mature trees are unlikely to respond as much in a forest environment (Oren *et al.,* 2001), some increase in productivity is likely and will be accompanied by a range of other effects including lower stomatal conductance leading to reduced water use on a leaf area basis (Medlyn *et al.,* 2001), an increase in leaf area (Broadmeadow and Randle, 2002), possible changes in timber quality (Savill and Mather, 1990) and in the nutritional quality of foliage to insect herbivores (Watt et al., 1996). However, since all other environment conditions will not remain constant we can expect any increases in productivity resulting from higher levels of CO2 in the atmosphere to be offset, and in many situations completely cancelled, by changes in the climate resulting from higher levels of CO2 and other GHGs.

Changes in temperature, rainfall, wind and humidity

Changes in temperature, rainfall, wind and humidity affect forest trees in many ways, including photosynthesis and respiration (and therefore growth), reproduction, pollination, seed dispersal, phenology, pest and disease resistance and competitive ability (Broadhead, Durst and Brown 2009; Maroschek et al. 2009). The response of individual trees determines the way in which the forest responds. If changes in the climate exceed a species' physiological tolerances the rates of biophysical forest processes will be altered (Olesen et al. 2007, Kellomaki et al. 2008, Malhi et al. 2008). After a certain point the vegetation will reach a threshold beyond which it no longer comprises a forest; it will have changed its state. Under severe drying conditions, forests may be replaced by savannahs or grasslands (or even desert).

More frequent extreme weather events

Strong winds can cause severe damage to forests by uprooting and breaking the stems of trees. Heavy rain can cause soil erosion and landslides. The disturbances caused by such events reduce productivity in the short term and can make forests more vulnerable to pests and diseases.

More frequent and more devastating fires

Prolonged dry and hot weather will increase the risk of forest fires. Severe fires destroy organic matter and nutrients are lost by volatilization. Frequent fires can also increase soil erosion, reduce regeneration and in dry areas may accelerate desertification (Kolström, Vilén and Lindner 2011).

More frequent and more severe outbreaks of pests and diseases

Increases in precipitation favour many forest pathogens by enhancing sporulation, dispersal and host infection (Lucier et al 2009 citing Garrett et al. 2006). Warm climate conditions have clearly contributed to some recent insect epidemics: e.g. bark beetles in North America (Lucier et al 2009 citing Berg et al. 2006, Tran et al. 2007, Raffa et al. 2008), defoliators in Scandinavia (Lucier et al 2009 citing Jepsen et al. 2008), aphids in the United Kingdom (Lucier et al 2009 citing Lima et al. 2008) and the processionary moth in continental Europe (Lucier et al 2009 citing Battisti et al. 2005, 2006). The drought stress of trees will make forests more vulnerable to infestation by insect herbivores and fungal diseases (Kolström, Vilén and Lindner 2011).

More favourable conditions for invasive species

Climate change can affect forests by altering environmental conditions and increasing niche availability for invaders (Lucier et al 2009 citing McNeely 1999, McNeely et al. 2001, Hunt et al. 2006, Ward and Masters 2007, Dukes et al. 2009, Logan and Powell 2009). As a result of climate change, dominant endemic species may no longer be adapted to the changed environmental conditions of their habitat, affording the opportunity for introduced species to invade, and to alter successional patterns, ecosystem function and resource distribution (Lucier et al 2009 citing McNeely 1999, Tilman and Lehman 2001).

4.2. Impacts of climate change on forests in the South Caucasus

A recent study of the impacts of climate change on forests in the South Caucasus predicts that conditions will become less suitable for most of the forest types that occur in the region at present (Zazanashvili et al 2011). Under an ecologically less unfavourable GHG emissions scenario there could be a reduction of 8% in the area suited to the forest types that occur in the region today compared with actual forest cover in 2011. Under an ecologically more unfavourable emissions scenario there could be a reduction of 33%. The models run in the study predict that impacts will vary between bioclimatic zones and countries with Georgia being affected less overall than Armenia and Azerbaijan.

The impacts of climate change on forests in the region will take many years to show and while some forest formations may benefit overall from climate change, most formations will become stressed and lose vigour. Unless species or genotypes that are better adapted to the

changing conditions are able to colonize the site the forest will gradually disappear. Modelling based on an ecologically more favourable GHG emissions scenario predicts that conditions will become more suitable over a larger part of the region for dry woodlands, *Buxus, Castanea, Parrotia and Zelkova*. Under the ecologically less favourable scenario conditions will become more suitable over a larger part of the region only for dry woodlands and *Zelkova.*

The study predicts different impacts in the three countries. Under the ecological more favourable GHG scenario, in Georgia conditions become more favourable overall for the forest types that occur in the country today, while in Armenia conditions become slightly less favourable and in Azerbaijan conditions become a lot less favourable. Under the ecologically less favourable climate scenario, the area suitable for existing forest formations in Armenia and Azerbaijan will fall substantially (by 52% and 62% respectively) and several forest types will disappear. In Georgia the predicted impact is less than in Armenia and Azerbaijan - a reduction of 11% in the area suitable for existing forest types.

The impact of long term climate change on forests predicted by the study will take many years to show. Forest formations occupying sites which will become less suitable for them will gradually become more and more stressed; the most vulnerable tree species in the formation will lose vigour and may die prematurely; seed production and the formation's capacity for natural regeneration will be reduced.

This does not mean that forests will disappear. Forests and their biological components respond autonomously to long term climate change. The distribution of forests and of different forest types in the south Caucasus 5,000 years ago, before human activity started to cause the deforestation of large areas, was very different from what it was immediately after the end of the last ice age. Sedjo 2010 citing Shugart et al. 2003 notes that forests have responded to past climate change with alterations in the ranges of important tree species. However a critical issue is the rate at which tree species migrate. After the last glacial period, tree species migrated at rates of a few kilometres per decade or less, but the projected rate of shift in climate zones of 50 kilometres per decade could lead to massive loss of natural forests

The capacity for long-distance migration of plants by seed dispersal is particularly important in the event of rapid environmental change. Most, and probably all, species are capable of long-distance seed dispersal, despite morphological dispersal syndromes that would indicate morphological adaptations primarily for short-distance dispersal (Cwyner and MacDonald 1986, Higgins et al. 2003). Assessments of mean mi-

gration rates found no significant differences between wind and animal dispersed plants (Wilkinson 1997, Higgins et al. 2003). Long-distance migration can also be strongly influenced by habitat suitability (Higgins and Richardson 1999) suggesting that rapid migration may become more frequent and visible with rapid changes in habitat suitability under scenarios of rapid climate change. The discrepancy between estimated and observed migration rates during re-colonization of northern temperate forests following the retreat of glaciers can be accounted for by the underestimation of long-distance dispersal rates and events (Brunet and von Oheimb 1998, Clark 1998, Cain et al. 1998, 2000). Nevertheless, concerns persist that potential migration and adaptation rates of many tree species may not be able to keep pace with projected global warming (Davis 1989, Huntley 1991, Dyer 1995, Collingham et al. 1996, Malcolm et al. 2002). However, these models refer to fundamental niches and generally ignore the ecological interactions that also govern species distributions.

There is also potential for natural evolutionary change, which has been demonstrated in numerous long term programmes based on artificial selection (Falconer 1989). In the face of rapid environmental change genetic diversity and adaptive capacity of forested ecosystems depends largely on in situ genetic variation within each population of a species (Bradshaw 1991). Populations exposed to a rate of environmental change exceeding the rate at which populations can adapt, or disperse, may be doomed to extinction (Lynch and Lande 1993, Burger and Lynch 1995). Genetic diversity determines the range of fundamental eco-physiological tolerances of a species. It governs inter-specific competitive interactions, which, together with dispersal mechanisms, constitute the fundamental determinants of potential species responses to change (Pease et al. 1989, Halpin 1997).

In the light of the evidence presented in the preceding paragraphs we can conclude that if we take no action to mitigate the impact of climate change on forests we can expect changes in forest health, vitality and productivity caused by changes in climatic variables and the increased risks of damaging events to have significant consequences for people living in the region. Those consequences will include:

- an overall reduction in the quantity of timber and non-wood forest products such as mushrooms, berries and nuts from the forest types present in the region today, though production may increase in the Colchic bio-climatic region;
- an overall reduction in the value of environmental services provided by the region's forests, including regulation of water quality and wa-

ter flow, prevention of erosion, landslides and avalanches;

- changes in biodiversity and the special values of the region's protected areas;
- changes in the visual landscape.

5. STRATEGIES FOR MITIGATION AND ADAPTATION OF THE IMPACTS OF CLIMATE CHANGE ON THE REGION'S FORESTS

If we want to avoid the consequences of climate change described in Chapter 4.2 we must intervene to help forests adapt. There are two possible approaches open to us: reactive adaptation and planned adaptation.

Reactive adaptation is action taken after climate change impacts have already occurred and been observed; for example changing the tree species after the existing species have shown signs of loss of vigour and early mortality, salvage harvesting after storms, recalculation of allowable cuts in response to declining productivity. Reactive adaptation may lessen some of the long term impacts of climate change on forests that would occur in a no intervention scenario but the long time scales required to bring about changes in forest formations will delay any positive impacts of reactive intervention.

Planned adaptation involves redefining forestry goals and practices in anticipation of climate change-related risks. Planned adaption is made difficult by the fact that our knowledge about the vulnerability of ecosystems and species, and the spatial and temporal resolution of the future climate, are poor and the exact nature and scale of the impacts of climate change on forests impossible to predict. In spite of the high degree of uncertainty it is possible to develop adaptation strategies now, and we need to start now: the impacts are likely to be substantial, and the negative impacts many times greater than any positive impacts (Bernier and Schoene 2009); and adaptation to climate change in forest management requires a planned response well in advance of the impacts of climate change (Spittlehouse and Stewart 2003).

Ways in which we can help forests adapt to climate change include the following:

Increasing the natural adaptive capacity of forests

Adaptation theory suggests that more diverse natural systems are more resilient to short term shocks and long term changes in environmental parameters; e.g. forest ecosystems with greater diversity usually show a greater adaptive capacity (SCBD 2003; Fontaine et al. 2005; Stokes and Kerr 2009), as they are able to adapt in a variety of ways to different changes. Increasing the diversity of species and provenances in forest stands provides insurance against the risk that forest health and productivity will decline as a result of climate change.

While the scientific evidence supports the hypothesis that mixed-species forest ecosystems are more resilient than monotypic stands, some natural monotypic, or nearly monotypic, forests do occur. In the boreal forest zone, natural stands of jack pine *(Pinus banksiana)*, Scots pine *(P. sylvestris)*, lodgepole pine *(P. contorta)*, and Dahurian larch *(Larix gmelinii)* are commonly dominated by single species. These stands self-replace usually following fire over large landscapes, with no change in production over time. Similarly, in wet boreal systems where fire is absent, monotypic stands of a single species of fir *(Abies spp.)* occur and generally self-replace following insect-caused mortality. Generally, these monodominant boreal forest ecosystems tend to be relatively shortlived and are prone to fire or insect infestation. (Thompson et al 2009)

Planting species and provenances that are more resilient or promoting them in naturally regenerated stands by selective tending and thinning. In Germany the use of provenances of native and non-native tree species (e.g. Douglas fir) from regions with a climate corresponding to future climate in Germany is an important element of active adaptation (Bolte and Degen 2010). Species and provenance selection needs to be informed by research into the responses of species and genotypes to climate, for example to identify drought-tolerant genotypes (Spittlehouse and Stewart 2003 citing Farnum 1992). Trees can be bred for pest resistance and for a wider tolerance to a range of climate stresses and extremes in specific genotypes (Spittlehouse and Stewart 2003 citing Namkoong 1984 and Wang et al. 1995).

Alternative provenances or species could be planted to respond positively to the predicted warmer climate (see Cannell et al., 1989). However, the adoption of new varieties or the wider use of some that are already planted will require careful balancing against commitments to the use of native species and origins. Furthermore, where species or provenances originating from hotter, drier climates are planted, performance under a future climate must be balanced with performance under the current climate.

Increasing the resilience and natural adaptive capacity of forests at a landscape level

Reducing fragmentation and creating ecological corridors facilitates the natural movement of species, and strengthens and extends regimes of forest preserves to reduce anthropogenic impacts that compound the negative effects of climate change (Robledo and Forno, 2005).

Adaptation of fire prevention and control practices

Adaptation of fire prevention and control practices include altering forest structure (e.g., tree spacing and density, standing dead trees, or coarse woody debris on the forest floor) to reduce the risk and extent of disturbance (Spittlehouse and Stewart 2003 citing Dale et al. 2001); increasing the use of prescribed burning to minimize fuel loading (Spittlehouse and Stewart 2003 citing Wheaton 2001); developing "fire-smart" landscapes by using harvesting, regeneration, and stand-tending activities that manage fuels to control the spread of wildfire (Spittlehouse and Stewart 2003 citing Hirsch and Kafka 2001 and Climate Change Impacts and Adaptation Directorate 2002); focusing on the protection of areas with high economic or social value, while in other areas allowing fire to run its course (Spittlehouse and Stewart 2003 citing Stocks et al. 1998 and Parker et al. 2000).

Adaptation of pest and disease prevention and control practices

Examples of adapting pest and disease prevention and control strategies include: partial cutting or thinning to increase stand vigour and lower the susceptibility to attack (Spittlehouse and Stewart 2003 citing Wargo and Harrington 1991 and Gottschalk 1995); reducing disease losses through sanitation cuts that remove infected trees; shortening the rotation length to decrease the period of stand vulnerability to damaging insects and diseases (Spittlehouse and Stewart 2003 citing Gottschalk 1995) and facilitating change to more suitable species (Spittlehouse and Stewart 2003 citing Lindner et al. 2000); using insecticides and fungicides in situations where silvicultural activities for insect pest management are ineffective or inappropriate (Spittlehouse and Stewart 2003 citing Parker et al. 2000); controlling undesirable plant species, which become more competitive in a changed climate, through vegetation management treatments (Spittlehouse and Stewart 2003 citing Parker et al. 2000).

Adaptation of silvicultural practices to manage declining and disturbed stands

Adaptation of silvicultural practices include: selectively removing suppressed, damaged, or poor quality individuals to increase light, water, and nutrient availability to the remaining trees (Spittlehouse and Stewart 2003 citing Smith et al.1997 and Papadopol 2000); reducing vulnerability to future disturbances by managing tree density, species composition, forest structure (e.g., under-planting; planting late-successional species), and location and timing of management activities (Spittlehouse and Stewart 2003 citing Dale et al. 2001); reducing the rotation age followed by planting to speed the establishment of better-adapted forest types (Spittlehouse and Stewart 2003 citing Lindner et al. 2000 and Parker et al. 2000).

Implementing adaptive management

Forest managers need to prepare forest management plans in the face of increasing uncertainty about climate and the response of trees and forest formations to climate change. Former certainties underlying classical tools such as yield tables no longer hold true in the face of climate change and the tools are no longer valid (Spittlehouse and Stewart 2003). Adaptive management is a management approach that acknowledges the lack of unequivocal and definitive knowledge about the ways in which forest ecosystems work, and the uncertainty that dominates interactions with them (Robledo and Forno, 2005 citing Borrini-Feyerabend, 2000). It is a formal process for continually improving management policies and practices by learning from their outcomes (Robledo and Forno, 2005 citing Taylor et al., 1997). The key characteristics of adaptive management include (Robledo and Forno, 2005 citing Sit and Taylor, 1998):

- acknowledgement of uncertainty about what policy or practice is “best” for the particular management issue;
- thoughtful selection of the policies or practices to be applied;
- careful implementation of a plan of action designed to reveal critical knowledge;
- monitoring of key response indicators;
- analysis of the outcome in terms of the original objectives;
- incorporation of the results into future decisions.

Since scientific research results take many years to become applicable and operational on local sites, the notion of adaptive management postulates that forest managers themselves integrate applied research and experimentation in their daily work to generate data for immedi-

Box 1 *– Ecological principles to maintain and enhance long term forest resilience (from Thompson et al 2009)*

Thompson et al 2009 suggest the following as ecological principles that can be employed to maintain and enhance long term forest resilience, especially under climate change (a list of adaptation responses similar to these principles can be found on pages 4 and 5 of FAO 2011b):

1. Maintain genetic diversity in forests through practices that do not select only certain trees for harvesting based on site, growth rate, or form, or practices that depend only on certain genotypes (clones) for planting (see e.g., Schaberg et al. 2008) .
2. Maintain stand and landscape structural complexity using natural forests as models and benchmarks.
3. Maintain connectivity across forest landscapes by reducing fragmentation, recovering lost habitats (forest types), and expanding protected area networks (see 8. below).
4. Maintain functional diversity (and redundancy) and eliminate conversion of diverse natural forests to monotypic or reduced species plantations.
5. Reduce non-natural competition by controlling invasive species and reduce reliance on non-native tree crop species for plantation, afforestation, or reforestation projects.
6. Reduce the possibility of negative outcomes by apportioning some areas of assisted regeneration with trees from regional provenances and from climates of the same region that approximate expected conditions in the future.
7. Maintain biodiversity at all scales (stand, landscape, bioregional) and of all elements (genetic, species, community) and by taking specific actions including protecting isolated or disjunct populations of organisms, populations at margins of their distributions, source habitats and refugia networks. These populations are the most likely to represent pre-adapted gene pools for responding to climate change and could form core populations as conditions change.
8. Ensure that there are national and regional networks of scientifically designed, comprehensive, adequate, and representative protected areas (Margules and Pressey 2000). Build these networks into national and regional planning for large-scale landscape connectivity.

ate use (Robledo and Forno, 2005 citing Nyberg, 1999). This entails local assessments of climate change impacts and vulnerability studies of forest ecosystems, results of which would then feed into the initial stages of the adaptive management cycle, i.e. the problem assessment and the design of implementation measures. An essential element of adaptive forest management is that knowledge generated by learning is reintegrated into the project/working cycle and hence leads to adjustment and improvement of the forest management approach (Robledo and Forno, 2005).

A summary of ecological principles for maintaining the long term resilience of forests ecosystems is presented in Box 1 below.

6. INCREASING THE RESILIENCE OF THE REGION'S ARTIFICIALLY PROPAGATED FORESTS TO CLIMATE CHANGE (INCLUDING GENERAL RECOMMENDATIONS FOR THE SELECTED PILOT SITES)

6.1. Transformation aims

The silvicultural focus of the project is the transformation of monoculture forest stands in the region into highly resilient, "close to nature" forest stands. There are therefore two conditions that the transformation measures have to meet: the transformed stands must be highly resilient to climate change; and they must be "close to nature".

The term "resilient" is used with different meanings in the literature about climate change and forest adaptation[8]. The definition used in the United Kingdom's guidelines on forests and climate change (Forestry Commission, 2011) is probably closest to the meaning that applies in the context of the project: "Resilience [is] the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change". According to this definition a forest, a form of ecological system, can undergo changes in some of its characteristics, for example genetic composition of a species, species composition of a stand, and still meet the definition of resilient provid-

8. For example, Holling (1973) defines resilience as "The capacity of an ecosystem to return to the pre-condition state following a perturbation, including maintaining its essential characteristics taxonomic composition, structures, ecosystem functions, and process rates". Gunderson (2000) distinguishes between "ecological resilience" (the ability of a system to absorb impacts before a threshold is reached where the system changes into a different state) and "engineering resilience" (the capacity of a system to return to its pre-disturbance state).

ed that the system is still recognisably a forest in terms of its physical structure and the variety of goods and services that it provides. Within the meaning of resilient such scope for change in the genetic character of the forest as has just been described is probably going to be essential: no change or only a small change is almost certainly unrealistic given the increases in temperature and decreases in precipitation that are expected in the region.

"Close to nature forestry" is generally understood to mean a system of forest management which provides continuous regeneration, development and treatment of stands that are similar in species composition, structure and dynamic to forests occurring naturally in the specific site conditions (Box 2).

Box 2 *– Close to Nature Forestry (adapted from Slovenia Forest Service, 2008)*

TThe following description of "close to nature forestry" is taken from a publication by the Slovenia Forest Service which is a long standing follower and promoter of the approach:
"Close to nature forestry uses forest management methods that promote conservation of nature and forests, as its most complex creation, while deriving tangible and intangible benefits from a forest in a way to preserve it as a natural ecosystem of all its diverse life forms and relations formed therein.
Close to nature forestry is based on forest management plans adapted to individual site and stand conditions as well as forest functions, and considering natural processes and structures specific to natural forest ecosystems.
Natural processes are altered as little as possible, while still maintaining the financial profitability and social sustainability of forest management. Similarly to natural processes, close to nature forestry also contains inbuilt mechanisms for continual internal checks (controls) providing timely response to modify measures adapted in accordance with developmental characteristics of single forest stands and a forest as a whole.

Characteristics of close-to-nature forest management are:

- Preservation of the natural environment and the ecological balance of the landscape;
- Sustainability of all forest functions;
- Integrated approach to a forest ecosystem;
- Imitation of natural processes and forms;
- Tree species suited to site conditions;
- Based on [the adaptive] approach – constant monitoring and learning;
- Based on long-term economic efficiency;

• Plans designed at a broader and more detailed level.

Close-to-nature forest management is, therefore, a forest management practice where the goals of sustainable and multifunctional forest management are achieved through preservation of natural forest and silvicultural approach mimicking natural disturbances and processes. In this sense, close-to-nature forest management combines the principles of sustainable forest management and the ecosystem approach."

Thus we can summarise the aims of transformation in the following way:

• **Resilient to climate change**. The stand will continue as a forest formation (i.e it will not transform into another state such as grassland). The stand will continue to provide the range of goods and services that we currently associate with forests but the volumes/quantities of individual goods and services and their volumes/quantities relative to each other may change (e.g. the forest will continue to produce harvestable timber but may do so in smaller amounts than now, and it will continue to provide soil and water regulation services).

• **Close to nature forest stand**. The tree species which form the stand are native to the South Caucasus. The tree species are mixed in proportion to each other and arranged spatially in a way that resembles the structure of the forest that we would expect to develop naturally on the site. The question of how far we should take account of predicted future climate change and our idea of the forest that would develop naturally on the site under those predicted future conditions is discussed later in this report.

6.2. Experience of transforming forest stands in EU countries

Transformation of forest stands has become increasingly widespread in EU countries during the last 20 years as more and more forest managers have seen that traditional silvicultural practices have resulted in forest stands that are ecologically unstable.

In continental west and central Europe at least 6 to 7 million hectares of pure Norway spruce *(Picea abies3)* are located outside the species' natural range; at least 4 to 5 million hectares are located on sites naturally dominated by broadleaved species or mixed tree species. These forests have with time resulted in a higher exposure to forest decline, windthrows, pests, drought and soil deterioration. The transformation of these stands into mixed forests has become one of the most important strategic silvicultural targets and biggest challenges in forest policy and practice in EU countries.

In the UK and Ireland, large areas of forest plantations were established with conifer monocultures using non-native species such as sitka spruce *(Picea sitchensis)*, Norway spruce and lodgepole pine *(Pinus contorta)*. Now there is an increasing movement towards transforming these plantations into mixed "continuous cover" forests (see section 6.2 below).

It is an interesting point that the movement towards forest transformation in Europe developed before concern about the impacts of climate change on forest became widespread; the movement was inspired more by concerns about resistance to pests and diseases, the long term effects of monoculture silviculture on the site, and aesthetic considerations.

In EU countries we can distinguish the following standard situations and transformation concepts:

Monocultures of Norway spruce *(Picea abies)* – Transformation through underplanting of beech; e.g. the German States of Bavaria and Hesse (Bayerische Landesanstalt für Wald und Forstwirtschaft 2009; Hessen-Forst 2008):

1. Monocultures of Pine (Pinus sylvestris) – Transformation through introduction of oak (and other broadleaf species) after opening up the canopy cover of pine; e.g. the German State of Brandenburg (Ministerium für Ländliche Entwicklung, Umwelt und Verbraucherschutz des Landes Brandenburg und Landesforstanstalt Eberswalde 2006).
2. Enrichment of Douglas fir monocultures; e.g. the German State of Hesse (Hessen-Forst 2008).
3. Enrichment of pure beech stands; e.g. the German state of Hesse (Hessen-Forst 2008).

The experience of the German state of Brandenburg is particularly relevant because, as in the South Caucasus, the initial situation is usually a monocultural stand of artificially propagated pine that are not adapted to the site. The experience of the UK is also interesting. Although the initial situation is very different from that in the South Caucasus, the goal of transformation is the same, and the forestry administration has developed process guidelines for deciding how to transform conifer monocultures into more resilient forests.

German state of Brandenburg

The Brandenburg state forestry administration aims to increase the

proportion of broadleaf forests and to reduce the proportion of pine forests significantly in the next decades. The reason behind this policy is the evidence that oak and other broadleaf trees have an comparatively lower risk to get affected by insect pests, forest fires and other negative impacts intensified through climate change. Guidelines published by the Brandenburg state forestry administration provide advice to forest managers on how to transform pine plantations.

The most common silvicultural method for growing oak and other broadleaf species is planting or seeding them under the existing pine stand; the main advantages of this method are:

- with the help of the pine canopy the sensitive young oak and broadleaf seedlings are protected from damaging weather extremes (frost, heat)
- competition of aggressive grass and/or blackberry (Rubus) is prevented
- the existing pine stand can be harvested over a longer period producing continuous timber or fuelwood yields

Referring to oak underplanting it is crucial to consider the light requirements of oak seedlings: To ensure a good development of the seedlings the percentage of canopy cover (of the pine stand) should be below 70 %. On the other hand it is recommended to maintain a canopy cover percentage of more than 40 % to safeguard the protection function of the canopy against frost impacts on the seedlings.

United Kingdom

A large proportion of the UK's forest have been created in the last 90 years by planting mainly non-native conifers, mostly as monocultures and sometimes in mixtures.

The main silvicultural system is patch clearfelling followed by planting or occasionally natural regeneration. This system is probably employed in at least 90% of managed forests with an average size of clearfelled coupe of between 5 and 10 hectares, although there is appreciable regional variation (Mason et al., 1999).

The state forest administration now requires forest managers to *"identify areas which are, or will be, managed under a continuous cover forestry system and to build them into the forest design"* (Forestry Commission, 1998). The UK forest certification standard (UKWAS, 2000), which is the standard used in FSC and PEFC certification of UK forests, requires forest managers to favour lower impact silvicultural systems, which include continuous cover forestry.

Continuous Cover Forestry (CCF) is an approach to forest management that results in the development of diverse forests with a range of different structures and often a variety of species (Mason et al., 1999).

Initial interest in CCF was not associated with concerns about the impacts of climate change on forests: the attraction lay in the belief that the CCF approach was suited to an era of multi-purpose forestry where environmental, recreational, aesthetic and other objectives are as important as timber production; in particular, CCF was seen as a means of reducing the impact of clearfelling and the associated changes that it produces in forest landscapes and habitats (Mason et al., 1999). Now, though, CCF is seen as a way of adapting forests to the risks of climate change (Stokes and Kerr 2009).

CCF is not synonymous with close to nature forestry but some forms of CCF can be classed as CNF. CCF does not rule out the use of non-native species and it allows the use of any silvicultural system that does not create large areas that are completely open to the sky. In contrast, generally in CNF only species that are native to the locality are acceptable and there is an emphasis on management mimicking nature.

***Box 3** – UK guidelines for transforming even-aged conifer and mixed species stands into continuous cover forests (adapted from Mason and Kerr 2004)*

- **Stage 1:** Assess the feasibility of transformation.
  - Site appraisal (risk of windthrow, soil fertility and potential vegetation competition, species suitability)
  - Detailed stand appraisal (stand structure and quality, advance regeneration, ground flora, litter, animals, access and topography)
- **Stage 2**: Select the desired structure and appropriate silvicultural system
  - Decide upon the stand structure (simple or complex) that will best achieve management objectives (a simple structure will be produced by the uniform or group shelterwood systems, whereas a complex structure will result from an irregular shelterwood or a selection system).
- **Stage 3**: Choose a thinning regime that will favour the desired stand structure, taking into account the current stage of stand development. (The Guidelines provide recommendations for thinning regimes for two age groups of stand (young, 20-40; older, >40) and two desired types of structure (simple and complex).

Therefore irregular silvicultural systems (single stem selection, group selection, irregular shelterwood) are favoured over regular systems (uniform shelterwood, strip shelterwood)[9].

UK guidelines for transforming even-aged conifer and mixed species stands in continuous cover forests (Mason and Kerr 2004) recommend a three stage process (Box 3). Key points of the guidelines are:

- The importance of management objectives in the development of the transformation plan (i.e. forest managers should decide the objectives which the transformed forest will serve before deciding transformation measures).
- Transformation measures that are taken in the stand are decided only after deciding the future stand structure - i.e. simple (one or two storeys) or complex (more than two storeys) - and silvicultural system.
- The guidelines assume that the introduction of young trees will be by natural regeneration and recommend planting only when natural regeneration has failed. This limits the scope for increasing the resilience of the stand by introducing other species and/or different provenances.

  However, the guidelines state that under-planting can also be used, particularly if one aim is to introduce either desired species that are absent from the site or improved genotypes.
- There is no particular emphasis on native species.

6.3. Transformation of conifer plantations in the South Caucasus

In contrast to EU countries artificially propagated conifer forests cover only a very limited area in the South Caucasus (data covering, inter alia, artificially propagated conifer forests is presented in section 2.1 above). Often these plantations were created in the surroundings of cities in order to protect soil or for recreational purposes. In Armenia artificially propagated pine forests were established in otherwise treeless regions so that they had at least some forest cover. Thus, plantations in the South Caucasus often have positively valued landscape and recreational functions. Nevertheless their transformation into close to nature forests could improve correspondence to the mentioned functions at the same time as increasing their resilience to the impacts of climate change.

9. Regular stands are ones where all the trees are of similar height (but not necessarily of the same age) whereas irregular ones contain a mixture of sizes. Systems which promote regular structures require the removal of the overstorey once regeneration is established whereas in irregular systems there will always be some components of the overstorey retained in the stand.

General description of the pilot sites

The six pilot sites (see the summary table in Annex I) were selected by the project partners together with the forest administration responsible for assigning the pilot sites to the action. The sites were selected using the criteria that were developed at the initial project planning stage and which later on were adopted at national level in all 3 target countries (through review and conformation during the national introductory workshops with forestry administration staff). The criteria are set out in Annex II.

The site selection preconditions were identified as follows:

- Current leading tree species is not in its natural distribution area
- Current forest stand is a monoculture
- Current forest stand is vulnerable to climate change

As a result the following 6 pilot sites were selected and agreed with national governmental agencies:

In Armenia

Pilot Forest Site N1 – *"KOGHB"* in Tavush Region *(Armenia)* located on the state forest lands of the Noyemberyan State Forest Enterprise of the State Non-Commercial Organization "Hayantar" *(ArmenForest)* of the Ministry of Agriculture of the Republic of Armenia.

Pilot Forest Site N2 – *"SPITAK"* in Lori Region *(Armenia)* located on the state forest lands of the Gugarq State Forest Enterprise of the State Non-Commercial Organization "Hayantar" *(ArmenForest)* of the Ministry of Agriculture of the Republic of Armenia.

Detailed location and boundaries of the selected pilot forest sites already agreed with the State Non-Commercial Organization "Hayantar" *(ArmenForest)*, as well as relevant agreement with the stakeholder are available at the following web-page:

For the Pilot Forest Sites N1 and N2 :

http://awsassets.panda.org/downloads/memorandum_of_understanding_dec_29_2011.pdf

In Azerbaijan

Pilot Forest Site N1 – *"AGSU"* in Shamalkhi District *(Azerbaijan)* located on the state forest lands of the Shamakhi Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic.

Pilot Forest Site N2 – *"YEVLAKH"* in Yevlakh District *(Azerbaijan)* located on the state forest lands of the Yevlakh Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of the Azerbaijan Republic.

Detailed description of locations of the selected pilot forest sites already agreed with the relevant Forest Protection and Restoration Enterprises are available at the following web-pages:

For the Pilot Forest Site N1 :

http://awsassets.panda.org/downloads/mou_shamakhi.pdf

For the Pilot Forest Site N2 :

http://awsassets.panda.org/downloads/mou_yevlakh.pdf

In Georgia

Pilot Forest Site N1 – *"KHASHURI"* in Khashuri Municipality *(Georgia)* located on the state forest lands of the former Khashuri State Forestry, Forest Unit N.3, Forest Sub-Units NN.5-7 and NN.9-30 - currently under the management of Shida Kartli Service of the Natural Resources Agency of the Ministry of Energy and Natural Resources of Georgia.

Pilot Forest Site N2 – *"TSAVKISI"* in Tbilisi Municipality *(Georgia)* located on the former state forest lands of Kojori Forest Unit of the former Tbilisi State Forestry - currently under the management of the Municipality of Tbilisi.

Detailed location and boundaries of the selected pilot forest sites already agreed with stakeholders, as well as relevant agreements with the stakeholders are available at the following web-pages:

For the Pilot Forest Site N1:

http://awsassets.panda.org/downloads/mou_geo_site_khashuri.pdf

For the Pilot Forest Site N2:

http://awsassets.panda.org/downloads/mou_geo_site_01_tsavkisi.pdf

The pilot sites are located in different natural forest vegetation zones of the South Caucasus and they are mainly represented by artificially propagated non-native pine forests (e.g., by *Pinus nigra* in Georgia).

Currently, transformation plans for the selected sites are being prepared in all 3 countries. These plans will specify in detail the measures to be carried out on each of the pilot forest sites. The measures will include a variety of silvicultural operations: fencing, preparation of sites, seeding and planting, and clearing of competing vegetation from around the seeded and planted trees. The transformation plans will serve as a base for developing best practices and to obtain reliable information about costs and results.

The main silvicultural idea is to transform the pine stands at the pilot sites into close to nature forests by using the existing pine cover as a nurse crop to introduce tree and shrub species by under-planting and, in addition, to reforest open areas. A common example is where a slower-growing, shade-tolerant species forms the lower layer beneath a canopy of a faster-growing, shade-intolerant species.

The factors that have to be considered in planning process include, but are not limited to:

- tree and shrub species that can be used for under-planting (which will depend on species composition natural for the pilot site area, existing vegetation, and existing canopy density;
- soil preparation methods;
- planting and seeding techniques and spacing;
- methods assisting natural regeneration;
- clearing of competing vegetation from around the seeded and planted trees;
- physical protection (fencing of the pilot sites and if necessary single tree protection).

Scenarios for the future climate of the pilot sites

In the time assigned for the preparation of this report it has not been possible to analyse in detail the results of the climate projections for the region prepared by, for example, UNDP (UNDP 2011) and the governments of the three countries (MENR-AZ 2010; MEPNR-GE 2009; MNP-AM 2010). The following projections for temperature and precipitation are interpreted from data presented in a report by Zoï Environment Network (Zoï Network 2011), specifically the maps of current average

annual temperature and average annual precipitation on pages 10 and 11 and the maps of forecast average annual temperature and average annual precipitation on pages 22 and 23. The project team should consider whether it would be worthwhile carrying out more precise projections for the purposes of planning transformation measures.

The Armenian pilot sites at Spitak and Noyemberyan lie in a zone in which present day average annual air temperature is 10 13 °C and present day average annual precipitation is between 200-600 mm. The projections presented in the Zoï Network report are that average annual air temperature where the pilot sites are situated will increase by 1.5 °C by 2040, by 3 °C by 2070 and by 5 °C by the end of this century. Average annual precipitation is projected to fall by 5% by 2040, by 5-10% by 2070, and 10-15% by the end of this century.

The Azerbaijan pilot sites at Yevlakhi and Shamlakhi lie in the zone with the highest present day average annual temperature in the South Caucasus (13-16 °C) and lowest average annual precipitation (less than 200 mm). The projections presented in the Zoï Network report are that average annual air temperature where the pilot sites are situated will increase by 1.5 °C by 2040, by 1.5-3 °C by 2070 and by 4-5 °C by the end of this century. Average annual precipitation is projected to fall by 0-5% by 2040, by 5-10% by 2070, and 15-20% by the end of this century.

The Georgian pilot sites lie in zones in which average annual air temperature is 7-10 °C in the case of Khashuri and 10-13 °C in the case of Tsavkisi, and average annual precipitation is 400-600 mm in the case of Khashuri and 200-400 mm in the case of Tsavkisi. The projections presented in the Zoï Network report are that average annual air temperature where the pilot sites are situated will increase by 1.5 °C by 2040, by 3 °C by 2070 and by 5 °C by the end of this century. Average annual precipitation is projected to fall by 0-5% by 2040, by 0-5% by 2070, and 10-15% by the end of this century.

There are huge uncertainties around these projections but all of the studies – the study that produced the data included in the Zoï Network report (UNDP 2011), the national studies that are reported in the countries 2nd national communications to the UNFCC (MENR-AZ 2010; MEPNR-GE 2009; MNP-AM 2010) – predict continuously increasing average annual temperatures and (with one exception) a decrease in annual average precipitation.

General recommendations for the pilot sites

This section of the report provides recommendations on the process for preparing transformation plans for the pilot sites. The report does not make specific recommendations on the species and the provenance of species or on the silvicultural measures that should be used at the pilot sites. These decisions should be taken following a comprehensive site assessment, which is one step in the process described in the rest of this section.

The UK process guidelines described in section 6.2.2. above include references to the objectives of the stands and the silvicultural system which will applied to the stands. These two considerations are not included in the recommendations for the pilot sites. For the purpose of this report its is assumed that the objective for all of the sites is that they will continue to provide the range of goods and services that we currently associate with forests and that no specific objective (e.g. wood production) is favoured over another (e.g. regulation of water resources). The silvicultural system which will be applied to the stands can be decided once the stands have been transformed.

The recommended process for deciding measures for transforming the stands at the pilot sites is pictured in Figure 1 below. The steps in the process are explained in the following paragraphs.

Step 1. Delineate the perimeter of the forest that is to be transformed

In some situations the outer boundary of the area in which transformation measures will be taken will be quite easy to determine. If the plantation has a “hard edge” against land that is not under trees, the plantation edge can be taken as the perimeter. In many situations, where the plantation has been subject to illegal felling, grazing, or trees have simply been unable to establish themselves and have dies, the edges of the plantation are not distinct. The boundary of a plantation may even be disputed by neighbouring land owners and users. In such situations the boundary will have to be negotiated. The output from this step is a map or aerial photo on which an undisputed boundary is marked.

2(a). Survey the forest and define and delineate categories

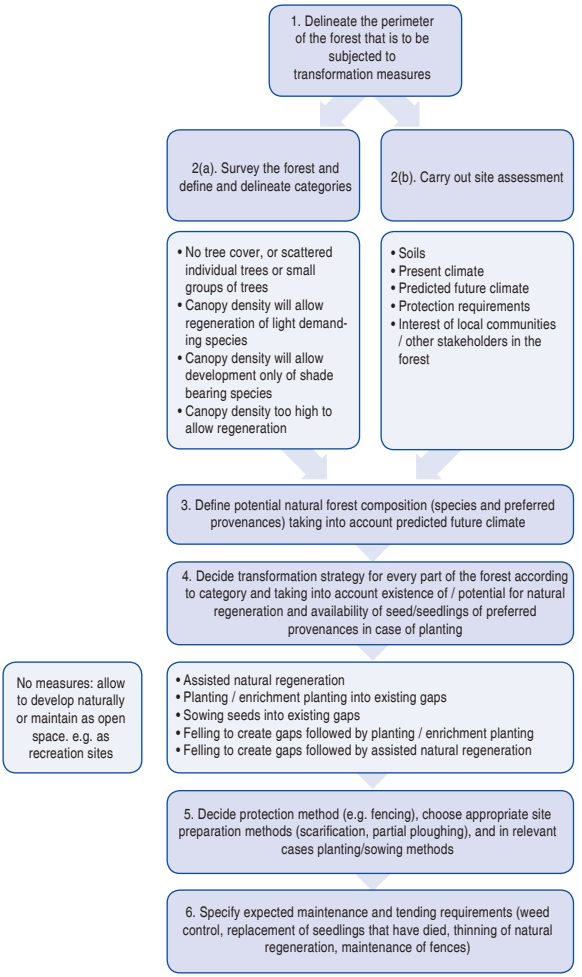
Dividing the stand into categories is the basis for planning the specific transformation measures that will be carried out. The categories listed in the diagram reflect factors that will be important in deciding the

measures that should be taken, i.e the density and distribution of tree cover. The presence of or potential for natural regeneration could be included at this stage in the process but is included in step 4 as a more logical point at which to take it into account.

2(b). Carry out site assessment

The site assessment includes mapping of soils, which is for deciding which species and the proportions of the chosen species that might be

Figure 1 *– Recommended process for deciding measures for transforming artificially propagated pine stands into close to nature forest stands*



planted in different parts of the stand, and the present and predicted future climate. Assessment of protection requirements – in particular whether it will be necessary to erect a fence around the stand to prevent grazing of young trees by livestock – can also be carried out at this stage. The need for protection measures will usually be determined by pressures on the stand from neighbouring communities and it is important to find out the interest of local people in the stand and the products and services that it provides now and could provide in the future.

3. Define potential natural forest composition

If we consider only the species that would form the natural vegetation under present day conditions we could be guided by the fact that in the South Caucasus in the zone between 350 and 1,800 m hornbeam-oak *(Carpinus betulus, Quercus iberica)* forests are the dominating natural forests, while beech *(Fagus orientalis)* forests form a distinguishably separate zone between 1000 and 1500m. However, it is important to consider the future climate in which the trees will be growing.

The projected changes in temperature over the next 30 years discussed in section 6.3.2 above are large enough to have significant impacts on the functioning of forest ecosystems that are adapted to present day conditions. The projected changes by the middle of the century are large enough to raise concerns about the performance of tree species and provenances that are adapted to present day conditions at the sites. Therefore serious thought needs to be given to using species that are adapted to conditions similar to those projected for the pilot sites and at the very least to using provenances that show the greatest tolerance of high temperature; in any case, adaptive management should be implemented – the health and vitality of the species established on the site should be monitored and enrichment with better adapted species considered if health and vitality deteriorate.

4. Decide the transformation strategy

In this step the transformation strategy for every part of the stand is worked out in terms whether to establish the future trees by using natural regeneration, by planting or sowing, or a combination of methods, and whether to open the canopy of the existing trees in order to provide enough light for the future trees.

5. Choose appropriate site preparation methods

The specific techniques that will be used to establish the future trees are decided in this step. They include preparation of the site to promote natural regeneration and to provide positions for sowing and planting

that are as free as possible from grasses, herbs and other plants that could compete with the future trees for water and nutrients. The Forest Restoration Guidelines published by WWF (WWF 2011) provide detailed advice about choosing site preparation methods. Protection methods should be decided in this step if they have not already been decided in step 2(b); the Forest Restoration Guidelines provide detailed specifications for fencing.

6. Specify expected maintenance and tending requirements

The final step before starting to implement the transformation measures is to specify the maintenance and tending measures that will be necessary to ensure successful establishment and development of the future trees. It is important to know what measures are likely to be necessary so that the work can be planned and budgeted and arrangements made for it to be carried out.

Measures will include removal of competing vegetation, replacing planting seedlings that have died and enriching natural regeneration with planted seedlings. Contingency plans should be made for watering planted seedlings in the event of lengthy hot, dry spells likely to cause a high rate of mortality (watering adds significantly to the costs of establishment and should be used only in exceptional circumstances).

7. OUTLOOK

There is a lot of uncertainty around predictions of the future climate of the South Caucasus; however, the results of climate modelling indicate that we should expect a continuous increase in average annual temperatures and lower average annual precipitation. We should also expect more frequent extreme weather events. The Project will implement measures to transform artificially propagated conifer stands which will become increasingly stressed into close to nature stands that are more resilient to predicted climate change.

Techniques for establishing the trees that will form the future forests stands at the pilot sites have already been tried and tested in the region and are described in detail in the Forest Restoration Guidelines referred to above.

The most difficult aspect of transformation is the choice of species and provenances. That choice must take into account the predicted future climate at the pilot sites. However, the uncertainty around the predic-

tions and the limitations on the availability of native species and provenances that are well adapted to the predicted future climate, will inevitably cause a high level of uncertainty about the resilience of the transformed stands. Further action may need to be taken many years after the transformation measures have been implemented in order to reinforce resilience, including planting species that are better adapted to the future climate at the sites. Those responsible for taking care of the transformed forests after the project has ended will therefore need to implement an adaptive management approach and continuously monitor the health of the stands and be ready to implement further adaptation measures if they become necessary.

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Annex I. *Summary Table for Selected Forest Pilot Sites in the South Caucasus Countries*

Country	Name of Pilot Site	Land Tenure Status	Owner	Location	Size
Armenia					
Armenia	1. Koghb FPS *(MoU signed on 29.12.2011)* *http://awsassets.panda.org/downloads/memorandum_of_understanding_dec_29_2011.pdf*	*State Forest Land*	Ministry of Agriculture ▼ State Organization "Hayantar" (ArmenForest) ▼ Noyemberyan State Forest Enterprise	Tavush Region	78 ha
Armenia	2. Spitak FPS *(MoU signed on 29.12.2011)* *http://awsassets.panda.org/downloads/memorandum_of_understanding_dec_29_2011.pdf*	*State Forest Land*	Ministry of Agriculture ▼ State Organization "Hayantar" (ArmenForest) ▼ Gugarq State Forest Enterprise	Lori Region	72 ha
TOTAL for ARMENIA					**150 ha**

Country	Name of Pilot Site	Land Tenure Status	Owner	Location	Size
Azerbaijan					
Azerbaijan	1. Agsu FPS *(MoU of 20.12.2011)* *http://awsassets.panda.org/downloads/mou_shamakhi.pdf*	*State Forest Land*	Ministry of Ecology and Natural Resources ▼ Shamakhi Forest Protection and Restoration Enterprise	Shamakhi District	75 ha
Azerbaijan	2. Yevlakh FPS *(MoU of 20.12.2011)* *http://awsassets.panda.org/downloads/mou_yevlakh.pdf*	*State Forest Land*	Ministry of Ecology and Natural Resources ▼ Yevlakh Forest Protection and Restoration Enterprise	Yevlakh District	75 ha
TOTAL for AZERBAIJAN					**150 ha**

Country	Name of Pilot Site	Land Tenure Status	Owner	Location	Size
Georgia					
Georgia	1. Tsavkisi FPS *(MoU of 11.08.2011)* *http://awsassets.panda.org/downloads/mou_geo_site_01_tsavkisi.pdf*	*Muni-cipal Forest Land*	Tbilisi City Mayor's Hall ▼ Environmental and Green Areas Municipal Service	Municipality of Tbilisi	75 ha
Georgia	*2. Khashuri FPS* *(MoU of 21.12.2011)* *http://awsassets.panda.org/downloads/mou_geo_site_khashuri.pdf*	*State Forest Land*	Ministry of Energy and Natural Resources ▼ Natural Resources Agency	Khashuri Municipality	79.9 ha
TOTAL for GEORGIA					**154.9 ha**
South Caucasus					
Grand TOTAL for the South Caucasus 454.9 ha					

Annex II. Table for Site Selection Criteria

1) Nature conservation criteria

a) Biodiversity indicators occurrence of endemic and/or endangered species

b) Importance to connect fragmentized habitats (eco-corridor)

2) Silvicultural/Ecological criteria

a) Canopy cover*
b) Dimension of the forest stand (average height and diameter)
c) Soil and nutrient situation
d) Hydrological situation*
e) Capacity of natural regeneration
f) Availability of site adapted planting material
g) Protective function of forest stand
i) Flood water protection
ii) Water protection zone
iii) Erosion Protection
h) Risk factors
i) Grazing

ii) Fire

3) Legal criteria

a) Land tenure
b) Status of forest land

c) Legal restrictions for forest transformation measures*

4) Social- economic criteria

a) Support and interest of local population and local government
b) Possibilities of involvement of local population in work process
c) Distance to villages
d) Importance for recreation and environmental education
5) Other
a) Sustainability of the action
i) Commitment of landowner
ii) Capacity of land owner
iii) Possibility of follow-up financing

b) Visibility

Explanatory notes to site selection criteria for forest transformation:

*Canopy cover: Canopy cover is the foliar cover in a forest stand consisting of one or several layers. It is measured in percentage of full cover. For example a canopy cover more than 30 % would make difficult survival capacity of oak seedlings due to their light requirements.

*Hydrological situation: The Hydrological situation of the site is decisive for the success of seeding or planting. For example extreme dry situations due to exposition or lack of water supply could make impossible survival of plants.

*Legal restrictions for forest transformation measures: For example transformation of forest stands could make necessary felling for opening up of canopy. Possibly measures like this are not covered by national forest legislation.

Notes



View of Khashuri Pilot Forest Site, Georgia, Jun-2011 © M.Dzneladze, WWF-Caucasus



View of Agsu Pilot Forest Site, Azerbaijan, Sep-2011 © M.Dzneladze, WWF-Caucasus



View of Koghb Pilot Forest Site, Armenia, Sep-2011 © M.Dzneladze, WWF-Caucasus



WWF Caucasus Programme Office

Merab Aleksidze Str. 11
0193 Tbilisi
Georgia

Tel: + 995 32 237500
Fax: + 995 32 237501

www.panda.org/caucasus
office@wwfcaucasus.ge

WWF Deutschland

14 Reinhardtstraße
Berlin 10117
Germany
Fax: +49 (0)30311777 199
Tel.: +49 (0)30-311777-274

www.wwf.de

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Annex 18. Terms of Reference and Model Outline for Development of Transformation Plans for the Selected Pilot Forest Sites

MODEL TERMS OF REFERENCE AND INDICATIVE (RECOMMENDED) OUTLINE/TEMPLATE

FOR FOREST PLANNING ORGANISATION TO PREPARE THE FOREST TRANSFORMATION PLAN (PLAN OF SILVICULTURAL MEASURES) FOR SELECTED PILOT FOREST SITES IN GEORGIA/ARMENIA/AZERBAIJAN

Malkhaz Dzneladze – Regional Project Coordinator (WWF-Caucasus)
Hannes Neuner – International Advisor (WWF-Caucasus)

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

TERMS OF REFERENCE

FOR A FOREST PLANNING ORGANISATION TO PREPARE THE FOREST TRANSFORMATION PLAN (PLAN OF SILVICULTURAL MEASURES) FOR SELECTED PILOT FOREST SITES IN GEORGIA/ARMENIA/AZERBAIJAN

WWF-Caucasus in partnership with WWF-Germany is implementing the EU financed Project DCI-ENV/2010/221391 *On Increasing the resilience of forest ecosystems against climate change in the South Caucasus through forest transformation* ("the Project").

With the above regard, WWF- Caucasus awards a service contract FORESTINVENTPROJECT Ltd. under the above Project for preparation of Forest Transformation Plan (*Plan of Silvicultural Measures for Reconstruction of Forest Stands*) for selected sites in GEORGIA/ARMENIA/AZERBAIJAN.

Background information on the Project

Climate change has already started to have significant impact on nature and people in the Southern Caucasus and in particular in GEORGIA/ARMENIA/AZERBAIJAN – effects that will become even more severe in the future. Through increasing temperature, decreasing water availability, increased damage from floods and storms and associated risks, climate change will no doubt put a challenge to the future development in the country. To reduce impacts will require the enhancement of ecosystem resilience and the introduction of specific climate mitigation/adaptation measures with regard to forest and water management, land use, food production and health.

The overall objective of the Project is to increase the resilience of forest ecosystems in the Southern Caucasus, namely in GEORGIA/ARMENIA/AZERBAIJAN, against climate change impacts and to improve biodiversity and livelihoods of local populations. The overall objective addresses the overarching threat of climate change to biodiversity and to forest ecosystem services which support the livelihoods of rural communities. Those services include protection of soils and water supply and quality, and timber and non-timber forest products. Objectively Verifiable Indicator (OVI) for the overall objective is that: by 2015 (two years after the completion of the Project), the national government will have adopted and started to implement policies that will make forests and the services they provide highly resilient to climate change.

The specific objective of the Project contributes to the overall objective by establishing the necessary conditions for the forest administrations in GEORGIA/ARMENIA/AZERBAIJAN to develop and implement strategies for transforming monoculture forest stands into highly resilient, "close to nature" forest stands. It is proposed to do this through awareness raising about climate change impacts on forests, demonstrating practical measures to make forests more resilient, and providing forest administration staff and local community members who use forests with the necessary knowledge and skills to transfer the development and implementation of transformation measures to other forest stands.

To achieve the specific objective, the following OVIs are proposed by the end of the Project:
- forest stand structure has been transformed in such a way that they will be highly resilient to climate change on pilot sites;

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

- forest stand potential to enhance the livelihoods of neighbouring communities will have increased on selected pilot sites; and
- the chief executives and heads of the policy and planning departments of forest administrations and heads of relevant departments in the forest administrations show a demonstrable increase in their awareness of climate change impacts on forests and motivation to develop strategies for making forests more resilient.

Expected results of the Project are:
Result 1 - Selected forest stands vulnerable to climate change have been transformed into highly resilient "close to nature" forest stands;
Result 2 - Silvicultural guidelines for the transformation of monoculture stands into more resilient stands are elaborated, published in GEORGIA/ARMENIA/AZERBAIJANn and English languages and made available for relevant officials and experts;
Result 3 - The capacities of forest administration experts to develop silvicultural strategies to transform monoculture stands into stable, site-adapted forests are increased;
Result 4 - The awareness of local communities about the importance of forest rehabilitation with regard to mitigating negative biotic and abiotic impacts of climate change is improved.

The Project is neither the continuation of a previous action nor part of a larger programme. It is however complementary to the recently completed German (BMU/KfW) financed WWF project "Mitigating Impacts of Climate Change through the Restoration of Forest Landscapes in the Southern Caucasus", the latter focusing on forest restoration.

Description of the assignment

Objective of the assignment is to prepare Forest Transformation Plan/ Plan* of Silvicultural Measures ("the Plan") with for the following selected pilot forest sites in GEORGIA/ARMENIA/AZERBAIJAN :

Example for Georgia:

Pilot Site N1 – "*KHASHURI*" with total area of 80 ha, located on the state forest lands of the former Khashuri State Forestry, Forest Unit N.3, Forest Sub-Units NN.5-7 and NN.9-30 - currently under the management of Shida Kartli Service of the Natural Resources Agency of the Ministry of Energy and Natural Resources of Geogria.

Pilot Site N2 – "*TSAVKISI*" with total area of 75 ha, located on the former state forest lands of Kojori Forest Unit of the former Tbilisi State Forestry - currently under the management of Municipaluty of Tbilisi.

Thus, total planning area shall cover about 155 ha.

The above forest sites have been selected by the Project team in cooperation with the forest authorities during the inception phase of implementation on a base of preliminary agreed selection criteria.

* *Due regard has to be paid to the requirements under National Legislation of GEORGIA/ARMENIA/AZERBAIJAN when preparing the Plan.*

Selected pilot sites represent forest stands with artificially propagated monoculture pine plantations and therefore most vulnerable to climate change impacts.

Detailed location and boundaries of the selected sites already agreed with stakeholders, as well as relevant agreements with the stakeholders are available at the following web-pages:

For the Pilot Site N1 : http://awsassets.panda.org/downloads/mou_geo_site_khashuri.pdf

For the Pilot Site N2 : http://awsassets.panda.org/downloads/mou_geo_site_01_tsavkisi.pdf

Beyond the above pilot sites, there are more artificially propagated plantations in Gerogia which provide goods and services to adjacent rural communities. A large proportion of the plantations are degraded and highly vulnerable to climate change. The continued production and protective functions of most of the monoculture pine stands established in the past are no longer guaranteed due to the growing incidence of climatic extremes, the proliferation of diseases, the forests. limited capacity to adapt, and the lack of structural diversity. All these factors will aggravate the problems for local communities to maintain the flow of forest products and environmental services mentioned above. Local people shall benefit greatly from transformed forest stands that will be resilient to the impacts of climate change, provide a wider range and greater volume of products for household consumption (fuel wood, fruits and nuts), and sustained forest services such as watershed protection, prevention of soil erosion, protection of biodiversity etc. In future, the knowledge and experience gained from the implementation of transformation measures under the Plan will be transferable to other degraded and vulnerable stands; thus the final beneficiaries could include many thousands of rural households and city dwellers.

In the longer term, the people in the communities adjacent to the pilot sites will benefit from the measures carried out at the pilot sites in two ways:
- 155 hectares of forest will be made more resilient to climate change, thus maintaining the flow of goods and services to the communities adjacent to the pilot sites;
- the transformation measures will increase the range of goods and services and the volume of goods provided by the forests at the pilot sites to the adjacent communities.

Methodology

Forest Transformation Plan shall be aimed at elaborating of variety of silvicultural measures that will contribute to transformation of vulnerable to climate change forest stands into highly resilient "close to nature" forest stands with native mixed broadleaf species composition.

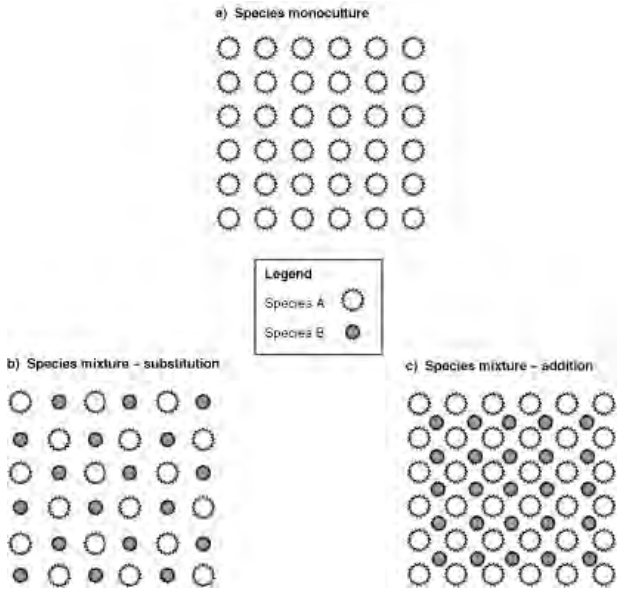
The transformation plan shall serve as a base for developing best practices and to obtain reliable information about costs and results.

The forest stands on pilot sites shall be surveyed to determine the necessary silvicultural (transformation/, reforestation/restoration/rehabilitation etc) measures.

The factors that have to be considered in planning process include, but are not limited to:
- tree and shrub species that can be used for under-planting (which will depend on natural for the pilot site area species composition, existing vegetation, and existing canopy (stock density);
- soil preparation methods;
- planting and seeding techniques and spacing;

- methods assisting natural regeneration;
- clearing of sod creating grasses and other competing vegetation from around the seeded and planted trees;
- physical protection (fencing of the pilot sites and if necessary single tree protection).

The main silvicultural idea is to transform vulnerable monoculture pine stands into close to nature forests by using the existing pine cover as a nurse crop to introduce tree and shrub species by under-planting and in addition, to reforest open areas. A common example is where a slower-growing, shade-tolerant species forms the lower layer beneath a canopy of a faster-growing, shade-intolerant species. A monoculture can be altered by a) substituting or b) adding trees of another species – *see the scheme bellow*:



The trees and shrubs representing for the given area and vertical zone/elevation (nature-geographical forest vegetation zone) the natural composition of species are always showing greater resilience to changes of the natural conditions, which inter alia could be caused by climatic phenomena.

Technical Assistance and Supervision

The forest planning organization contracted by the WWF-Caucasus shall prepare the Plan under the supervision of the ***Project Country Coordinator*** and with technical assistance and advice from the ***Project International Forest Advisor*** and ***Regional GIS Expert*** both available at the Project regional partner organization – WWF-Caucasus. The Project partner have experience in planning, implementing, and managing silvicultural measures from their involvement in the similar projects.

The planning process has to be performed based on participatory planning approach. The forest planning organization shall involve local forestry administration staff and members of communities close to the pilot stands in the preparation of the transformation plans.

In addition, the forest planning organization will be provided with baseline digital map production (GIS shape files, satelite images and topographic maps) for the selected pilot sites.

Scope of Work

1. Elaborate a soil analyses for the selected sites and provide with recommendation for native species to plant/seed based on soil. The forest planning organization will elaborate a map illustrating the soils of the site. For each soil type recommendation for planting/seeding native species will be given. Other parameters as potential natural vegetation, relief, exposition and climate will be considered in this recommendation.

2. Elaborate a detailed plan (verbal description and visual illustration on maps) for fencing, tending, planting or seeding measures on the selected sites. For each selected site the plan illustrates at least following contents:

- Identification of seeding and planting areas
- Description and Visualization of transformation activities
    - Fence line
    - Areas of planting
    - Areas of seeding
    - Areas of tending
    - Areas for natural regeneration assisting measures
    - Areas for clearing of sod creating grasses and other competing vegetation from around the seeded and planted trees
- Design of planting method (groups, rows, spacing, etc)
- Technological scheme for forest transformation activities
- Measures for post-planting maintenance and care of pilot sites (5-year technological scheme of measures for post-planting care of pilot sites)
- Quantification of fence material, planting and seeding material
- Cost calculation of material

3. Elaborate a detailed work/time schedule plan for the implementing works.

Planning Period (Duration of the Plan)

All silvicultural measures (except that of 5-year technological scheme of measures for post-planting maintenance and care of pilot sites) envisaged under the Plan have to cover the following years: 2012 and 2013.

Format and Indicative Outline/Template for the Transformation Plan

The Plan has to be prepared in line with national forestry technical guidelines, rules and standards and therefore traditional formats for Forest Reconstruction, Reforestation and Forest Amelioration have to be used in combination when necessary.

Indicative (Recommended) Outline/Template for the Plan has to cover (but might be not limited to) the topics shown in Attachment 1 (attached).

Deliverables

- Electronic version (Microsoft Word and PDF and in other relevant formats) and 3 hard copies of full version of descriptive transformation plan in GEORGIA/ARMENIA/AZERBAIJANn language including:
    - Work schedule for the implementation
    - Lists of all materials and supplies required for implementation works
    - Cost calculation (*all cost calculations shall be done in both National Currency and Euro*)
- Maps showing the following details:
    - Precise boundaries of the pilot sites
    - Result of soil analyses on the selected sites
    - Forest transformation activity zones on each site (Fence lines, areas of planting for open spaces, areas of seeding for open spaces, areas of substituting and adding trees to monoculture stands, areas of pruning/tending, areas of natural regeneration assisting measures)
    - Design of planting method (groups, rows, spacing, etc….)
- GIS shape files created by the planning organization.
- Minutes of meetings with local community, local authority/ies and other stakeholder representatives.

Duration of the Assignment

Duration of the assignment shall be not more than 1,5 month.

Qualification requirements

The members of the forest planning organization hold M.Sc. degrees in forest sciences and related fields.
The forest planning organization has at least 5 years experience in planning of silvicultural measures.

INDICATIVE (RECOMMENDED) OUTLINE/TEMPLATE

TITLE : FOREST TRANSFORMATION PLAN (PLAN OF SILVICULTURAL MEASURES) FOR SELECTED PILOT FOREST SITES IN GEORGIA

Technical Statement for Planning Work Design (*Client Organization; Planned Area, Planning Organization, Number of Experts Involved etc, Duration of Assignment, linkage with other institutions etc*)
Authors and Contributors
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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Georgia:
WWF Caucasus Programme Office
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

Project office in Armenia:
WWF Armenia
11, Proshyan, Str.
0019 Yerevan, Armenia
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

Project office in Azerbaijan:
WWF Azerbaijan
M.Mushfig Str., Blok 105, 2K
AZ 1073 Baku, Azerbaijan
Tel.: + (994 12) 538 5316
Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

Annex 19. Transformation Plan for the Selected Pilot Forest Sites in Armenia

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

EC THEMATIC PROGRAMME ON ENVIRONMENT AND SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

EuropeAid/128320/C/ACT/Multi External Actions of the European Union No. DCI-ENV/2010/221391

FOREST TRANSFORMATION PLAN

ARMENIA

(2012)

This document is the sole responsibility of the Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation and can in no way be taken to reflect the views of the European Union

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Armenia:
WWF - World Wide Fund for Nature Armenian Branch (WWF Armenia)
11, Proshyan, Str.
0019 Yerevan
Tel.: + 374 (10) 58 89 83
Fax: + 374 (10) 54 61 56
office@wwfcaucasus.am
www.panda.org/armenia

“Kanach Desine” LLC

Forest Transformation Plan for Selected Pilot Forest Sites in Gugark and Noyemberyan Forest Enterprises



Client Organization	**Worldwide Fund for Nature (WWF) Armenian Branch**
Implementer	**“Kanach Desine” LLC**
Director	**S. Grigoryan**
Coordinator	**H. Khurshudyan, Candidate of Biological Sciences**

Yerevan 2012

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INTRODUCTION

The role and importance of forest is of upmost importance for Armenia, as a mountainous country with limited forest resources, in terms of its numerous useful features.

Around 270 species of trees and shrubs occur in Armenia. The main forest forming species are oak, beech, hornbeam and others comprising 90% of total forest covered areas and 97% of total volume. The main species of manmade plantations are common pine and Crimean pine.

Forest vegetation is of great significance with respect to erosion control, due to rugged relief and landslides in around 60% of the areas in the country. The nature-protecting features of the forest, in particular soil-protection, water-protection, water-regulating, climate-regulating, as well as social-economic, recreational, sanitary-hygienic and health protection capacities are crucial.
The haphazard large-scale cuttings during the energy and economic crises of the late 1990s of the 20th century have had a negative impact on the forests of Armenia. Forests have lost their soil-protection, water-regulating as well as production capacities in some areas. Erosion processes have become more intensive. Loss of biodiversity and undesirable alteration of valuable species to low-value species became obvious.

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The objective of the plan is to select several monoculture stands and transform them into mixed stands with species more resilient to climate change and efficient in terms of carbon accumulation.

The transformation plan presented in this report has been prepared in the framework of the EU-funded “EU ENRTP Caucasus - Increasing the resilience of forest ecosystems against climate change in the South Caucasus Countries through forest transformation” regional project implemented by WWF-Armenia under leadership of WWF-Caucasus/WWF-Germany. The project is aimed at establishing the necessary conditions for the forest administrations to develop and implement strategies for transforming monoculture forest stands into highly resilient “close to nature” forest stands.

ABBREVIATIONS

FE	Forest Enterprise
B	Branch
SNCO	State Non Commercial Organization
ha	hectare
km	Kilometer
M	Meter
AMD	Armenian Dram
ASL	Above sea level
MXT	Fagetum mixtoherbosum
P	Pine
O	Oak
H	Hornbeam
M	Maple
A	Ash
LT	Lime-tree
GW	Greek walnut
AT	Apple tree
PT	Pear tree
H	Hawthorn
DR	Dog rose
D	Dewberry
N	North
S	South
E	East
SE	Southeast
SW	Southwest
NW	Northwest

SECTION I. GENERAL PART

1. CHAPTER 1. OBJECTIVES AND METHODOLOGY

1.1. Objectives

The main objective of the plan is to have a basis for implementation of transformation measures in selected monoculture pilot forest stands within Gugark and Noyemberyan FE areas. Transformation measures will be implemented through establishment of mixed stands with species more resilient to climate change and efficient in terms of carbon accumulation.

1.2. Methodology

The plan is developed to be implemented using acknowledged forestry methods (planting, seeding, additional planting, maintenance, etc.) on the basis of the forest management plans developed for the respective areas.

2. CHAPTER 2. BASELINE DATA

2.1. Baseline Data (Site N1)

2.1.1. *Geographical Location and Status*

Site N1 is selected in Koghb Forest District of Noyemberyan FE branch of "Hayantar" SNCO. Noyemberyan FE branch is located in the North-eastern part of the Republic of Armenia in the former Noyemberyan region of Tavush Marz. The FE extends 37 km from Northeast to Southwest and 21 km from East to West. It has a 15 km border with Getashen Forest District of Sevqar FE branch in the South and Southeast, 10 km border with Shnogh Forest District of Tumanyan FE branch in the West. It borders with community lands of Noyemberyan Region in the North and has a 15 km border with Ghazakh Region of the Republic of Azerbaijan in the Northeast.

The forests of Noyemberyan FE are located on the Gugarac Mountain Chain of the Small Caucasus mountain system, in the North-western forest region of Armenia. The highest Mountain is Mets Kanach Sar with the peak of 1 896 m (Mets Srbasar).

The altitudinal range of the FE is 500 to 1 850 m above sea level, including 1 015.4 ha at altitudes of up to 800 m, comprising 3.8% of the total forest covered area and 12 627.4 ha (46.8%), 11 031. ha (40.8%) and 2 327 ha (8.6%) at altitudes of 801-1 200, 1 201-1 600 and 1 601 and above respectively.

The relief of the FE's territory is rugged and slope exposition varies. Slopes with northern exposition dominate, where 15 641.3 ha forests are located, while 9 482.3 ha (35.1%) forests are located on the slopes with southern exposition.

2.1.2. *Existing Planning Documents*

The Forest Management Plan of Noyemberyan FE approved by Decree № 23A of the Minister of Agriculture, dated 16.02.2010, is the basis for planning forestry measures on the territory of the FE.

2.1.3. *Silvicultural Measures taken for the past 5 years*

Forest rehabilitation and afforestation measures were implemented on 960.5 ha areas in Noyemberyan FE area during the last 5 years (2007-2011), including afforestation on 75.5 ha and forest rehabilitation on 885 ha.

2.2. Baseline Data (Site N2)

2.2.1. *Geographical Location and Status*

Site N1 is selected within Spitak Forest district of Gugark FE branch of "Hayantar" SNCO. Gugark FE branch of "Hayantar" SNCO is located in the Northeastern part of the Republic of Armenia in the former Gugark Region of Lori Marz.

The FE's territory is located on the Northern slopes of Pambak Mountain Chain of the Small Caucasus mountain system. The highest Mountain is Maymekh with the peak of 3 100 m.

The FE extends 29 km from North to South and 65 km from East to West. It borders with Dsegh FE branch of "Hayantar" SNCO in the Northeast, with "Dilijan" National Park in the East, with community lands of Shirak Marz in the West and with community lands of Kotayk and Aragatsotn Marzes in the South.

The territory of the FE is located within the North-eastern forest region of Armenia. Its altitude ranges from 750 to 2 300 m above sea level, including 54,1 ha on the altitudes of up to 800 m, comprising 0,2% of the total forest covered area, 953,4 ha (4.3%), 6343,6 (28,4%) and 14 972 ha (67,1%) on the altitudes of 801-1 200, 1 201-1 600 and 1 601 and above respectively.

The relief of the enterprise area is rugged and varies as to the slope exposition. Slopes with a northern exposition dominate, however the areas with the inclination of 26-30º are prevailing irrespective of the exposition.

2.2.2. *Existing Planning Documents*

The Forest Management Plan of Gugark FE approved by the Decree № 23a of the Minister of Agriculture, dated 16.02.2010, is the basis for planning forestry measures on the territory of the FE.

2.2.3. *Silvicultural Measures taken for the past 5 years*

Forest rehabilitation and afforestation measures were implemented on a total of 1 525 ha areas in Gugark FE area during the last 5 years (2007-2011), including afforestation on 575 ha and forest rehabilitation on 950 ha.

3. CHAPTER 3. DESCRIPTION OF NATURAL CONDITIONS

3.1. Natural Conditions (Site N1)

3.1.1. *Description of Existing Forest Stand/s*

Plot No	Forest Block	Compartment	Area Description	ASL, m	Exposition	Slope Inclination	Stand Composition	Layer	Layer height	Forest Element	Age	Height	Diameter	Age Class	Age Group	Site Class	Forest Type	Forest-growing conditions	Density
1	23	15	Forest	1225	SE	5	9H1O	1	15	O	70	15	22	4	3	4	MXT	C2	0,3
										H	90	16	28						
		16	Forest cultures	1200	SE	15	10P	1	14	P	46	14	24	3	2	2	MXT	C2	0,7
		17	Forest cultures	1200	SE	10	10P	1	14	P	53	14	24	3	2	3	MXT	C2	0,7
		18	Open space	1200	SE	5				P						3	MXT	C2	
		19	Forest cultures	1200	SE	15	10P	1	16	P	53	13	28	3	2	2	MXT	C2	0,7
							single trees 8O2H			O	90	17	30						
										H	70								
		20	Forest cultures	1200	SE	10	10P	1	15	P	53	15	26	3	2	3	MXT	C2	0,4
		21	Open space	1200	SE	10				P						4	MXT	C2	
		22	Forest cultures	1200	SE	10	10P	1	14	P	53	14	24	3	2	3	MXT	C2	0,3
		23	Glade	1200	SE	10				O						4	MXT	C2	
							single trees 7O2H1Pear			O	85	15	32						
										H									
										pear									
		24	Forest	1175	SE	10	5O4H1M	1	17	O	80	17	28	4	2	3	MXT	C2	0,5
										H	65	16	24						
										M	70	16	24						

							regeneration: 7H3O (10) 0,6m, 3,0 thousand pieces per 1 ha, non-reliable												
							Under-forest: hawthorn, dog rose (rare)												
		25	Forest	1175	SE	10	6O3H1A+pear	1	19	O	100	19	32	5	2	4	MXT	C2	0,5
										H	80	18	28						
										A	110	23	40						
		30	Forest	1100	SW	20	7O2H1Ash	1	16	O	130	15	36	7	2	5	MXT	C2	0,5
										H	70	17	24						
										ash		16	22						
		31	Forest																
		32	Forest	1100	SE	10	9O1pear	1	14	O	130	14	44	7	2	5	MXT	C2	0,3
										Pear									
							Sub-forest: cornelian cherry, hawthorn, dog rose												
		33	Forest	1100	SE	10	9O1pear+H	1	14	O	130	14	44	7	2	5	MXT	C2	0,4
										Pear									
							Under-forest: cornelian cherry, hawthorn, dog rose												
		35	Forest cultures	1050	SW	15	10P	1	15	P	52	15	28	3	2	2	MXT	C2	0,3
		36	Forest cultures	1100	SW	10	10P	1	12	P	37	12	20	2	1	2	MXT	C2	0,6
		37	Forest	1145	S	10	10 GW	1	12	GW	45	12	24	3	2	3	MXT	C2	0,8
							Under-forest: dog rose												
		39	Forest	1100	SW	10	8O1H1pear	1	15	O	70	15	24	4	2	4	MXT	C2	0,5
							H												
							pear												
		40	Forest cultures	1150	S	10	10 sea-buckthorn	1	3	sea-buckthorn	26	3	4	6	4	5a	MXT	C1	0,3
							single trees 8O1H1pear			O	70	14	24						
										H		13	20						
										Pear		14	24						
							Under-forest: hawthorn, dog rose, dewberry												
		58	Forest cultures with non-closed canopy	1050	SW	15	9ash1apple+M			ash	2			3	2	3	MXT	C2	
										apple									

		59	Forest	1150	S	10	8O1H1pear	1	14	O	70	14	24	4	2	4	MXT	C1	0,3
										H		13	20						
										Pear		14	24						
							Under-forest: hawthorn, dog rose, dewberry												
2	13	28	Forest Orchard																
2	13	36	Forest	1150	NW	15	4O4H1L1M	1	16	O	90	16	32	5	2	4	MXT	C2	0,4
										H	70	15	24						
										LT	80	17	32						
										M		15	24						
		37	Forest Orchard				10greek walnut												
		43	Forest cultures				10P												
		44	Forest cultures				10P												
3	19	21	Open space	900	SE	20				O						5	MXT	C1	
		22	Forest cultures	875	SW	15	10P	1	16	P	47	16	20	3	2	2	NUD	C2	0,7
		23	Orchard				10greek walnut			GW	46	10	16						
		24	Forest cultures	890	S	15	10P	1	17	P	50	17	24	3	2	2	MXT	C2	0,9

3.1.2. *Current land use (including grazing)*

The selected pilot areas are currently used for timber harvesting and collection of fruits, berries and hay-making. Grazing is carried out only in some areas.

3.1.3. *Climate*

The area of Noyemberyan FE belongs to the 6th (temperate warm) and 7th (temperate cold) climatic zones, which cover altitude classes of up to 900 m and over 900 m above sea level, respectively. Climatic conditions are comparatively severe in the upper zones of the forest, which have an altitude of 1 700 m and above. Small temperature changes, moderately warm, comparatively dry summers, rainy autumns and moderately cold winters are typical for the area. Depending on the mountainous conditions, rainfall is mainly influenced by western and eastern airflows.

The mean precipitation is 550-600 mm, the mean annual temperature is +10.4°C, and the minimum temperature is -23.8°C. Snow cover varies from 8-10 cm up to 50-60 cm depending on the altitude.

Non major temperature changes are typical for the area; moderate warm, fairly dry summers, rainy autumns, moderate cold winters. The period without freeze is around 214 days.

The maximum depth of soil frost is 15 cm. In general, climate conditions are fairly favourable for growing various trees and bushes.

3.1.4. *Biodiversity*

Vegetation

The area stands out for its strictly expressed rugged topography, diversity of relief and rich biodiversity, mainly as a result of its geographical position and altitude above sea level. The main vegetation type is forest, while dry sparse areas and sub-alpine ecosystems occupy small areas.

The main forest-forming species are oriental beech (*Fagus orientalis*), Caucasian oak (*Quercus macranthera*), Georgian oak (*Quercus iberica*), hornbeam (*Carpinus*). The accompanying species are oriental hornbeam (*Carpinus orientalis*), lime-tree (*Tilia* spp.), ash (*Fraxinus* spp.), Norway maple (*Acer platanoides*), field maple (*Acer campestre*) and others. They form mixed stands with beech and oak and occasionally also small monoculture stands.

Forest vegetation on lower mountainous zone (up to 1 000 m) is mainly comprised of oriental hornbeam coppice stands. Other forest forming species are Georgian oak (*Quercus iberica*), ash (*Fraxinus oxycarpa*), common ash (*Fraxinus excelsior*), Georgian maple (*Acer ibericum*), field maple (*Acer campestre*) and elm (*Ulmus glabra*). The most prominent shrubs are Cornelian cherry (*Cornus mas*), hawthorn (*Grataegus orientalis*), dog rose (*Rosa canina*), medlar

(*Mespilus germanica*), dewberry (*Rubus caesius*) and others. Oriental hornbeam associations are actually derivatives, they have secondary origin and substitute previously cut oak forests.
Juniper open woodlands can be seen on the southern slopes, where *Celtis* L., *Rhamnus* L. and other xerophylic species grow side by side with juniper. Small groups or single walnut trees grow at the altitudes of 700-1 400 m.

Beech stands are dominant on the northern slopes of the central mountainous zone at an altitude of 1 000-1 700 m, and oak associations occupy slopes facing south. Hornbeam, oak, lime-tree and ash are present in beech stands.

Honeysuckle, dog rose, cornelian cherry, medlar and elder appear in glades and in the understory.

Georgian oak mixed forests are typical for the southern slopes at altitudes up to 1 200 m. Georgian oak and mountain oak often grow side by side at the altitudes of 1 200-1 400 m. There are mountain oak stands at altitudes from 1 400 m up to upper tree line. Hornbeam, ash, maple, lime-tree, forest apple and pear are typically mixed with oak stands.

Fauna

Fauna includes species typical for Caucasian broadleaved forests. One amphibious, four reptile, 84 bird and 24 mammal species have been registered in this zone. Mountainous rugged relief, natural caves, dense forests, waters, as well as the proximity of the Kur river basin contribute to the diversity of fauna of the area. The following species of fauna can be observed: roe deer, brown bear, wild boar, wolf, fox, badger, rabbit, marten, hedgehog, squirrel, forest cat, field mouse, some reptile and amphibious species as well as birds and insects. Among fish species Salmo trutta m. fario, Barbus mursa and Barbus tauricus are typical.

3.1.5. *Soils*

Grey mountainous, dark brown forest soils are dominant in the FE area.

On the slopes with northern exposition, dark brown mountainous soils which are formed from various limestones, are rather dominant and have a thickness of up to 1 m on steeper slopes. On the slopes of southern exposition light brown soils typical for oak and oak-hornbeam mixed stands are prevalent. On the upper zones of the forest evidence suggests that grey forest soils transform into light brown soils typical to oak stands

At the altitudes lower than 800 m of the forest zone, there are skeletal soils poor in nutrients, where secondary associations of hornbeam and oriental hornbeam are mainly represented, accompanied by xerophilous bushes formed in the result of degradation of previous oak stands.

3.1.6. *Grasses*

The grass cover of the pilot area is motley grass. There are grass swards in some areas.

3.1.7. *Forest Pests and Diseases*

According to the Forest Management Plan, no colonies of pests or massive diseases were detected in Noyemberyan FE area. Single trees infected, damaged by pests and dead trees were found in the areas.

3.1.8. *Hydrography*

Noyemberyan FE area is covered with a network of small streams. All the streams are of mountainous type and are replenished by underground, melting and spring waters. These include fast-flowing rivers and rapids with typical mountainous origin and contain lots of stones and sands. They are shallow; however flooding occurs in the springtime. The Koghb, Voskepar Rivers are the bigger rivers that flow in the area of the FE. Koghb River is 45 km, and flows in the territory of Koghb and Berdavan community areas. It is the main source for irrigation, but in summers usually gets shallow causing serious problems for both irrigating agricultural crop, as well as worsens the sanitary condition of the riversides in the mentioned communities.

Voskepar River replenishes the Joghaz weir, which was used for irrigation of several thousand hectares of agricultural lands using three level pumps before early 1990s.
River Debed, abounding in water compared to others, flows in the North-western part of the FE.

3.1.9. *Infrastructures and Recreation Resources*

Noyemberyan region, where the forests of Noyemberyan FE are located, is connected to the main communication roads of Armenia through Yerevan-Ijevan-Bagratashen and Yerevan-Vanadzor-Bagratashen asphalt road.

The roads are mainly formed from soft soil for seasonal use only, though parts are renovated every year to keep them trafficable. The roads are in poor condition due to the lack of ditches, drain piping or gravel surface.

The total road network is 392 km, of which 32 km with solid asphalt cover and 135 km earth roads and 225 km ground forest roads. The average road density is approximately 12, 7 km/1 000 ha.

The present length of the inner forest roads (according to forest management plan) is explained by the fact that during 1993 and the following years several roads for temporary use were built for the purpose of timber harvesting without any design. Most of these roads belong to the third class. The driveable width of these roads is less than 3.5 m.

The total length of such roads is 131 km (53.2% of the total earth roads) and is used for waste wood extraction and fire prevention purposes.

Historical-cultural and nature monuments, landscape diversity, favourable climate, fresh springs and high biodiversity potential are the important preconditions for the development of the recreational sector, which has an important role in the socio-economic development of the country and improvement of livelihood of population.

The forest areas of Noyemberyan region are noteworthy in this respect. Provision of health and recreation services is promising in this area due to mild climate and presence of fresh springs.

3.1.10. *Local Communities*

Koghb, Lchkadzor and Archis communities are located in the vicinity of pilot areas.
The population of Koghb community is around 4200. Agriculture, cattle breeding and partly horticulture is developed in the community.
The population of Lchkadzor community is around 550. Agriculture, and specially fruit-growing and viticulture are developed in the community.
The population of Archis community is around 1462. Agriculture, fruit-growing and viticulture are developed in the community.

3.2. Natural Conditions (Site N2)

3.2.1. *Description of Existing Forest Stand/s*

Plot No	Forest Block	Compartment	Area Description	ASL, m	Exposition	Slope Inclination	Stand Composition	Layer	Layer height	Forest Element	Age	Height	Diameter	Age Class	Age Group	Site Class	Forest Type	Forest-growing conditions	Density
1	31	21	Forest cultures	1900	NW	15	10P	1	1	P	20	1	2	1	1	5a	MXT	B2	0,5
		23	Forest cultures with non-closed canopy	1750	E	20	10P			P				3		4	MXT	B2	uneven
		25	Forest cultures with non-closed canopy	1850	E	25	10P			P	5					4	MXT	B2	uneven
2	31	2	Forest cultures with non-closed canopy	1700	N	15	10P			P	8	1				3	MXT	B3	uneven
		3	Forest cultures with non-closed canopy	1700	SE	25	10P			P	8	0,5				3	MXT	B2	
		4	Forest cultures with non-closed canopy	1680	NW	20	10P			P	8	1				3	MXT	C2	
		5	Open area	1690	NE	20				P						3	MXT	B2	
		6	Forest cultures with non-closed canopy	1750	NW	25	10P			P	8	1				3	MXT	C3	uneven
		7	Forest cultures with non-closed canopy	1850	NW	30	10P			P	8	1				4	MXT	C3	uneven

3.2.2. *Current Land Use*

A part of selected pilot areas (subplot 2-8) is used as pastureland. The rest of the areas are forest cultures.

3.2.3. *Climate*

Gugark FE area belongs to the 7th (temperate cold) zones, which cover altitudes of over 1000 m above sea level. Climatic conditions are comparatively severe in the upper zones of the forest. Major temperature variations are typical for the area, depending on the changes of altitude and exposition. The altitudes of 1300-1400 m above sea level are characterized by moderate warmth, while moderate cold and cold climate are typical for the altitudes of 1600-1700 and 2000-2200 m above sea level respectively. Depending on the mountainous conditions, rainfall is mainly influenced by western and eastern airflows.

The mean precipitation is 550-600 mm, and the mean annual temperature is plus 7.4°C. The minimum temperature is -20°C, and the snow cover varies from 20 cm up to 60-70 cm depending on the altitude. The maximum depth of soil frost is 30 cm.

3.2.4. *Biodiversity*

Vegetation

The area stands out for its rugged vertical zonation topography, diversity of relief and rich biodiversity, mainly as a result of its geographical position and altitude above sea level.

The main forest forming species are oriental beech (*Fagus orientalis*), mountain oak (*Quercus macranthera*), Georgian oak (*Quercus iberica*), hornbeam (*Carpinus*). The accompanying species are oriental hornbeam (*Carpinus orientalis*), lime-tree (*Tilia* spp.), Ash (*Fraxinus* spp.), birch, Norway maple (*Acer platanoides*), field maple (*Acer campestre*) and others. They form mixed stands with beech and oak and occasionally also small monoculture stands.

Forest vegetation on lower mountainous zone up to 1 000 m, is mainly comprised of oriental hornbeam, hornbeam and oak stands of coppice origin. Other forest forming species are Georgian oak (Quercus iberica), ash (Fraxinus oxycarpa), common ash (Fraxinus excelsior), Georgian maple (Acer ibericum), field maple (Acer campestre), elm (Ulmus glabra), aspen and others. The most prominent shrubs are Cornelian cherry (Cornus mas), hawthorn (Grataegus orientalis), dog rose (Rosa canina), medlar (Mespilus germanica), dewberry (Rubus caesius) and others. Oriental hornbeam symbioses are actually derivatives, they have secondary origin and substitute previously cut oak forests.

Small groups or single walnut trees grow at the altitudes of 700-1 400 m.

Beech stands are dominant on the northern slopes of the central mountainous zone at an altitude of 1 000-1 700 m, and oak symbiosis occupy slopes facing south. Hornbeam, oak, lime and ash are present in the composition of beech stands.

Honeysuckle, dog rose, cornelian cherry, medlar and elder appear in glades and in the understory.

Georgian oak mixed forests are typical to southern slopes at altitudes up to 1 200 m. Georgian oak and mountain oak often grow side by side at the altitudes of 1 200-1 400 m. There are mountain oak stands at altitudes from 1 400 m up to upper tree line. Hornbeam, ash, maple, lime, forest apple and pear are typically mixed with oak stands.

Fauna

Fauna includes species typical for Caucasian broadleaved forests. Mountainous rugged relief, natural caves, forests and waters contribute to the diversity of fauna of the area. The following species of fauna can be observed: roe deer, brown bear, wild boar, wolf, fox, badger, rabbit, marten, hedgehog, squirrel, forest cat, field mouse, some reptile and amphibious species as well as birds and insects. Among fish species Salmo trutta m. fario barbel, Barbus mursa and Barbus tauricus are common.

3.2.5. *Soils*

Brown mountainous, dark brown sylvan and mountain-meadow soils are dominant in the target area.

On slopes with northern exposition, dark brown mountainous soils are rather dominant and have a thickness of up to 1 m on steeper slopes. In the slopes of southern exposition, light brown soils typical for oak and oak-hornbeam mixed stands are prevalent. At altitudes lower than 1000 m of the forest zone, there are skeletal soils poor in nutrients. Here secondary associations of hornbeam (*Carpinus*) are well represented, accompanied by xerophilus bushes, which were formed due to the degradation of the previous oak stands.

Mountain brown soils are observed at the altitudes of up to 1700 m above sea level, where hornbeam-oak-maple forest stands are dominant.

Forest dark soils are mainly observed at the altitudes of 1300-2000 m above sea level, where the climate is moderately warm and humid, hornbeam, oak and beach mixed stands are dominant.
Mountain-meadow soils are mainly observed at the altitudes of 2000 m and more above sea level. Here, massive humidity of soils and low temperature has promoted the prevalence of motley grass and leguminous species.

3.2.6. *Grasses*

The grass cover of the pilot area is motley grassn. Some areas are covered by grass swards.

3.2.7. *Forest Pests and Diseases*

According to the Forest Management plan, no colonies of pests or massive diseases were detected in Gugark FE area.

Single trees infected by disease, damaged by pests and dead trees were found in the areas.

3.2.8. *Waters and Drainage*

Hydrological network of Gugark FE belongs to Debed River Basin with an area of 4080 km^2. The hydrological network of the area, typical for all mountainous countries, is well developed; however, it has uneven distribution. The length of Debed River (starting from Pambak) is 178km, the average width is 15m, average deepness is 0.4 m, meander index is 1.3, annual flow is 995 mln. m^3, flow module is 9, 21, average mineralization is 225 mg/l. Pambak rises in the eastern basis of Jajur, at the altitude of 2090m. There are hundreds of small rivers in Debed system formed from Pambak and Dzoraget rivers, and several of them have a length of 10km and more.

Among them comparatively bigger streams of Dzoraget are Tashir, Chqnagh, Urut, Gargar, and Lernapat, Tandzut, Alarex are bigger streams of Pambak. The average density of river network is 0.84 km^2; moreover, it grows, depending on the altitude. The rivers are slow-flowing in submontane and montane plains, with low-lying and sometimes swampy banks often creating meanders. The flow of the rivers accelerates in parallel with the increase of slope inclination in middle and high mountain belts, resulting in formation of narrow and deep gorges and canyons, where the roughness reaches up to 400-600m and more. The areas of river basins and average balanced altitudes, ranging from 1200-1300m to 2200-2300m. One of the most important features of the rivers in focus is that they have mixed replenishment through rainfalls, melting and partly underground waters.

Snow melts gradually in river basins, due to major difference in altitudes, resulting in prolonged season of overflow up to midsummer. It is evident in forest covered river basins, where the snow-melting season is prolonged by 2-3 weeks due to forest cover and high average balanced altitudes. The rivers of the Region are not suitable for water transport.

3.2.9. *Infrastructure and Recreation Resources*

Gugark Region stands out for its well-developed road network. Yerevan-Tbilisi interstate road passes through the region, 68 km section of this road is bordering forest lands. 34 km of Vanadzor-Dilijan road of national significance, 13km of Vanadzor-Stepanavan road, 26 km of Spitak Gyumri road, as well as 50km of Yerevan Tbilisi railway passes through the region. The road network of the FE, 315km in total, is of earth origin and is used for extraction of timber and fire prevention purposes.

The roads are mainly formed from soft soil for seasonal use only, though parts are renovated every year to keep them trafficable. The roads are usually in poor condition due to the fact that there are no ditches, drain piping or gravel surface. The average road density is approximately 13 km/ 1 000 ha.

The present length of the inner forest roads is explained by the fact that during 1992 and the following years several roads for temporary use were built without any design for timber

harvesting. Most of these roads belong to the third class. The driveable width of these roads is less than 3.5 m. The total length of this road is 189 km (60% of the total earth roads) and is used for waste wood extraction and fire prevention purposes.

The total length of the earth roads of second class, where the driveable width is 3.5-5.4 m, is 91 km comprising 29% of the total roads, while the length of the roads of first class is 35 km (11%).

The forests of Gugark FE are unique corners of the country. They stand out for their rocky slopes and trapezium-shaped mountain peaks, deep canyons and gorges, mountainous-sylvan landscapes, which are promising preconditions for provision of health and recreation services. Mild climate, fresh springs and presence of tourism infrastructures also contribute to this.

3.2.10. *Local Communities*

Spitak, Lernantsk, Jrashen and Saramej communities are located in the vicinity of pilot areas with the population of 15300, 1563, 3689 and 2112 respectively.

The inhabitants of the mentioned communities are mainly involved in agriculture, cattle breeding and horticulture.

4. CHAPTER 4. DESCRIPTION OF CLOSE TO NATURAL FOREST CONDITIONS

4.1. Natural Forest Vegetation Zone and Matching Species (Site N1)

4.1.1. *Model Natural Forest Type (according to Natural-Geographical Forest Vegetation Zone and Vertical Zone) for the Pilot Site Area*

The selected pilot area belongs to the lower forest zone, where the oak-hornbeam mixed stands are prevalent.

4.1.2. *Matching Tree and Shrub Species for the Pilot Site Area*

The matching tree and shrub species for the pilot sites in Koghb forest district area are as follows:

- ~ Pine - Pinus silvestris L.
- ~ Oak - Quercus iberica stev.
- ~ Wall-nut - Juglans regia L.
- ~ Maple - Acer campestre L.
- ~ Ash - Fraxinus excelsior L
- ~ Apple - Malus orientalis Uglitzkich
- ~ Elm - Ulmus parvifolia Jacq.
- ~ Cornelian cherry - Cornus mas L.
- ~ Hawthorn - Crataegus caucasica
- ~ Dog-rose - Rosa canina

4.2. Natural Forest Vegetation Zone and Matching Species (Site N2)

4.2.1. *Model Natural Forest Type (according to Natural-Geographical Forest Vegetation Zone and Vertical Zone) for the Pilot Site Area*

There are no natural forest associations in the pilot site areas. There are only artificial pine plantations.

4.2.2. *Matching Tree and Shrub Species for the Pilot Site Area*

- ~ Pine - Pinus silvestris L.
- ~ Oak - Quercus macranthera Fishch. et Mey. ex Hohen
- ~ Maple - Acer trautvetteri Medw
- ~ Ash - Fraxinus excelsior L
- ~ Apple - Malus orientalis Uglitzkich

~ Pear - Pyrus caucasica Fed.
~ Elm - Ulmus parvifolia Jacq.

SECTION II. SPECIAL PART

5. CHAPTER 5. PLANNING OF TRANSFORMATION MEASURES FOR 2012-2013

5.1. Transformation Measures for Site N1

5.1.1. *Selection of Transformation Measures*

The Pilot site in Koghb FE is divided into following 3 plots and subplots:

- ~ Plot N1 is 67 ha, selected from forest block N23 and divided into 3 subplots:
- ~ Subplot 1-1, 20.4ha, includes Parcels N 31 & 28 of Forest block N 23
- ~ Subplot 1-2, 32.4ha, includes Parcels N 17-25, 32, 33, 39, 40& 59 of Forest block N 23
- ~ Subplot 1-3, 14.2ha, includes Parcels N 15, 16, 30, 35, 36 & 37 of Forest block N 23
- ~ Plot N2 is 8 ha, selected from forest block N13 and divided into 2 subplots:
- ~ Subplot 2-1, 6.7ha, includes Parcels N 28 & 37 of Forest block N 13
- ~ Subplot 2-2, 1.3ha, includes Parcels N 36, 43 & 44of Forest block N 13
- ~ Plot N3 is 3 ha, selected from forest block N19 and divided into 2 subplots:
- ~ Subplot 3-1, 1.4ha, includes Parcels N 21, 22 & 23 of Forest block N 19
- ~ Subplot 3-2, 1.6ha, includes Parcels N 21& 24 of Forest block N 19

5.1.2. *Selection of Tree and Shrub Species for Planting and Seeding and Standard Requirements for Planting and Seed Material*

Small size seedlings of following species are planned to use for planting in selected areas of Koghb forest district:

- ~ Quercus iberica stev.
- ~ Juglans regia L.
- ~ Acer campestre L.
- ~ Fraxinus excelsior L
- ~ Malus orientalis Uglitzkich

The height of the seedlings should be up to 1 m and the root system well-developed.
No seeding is planned for the Plot N 1.

5.1.3. *Pre-Planting Treatment and Preparation of Soil*

Soil preparation should be done with pits of 0.5x 0.5x 0.5m.

5.1.4. *Under-planting (Substituting and Adding Trees to Monoculture Pine Stands)*

Under-planting is planned in the Subplot N1-1.
Small size seedlings of oak, ash and apple will be used for planting.

The subplots N 2-1, 3-1 & 3-2 are forest orchards, where additional planting of small size walnut seedlings is planned.

5.1.5. *Planting for Open Spaces*

Planting for open spaces is planned in Subplots N 1-2, 1-3 & 2-2.
Small size seedlings of oak, ash and maple will be used for planting.

5.1.6. *Seeding*

No seeding is planned for the Plot N1.

5.1.7. *Pruning and Thinning*

No pruning and thinning is planned for the Plot N1.

5.1.8. *Fencing*

In order to implement transformation measures installation of 5750 m fence is planned for Koghb forest district of Noyemberyan FE branch, including 3500m, 1400m and 850m for Plots N1, 2 and 3 respectively.

5.1.9. *Natural Regeneration Assisting Measures other than Fencing*

Natural regeneration is sufficient in the selected pilot area, thus there is no need for other measures assisting natural regeneration, apart from fencing.

5.1.10. *Drainage*

There is no need for drainage, as the areas are not irrigated.

5.1.11. *Measures with Regard to Deadwood Material*

Cleaning of the area from snow breaks in 19 ha is planned, including 12 ha in subplots N 1-2, 4 ha in subplot N 1-3 and 1 ha in each of subplots N 2-2, N3-1 and N3-2.

5.1.12. *Additional plantings in established forest cultures*

During autumn 2013 additional planting in forest cultures established in 2012 is planned, including 25% in forest cultures established under canopy and 40% in forest cultures established in open spaces.

5.2. Transformation Measures for Site N2

5.2.1. *Selection of Transformation Measures*

The Pilot site of 72 ha in Spitak forest district of Gugark FE is divided into following 2 plots and subplots:

- Plot N1 is 39 ha, selected from forest block N31 and divided into 5 subplots:
  - ~ Subplot 1-1, 8.6ha, includes Parcels N 23 of Forest block N 31
  - ~ Subplot 1-2, 2.9ha, includes Parcels N 21 of Forest block N 31
  - ~ Subplot 1-3, 10.5ha, includes Parcels N 23 of Forest block N 31
  - ~ Subplot 1-4, 4.4ha, includes Parcels N 21& 23 of Forest block N 31
  - ~ Subplot 1-5, 12.6ha, includes Parcels N 25 of Forest block N 31
- Plot N2 is 33 ha, selected from forest block N31 and divided into 8 subplots:
  - ~ Subplot 2-1, 5.2ha, includes Parcels N 4 & N5 of Forest block N 31
  - ~ Subplot 2-2, 1.0ha, includes Parcels N 4 of Forest block N 31
  - ~ Subplot 2-3, 7.3ha, includes Parcels N 2 & N3 of Forest block N 31
  - ~ Subplot 2-4, 4.1ha, includes Parcels N 2& N3 of Forest block N 31
  - ~ Subplot 2-5, 1.9ha, includes Parcels N 2 of Forest block N 31
  - ~ Subplot 2-6, 0.8ha, includes Parcels N 2 of Forest block N 31
  - ~ Subplot 2-7, 2.8ha, includes Parcels N 2& N6 of Forest block N 31
  - ~ Subplot 2-8, 9.9ha, includes Parcels N 6 & N7 of Forest block N 31

5.2.2. *Requirements for Planting and Seed Material*

Saplings of following species are planned to use for planting in selected areas of Spitak forest district:

- ~ Acer trautvetteri Medw
- ~ Ulmus parvifolia Jacq.
- ~ Fraxinus excelsior L
- ~ Malus orientalis Uglitzkich
- ~ Pyrus caucasica Fed.

Seeds of oak - Quercus macranthera Fishch. et Mey. ex Hohen are planned to be used for seeding.

The height of saplings should be up to 40 cm and the root system well-developed. Healthy oak seeds of first class are needed for seeding.

5.2.3. *Pre-Planting Treatment and Preparation of Soil*

Soil will be prepared through pits with the size of 0, 35mx0, 35mx0, and 35m

5.2.4. *Under-planting (Substituting and Adding Trees to Monoculture Pine Stands)*

Additional planting in previously established forest cultures is planned to implement in Subplots N1-1, N1-3, N1-5, N2-1, N2-2, N2-3, N2-5 and N2-7.
Seedlings of ash, maple, elm, apple and pear will be used for planting.

5.2.5. *Planting for Open Spaces (Methods and Spacing)*

Afforestation is planned in Subplot N2-8 through planting ash, maple and elm saplings.

5.2.6. *Seeding (Methods and Spacing)*

Seeding of Caucasian oak (Quercus macranthera) will be carried out along with planting in the subplots mentioned in Sections 5.2.4 and 5.2.5.

5.2.7. *Pruning and Thinning*

Care cuttings are proposed to be implemented by «Hayantar» SNCO in Subplots N1-2, N1-4, N2-4 and N2-6.

5.2.8. *Fencing*

In order to implement transformation measures installation of 9250 m fence is planned for Spitak forest district of Gugark FE branch, including 4350m and 4900m for Plots N1 and N2 respectively.

5.2.9. *Natural Regeneration Assisting Measures other than Fencing*

Natural regeneration assisting measures are not planned, as there are no natural forests in the selected pilot area.

5.2.10. *Drainage*

There is no need for drainage, as the areas do not have excessive moisture.

5.2.11. *Measures with Regard to Deadwood Material*

No measures are planned with regard to deadwood material, as the Plot N2 is young artificial forest and no deadwood is present.

5.2.12. *Additional plantings in established forest cultures*

Additional plantings are planned for the year 2013 in forest cultures established in 2012, including 25% in already added areas and 40% in newly established forest cultures.

5.3. Quantification and Cost Calculation for Transformation Measures

5.3.1. *Quantification of Fence Material, Planting and Seeding Material and Cost Calculation for Site N1 and Site N2*

Pilot Site N1

Materials required for fencing

Plot N	Cost of fencing materials	
	thousand AMD	EUR
Plot N1	5374,62	10538.5
Plot N2	2144,74	4205.4
Plot N3	1317,88	2584.1
Total	**8837,25**	**17328.0**
Overhead costs, 5,3 %	468.37	918.4
Total	**9305.62**	**18246.4**
Profit, 10%	930.56	1824.6
Total	**10236.18**	**20071.0**
Temporary buildings and constructions, 1,5%	153.54	301.1
Grand total	**10389.72**	**20372.1**

Materials required for planting (thousand AMD)

Plot N	Quantity of planting materials to be used for afforestation		Quantity of planting materials to be used for additional planting for the following year		Transport costs	Total costs
	piece	thousand AMD	piece	thousand AMD	thousand AMD	thousand AMD
Plot N1	67880	10860,8	22562	3609,92	1012,95	15483,67
Plot N2	1710	273,6	584	93,36	25,69	392,65
Plot N3	240	38,4	60	9,60	3,36	51,36
Total	**69830**	**11172,8**	**23206**	**3712,88**	**1042,0**	**15927,68**
Overhead costs, 5,3 %						844,17
Total						**16771,84**
Profit, 10%						1677,18
Total						**18449,03**
Temporary buildings and constructions, 1,5%						276,74

Grand total	**18725,76**

EUR

Plot N	Quantity of planting materials to be used for afforestation		Quantity of planting materials to be used for additional planting for the following year		Transport costs	Total costs
	piece	EUR	piece	EUR	EUR	EUR
Plot N1	67880	21295,7	22562	7078,3	1986,2	30360,1
Plot N2	1710	536,5	584	183,1	50,4	769,9
Plot N3	240	75,3	60	18,8	6,6	100,7
Total	**69830**	**21907,5**	**23206**	**7280,2**	**2043,1**	**31230,7**
Overhead costs, 5,3 %						1655,2
Total						**32886,0**
Profit, 10%						3288,6
Total						**36174,6**
Temporary buildings and constructions, 1,5%						542,6
Grand total						**36717,2**

Pilot Site N2

Materials required for fencing

Plot	Cost of fencing materials	
	thousand AMD	EUR
Plot N1	6600.42	12942.0
Plot N2	7442.24	14592.6
Total	**14042.66**	**27534.6**
Overhead costs, 5,3 %	744.26	1459.3
Total	**14786.92**	**28993.9**
Profit, 10%	1478.69	2899.4
Total	**16265.61**	**31893.3**
Temporary buildings and constructions, 1,5%	243.98	478.4
Grand total	**16509.59**	**32371.7**

Materials required for seeding and planting

thousand AMD

Plot N	Quantity of planting materials to be used for afforestation		Quantity of seeds to be used for afforestation		Quantity of planting materials to be used for additional planting for the following year		Quantity of seeds to be used for additional planting for the following year		Transport costs	Total costs
	piece	thousand AMD	kg	thousand AMD	piece	thousand AMD	kg	thousand AMD	thousand AMD	thousand AMD
Plot N1	47550	4279,50	792,5	237,75	11888	1069,88	190,2	57,06	395,00	6039,19
Plot N2	33645	3028,05	565,7	169,71	10862	977,54	179,3	53,78	296,00	4525,07
Total	**81195**	**7307,6**	**1358,2**	**407,46**	**22749**	**2047,41**	**369,5**	**110,84**	**691,0**	**10564,26**
Overhead costs, 5,3 %										559,91
Total										**11124,16**

Profit, 10%	1112,42
Total	**12236,58**
Temporary buildings and constructions, 1,5%	183,55
Grand total	**12420,13**

EUR

Plot N	Quantity of planting materials to be used for afforestation		Quantity of seeds to be used for afforestation		Quantity of planting materials to be used for additional planting for the following year		Quantity of seeds to be used for additional planting for the following year		Transport costs	Total costs
	piece	EUR	kg	EUR	piece	EUR	kg	EUR	EUR	EUR
Plot N1	47550	8391,2	792,5	466,2	11887,5	2097,8	190,2	111,9	774,7	11841,7
Plot N2	33645	5937,4	565,7	332,8	10861,5	1916,7	179,3	105,4	580,5	8872,8
Total	**81195**	**14328,5**	**1358,2**	**798,9**	**22749,0**	**4014,5**	**369,5**	**217,3**	**1355,2**	**20714,5**
Overhead costs, 5,3 %										1097,9
Total										**21812,3**
Profit, 10%										2181,2
Total										**23993,6**
Temporary buildings and constructions, 1,5%										359,9
Grand total										**24353,5**

5.3.2. *Quantification for Other Materials and if Necessary Mechanization Work and Cost Calculation for Site N1 and Site N2*

Pilot Site N1

Materials	Unit	Volume	Total cost, thousand AMD	Total cost, EUR
Procurement of rodenticides Storm II (0,05 g/kg) Flocoumafen BASF Agro B.V	kg	117	819.0	1605.9
Transport costs			57.0	111.7
Total			**876.0**	**1717.6**
Overhead costs, 5,3 %			46.4	91.0
Total			**922.4**	**1808.6**
Profit, 10%			92.2	180.8
Total			**1014.6**	**1989.4**
Temporary buildings and constructions, 1,5%			15.2	29.8
Grand total			**1029.8**	**2019.2**

Plot N2

Materials	Unit	Volume	Total cost, thousand AMD	Total cost, EUR
Procurement of rodenticides Storm II (0,05 g/kg) Flocoumafen BASF Agro B.V	kg	89.7	627.9	1231.2
Transport costs			45.0	88.2
Total			**672.9**	**1319.4**
Overhead costs, 5,3 %			35.7	69.9
Total			**708.6**	**1389.3**
Profit, 10%			70.8	138.9
Total			**779.4**	**1528.2**
Temporary buildings and constructions, 1,5%			11.7	22.9
Grand total			**791.1**	**1551.1**

5.3.3. *Work/Time Schedule for Implementing of Transformation Works (Site N1 and Site N2)*

Measure	Terms of implementation
Fencing	01.06.2012-30.11.2012
Cleaning of the area	01.06.2012-30.09.2012
Seeding and planting	01.10.2012-30.11.2012
Forest-pathologic survey	01.10.2012-30.11-2012
Rodent control	01.10.2012-30.11-2012
Additional planting in the established forest cultures	01.10.2013-01.11.2013
Tending of established forest cultures	01.04.2013-01.10.2013

6. CHAPTER 6. PLANING OF POST-TRANSFORMATION MEASURES FOR 2012-2013 AND 2014-2018

6.1. Post-Transformation Measures for Site N1 (Measures for the Periods of 2012-2013 and 2014-2018)

Additional planting in forest cultures established in 2012 is planned during autumn, 2013.

6.1.1. *Controlling Unwanted Vegetation*

Agro-technical maintenance (couching, hoeing and weeding) of forest cultures established in 2012 (4 times) and hay removal (once) is planned in 2013.
Agro-technical maintenance (6 times) and hay removal (5 times) is planned in the period 2014-2018.

6.1.2. *Pest Control Measures*

Rodent control measures should be implemented upon necessity prior to planting in 2012.

6.1.3. *Other Measures*

There are no other measures planned.

6.2. Post-Transformation Measures for Site N2 (Measures for the Periods of 2012-2013 and 2014-2018)

6.2.1. *Controlling Unwanted Vegetation*

Agro-technical maintenance (couching, hoeing and weeding) of forest cultures established in 2012 (4 times) and hay removal (once) is planned in 2013.
Agro-technical maintenance (6 times) and hay removal (5 times) is planned in the period 2014-2018.

6.2.2. *Pest Control Measures*

Rodent control measures should be implemented upon necessity prior to planting and seeding in 2012.

6.2.3. *Other Measures*

There are no other measures planned.

6.3. Quantification and Cost Calculation for Post-Transformation Measures (*Measures for the Periods of 2012-2013 and 2014-2018*)

6.3.1. *Quantification of Materials and Works Needed and Cost Calculation for Site N1 and Site N2*

The materials and works needed and cost calculation for Site N1 and Site N2 are done based on current prices and can vary depending on possible changes during the following years.
The exchange rate for EURO used for the calculations is 1Euro=510AMD.

Pilot Site N1

Cost calculation for under-planting in Plot 1-1 of Koghb Forest District (20.4ha) in Autumn, 2012

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 20,4 ha, 1000 AMD**	**Total cost for 20,4 ha, EURO**
1	2	3	4	5	6	7	8	9
Digging of pits /manually/	3-1-7							
	Piece	1 500	41	36,6	3,0	109,80	2239,92	4392,0
Covering small-size seedlings with soil /temporary/	3-2-1							
	1 000 pieces	1,5	49	0,03	3,0	0,09	1,84	3,6
Preparation of small-size seedlings for planting	3-2-12							
	1 000 pieces	1,5	30	0,05	3,0	0,15	3,06	6,0
Planting of small-size seedlings with spade	3-1-14							
	1 000 pieces	1,5	0,27	5,6	3,0	16,80	342,72	672,0
Total						**126,84**	**2587,54**	**5073,6**
Forest pathologic survey	ha	1,0			0,6	0,60	12,24	24,0
Rodent control	ha	1,0	1,0	1,0	3,0	3,00	61,20	120,0
Total						**3,60**	**73,44**	**144,0**
Procurement of rodenticides Storm II (0,05 g/kg) Flocoumafen BASF Agro B.V	kg	1,5			7,0	10,50	214,20	420,0
Total						**14,10**	**287,64**	**564,0**
Procurement of planting material, including	piece	1500				240,00	4896,00	9600,0
Oak, ash,	piece	1500			0,16	240,00	4896,00	9600,0

apple								
Total						**380,94**	**7771,18**	**15237,6**
Transport costs						26,0	530,00	1039,2
Grand Total for 2012						**406,94**	**8301,18**	**16276,8**

Cost calculation for agro-technical maintenance of forest cultures in Subplot N 1-1 (20, 4 ha) of Koghb Forest District (year of establishment- autumn, 2012, year of planned implementation 2013)

Planned Activities	Unit	Volume per 1 ha	Norm Performance	Number of Norms	Price for 1 norm, 1000 AMD	Total cost for 1 ha, thousand AMD	Total cost for 20,4 ha, 1000 AMD	Total cost for 20,4 ha, EURO
1	2	3	4	5	6	7	8	9
Agro-technical maintenance /4times/	3-4-3							
	piece	6000	210	28,6	3,0	85,80	1750,32	3432,0
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	973,08	1908,0
Total						**133,50**	**2723,40**	**5340,0**
Transport costs						9,00	183,00	358,8
Total maintenance costs for 2013						**142,50**	**2906,40**	**5698,8**

Cost calculation for additional planting in forest cultures in Subplot N1-1 (20.4ha) of Koghb Forest District

(Year of establishment- autumn, 2012, year of planned implementation- autumn, 2013)

Planned Activities	Unit	Volume per 1 ha	Norm Performance	Number of Norms	Price for 1 norm, 1000 AMD	Total cost for 1 ha, thousand AMD	Total cost for 20,4 ha, 1000 AMD	Total cost for 20,4 ha, EURO
1	2	3	4	5	6	7	8	9
Soil preparation for additional planting	3-1-7							
	piece	375	150	2,5	3,0	7,50	153,00	300,0
Additional plantings in established forest cultures	3-3-3							
	piece	375	307	1,2	3,0	3,60	73,44	144,0
Total						**11,10**	**226,44**	**444,0**
Procurement of planting material for additional planting	piece	375			0,16	60,00	1224,00	2400,0
Total						**71,10**	**1450,44**	**2844,0**
Transport costs						5,00	102,00	200,0
Total cost for additional planting						**76,10**	**1552,44**	**3044,0**

Cost calculation for agro-technical maintenance of forest cultures established in Subplot N 1-1 (20,4 ha) of Koghb Forest District (year of establishment- autumn 2012, period of planned implementation 2014-2018)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 20,4 ha, 1000 AMD**	**Total cost for 20,4 ha, EURO**
1	2	3	4	5	6	7	8	9
2014								
Agro-technical maintenance /3 times/	3-4-3							
	piece	4500	210	21,4	3,0	64,20	1309,68	2568,0
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	973,08	1908,0
Total						**111,90**	**2282,76**	**4476,0**
2015								
Agro-technical maintenance /2 times/	3-4-3							
	piece	3000	210	14,3	3,0	42,90	875,16	1716,0
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	973,08	1908,0
Total						**90,60**	**1848,24**	**3624,0**
2016								
Agro-technical maintenance /once/	3-4-3							
	piece	1500	210	7,1	3,0	21,30	434,52	852,0
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	973,08	1908,0
Total						**69,00**	**1407,60**	**2760,0**
2017								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	973,08	1908,0
Total						**47,70**	**973,08**	**1908,0**
2018								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	973,08	1908,0
Total						**47,70**	**973,08**	**1908,0**
Total maintenance costs						**366,90**	**7484,76**	**14676,0**
Transport costs						25,00	510,00	1000,0
Total maintenance costs for the period of 2014-2018						**391,90**	**7994,76**	**15676,0**

Cost calculation for planting in open spaces in Subplots N 1-2 (32, 4 ha) and N 1-3 (14, 2 ha) in autumn 2012

SchemeN2

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 46.6 ha, 1000 AMD**	**Total cost for 46.6 ha, EURO**
1	2	3	4	5	6	7	8	9
Clearing of the area, Subplots N1-2 – 12 ha, and N 1-3 - 4 ha	ha	16,0			75,0		1200,0	2352,9
Digging of pits /manually/ 0,5x0,5x0,5m	3-1-7							
	piece	800	41	19,5	3,0	58,50	2726,10	5345,3
Covering small-size seedlings with soil /temporary/	3-2-1							
	1 000 pieces	0,8	49	0,02	3,0	0,06	2,80	5,5
Preparation of small-size seedlings for planting	3-2-12							
	1 000 pieces	0,8	30	0,03	3,0	0,09	4,19	8,2
Planting of small-size seedlings with spade	3-1-14							
	1 000 pieces	0,8	0,27	3,0	3,0	9,00	419,40	822,4
Total						**67,65**	**4352,49**	**8534,3**
Forest pathologic survey	ha	1,0			0,6	0,60	27,96	54,8
Rodent control	ha	1,0	1,0	1,0	3	3,00	139,80	274,1
Total						**3,60**	**167,76**	**328,9**
Procurement of rodenticides Storm II (0,05 g/kg) Flocoumafen BASF Agro B.V	kg	1,5			7,0	10,50	489,30	959,4
Total						**14,10**	**657,06**	**1288,4**
Procurement of planting material, including	piece	800				128,00	5964,80	11695,7
Oak, ash, maple	piece	800			0,16	128,00	5964,80	11695,7
Total						**209,75**	**10974,35**	**21518,3**
Transport costs						14,0	650,00	1274,5
Total for 2012						**223,75**	**11624,35**	**22792,8**

Cost calculation for agro-technical maintenance of forest cultures in Subplots N 1-2 (32.4ha) and N 1-3 (14.2ha) of Koghb forest district (year of establishment- autumn 2012, year of planned implementation 2013)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 46.6 ha, 1000 AMD**	**Total cost for 46.6 ha, EURO**
1	2	3	4	5	6	7	8	9
Agro-technical maintenance /4 times/	3-4-3							
	piece	3200	210	15,2	3,0	45,60	2124,96	4166,6
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	2222,82	4358,5
Total						**93,30**	**4347,78**	**8525,1**
Transport costs						6,00	280,00	549,0
Total maintenance costs for 2013						**99,30**	**4627,78**	**9074,1**

Cost calculation for additional planting in forest cultures established in open spaces of Subplots N1-2 (32.4ha) and N 1-3 (14.2ha) of Koghb Forest District (year of establishment- autumn 2012, year of planned implementation- autumn 2013)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 46.6 ha, 1000 AMD**	**Total cost for 46.6 ha, EURO**
1	2	3	4	5	6	7	8	9
Soil preparation for additional planting	3-1-7							
	piece	320	150	2,1	3,0	6,30	293,58	575,6
Additional plantings in established forest cultures	3-3-3							
	piece	320	307	1,0	3,0	3,00	139,80	274,1
Total						**9,30**	**433,38**	**849,8**
Procurement of planting material for additional planting	piece	320			0,16	51,20	2385,92	4678,3
Total						**60,50**	**2819,30**	**5528,0**
Transport costs						4,00	186,00	364,7
Total cost for additional planting						**64,50**	**3005,30**	**5892,7**

Cost calculation for agro-technical maintenance of forest cultures in Subplots N1-2 (32.4ha) and N 1-3 (14.2ha) of Koghb Forest District (year of establishment- autumn 2012, period of planned implementation 2014-2018)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 46.6 ha, 1000 AMD**	**Total cost for 46.6 ha, EURO**
1	2	3	4	5	6	7	8	9
2014								
Agro-technical maintenance /3 times/	3-4-3							
	piece	2400	210	11,4	3,0	34,20	1593,72	3124,9
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	2222,82	4358,5
Total						**81,90**	**3816,54**	**7483,4**
2015								
Agro-technical maintenance /2 times/	3-4-3							
	piece	1600	210	7,6	3,0	22,80	1062,48	2083,3
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	2222,82	4358,5
Total						**70,50**	**3285,30**	**6441,8**
2016								
Agro-technical maintenance /once/	3-4-3							
	piece	800	210	3,8	3,0	11,40	531,24	1041,6
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	2222,82	4358,5
Total						**59,10**	**2754,06**	**5400,1**
2017								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	2222,82	4358,5
Total						**47,70**	**2222,82**	**4358,5**
2018								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	2222,82	4358,5
Total						**47,70**	**2222,82**	**4358,5**
Total maintenance costs						**306,90**	**14301,54**	**28042,2**
Transport costs						21,00	978,00	1917,6
Total maintenance costs for the period of 2014-2018						**327,90**	**15279,54**	**29959,9**

Cost calculation for fencing of Subplot N 1 of Koghb Forest District

No	Planned activity	Unit	Norm Performance	Number of necessary norms	Cost for 1 norm, thousand AMD	Payment for 1 km fencing, thousand AMD.	Total for 3.5km fencing, thousand AMD	Total for 3.5km fencing, EUR
Preparation of posts and fencing								
1	Debarking and debranching of roundwood [1]	piece	42	11,8	6,3	74,3	260,2	510,2
2	Preparation of posts (2.1 m length) and base tarring 0.8m	piece	95	5,2	6,3	32,76	114,66	224,8
3	Demarcation of fencing area and digging holes for the installation of posts 0,35x0,35m, 0,6 m deep	piece	42	11,8	6,3	74,34	260,19	510,2
4	Post loading and transportation to the planting areas	piece	496	1	20,0	20,00	70,00	137,3
5	Installation and tightening of posts	piece	42	11,8	6,3	74,34	260,19	510,2
6	Barbwire stretching and attachment to posts	m	515 [*]	14,1	6,3	88,83	310,905	609,6
	Total					**364,61**	**1276,14**	**2502,2**
	Transport costs					25,00	89,00	174,5
	Grand total					389,61	1365,14	2676,7

Cost calculation for fencing of Subplot N 1 of Koghb Forest District

No	Planned activity	Unit	Materials necessary for 1 post	Materials necessary for 496 posts (1 000m fence)	Unit price, thousand AMD	Total price, thousand AMD	Total for 3.5km fence, thousand AMD	Total for 3.5km fence, EUR
Materials to be used for fencing								
1	Procurement of 8-12 cm diameter poles made of broadleaved species	piece	496	-	1,3	644,8	2256,8	4425,1
2	Tar	kg	0,16	79,4	0,5	39,7	139,0	272,5
3	Dissolver (diesel oil)	litre	0,2	99,2	0,46	45,6	159,7	313,2
4	Staples	kg	0,06	29,8	1,2	35,8	125,2	245,4
5	Barbed wire (galvanized)	1 000 m	7,24		100,0	724,00	2534,0	4968,6
6	Double-wing wooden gates 2x (2mx1,5m)	piece		4	40,0		160,0	313,7
	Total					**1489,89**	**5374,62**	**10538,5**

[1] 496 posts are required for 1 km fence
[*] 7240 m barbwire is required for 1 km fence

Cost calculation for additional planting in Subplot N 2-1 (6.7ha) of Koghb forest district in autumn 2012

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 6.7 ha, 1000 AMD**	**Total cost for 6.7 ha, EURO**
1	2	3	4	5	6	7	8	9
Digging of pits /manually/ 0,5x0,5x0,5Ù	3-1-7							
	piece	100	41	2,4	3,0	7,20	48,24	94,6
Covering small-size seedlings with soil /temporary/	3-2-1							
	1 000 pieces	0,1	49	0,002	3,0	0,01	0,04	0,1
Preparation of small-size seedlings for planting	3-2-12							
	1 000 pieces	0,1	30	0,003	3,0	0,01	0,06	0,1
Planting of small-size seedlings with spade	3-1-14							
	1 000 pieces	0,1	0,27	0,4	3,0	1,20	8,04	15,8
Total						**8,42**	**56,38**	**110,6**
Forest pathologic survey	ha	1,0			0,6	0,60	4,02	7,9
Rodent control	ha	1,0	1,0	1,0	3,0	3,00	20,10	39,4
Total						**3,60**	**24,12**	**47,3**
Procurement of rodenticides Storm II (0,05 g/kg) Flocoumafen BASF Agro B.V	kg	1,5			7,0	10,50	70,35	137,9
Total						**14,10**	**94,47**	**185,2**
Procurement of planting material, including	piece	100				16,00	107,20	210,2
Walnut, apple	piece	100			0,16	16,00	107,20	210,2
Total						**38,52**	**258,05**	**506,0**
Transport costs						3,00	20,00	39,2
Total for 2012						**41,52**	**278,05**	**545,2**

Cost calculation for agro-technical maintenance of forest cultures in Subplot N 2-1 (6.7 ha) of Koghb Forest District (year of establishment- autumn 2012, year of planned implementation 2013)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 6.7 ha, 1000 AMD**	**Total cost for 6.7 ha, EURO**
1	2	3	4	5	6	7	8	9
Agro-technical maintenance /4 times/	3-4-3							
	piece	400	210	1,9	3,0	5,70	38,19	74,9
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	319,59	626,6
Total						**53,40**	**357,78**	**701,5**
Transport costs						4,00	26,00	51,0
Total maintenance costs for 2013						**57,40**	**383,78**	**752,5**

Cost calculation for additional planting in forest cultures in Subplot 2-1 (6.7ha) of Koghb Forest District (year of establishment- autumn 2012, year of planned implementation- autumn 2013)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 6.7 ha, 1000 AMD**	**Total cost for 6.7 ha, EURO**
1	2	3	4	5	6	7	8	9
Soil preparation for additional planting	3-1-7							
	piece	25	150	0,2	3,0	0,60	4,02	7,9
Additional plantings in established forest cultures	3-3-3							
	piece	25	307	0,1	3,0	0,30	2,01	3,9
Total						**0,90**	**6,03**	**11,8**
Procurement of planting material for additional planting	piece	25			0,16	4,00	26,80	52,5
Total						**4,90**	**32,83**	**64,4**
Transport costs						0,30	2,00	3,9
Total						**5,20**	**34,83**	**68,3**

Cost calculation for agro-technical maintenance of forest cultures in Subplot N 2-1 (6.7 ha) of Koghb Forest District (year of establishment- autumn 2012, period of planned implementation 2014-2018)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 6.7 ha, 1000 AMD**	**Total cost for 6.7 ha, EURO**
1	2	3	4	5	6	7	8	9
2014								
Agro-technical maintenance /3 times/	3-4-3							
	piece	300	210	1,4	3,0	4,20	28,14	55,2
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	319,59	626,6
Total						**51,90**	**347,73**	**681,8**
2015								
Agro-technical maintenance /2 times/	3-4-3							
	piece	200	210	1,0	3,0	3,00	20,10	39,4
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	319,59	626,6
Total						**50,70**	**339,69**	**666,1**
2016								
Agro-technical maintenance /once/	3-4-3							
	piece	100	210	0,5	3,0	1,50	10,05	19,7
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	319,59	626,6
Total						**49,20**	**329,64**	**646,4**
2017								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	319,59	626,6
Total						**47,70**	**319,59**	**626,6**
2018								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	319,59	626,6
Total						**47,70**	**319,59**	**626,6**
Total maintenance costs						**247,20**	**1656,24**	**3247,5**
Transport costs						17,00	114,00	223,5
Total maintenance costs for the period of 2014-2018						**264,20**	**1770,24**	**3471,1**

Cost calculation for planting for open spaces in Subplot 2-2 (1.3ha) of Koghb Forest District (year of planned implementation- autumn 2012)

Scheme N2

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 1.3 ha, 1000 AMD**	**Total cost for 1.3 ha, EURO**
1	2	3	4	5	6	7	8	9
Clearing of the area, subplot 2-2 -1,0 ha	ha	1,0			75,0		75,0	147,1
Digging of pits /manually/ 0,5x0,5x0,5m	3-1-7							
	Piece	800	41	19,5	3,0	58,50	76,05	149,1
Covering small-size seedlings with soil /temporary/	3-2-1							
	1 000 pieces	0,8	49	0,02	3,0	0,06	0,08	0,2
Preparation of small-size seedlings for planting	3-2-12							
	1 000 pieces	0,8	30	0,03	3,0	0,09	0,12	0,2
Planting of small-size seedlings with spade	3-1-14							
	1 000 pieces	0,8	0,27	3,0	3,0	9,00	11,70	22,9
Total						**67,65**	**162,95**	**319,5**
Forest pathologic survey	ha	1,0			0,6	0,60	0,78	1,5
Rodent control	ha	1,0	1,0	1,0	3	3,00	3,90	7,6
Total						**3,60**	**4,68**	**9,2**
Procurement of rodenticides Storm II (0,05 g/kg) Flocoumafen BASF *Agro B.V*	kg	1,5			7,0	10,50	13,65	26,8
Total						**14,10**	**18,33**	**35,9**
Procurement of planting material, including	piece	800				128,00	166,40	326,3
Oak, ash, maple	piece	800			0,16	128,00	166,40	326,3
Total						**209,75**	**347,68**	**681,7**
Transport costs						15,0	19,00	37,3
Total for 2012						**224,75**	**366,68**	**719,0**

Cost calculation for agro-technical maintenance of forest cultures established in open spaces in Subplot N 2-2 (1.3 ha) of Koghb Forest District (year of establishment- autumn 2012, year of planned implementation 2013)

Planned Activities	Unit	Volume per 1 ha	Norm Performance	Number of Norms	Price for 1 norm, 1000 AMD	Total cost for 1 ha, thousand AMD	Total cost for 1.3 ha, 1000 AMD	Total cost for 1.3 ha, EURO
1	2	3	4	5	6	7	8	9
Agro-technical maintenance /4 times/	3-4-3							
	piece	3200	210	15,2	3,0	45,60	59,28	116,2
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	62,01	121,6
Total						**93,30**	**121,29**	**237,8**
Transport costs						6,00	8,00	15,7
Total maintenance costs for 2013						**99,30**	**129,29**	**253,5**

Cost calculation for additional planting in forest cultures established in open spaces of Subplot 2-2 (1.3ha) of Koghb Forest District (year of establishment- autumn 2012, year of planned implementation- autumn 2013)

Planned Activities	Unit	Volume per 1 ha	Norm Performance	Number of Norms	Price for 1 norm, 1000 AMD	Total cost for 1 ha, thousand AMD	Total cost for 1.3 ha, 1000 AMD	Total cost for 1.3 ha, EURO
1	2	3	4	5	6	7	8	9
Soil preparation for additional planting	3-1-7							
	piece	320	150	2,1	3,0	6,30	8,19	16,1
Additional plantings in established forest cultures	3-3-3							
	piece	320	307	1,0	3,0	3,00	3,90	7,6
Total						**9,30**	**12,09**	**23,7**
Procurement of planting material for additional planting	piece	320			0,16	51,20	66,56	130,5
Total						**60,50**	**78,65**	**154,2**
Transport costs						3,00	4,00	7,8
Total cost for additional planting						**63,50**	**82,65**	**162,1**

Cost calculation for agro-technical maintenance of forest cultures established in open spaces of Subplot 2-2 (1.3ha) of Koghb Forest District (year of establishment- autumn 2012, period of planned implementation 2014-2018)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 1.3 ha, 1000 AMD**	**Total cost for 1.3 ha, EURO**
1	2	3	4	5	6	7	8	9
2014								
Agro-technical maintenance /3 times/	3-4-3							
	piece	2400	210	11,4	3,0	34,20	44,46	87,2
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	62,01	121,6
Total						**81,90**	**106,47**	**208,8**
2015								
Agro-technical maintenance /2 times/	3-4-3							
	piece	1600	210	7,6	3,0	22,80	29,64	58,1
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	62,01	121,6
Total						**70,50**	**91,65**	**179,7**
2016								
Agro-technical maintenance / once/	3-4-3							
	piece	800	210	3,8	3,0	11,40	14,82	29,1
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	62,01	121,6
Total						**59,10**	**76,83**	**150,6**
2017								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	62,01	121,6
Total						**47,70**	**62,01**	**121,6**
2018								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	62,01	121,6
Total						**47,70**	**62,01**	**121,6**
Total maintenance costs						306,90	398,97	782,3
Transport costs						21,00	27,00	52,9
Total maintenance costs during 2014-2018						**327,90**	**425,97**	**835,2**

Cost calculation for fencing of Plot N2 in Koghb forest district

No	Planned Activities	Unit	Norm Performance	Number of necessary norms	Price for 1 norm, 1000 AMD	Remuneration for 1 km fencing, thousand AMD	Total for 1.4km fencing, thousand AMD	Total for 1.4km fencing, EUR
Preparation of posts and fencing								
1	Debarking and debranching of roundwood*	piece	42	11,8	6,3	74,3	104,076	204,1
2	Preparation of posts (2.1 m length) and base tarring 0.8m	piece	95	5,2	6,3	32,76	45,864	89,9
3	Demarcation of fencing area and digging holes for the installation of posts 0,35x0,35m, 0,6 m deep	piece	42	11,8	6,3	74,34	104,076	204,1
4	Post loading and transportation to the planting areas	piece	499	1	20,0	20,00	28	54,9
5	Installation and tightening of posts	piece	42	11,9	6,3	74,97	104,958	205,8
6	Barbwire stretching and attachment to posts	m	515†	14,2	6,3	89,46	125,244	245,6
	Total salary					**365,87**	**512,22**	**1004,3**
	Transport costs					25,00	35,00	68,6
	Grand Total					**390,87**	**547,22**	**1073,0**

Cost calculation for fencing of Plot N2 in Koghb forest district

No	Planned Activities	Unit	Materials necessary for 1 post	Materials necessary for 499 posts (1 000m fence)	Unit price, thousand AMD	Total price, thousand AMD	Total for 1.4km fence, thousand AMD	Total for 1.4km fence, EUR
Materials to be used for fencing								
1	Procurement of 8-12 cm diameter poles made of broadleaved species	piece	499	-	1,3	648,7	908,2	1780,7
2	Tar	kg	0,16	79,8	0,5	39,9	55,9	109,5
3	Dissolver (diesel oil)	litre	0,2	99,8	0,46	45,9	64,3	126,0
4	Staples	kg	0,06	29,9	1,2	35,9	50,2	98,5
5	Barbed wire (galvanized)	1 000 m	7,33		100,0	733,00	1026,2	2012,2
6	Double-wing wooden gates 2x (2mx1,5m)	piece		1	40,0		40,0	78,4
	Total					**1503,39**	**2144,74**	**4205,4**

* 499 posts are required for 1 km fence
† 7330 m barbwire is required for 1 km fence

Cost calculation for additional planting in Subplots N 3-1 (1.4ha) and N 3-2 (1.6ha) of Koghb forest district in autumn 2012

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 3.0 ha, 1000 AMD**	**Total cost for 3.0 ha, EURO**
1	2	3	4	5	6	7	8	9
Clearing of the area, plot 3-1 - 1,0 ha, plot 3-2 - 1,0 ha	ha	2,0			75,0		150,0	294,1
Digging of pits /manually/ 0,5x0,5x0,5Ù	3-1-7							
	piece	80	41	2,0	3,0	6,00	18,00	35,3
Covering small-size seedlings with soil /temporary/	3-2-1							
	1 000 pieces	0,08	49	0,002	3,0	0,01	0,02	0,04
Preparation of small-size seedlings for planting	3-2-12							
	1 000 pieces	0,08	30	0,003	3,0	0,01	0,03	0,1
Planting of small-size seedlings with spade	3-1-14							
	1 000 pieces	0,08	0,27	0,3	3,0	0,90	2,70	5,3
Total						**6,92**	**170,75**	**334,8**
Forest pathologic survey	ha	1,0			0,6	0,60	1,80	3,5
Rodent control	ha	1,0	1,0	1,0	3	3,00	9,00	17,6
Total						**3,60**	**10,80**	**21,2**
Procurement of rodenticides Storm II (0,05 g/kg) Flocoumafen BASF Agro B.V	kg	1,5			7,0	10,50	31,50	61,8
Total						**14,10**	**42,30**	**82,9**
Procurement of planting material, including	piece	80				12,80	38,40	75,3
Walnut, apple	piece	80			0,16	12,80	38,40	75,3
Total						**33,82**	**251,45**	**493,0**
Transport costs						2,00	6,00	11,8
Total for 2012						**35,82**	**257,45**	**504,8**

Cost calculation for agro-technical maintenance of forest cultures in Subplots N 3-1 (1, 4 ha) and N 3-2 (1.6ha) of Koghb Forest District (year of establishment- Autumn, 2012, year of planned implementation- 2013)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 3.0 ha, 1000 AMD**	**Total cost for 3.0 ha, EURO**
1	2	3	4	5	6	7	8	9
Agro-technical maintenance /4 times/	3-4-3							
	piece	320	210	1,5	3,0	4,50	13,50	26,5
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	143,10	280,6
Total						**52,20**	**156,60**	**307,1**
Transport costs						4,00	12,00	23,5
Total maintenance for 2013						**56,20**	**168,60**	**330,6**

Cost calculation for additional planting in forest cultures established in Subplots N3-1 (1.4ha) and N3-2 (1.6ha) of Koghb Forest District (year of establishment- Autumn, 2012, year of planned implementation- Autumn, 2013)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 3.0 ha, 1000 AMD**	**Total cost for 3.0 ha, EURO**
1	2	3	4	5	6	7	8	9
Soil preparation for additional planting	3-1-7							
	piece	20	150	0,1	3,0	0,30	0,90	1,8
Additional plantings in established forest cultures	3-3-3							
	piece	20	307	0,1	3,0	0,30	0,90	1,8
Total						**0,60**	**1,80**	**3,5**
Procurement of planting material for additional planting	piece	20			0,16	3,20	9,60	18,8
Total						**3,80**	**11,40**	**22,4**
Transport costs						0,20	0,60	1,2
Total cost for additional planting						**4,00**	**12,00**	**23,5**

Cost calculation for agro-technical maintenance of forest cultures established in Subplots N 3-1 (1.4ha) and N 3-2 (1.6ha) of Koghb Forest District (year of establishment- autumn 2012, period of planned implementation 2014-2018)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 3.0 ha, 1000 AMD**	**Total cost for 3.0 ha, EURO**
1	2	3	4	5	6	7	8	9
2014								
Agro-technical maintenance /3 times/	3-4-3							
	piece	240	210	1,1	3,0	3,30	9,90	19,4
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	143,10	280,6
Total						**51,00**	**153,00**	**300,0**
2015								
Agro-technical maintenance /2 times/	3-4-3							
	piece	160	210	0,8	3,0	2,40	7,20	14,1
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	143,10	280,6
Total						**50,10**	**150,30**	**294,7**
2016								
Agro-technical maintenance /once/	3-4-3							
	piece	80	210	0,4	3,0	1,20	3,60	7,1
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	143,10	280,6
Total						**48,90**	**146,70**	**287,6**
2017								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	143,10	280,6
Total						**47,70**	**143,10**	**280,6**
2018								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	143,10	280,6
Total						**47,70**	**143,10**	**280,6**
Total maintenance costs						**245,40**	**736,20**	**1443,5**
Transport costs						17,00	51,00	100,0
Total maintenance costs for the period of 2014-2018						**262,40**	**787,20**	**1543,5**

Cost calculation for Fencing of Subplot N 3 of Koghb Forest District

No	Planned Activities	Unit	Norm Performance	Number of necessary norms	Price for 1 norm, 1000 AMD	Remuneration for 1 km fencing, thousand AMD	Total for 0.85 km fencing, thousand AMD	Total for 0.85 km fencing, EUR
Preparation of posts and fencing								
1	Debarking and debranching of roundwood [3]	piece	42	11,8	6,3	74,3	63,189	123,9
2	Preparation of posts (2.1 m length) and base tarring 0.8m	piece	95	5,2	6,3	32,76	27,846	54,6
3	Demarcation of fencing area and digging holes for the installation of posts 0,35x0,35m, 0,6 m deep	piece	42	11,8	6,3	74,34	63,189	123,9
4	Post loading and transportation to the planting areas	piece	499	1	20,0	20,00	17	33,3
5	Installation and tightening of posts	piece	42	11,9	6,3	74,97	63,7245	125,0
6	Barbwire stretching and attachment to posts	m	515 [*]	14,2	6,3	89,46	76,041	149,1
	Total salary					**365,87**	**310,99**	**609,8**
	Transport costs					25,61	21,77	42,7
	Grand total					**391,48**	**332,76**	**652,5**

[3] 499 posts are required for 1 km fence
[*] 7330 m barbwire is required for 1 km fence

Pilot Site N2

Cost calculation for additional planting in Subplots N 1-1 (8.6ha), N 1-3 (10.5ha) and N 1-5 (12.6ha) of Spitak forest district in autumn 2012

Scheme N3

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 31.7 ha, 1000 AMD**	**Total cost for 31.7 ha, EURO**
1	2	3	4	5	6	7	8	9
Digging of pits /manually/ 0,35x0,35x0,35Ù	3-1-7							
	Piece	3 000	41	73,2	3,0	219,60	6 961,32	13 649,6
Oak seeding (5 seeds in 1 seedbed)	3-2-15							
	seedbed	1 500	400	3,7	3,0	11,10	351,87	689,9
Covering saplings with soil /temporary/	3-2-1							
	1 000 pieces	1,5	49	0,03	3,0	0,09	2,85	5,6
Preparation of saplings for planting	3-2-12							
	1 000 pieces	1,5	30	0,1	3,0	0,30	9,51	18,6
Planting of saplings with spade	3-1-14							
	1 000 pieces	1,5	0,27	5,5	3,0	16,50	523,05	1 025,6
Total						**247,59**	**7 848,60**	**15 389,4**
Forest pathologic survey	piece	1,0			0,6	0,60	19,02	37,3
Rodent control	piece	1,0	1,0	1,0	3,0	3,00	95,10	186,5
Total						**3,60**	**114,12**	**223,8**
Procurement of rodenticides Storm II (0,05 g/kg) Flocoumafen BASF Agro B.V	kg	1,5			7,0	10,50	332,85	652,6
Total						**14,10**	**446,97**	**876,4**
Procurement of planting material, including	piece	1500				135,00	4 279,50	8 391,2
Maple, apple, pear	piece	1500			0,09	135,00	4 279,50	8 391,2
Procurement of Quercus macranthera seeds and preparation (stratification) for additional planting	kg	25			0,3	7,50	237,75	466,2
Total						**404,19**	**12 812,82**	**25 123,2**
Transport costs						28,00	888,00	1 741,2
Total for 2012						**432,19**	**13 700,82**	**26 864,4**

Cost calculation for agro-technical maintenance of forest cultures established in Subplots N 1-1 (8.6 ha), N 1-3 (10.5ha) and N1-5 (12.6ha) of Spitak Forest District (year of establishment- autumn 2012, year of planned implementation- 2013)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 31.7 ha, 1000 AMD**	**Total cost for 31.7 ha, EURO**
1	2	3	4	5	6	7	8	9
Agro-technical maintenance /4 times/	3-4-3							
	piece	12000	210	57,1	3,0	171,30	5430,21	10647,5
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	1512,09	2964,9
Total						**219,00**	**6942,30**	**13612,4**
Transport costs						15,00	475,00	931,4
Total maintenance in 2013						**234,00**	**7417,30**	**14543,7**

Cost calculation for additional planting in forest cultures established in Subplots N 1-1 (8.6 ha), N1-3 (10.5ha) and N1-5 (12.6ha) of Spitak Forest District (year of establishment- autumn 2012, year of planned implementation- autumn 2013)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 31.7 ha, 1000 AMD**	**Total cost for 31.7 ha, EURO**
1	2	3	4	5	6	7	8	9
Soil preparation for additional planting	3-1-7							
	piece	750	150	5,0	3,0	15,00	475,50	932,4
Additional plantings in established forest cultures	3-3-3							
	piece	750	307	2,4	3,0	7,20	228,24	447,5
Total						**22,20**	**703,74**	**1379,9**
Procurement of planting material for additional planting	piece	375			0,09	33,75	1069,88	2097,8
Procurement of Quercus macranthera seeds and preparation (stratification) for additional planting	kg	6,0			0,30	1,80	57,06	111,9
Total						**57,75**	**1830,68**	**3589,56**
Transport costs						4,00	127,00	249,0
Total cost for additional planting						**61,75**	**1957,68**	**3838,6**

Cost calculation for agro-technical maintenance of forest cultures established in Subplots N 1-1 (8.6 ha), N 1-3 (10.5ha) and N1-5 (12.6ha) of Spitak Forest District (year of establishment- autumn 2012, period of planned implementation 2014-2018)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 31.7 ha, 1000 AMD**	**Total cost for 31.7 ha, EURO**
1	2	3	4	5	6	7	8	9
2014								
Agro-technical maintenance /3 times/	3-4-3							
	piece	9000	210	42,9	3,0	128,70	4079,79	7999,6
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	1512,09	2964,9
Total						**176,40**	**5591,88**	**10964,5**
2015								
Agro-technical maintenance /2 times/	3-4-3							
	piece	6000	210	28,6	3,0	85,80	2719,86	5333,1
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	1512,09	2964,9
Total						**133,50**	**4231,95**	**8297,9**
2016								
Agro-technical maintenance /once/	3-4-3							
	piece	3000	210	14,3	3,0	42,90	1359,93	2666,5
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	1512,09	2964,9
Total						**90,60**	**2872,02**	**5631,4**
2017								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	1512,09	2964,9
Total						**47,70**	**1512,09**	**2964,9**
2018								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	1512,09	2964,9
Total						**47,70**	**1512,09**	**2964,9**
Total maintenance costs						**495,90**	**15720,03**	**30823,6**
Transport costs						35,00	1110,00	2176,5
Total maintenance for the period of 2014-2018						**530,90**	**16830,03**	**33000,1**

Cost calculation for agro-technical maintenance of forest cultures established in Subplot N 2-8 (9.9ha) of Spitak Forest District (year of establishment- autumn 2012, period of planned implementation 2014-2018)

Planned Activities	**Unit**	**Volume per 1 ha**	**Norm Performance**	**Number of Norms**	**Price for 1 norm, 1000 AMD**	**Total cost for 1 ha, thousand AMD**	**Total cost for 9.9 ha, 1000 AMD**	**Total cost for 9.9 ha, EURO**
1	2	3	4	5	6	7	8	9
2014								
Agro-technical maintenance /3 times/	3-4-3							
	piece	9900	210	47,1	3,0	141,30	1398,87	2742,9
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	472,23	925,9
Total						**189,00**	**1871,10**	**3668,8**
2015								
Agro-technical maintenance /2 times/	3-4-3							
	piece	6600	210	31,4	3,0	94,20	932,58	1828,6
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	472,23	925,9
Total						**141,90**	**1404,81**	**2754,5**
2016								
Agro-technical maintenance /once/	3-4-3							
	piece	3300	210	15,7	3,0	47,10	466,29	914,3
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	472,23	925,9
Total						**94,80**	**938,52**	**1840,2**
2017								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	472,23	925,9
Total						**47,70**	**472,23**	**925,9**
2018								
Hay mowing between rows	8-5-15							
	m²	7500	473	15,9	3,0	47,70	472,23	925,9
Total						**47,70**	**472,23**	**925,9**
Total maintenance costs						**521,10**	**5158,89**	**10115,5**
Transport costs						36,00	355,00	696,1
Total maintenance costs for the period of 2014-2018						**557,10**	**5513,89**	**10811,5**

Cost calculation for Fencing of Plot N 2 of Spitak Forest District

No	Planned Activities	Unit	Norm Performance	Number of necessary norms	Price for 1 norm, 1000 AMD	Remuneration for 1 km fencing, thousand AMD	Total for 4.9 km fencing, thousand AMD	Total for 4.9 km fencing, EUR
Preparation of posts and fencing								
1	Debarking and debranching of roundwood [4]	piece	42	11,8	6,3	74,3	364,27	714,2
2	Preparation of posts (2.1 m length) and base tarring 0.8m	piece	95	5,2	6,3	32,76	160,52	314,8
3	Demarcation of fencing area and digging holes for the installation of posts 0,35x0,35m, 0,6 m deep	piece	42	11,8	6,3	74,34	364,27	714,2
4	Post loading and transportation to the planting areas	piece	497	1	20,0	20,00	98,00	192,2
5	Installation and tightening of posts	piece	42	11,8	6,3	74,34	364,27	714,2
6	Barbwire stretching and attachment to posts	m	515*	14,1	6,3	88,83	435,27	853,5
	Total salary					**364,61**	**1786,59**	**3503,1**
	Transport costs					25,52	125,06	245,2
	Grand total					**390,13**	**1911,65**	**3748,3**

Cost calculation for Fencing of Plot N 2 of Spitak Forest District

N	Planned activities	Unit	Quantity of materials required for 1 post	Quantity of materials required for 497 posts, 1 000 m fence	Unit price, thousand AMD	Total price, thousand AMD	Total for 4,9km fencing, thousand AMD	Total for 4,9km fencing, EUR
Materials to be used for fencing								
1	Procurement of 8-12 cm diameter poles made of broadleaved species	piece	497	-	1,3	646,1	3165,89	6207,6
2	Tar	kg	0,16	79,5	0,5	39,8	194,78	381,9
3	Dissolver (diesel oil)	litre	0,2	99,4	0,46	45,7	224,05	439,3
4	Staples	kg	0,06	29,8	1,2	35,8	175,22	343,6
5	Barbed wire (galvanized)	1 000 m	7,27		100,0	727,00	3562,30	6984,9
6	Double-wing wooden gates 2x (2mx1,5m)	piece		3	40,0		120,0	235,3
	Total					**1494,33**	**7442,24**	**14592,6**

[4] 497 posts are required for 1 km fence

* 7270 m barbwire is required for 1 km fence

6.3.2. *Work/Time Schedule for Implementing of Post-Transformation Works (Site N1 and Site N2)*

Activity	**Terms of implementation**
Tending of established forest cultures	01.05.2014-01.10.2018

7. CHAPTER 7. SUMMARY FOR ALL SILVICULTURAL MEASURES

7.1. Summary for Transformation and Post-Transformation Cost Calculations and Work-Time Schedule for 2012-2013

Summary for Transformation and Post-Transformation Cost Calculations in Pilot Site N1 for the period of 2012-2013

Plot N	Costs of establishment of forest cultures in 2012	Quantity of planting materials to be used for afforestation		Rodent control	Quantity of planting materials to be used for additional planting for the following year		Additional planting for the following year	Maintenance costs in 2013	Fencing of afforested areas		Cost for fencing materials	Transport costs	Total cost
	thousand AMD	piece	thousand AMD	thousand AMD	piece	thousand AMD	thousand AMD	thousand AMD	m	thousand AMD	thousand AMD	thousand AMD	thousand AMD
Plot N1	6940,03	67880	10860,8	944,70	22562	3609,92	659,82	7071,18	3500	1276,14	5374,62	2020,00	38757,20
Plot N2	219,33	1710	273,6	112,80	584	93,36	18,12	479,07	1400	512,22	2144,74	114,00	3967,24
Plot N3	170,75	240	38,4	42,30	60	9,60	1,80	156,60	850	310,99	1317,88	40,37	2088,68
Total	**7330,10**	**69830**	**11172,8**	**1099,80**	**23206**	**3712,88**	**679,74**	**7706,85**	**5750**	**2099,34**	**8837,25**	**2174,4**	**44813,12**
Maintenance costs- 3 guards x17 months x 50000													2550,00
Total													**47363,12**
Overhead costs, 5,3 %													2510,25
Total													**49873,37**
Profit, 10%													4987,34
Total													**54860,71**
Temporary buildings and constructions, 1,5%													822,91
Grand total													**55683,62**

Summary for Transformation and Post-Transformation Cost Calculations in Pilot Site N1 for the period of 2012-2013

EURO

Plot N	Costs of establishment of forest cultures in 2012	Quantity of planting materials to be used for afforestation		Rodent control	Quantity of planting materials to be used for additional planting for the following year		Additional planting for the following year	Maintenance costs in 2013	Fencing of afforested areas		Cost for fencing materials	Transport costs	Total cost
	EUR	piece	EUR	EUR	piece	EUR	EUR	EUR	m	EUR	EUR	EUR	EUR
Plot N1	13607,8	67880	21295,7	1852,3	22562	7078,2	1293,7	13865,1	3500	2502,2	10538,5	3960,9	75994,5
Plot N2	430,0	1710	536,5	221,1	584	183,1	35,5	939,3	1400	1004,4	4205,4	223,5	7778,9
Plot N3	334,8	240	75,3	82,9	60	18,8	3,5	307,1	850	609,7	2584,1	79,2	4095,5
Total	14372,74	69830	21907,5	2156,3	23206	7280,1	1332,7	15111,5	5750	4116,3	17328.0	4263,6	87868,9
Maintenance costs													5000,0
Total													**92868,9**
Overhead costs, 5,3 %													4922,0
Total													**97790,9**
Profit, 10%													9779,1
Total													**107570,0**
Temporary buildings and constructions, 1,5%													1613,5
Grand Total													**109183,6**

Summary for Transformation and Post-Transformation Cost Calculations in Pilot Site N2 for the period of 2012-2013

thousand AMD

Plot N	Costs of establishment of forest cultures in 2012	Quantity of planting materials to be used for afforestation		Rodent control		Quantity of planting materials to be used for additional planting for the following year	Additional planting for the following year		Maintenance costs in 2013		Fencing of afforested areas	Cost for fencing materials	Transport costs		Total cost	Quantity of planting materials to be used for afforestation	Rodent control
	thousand AMD	piece	thousand AMD	kg	thousand AMD	thousand AMD	piece	thousand AMD	kg	thousand AMD	thousand AMD	thousand AMD	m	thousand AMD	thousand AMD	thousand AMD	thousand AMD
Plot N1	7848,60	47550	4279,50	792,5	237,75	446,97	11888	1069,88	190,2	57,06	703,74	6942,30	4350	1591,53	6600,42	1600,00	31377,75
Plot N2	5555,44	33645	3028,05	565,7	169,71	396,21	10862	977,54	179,3	53,78	646,59	5187,30	9250	1786,59	7442,24	1224,06	26467,50
Total	13404,04	81195	7307,6	1358,2	407,46	843,18	22749	2047,41	369,5	110,84	1350,33	12129,60	13600	3378,12	14042,65	2824,1	57845,24
Maintenance costs- 2 guards x17 months x 50000																	1700,00
Total																	**59545,24**
Overhead costs, 5,3 %																	3155,90
Total																	**62701,14**
Profit, 10%																	6270,11
Total																	**68971,26**
Temporary buildings and constructions, 1,5%																	1034,57
Total																	**70005,82**

Summary for Transformation and Post-Transformation Cost Calculations in Pilot Site N2 for the period of 2012-2013

EURO

Plot N	Costs of establishment of forest cultures in 2012	Quantity of planting materials to be used for afforestation		Rodent control		Quantity of planting materials to be used for additional planting for the following year	Additional planting for the following year		Maintenance costs in 2013		Fencing of afforested areas	Cost for fencing materials	Transport costs		Total cost	Plot N	Costs of establishment of forest cultures in 2012
	EUR	piece	EUR	kg	EUR	EUR	piece	EUR	kg	EUR	EUR	EUR	m	EUR	EUR	EUR	EUR
Plot N1	15389,4	47550	8391,2	792,5	466,2	876,4	11888	2097,8	190,2	111,9	1379,9	13612,4	4350	3120,7	12942,0	3137,3	61525,0
Plot N2	10893,0	33645	5937,4	565,7	332,8	776,9	10862	1916,7	179,3	105,4	1267,8	10171,2	9250	3503,1	14592,6	2400,1	51897,1
Total	**26282,4**	**81195**	**14328,6**	**1358,2**	**798,9**	**1653,3**	**22749**	**4014,5**	**369,5**	**217,3**	**2647,7**	**23783,5**	**13600**	**6623,8**	**27534,6**	**5537,4**	**113422,0**
Maintenance costs																	3333,3
Total																	**116755,4**
Overhead costs, 5,3 %																	6188,0
Total																	**122943,4**
Profit, 10%																	12294,3
Total																	**135237,8**
Temporary buildings and constructions, 1,5%																	2028,6
Grand total																	**137266,3**

7.2. Summary for Post-Transformation Cost Calculations and Work-Time Schedule for 2014-2018

Summary for Post-Transformation Cost Calculations in Pilot Site N1 for 2014-2018

thousand AMD

Plot N	2014-2018 Maintenance costs	Transport costs	Total costs
	thousand AMD	thousand AMD	thousand AMD
Plot N1	21786,3	1488,0	23274,3
Plot N2	2055,2	141,0	2196,2
Plot N3	736,2	51,0	787,2
Total	24577,7	1680,0	26257,7
Maintenance costs- 3 guards x12 months x 50000 AMD x 5years			9000,0
Total			**35257,7**
Overhead costs, 5,3 %			1868,7
Total			**37126,4**
Profit, 10%			3712,6
Total			**40839,0**
Temporary buildings and constructions, 1,5%			612,6
Grand total			**41451,6**

Summary for Post-Transformation Cost Calculations in Pilot Site N1 for 2014-2018

EUR

Plot N	2014-2018 Maintenance costs	Transport costs	Total costs
	EUR	EUR	EUR
Plot N1	42718,2	2917,6	45635,9
Plot N2	4029,8	276,5	4306,3
Plot N3	1443,5	100,0	1543,5
Total	**48191,6**	**3294,1**	**51485,7**
Maintenance costs			17647,1
Total			**69132,8**
Overhead costs, 5,3 %			3664,0
Total			**72796,8**
Profit, 10%			7279,7
Total			**80076,5**
Temporary buildings and constructions, 1,5%			1201,1
Grand total			**81277,6**

7.3.

Summary for Post-Transformation Cost Calculations in Pilot Site N2 for 2014-2018

1000 AMD

Plot N	2014-2018 Maintenance costs	Transport costs	Total costs
	thousand AMD	thousand AMD	thousand AMD
Plot N1	15720,03	1110,00	16830,03
Plot N2	12465,99	868,00	13333,99
Total	28186,02	1978,0	30164,02
Maintenance costs- 2 guards x12 months x 50000 AMD x 5years			6000,00
Total			**36164,02**
Overhead costs, 5,3 %			1916,69
Total			**38080,71**
Profit, 10%			3808,07
Total			**41888,78**
Temporary buildings and constructions, 1,5%			628,33
Grand Total			**42517,12**

Summary for Post-Transformation Cost Calculations in Pilot Site N2 for 2014-2018

EURO

Plot N	2014-2018 Maintenance costs	Transport costs	Total costs
	EUR	EUR	EUR
Plot N1	30823,6	2176,5	33000,1
Plot N2	24443,1	1702,0	26145,1
Total	55266,7	3878,4	59145,1
Maintenance costs			11764,7
Total			**70909,8**
Overhead costs, 5,3 %			3758,2
Total			**74668,1**
Profit, 10%			7466,8
Total			**82134,9**
Temporary buildings and constructions, 1,5%			1232,0
Grand total			**83366,9**

7.4.

7.5. List of Approved Statutory Documents

1. Forest management plan of Noyemberyan FE, Yerevan 2008
2. Forest management plan of Gugark FE, Yerevan 2008

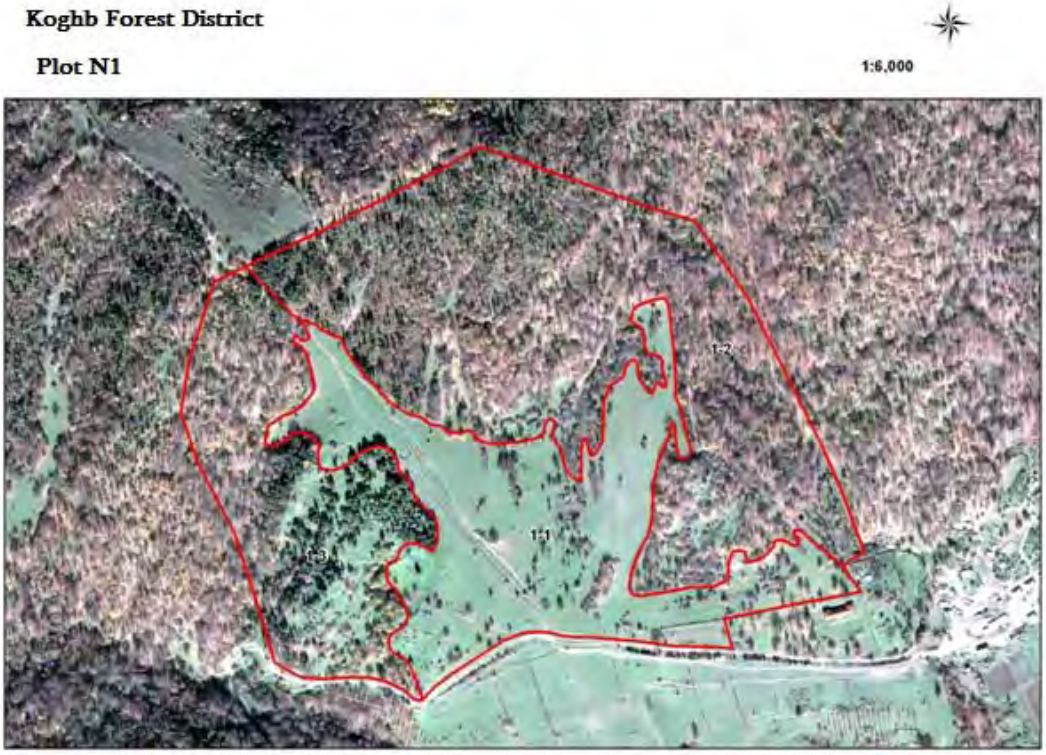
7.6. List of References

1. Zh. H. Vardanyan. Dendrology, Yerevan, 2005
2. Arutyunyan L. V., Khurshudyan P. A., Grigoryan A. A., Barseghyan A. M. Scientific bases of afforestation and reforestation of Armenian SSR, Yerevan, 1974
3. Khurshudyan P. A., Russian-Amenian information dictionary of forestry terms

ANNEXES (Maps, Schemes)

Annex 1 Pilot Site Location and Boundaries

Pilot site N1



Koghb Forest District

Plot N 2

1:5,000



Koghb Forest District

Plot N 3

1:3,000



Pilot Site N2

Spitak Forest District

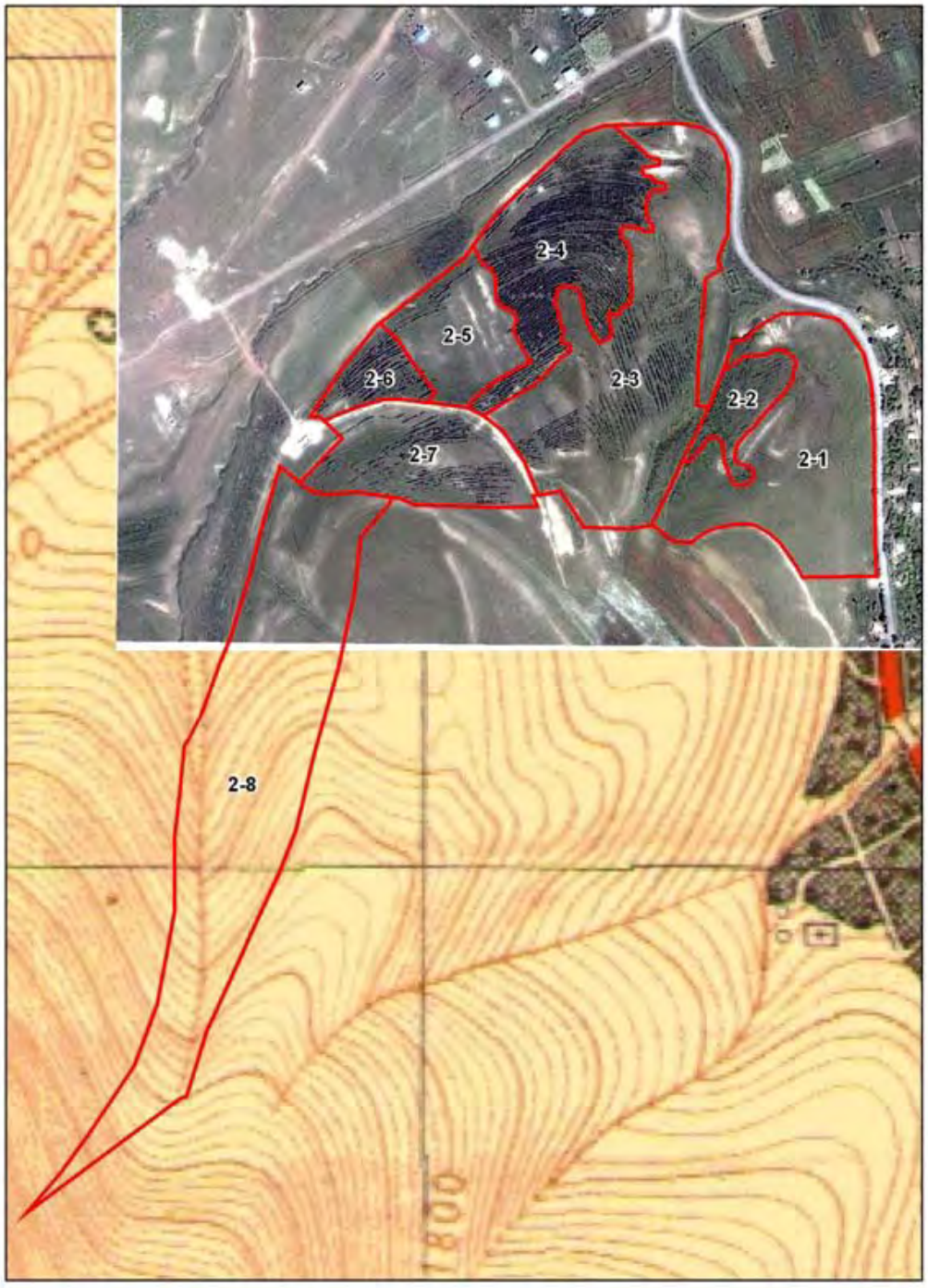
Plot N 1 **1:5,000**



Spitak Forest District

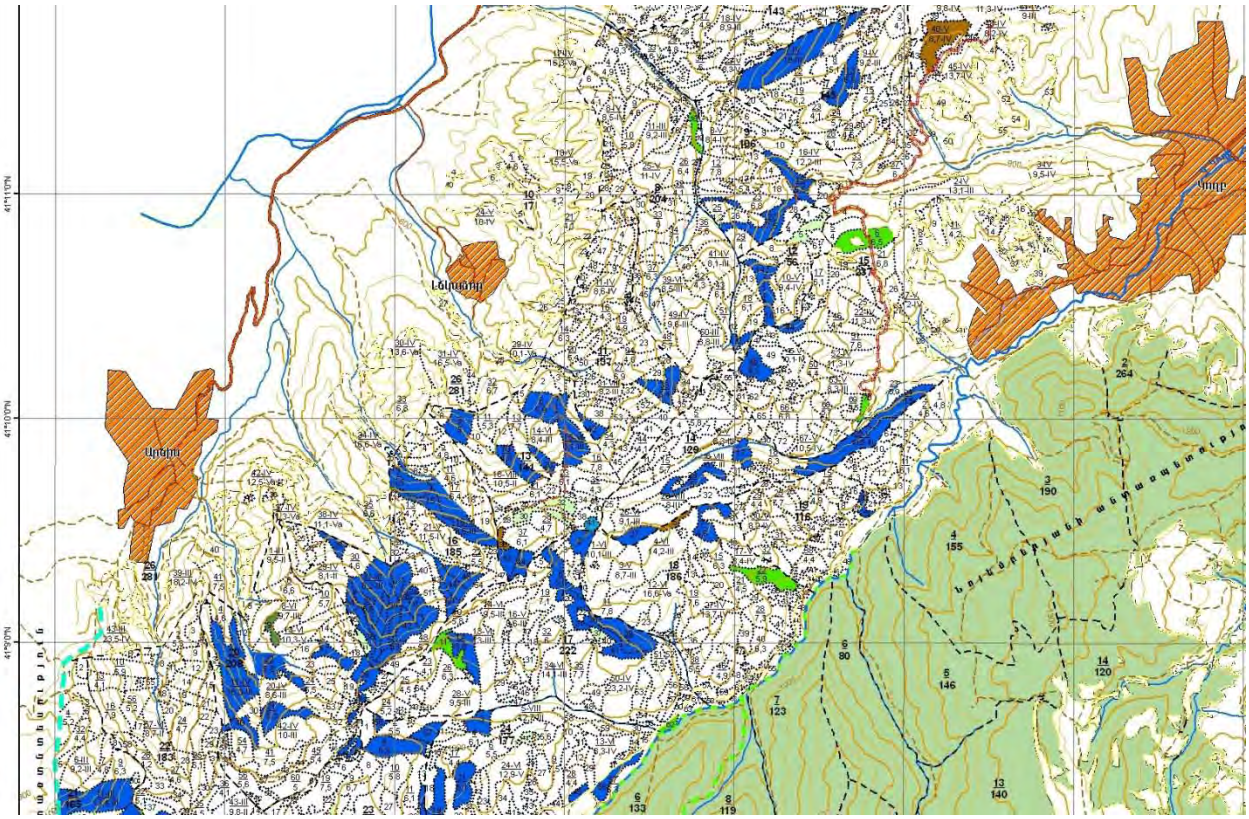
Plot N 2

1:6,000

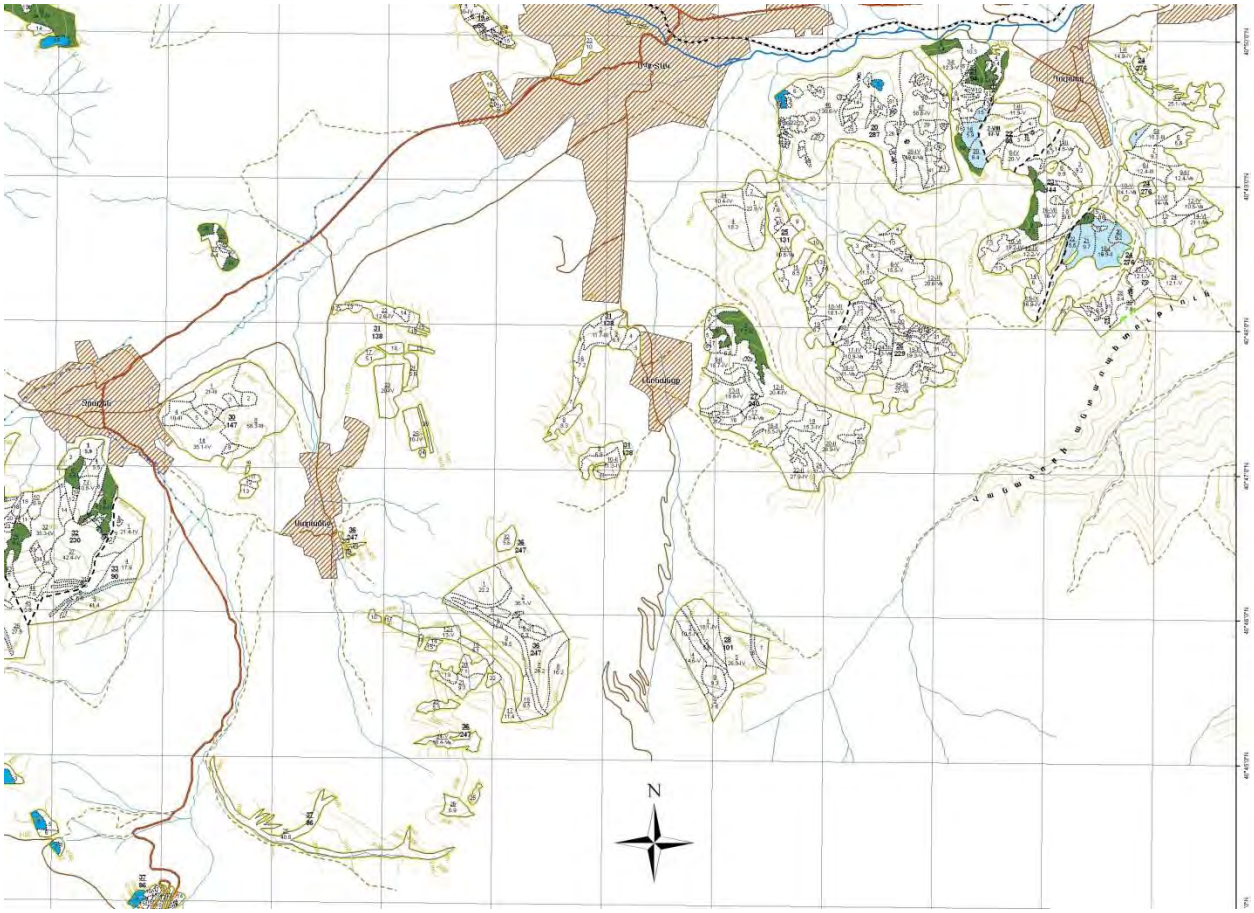


Annex 2 Division of Pilot Site according to Forest Administrative Units - Map

Site N1

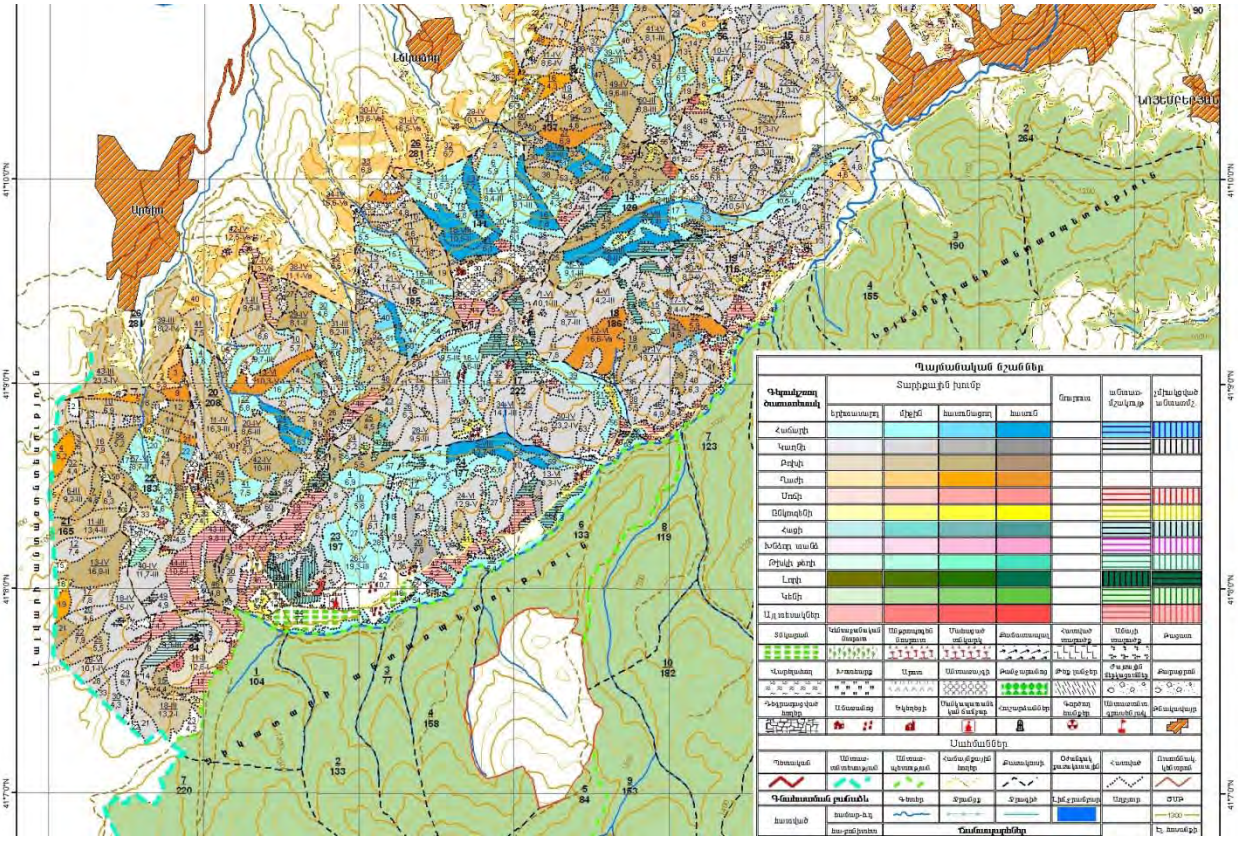


Pilot Site N2

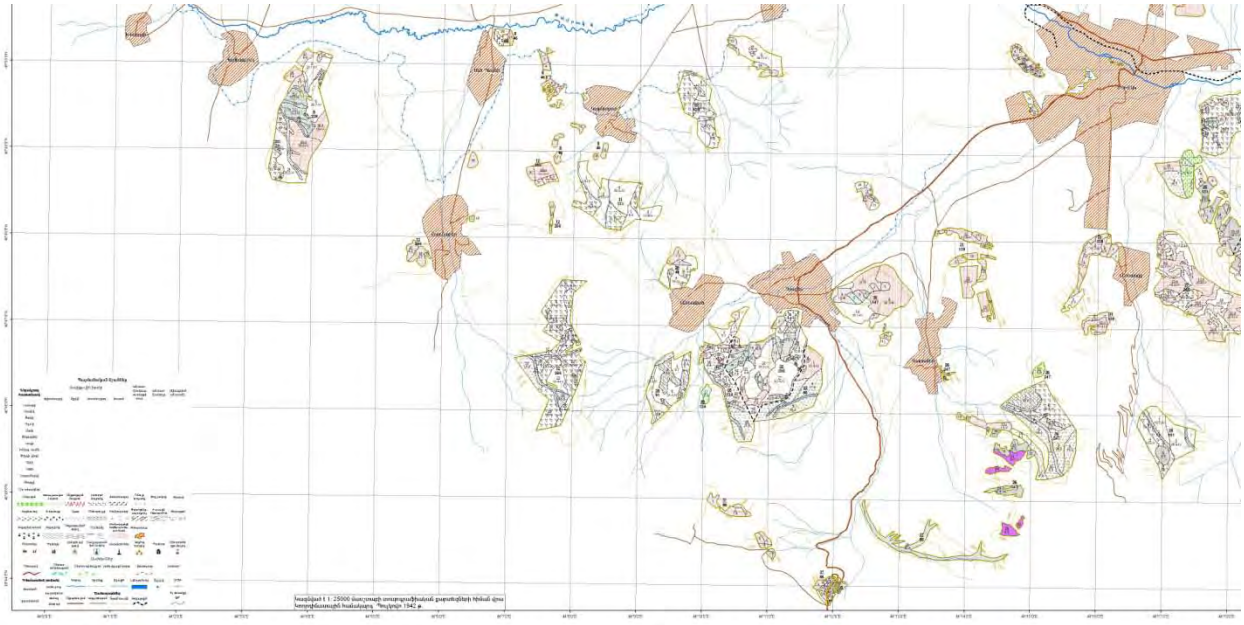


Annex 3 Pilot Site Division by the Areas under Monocultures, Open Space and Natural Vegetation coverage -Map

Pilot Site N1



Pilot Site N2



Annex 4 Existing Tree and Shrub Species Composition

Pilot Site N1

Plot N	Forest Block	Compartment	Stand composition	Forest element
1	23	15	9H1O	O
				H
		16	10P	P
		17	10P	P
		18	glade	P
		19	10P	P
			single trees 8O2H	O
				H
		20	10P	P
		21		P
		22	10P	P
		23		O
			single trees 7O2H1pear	O
				H
				Pear
		24	5O4H1M	O
				H
				M
			Regrowth, 7H3O (10) 0,6m, 3,0 1 000 pieces, unreliable	
			Underforest, hawthorn, dog rose (rare)	
		25	6O3H1Ż+pear	O
				H
				B
		30	7O2H1A	O
				H
				A
		31		
		32	9O1pear	O
				pear
			Underforest, cornelian cherry, hawthorn, dewberry	
		33	9O1pear+H	O
				pear
			Underforest, cornelian cherry, hawthorn, dewberry	
		35	10P	P
		36	10P	P
		37	10ĆŻ	ĆŻ
			Underforest, dog rose	
		39	8O1H1pear	O

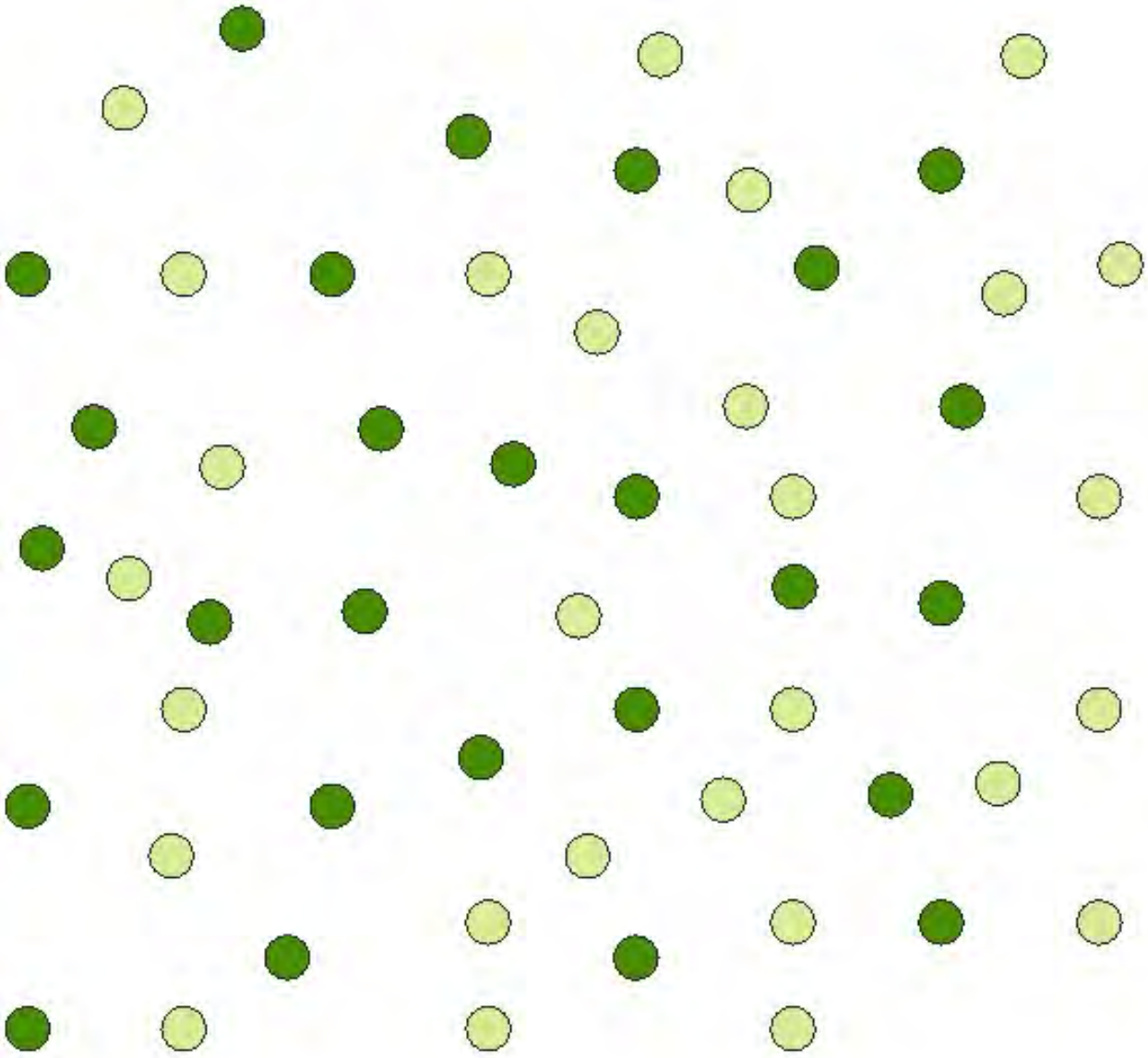
Plot N	Forest Block	Compartment	Stand composition	Forest element
			H	
			pear	
		40	10 sea-buckthorn	sea-buckthorn
			single trees 8O1H1 pear	O
				H
				pear
			Underforest, cornelian cherry, hawthorn, dewberry	
		58	9A1apple+M	A
				apple
		59	8O1H1pear	O
				H
				pear
			Underforest, cornelian cherry, hawthorn, dewberry	
2	13	28	forest orchard	
2	13	36	4O4H1L1M	O
				H
				L
				M
		37	Forest orchard	
		43	10P	
		44	10P	
3	19	21	Open area	O
		22	10P	P
		23	10GW	GW
		24	10P	P

Pilot Site N2

Plot N	Forest Block	Compartment	Stand composition	Forest element
1	31	21	10P	P
		23	10P	P
		25	10P	P
2	31	2	10P	P
		3	10P	P
		4	10P	P
		5		P
		6	10P	P
		7	10P	P

Annex5 Planting and sawing schemes

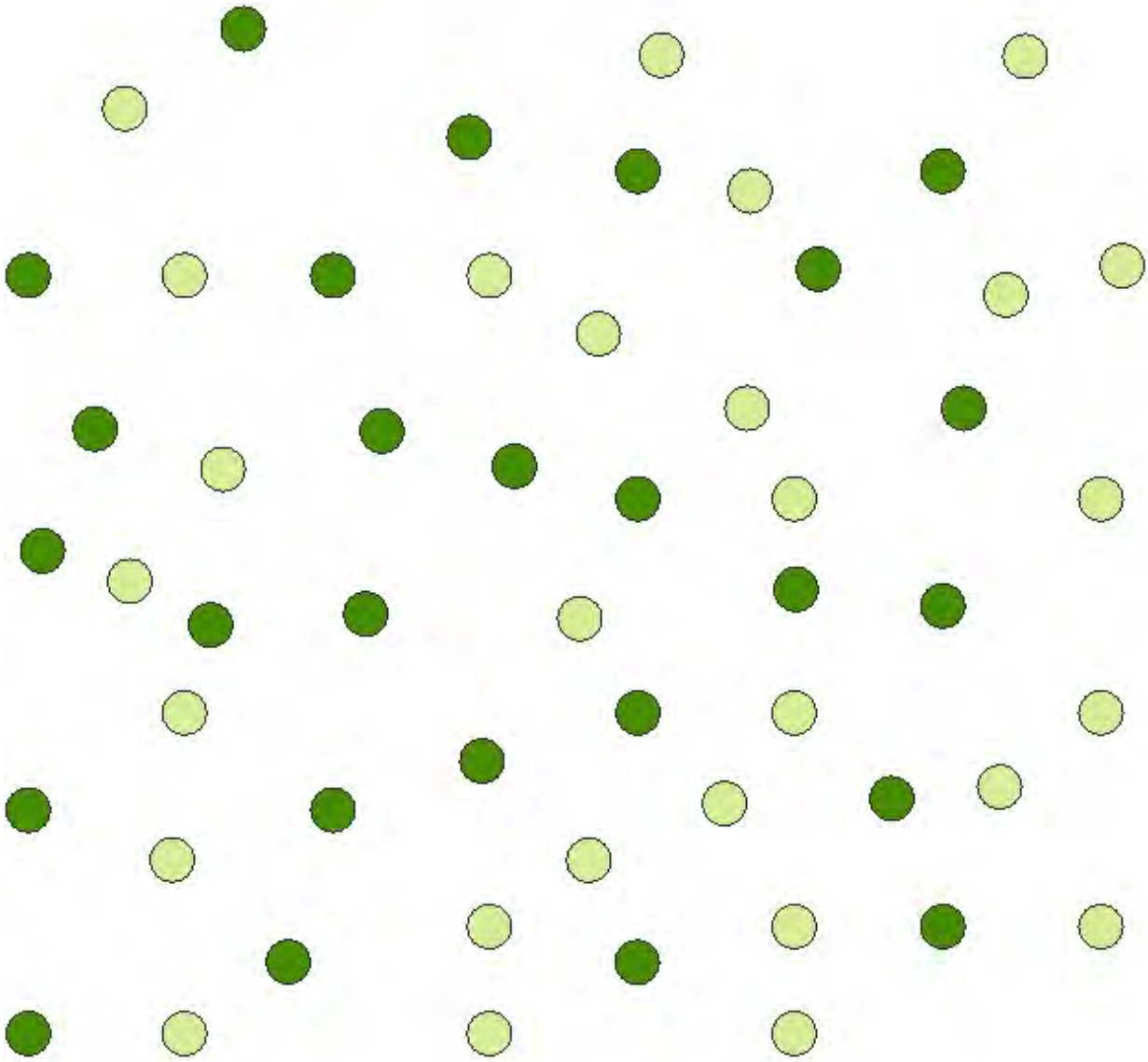
Scheme N 1



Main species – Quercus iberica stev.

Accompanying species – Fraxinus excelsior L
Malus orientalis Uglitzkich

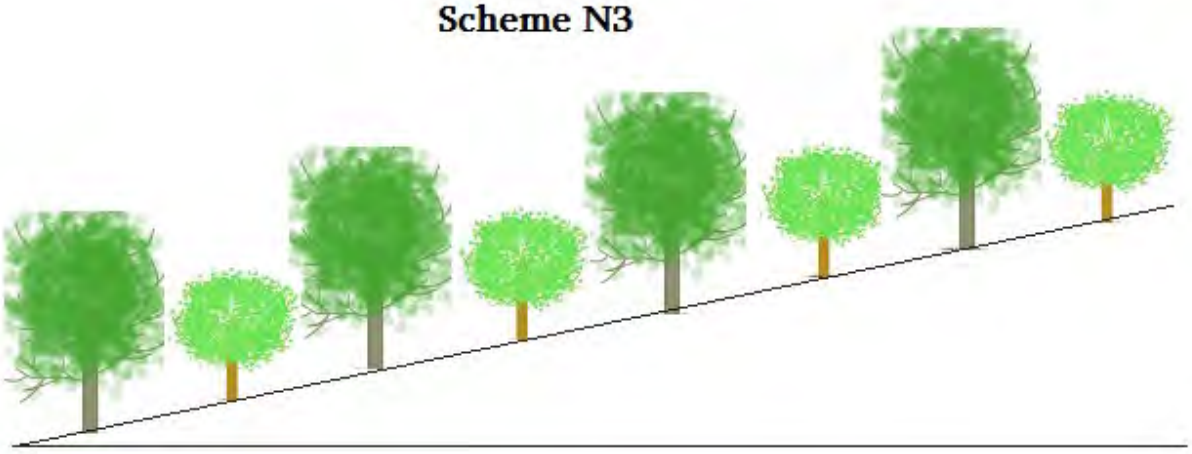
Scheme N2

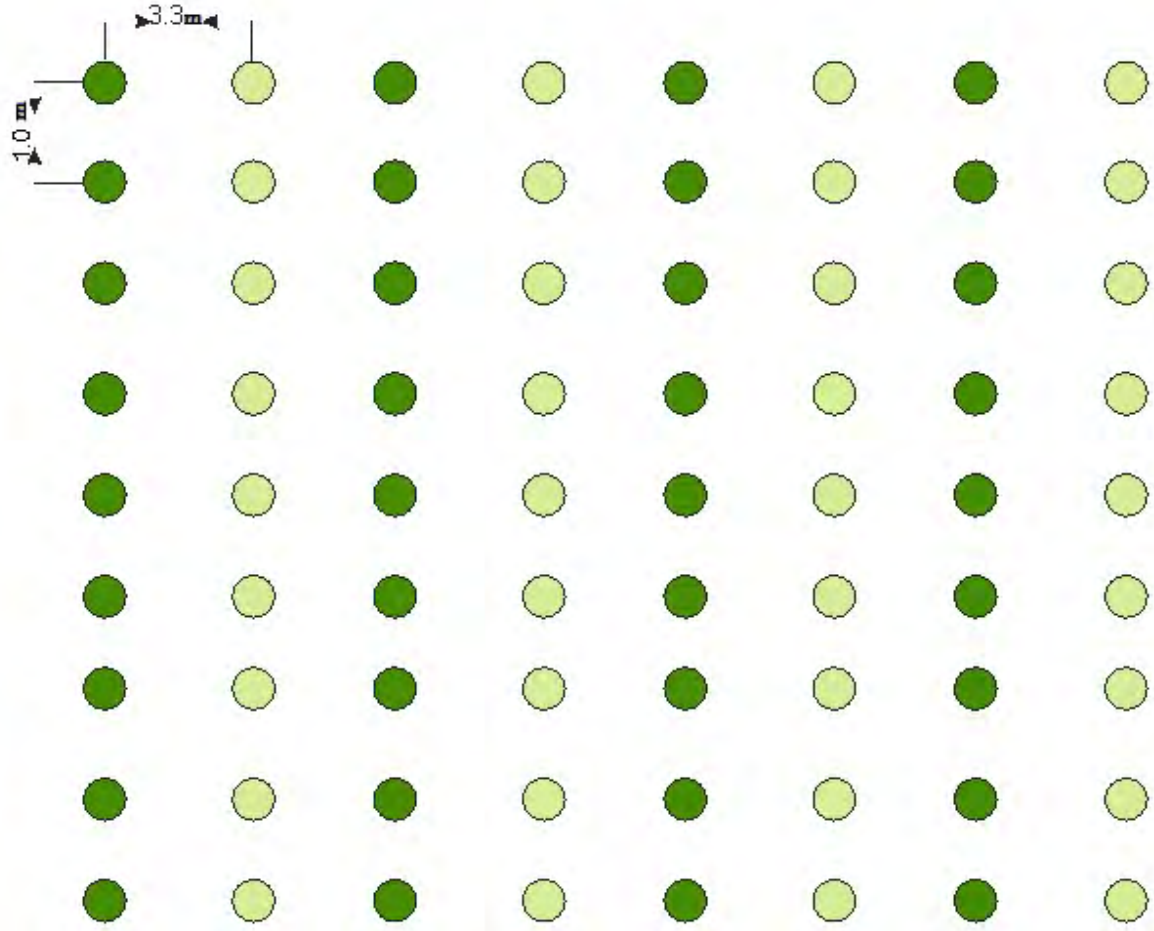


Main species- Quercus iberica stev.

Accompanying species- Fraxinus excelsior L
Acer campestre L.

Scheme N3





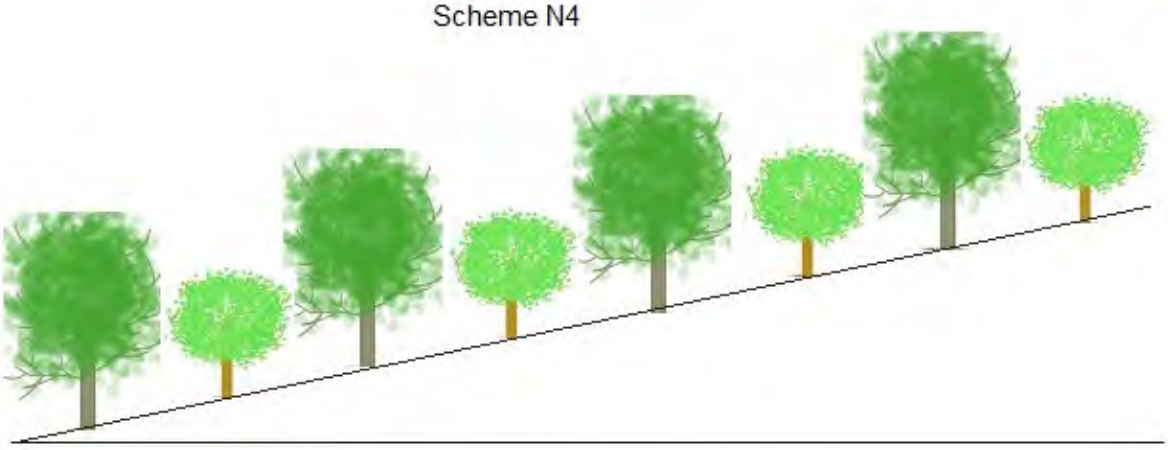
Main species- Quercus macranthera Fishch. et Mey. ex Hohen

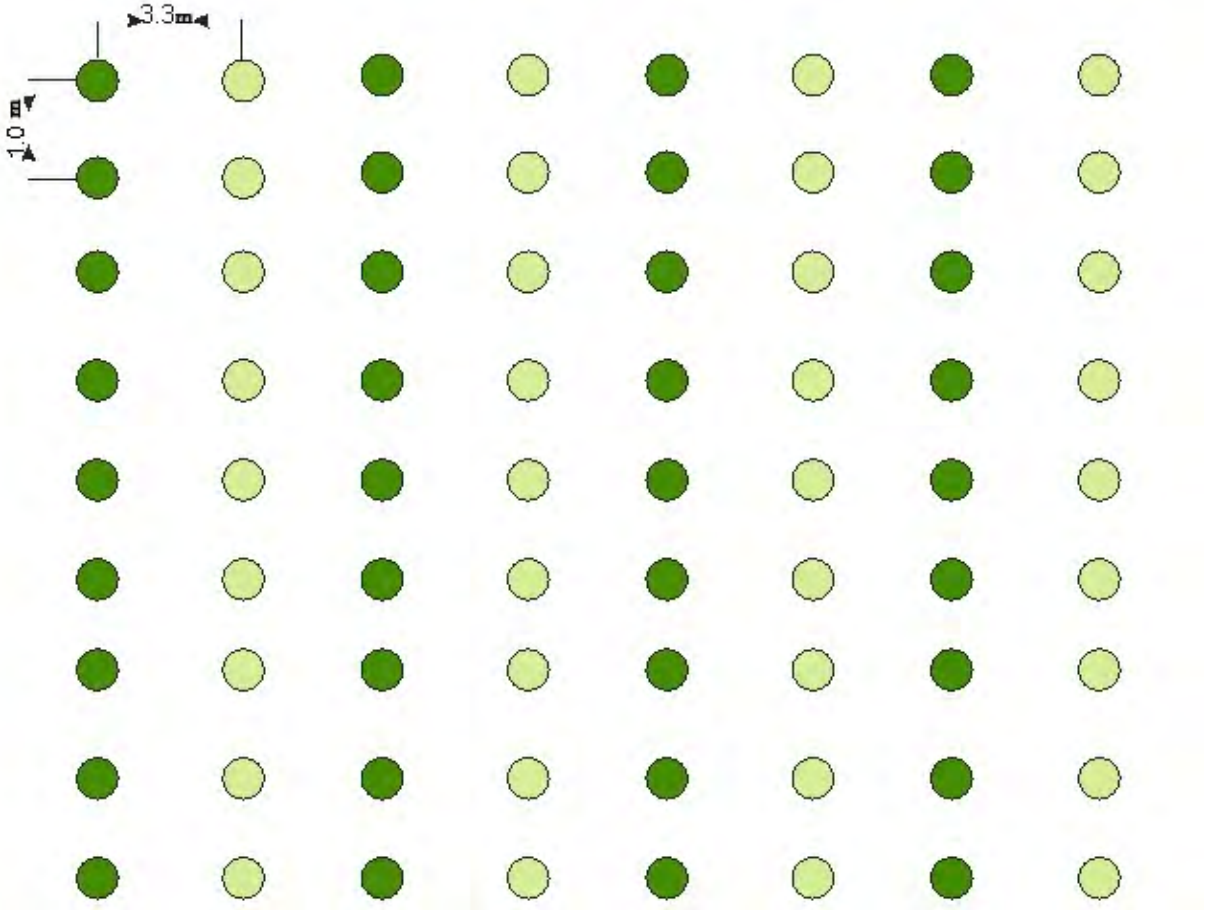
Accompanying species- Acer trautvetteri Medw

Malus orientalis Uglitzkich

Pyrus caucasica Fed.

Scheme N4





Main species

Accompanying species

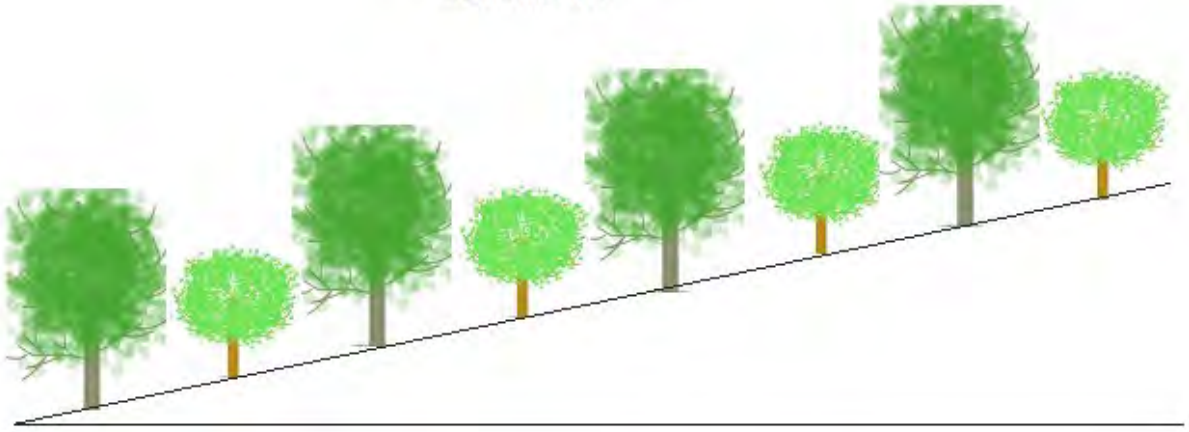
Quercus macranthera Fishch. et Mey. ex Hohen

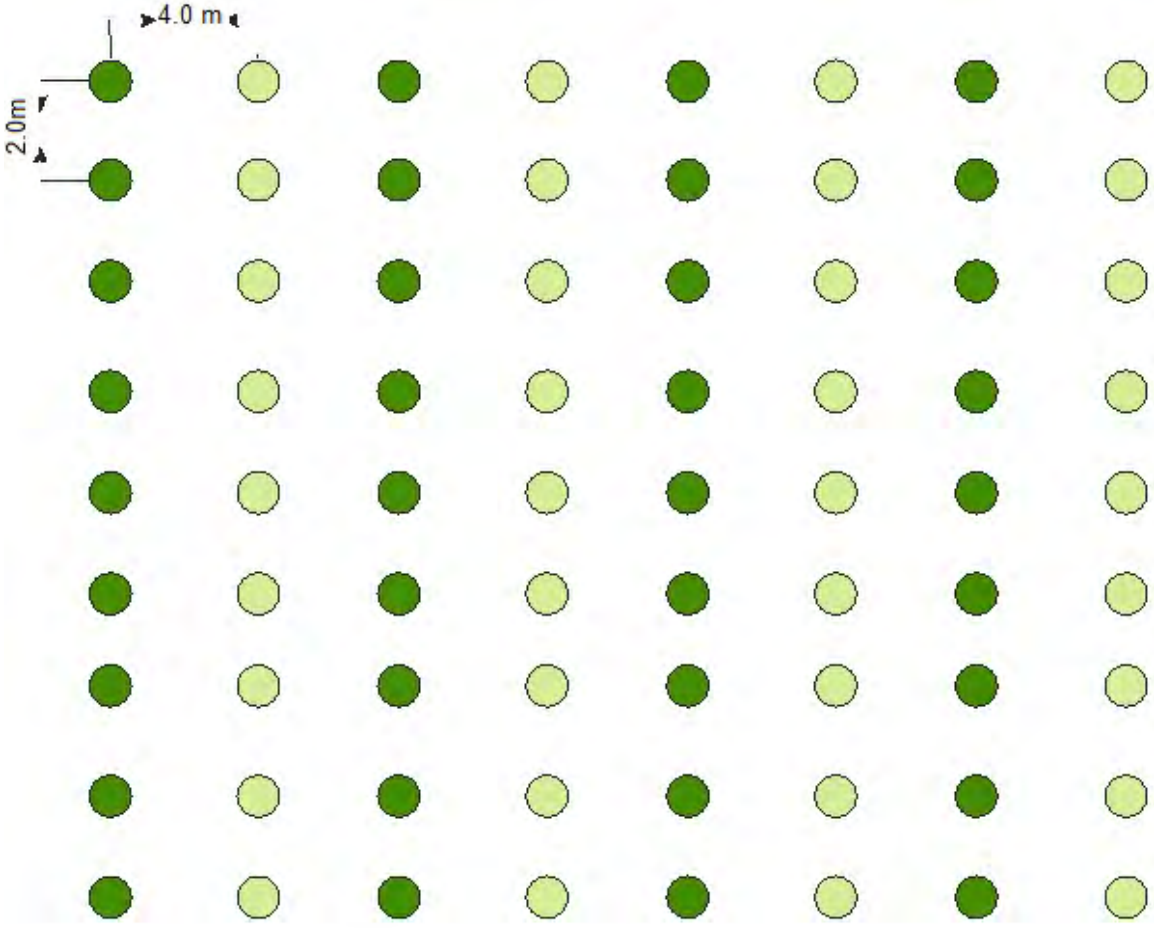
Fraxinus excelsior L

Malus orientalis Uglitzkich

Pyrus caucasica Fed.

Scheme N5





Main species

Accompanying species

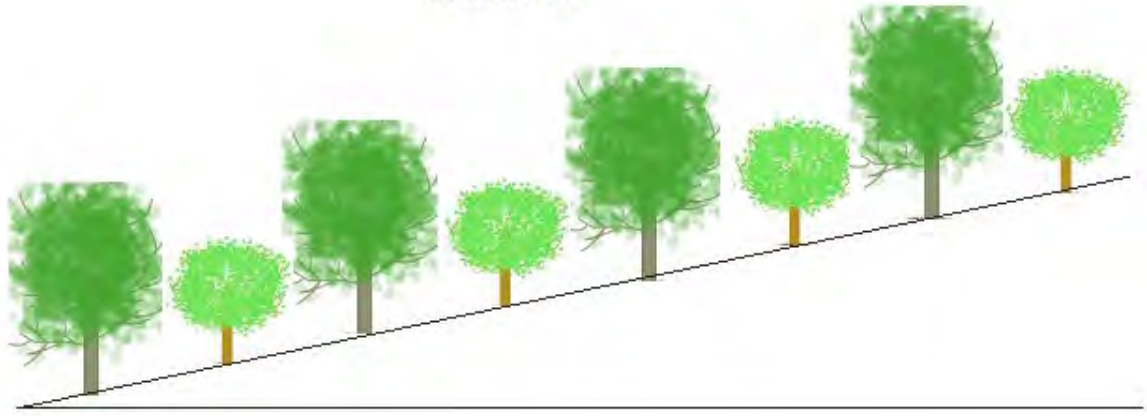
Quercus macranthera Fishch. et Mey. ex Hohen

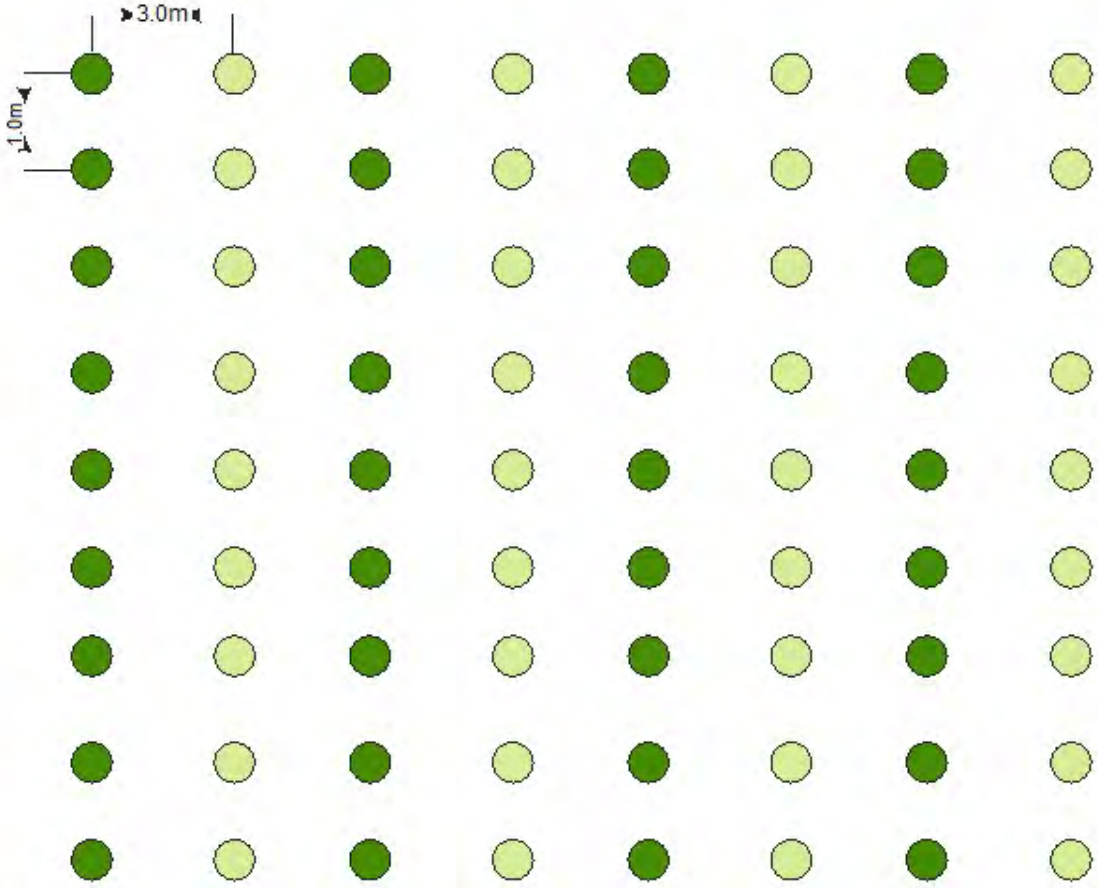
Fraxinus excelsior L

Acer trautvetteri Medw

Ulmus parvifolia Jacq.

Scheme N6





Main species

Accompanying species

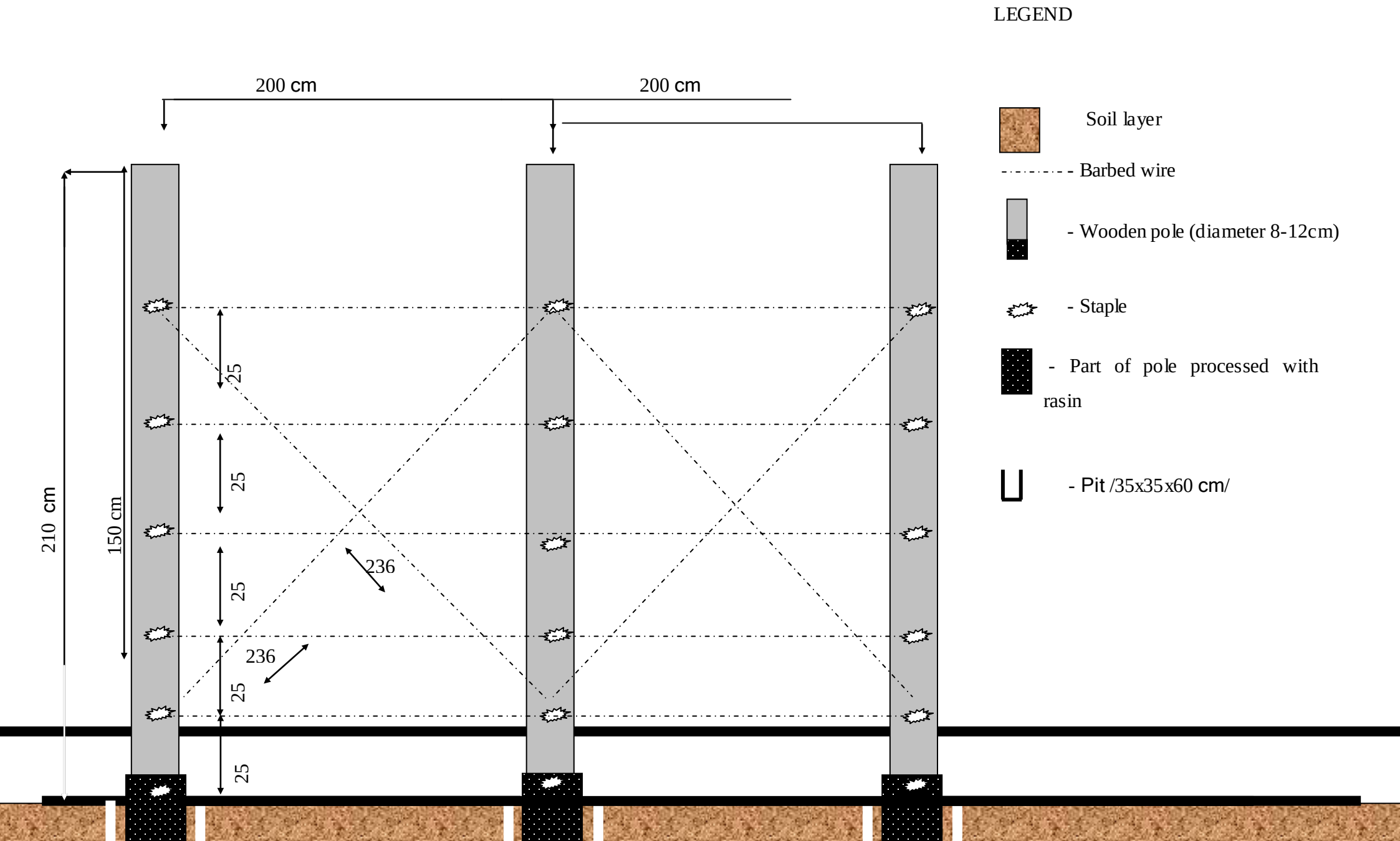
Quercus macranthera Fishch. et Mey. ex Hohen

Fraxinus excelsior L

Acer trautvetteri Medw

Ulmus parvifolia Jacq.

Annex 6 ***Fencing scheme***



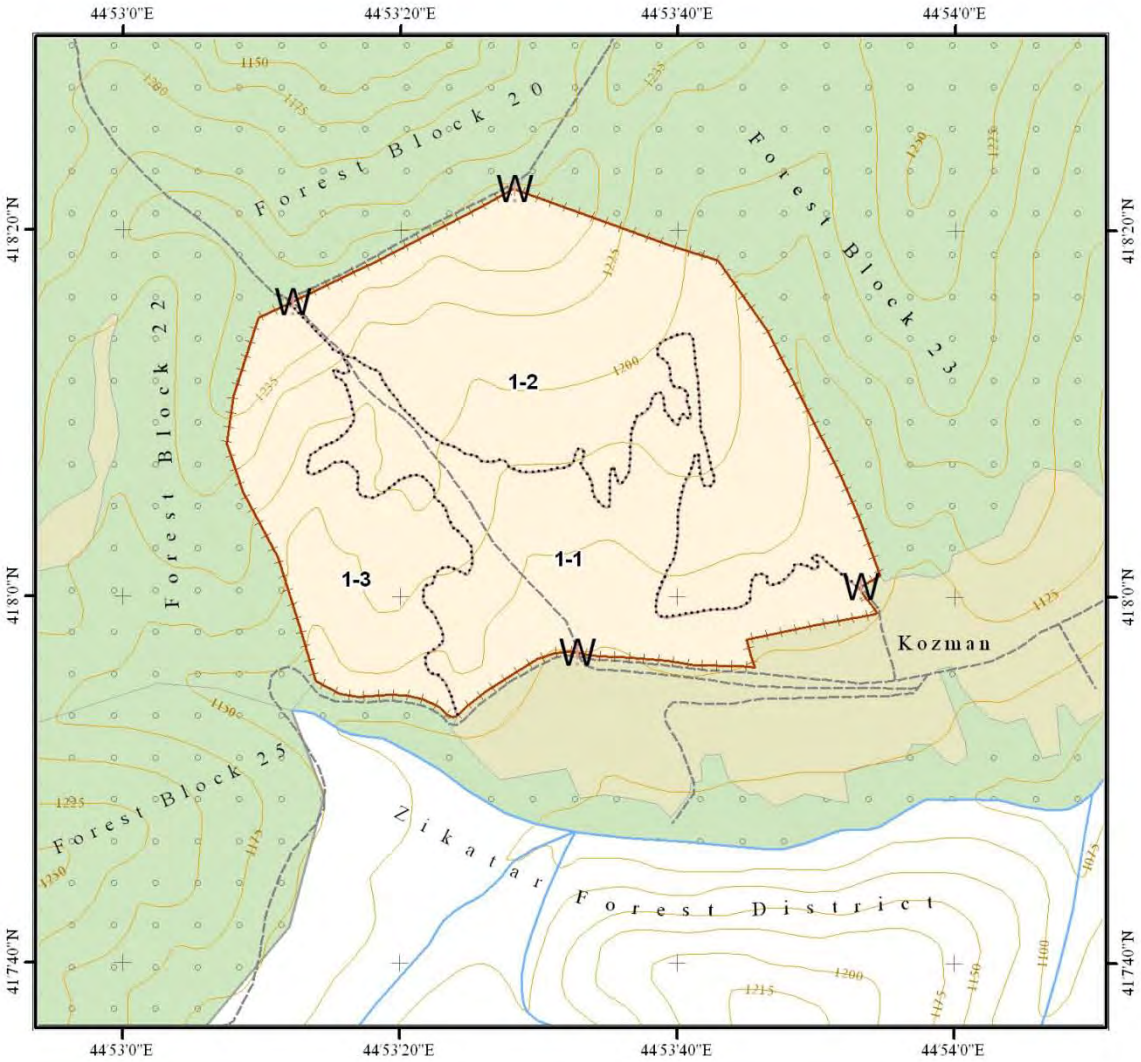
Annex 7 Planting, sowing and fencing areas

Pilot Site N1

RA Ministry of Agriculture
"Hayantar" SNCO
"Noyemberyan Forest Enterprise" Branch
Koghb Forest District

MAP SCHEME OF FOREST TRANSFORMATION
SITE 1

Scale 1:10000



LEGEND

- Forest lands
- Other forest lands
- Esrth road
- Altitude above sea level
- Rivers, streams
- Fencing
- Sub-plots
- W Gates

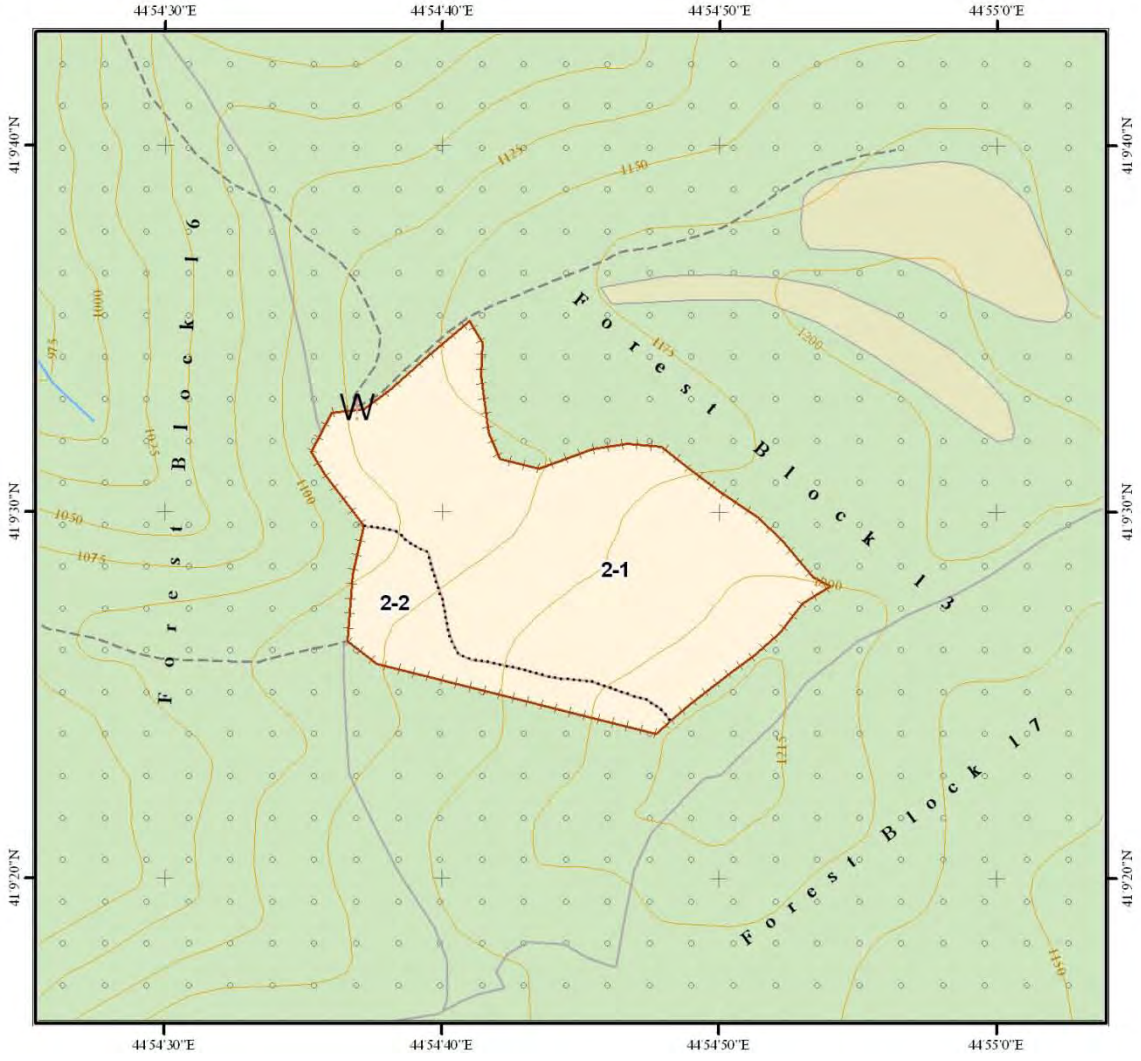
Site N	Sub-plot	Area in ha
Koghb 1	1-1	20.4
	1-2	32.4
	1-3	14.2
Total		*67.0*

RA Ministry of Agriculture
"Hayantar" SNCO
"Noyemberyan Forest Enterprise" Branch
Koghb Forest District

MAP SCHEME OF FOREST TRANSFORMATION

SITE 2

Scale 1:5000



LEGEND

- Forest lands
- Other forest lands
- Esrth road
- Altitude above sea level
- Fencing
- Sub-plots
- W Gates

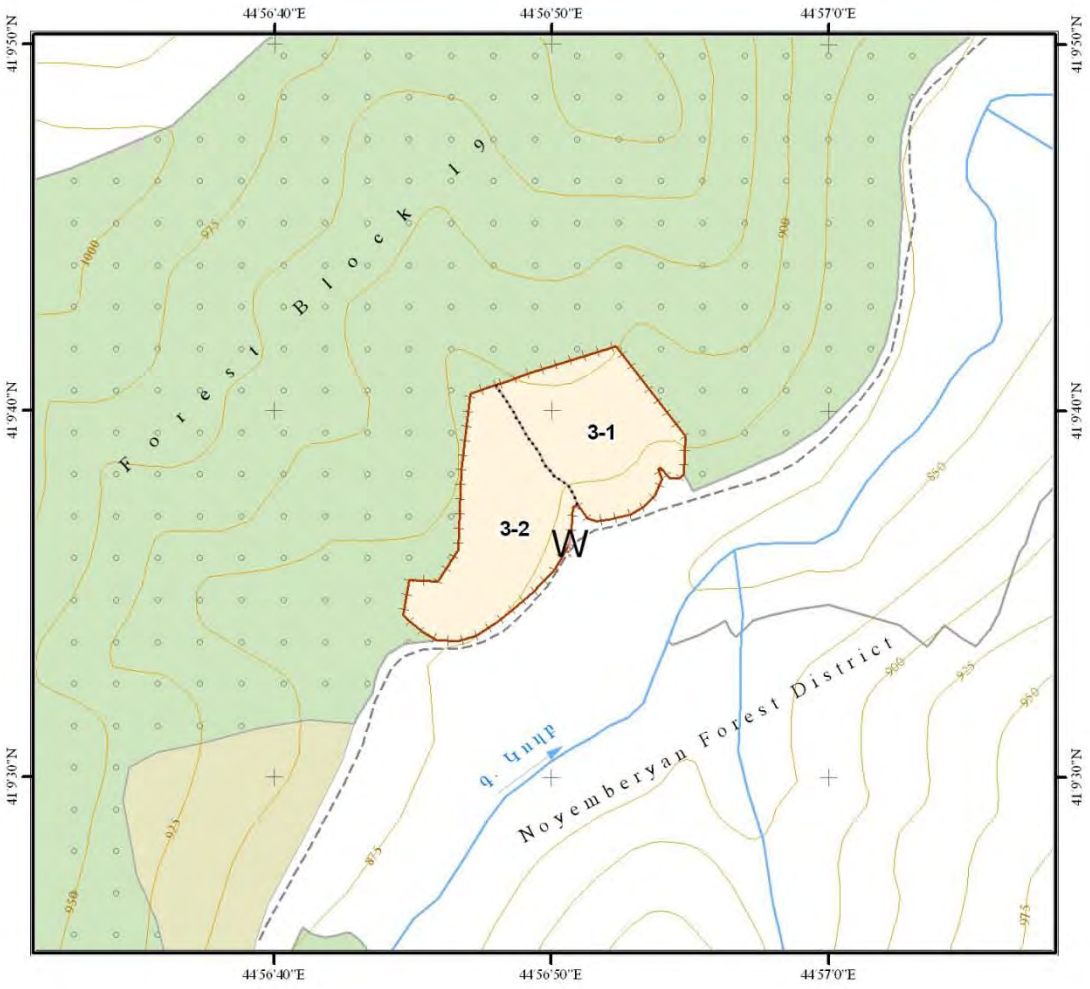
Site N	Sub-plot	Area in ha
Koghb 2	2-1	6.7
	2-2	1.3
Total		*8.0*

RA Ministry of Agriculture
"Hayantar" SNCO
"Noyemberyan Forest Enterprise" Branch
Koghb Forest District

MAP SCHEME OF FOREST TRANSFORMATION

SITE 3

Scale 1:5000



LEGEND

- Forest lands
- Other forest lands
- Esrth road
- Altitude above sea level
- Rivers, streams
- Fencing
- Sub-plots
- W Gates

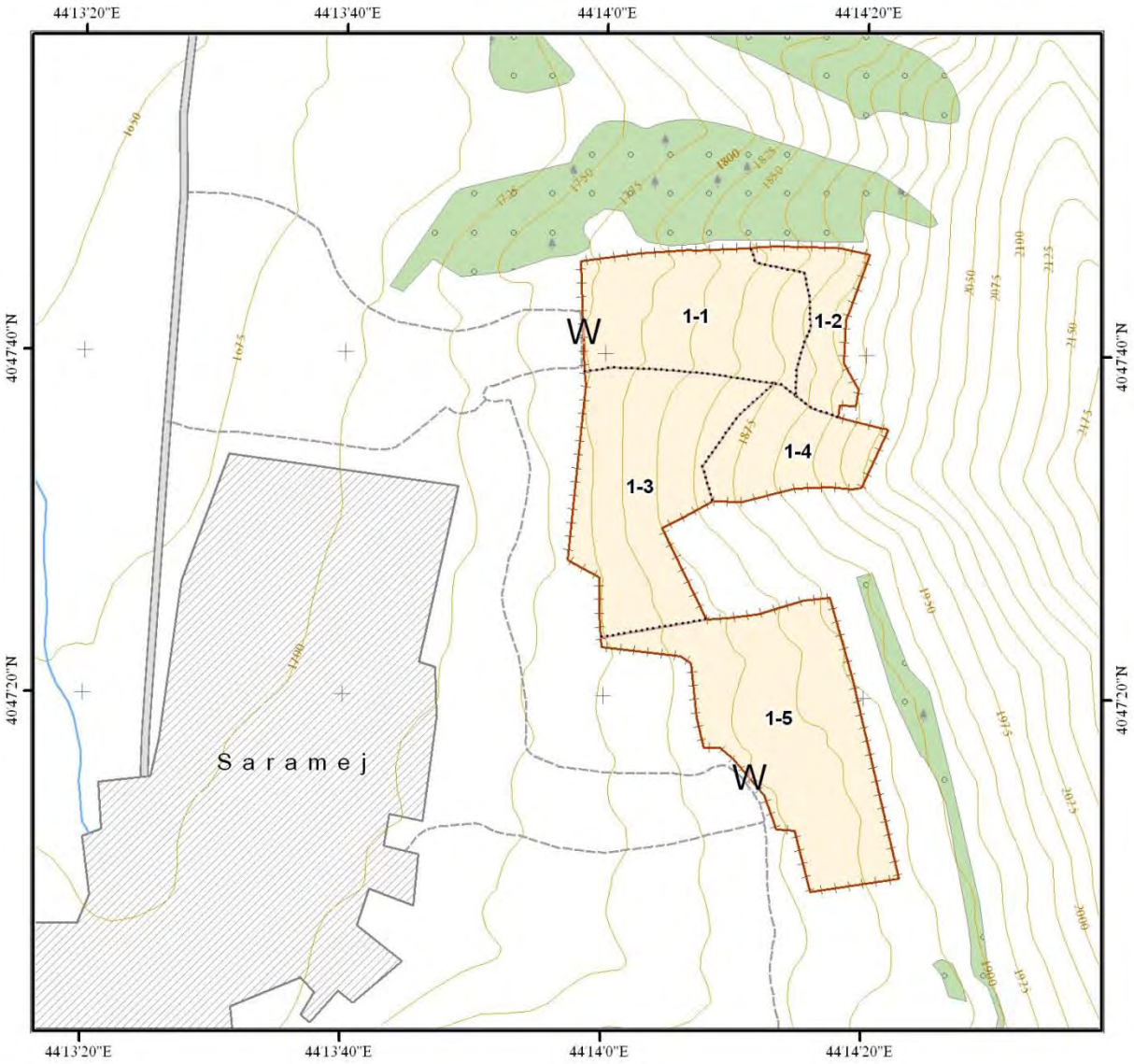
Site N	Sub-plot	Area in ha
Koghb 3	3-1	1.4
	3-2	1.6
Total		3.0

Pilot Site N2

RA Ministry of Agriculture
"Hayantar" SNCO
"Gugarq Forest Enterprise" Branch
Spitak Forest District

MAP SCHEME OF FOREST TRANSFORMATION
SITE 1

Scale 1:10000



LEGEND

Settlement
Road
Asphalt
Esrth road
Altitude above sea level
Rivers, streams
Forest lands
Fencing
Sub-plots
W Gates

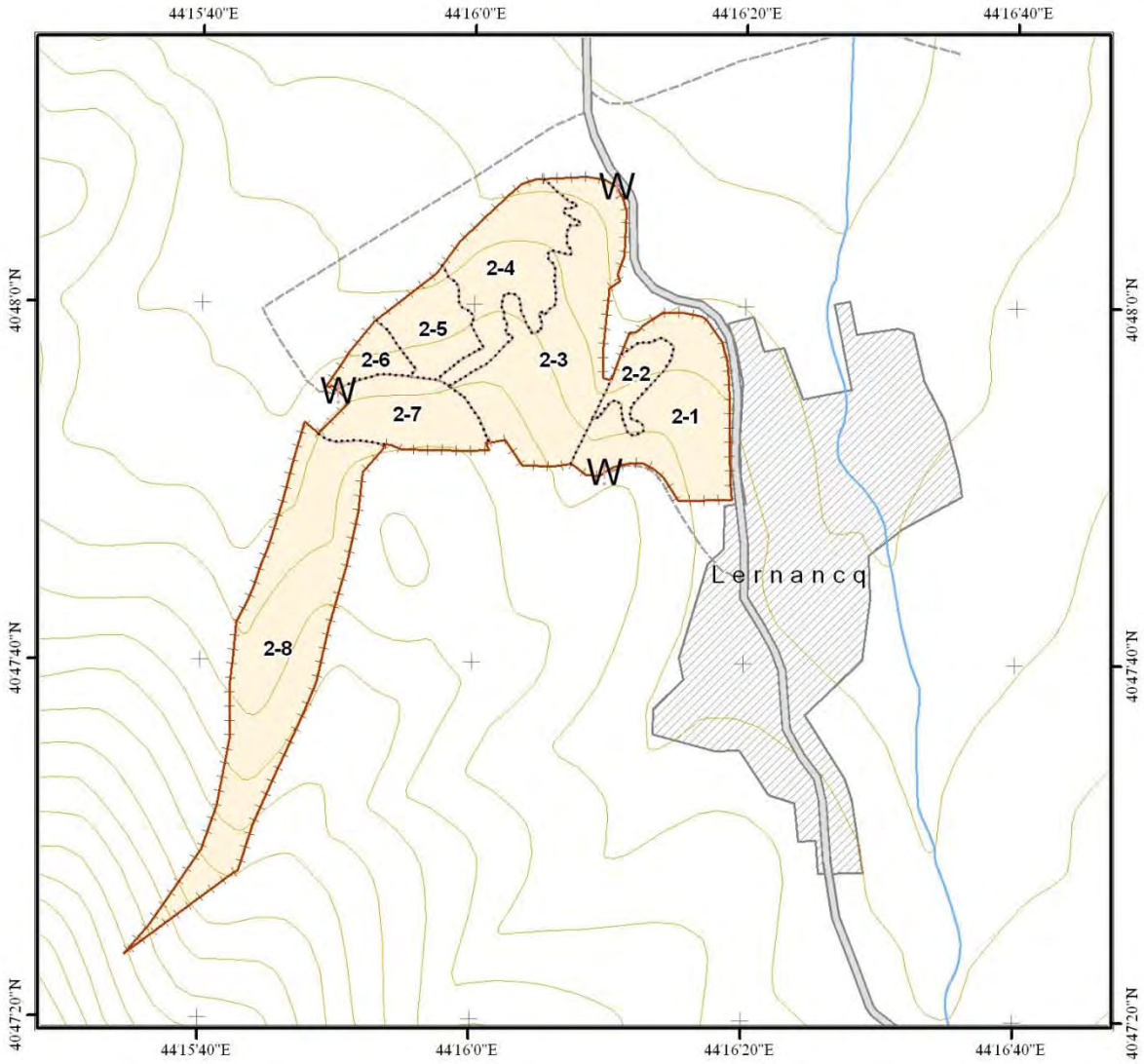
Site N	Sub-plot	Area in ha
Spitak 1	1-1	8.6
	1-2	2.9
	1-3	10.5
	1-4	4.4
	1-5	12.6
Total		*39.0*

RA Ministry of Agriculture
"Hayantar" SNCO
"Gugarq Forest Enterprise" Branch
Spitak Forest District

MAP SCHEME OF FOREST TRANSFORMATION

SITE 2

Scale 1:10000



LEGEND

- Settlement
- **Road**
  - Asphalt
  - Esrth road
  - Altitude above sea level
  - Rivers, streams
- Fencing
- Sub-plots
- W Gates

Site N	Sub-plot	Area in ha
Spitak 2	2-1	5.2
	2-2	1.0
	2-3	7.3
	2-4	4.1
	2-5	1.9
	2-6	0.8
	2-7	2.8
	2-8	9.9
Total		***33.0***

Annex 20. Transformation Plan for the Selected Pilot Forest Sites in Azerbaijan

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

EC THEMATIC PROGRAMME ON ENVIRONMENT AND SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

EuropeAid/128320/C/ACT/Multi External Actions of the European Union No. DCI-ENV/2010/221391

FOREST TRANSFORMATION PLAN

AZERBAIJAN

(2012)

This document is the sole responsibility of the Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation and can in no way be taken to reflect the views of the European Union

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project office in Azerbaijan:
Branch Office of the WWF - World Wide Fund for Nature in the Azerbaijan Republic (WWF Azerbaijan)
M.Mushfag Str., Blok 105, 2K
AZ 1073 Baku
Tel/Fax: + (994 12) 538 5316
office@wwfcaucasus.az
www.panda.org/caucasus

AZERBAIJAN REPUBLİC

FORESTRY DEVELOPMENT DEPARTMENT

MINISTRY OF ECOLOGY AND NATURAL RESOURCES

FOREST TRANSFORMATION FOR SELECTED PILOT FOREST AREAS IN AZERBAIJAN

(SILVICULTURAL MEASURES)

P L A N



BAKI – 2012

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1. **Introduction**
2. **Chapter 1 Objective and Methodology**
3. **Chapter 2.1. Background information: Plot #1**
4. **Background information: Plot #2**
5. **Chapter 3. Description of natural environment Plot #1**
6. **Chapter 3. Description of natural environment Plot #2**
7. **Chapter 4. Description of environments close to natural forest. Plot #1**
8. **Chapter 4. Description of environments close to natural forest. Plot#2**
9. **Chapter 5. Transformation measures planning for 2012–2013. Plot# 1**
10. **Chapter 5. Transformation measures planning for 2012–2013. Plot# 2**
11. **Chapter 6. Post-transformation measures planning. Plot#1**
12. **Chapter 6. Post-transformation measures planning. Plot#1**
13. **Map extract of Pilot area #1**
14. **Map extract of Pilot area # 2**
15. **Photos of Pilot area # 1**
16. **Photos of Pilot area # 2**

Introduction

Negative impacts of climate change are affecting the people in the South Caucasus, including in Azerbaijan like all over the world and it is expected that consequences of it may be huge in the future.

Some groves arranged through forest planting in the 50-60s of previous century are nowadays partially drained, thinned out and deformed. The reason of such cases is that main and auxiliary species had not been chosen correctly, local forests conditions had not been fully taken into account and preference had been given to introducent species, particularly coniferous trees and mainly monocultures.

All the abovementioned reasons cause gradual drying and thinning out of such groves. Negative impacts of climate change accelerate this process. Therefore, abovementioned artificial forests need to be replaced with more stable, fruitful tracts of forest which are efficient from water and soil protecting point of view and contain local species capable of natural restoration.

Measures provided by this project – replacement of forests established artificially and weakened in 40-50s of previous century, consequently lost resistance to external impacts with new fruitful and stable forest - are new approach in Azerbaijan in relation to forest restoration and transformation issues, as well as in mitigating climate change impacts.

Section I. General Part

Chapter 1. Objective and Methodology

1.1 Objectives

Real purpose of the project is to create new forests, more fruitful, stable against impacts of climate changes instead of homogenous monocultural forests which are artificially created, mitigated nowadays and faced degradation. General purpose consists of strengthening and increase of forest ecosystem aiming at developing biodiversity and local population living means against climate change in the South Caucasus, including in Azerbaijan.

However, main purpose includes measures towards mitigation of climate change impacts, strengthening of biodiversity and forest ecosystem having positive impact upon increase of villagers' living means. Such measures contain protection, increase and development of soil, water supply, tree and non-wood forest products.

1.2. Methodology

During implementation of the project forest restoration measures, both previously taken and planned to be taken, by the forest departments of the pilot plot will be carefully studied and the most positive results of such demands will be used as sample.

In the project area after full exploration of local foresting conditions silvicultural activities will be commenced. Selection of tree and bush species, methods of soil preparation, schemes of mixture and restoration of sort contents for foresting issues will be prepared by considering opinions of local specialists.

Key idea intended by the project – process of replacement of monocultural pine forests with tracts of forests, consisting of local species which are durable against climate change – will be realized by stuffing and applying the newest structural and practical technologies in this sphere.

Chapter 2.1. Background information: Ploot #1

2.1.1 Geographic location and status

Pilot plot N 1 involves totally 76.0 ha land and this sections belongs to Aghsu forester of Shamakhi Forest Protection and Restoration. Shamakhi MM and BM are located on the quarter 34 of Aghsu forester according to foresting documents. The mentioned territory wholly belongs to State Forest Fund and is considered as official territory of the Department of Forest Development of the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan.

Pilot plot № 1 is located on end of southern slope of the Caucasus Mountains, in Langabiz chain.

Pilot plot dimensions: From North to South – 980 m and from East to West - 840 m. Area of site is located on 500-550m above the sea level.

Pilot plot is located 17 km from Shamakhy town, 3 km away Aghsu town.

Plot is mainly located on southern and partly southeast exposition.

Through the middle part of the plot from north to south there is Baku-Aghsu highway.

2.1.2. Existing Planning Documents (forest structure documents for 10 year)

In Shamakhi MM and BM the last forest structure activities were performed in 2005-2006.

In that forest structure organizational plan of economic measures to be performed until 2016 is specified. In this forest structure only protection measures are intended for the area involving pilot plot № 1. No planting or sowing is planned for this plot in that forest structure.

2.1.3 Realization of silvicultural measures within the previous 5 – 10 years.

In the plot specified in the project there has been carried out foresting in 4 ha land and oak sowing activities within the last 10 years. Forest has been laid in the virgin land, from common ash-tree sort, in 3x2 schemes, by hand method. As a result of poor service measures and nonperformance of irrigation activities, growing level is low. Because, average growing of these sowing carried out in 4 plots is 30-35%. In comparison with foresting, forest sowing is more effective. Total average yield in these forest sowings prepared with long poled acorns, in 3x2 scheme, in virgin land and through hole method is 65-70 % which can be considered as good indicator for the plot stated. Nowadays, general condition of ash-tree and oak tree grew from the mentioned plant and sowings is better.

YEVLAKH F.P.R.E.

(Forest Protection and Rehabilitation Enterprise)

Background information (area)

2.2.1. Geographical position and status

Pilot plot No. 2 covers the area in total -0.75 ha and this plot belongs completely to Yevlakh Forest Protection and Rehabilitation Enterprise, named Chirdikhan forestry.

Pilot plot is located in administrative area of Yevlakh region.

According to forest planting of division to regions the center of area of Yevlakh FPRE and Eastern Caucasus circle refer to desert and semi-desert belt. The average height above sea level is 400 m. Forest soils of the enterprise is located Kura-Araz plain covering wide area between Greater and Small Caucasus.

Dimensions of the area from North to South is 650 m , from East to West is 2000 m. The Baku – Ganja road highway crossing the center of Pilot plot from East to West divides this area into two equal parts.

The area is located at 2 km distance from city Yevlakh.

2.2.2 Existing planning documents
(10-year forestry structuring documents)

The last forest structuring works in Yevlakh FP and RE were conducted in 2007– 2008.
The Plan on organization of economic measures at that forest structuring till 2017 has been composed. Only protection measures are envisaged at that forest structuring in the area covering pilot plot No. 2.

None forest planting and/or sowing works are planned at that forest structuring in this area.

2.2.3 Undertaking of measures on silvi-culture during the last 5- 10 years period.

None of silvi-culture measures have been planned for the last 10 (ten) years in the envisaged area.

Chapter 3. Description of natural environment: Plot #1

3.1.1 Description of existing forest

All the plot of pilot №1 is consisting of artificial pine forest which was developed through foresting between 1970-1975. This forest strip in the project plot is partly or wholly dried and is about to be destroyed. In about 60% of the plot condition of pine forest is moderate and satisfactory. Average stoutness of existing pine forests is 0.5 – 0.6, average height is 8 -10 m, in some plots 12 – 14 m, age class II and umbrella is in connected form. In these forests natural restoration occurs only on thin territories and broad-leaved tree species. Mainly, level of natural restoration in long-poled and ash-trees is too low – approximately 150-200 pcs per ha.

Part of the forest, which are thick and not subjected to natural loss, mainly consist of one layer while in the thinned part consists of 2 layers. Here first layer consists of pine, while second layer consists of young oak and a few ash-trees. Subforest layer mainly consists of paliurus and hawthorn sorts. Forest type of the pilot plot № 1 is oak grain and belongs to the group of dry hygritop. In such type of forests banking process is fast, therefore natural restoration is not satisfactory. In the plot with thick pine trees and where umbrellas are closely connected, trees left on the surface as a result of wind and snow and forest mattress of several years are observed. In other thin and fully open fields bush banks are observed. Such facts enable us to believe that there is probability of wildfire especially during droughty. Besides, banking makes natural restoration of forest difficult.

3.1.2. Current land use

Pilot are N – 1 is official territory of Shamakhi MMBM and the enterprise is entitled to use the lands.

Along Baku-Aghsu highway passing the plot of project plot of lands in some areas have been leased to some people for recreation purposes. Nowadays the people are offered catering services. Besides, such lands are not permitted to be otherwise.

Despite the enterprise doesn't allow for pasturing within the territories of pilot plot, the people nearby pasture their cattle in that area without permission. According to the latest forest structural documents with respect to quarter enterprise No:34 of the pilot plot (2005 – 2006) the area was listed among the areas which is subject to anthropogenic impacts.

3.1.3 Hydrography and climate

The nearest river to the project plot is Aghsu river which runs from some km distance through ravine.

There is no river, lake or artificial lake running through the project plot. Only at the early spring months there is a river with a little water running through the valley situated in the east part which soon gets dry and is not usable for irrigation purposes. No hydromeliorative activies have been done in the plot.

Climate data

Month	Temperature (Co)			Precipitation, mm	Snow cover, cm	Relative air humidity	Wind		Note
	Multiyear	Absolute					Direction	Speed m/sec	
		Maximum	Minimum						
January	0.6	16	-16	31	7	75	W	2.0	
February	0.0	17	-14	36	14	74	W	3.0	
March	3.8	25	-12	49	1	72	W	4.0	
April	9.1	30	-5	62	-	67	SW	2.0	
May	15.4	30	1	51	-	59	SW	1.5	
June	19.6	36	5	51	-	49	W	1.0	
July	23.2	36	10	22	-	40	W	2.0	
August	23.2	37	10	19	-	40	W	1.5	
September	17.9	32	2	41	-	52	W	1.5	
October	12.2	26	-4	54	-	70	W	2.0	
November	6.4	24	-10	48	1	73	W	1.5	
December	1.8	19	-15	29	5	75	SW	2.0	
Average annual	11.0	37	-16	493	18	62	W-SW	2.0	

Start and end of vegetation period occur at a time when average daily temperature is +9, 1.

Continuation of annual vegetation period in the plot of project is 210 days. Climate factors having negative impact on trees development include long term dry in the summer, early frost in the spring, late frost in the spring and strong winds.

Generally speaking, such climate is suitable for oak, ash-tree, birch, paliurus, mulberry, pomegranate, apricot. Cherrie, Elaeagnaceae, medlar and Cornel.

3.1.4. Biodiversity

Biodiversity of the territory of pilot plot № 1 is represented by grass, tree and bush species, various sorts of bird, animals and insects which are natural for the zone affected. Such biodiversity mainly involves xerophilous grass, bush and trees. Animal world contains wolf, fox, rabbit, jackal, boar, lizard, snake and so on. There is no information with regard to existence of any plant, animal or bird which are about to be destroyed.

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3.1.5. Relief and soil

Project site consists of foothills part for its relief features. In general, the area consists of uneven area located on different slope degrees, south-eastern, southern and south-western expositions. Slope differs from 4 degrees up to 40 degrees in the pilot plot.

The site surrounded by Pilot plot № 1 consists of grey-brown forest soils. Grey-brown forest soils are spread in foothills zone. They are in transitional stage from brown forest soils to dark chestnut soils. For their mechanical composition, they belong to light clayey soils. The amount of the physical clay reaches 68 %, humus composition is 6 %.

These soils are durable against erosion.

3.1.6. Forest diseases and vermins

There was no registered forest diseases infection on a mass scale during the last 20 years in Shamakhi LL and JVC and concretely in the project site. Such diseases were observed only in separate trees or small grove areas, so there was no need for mass combating measures. Although there were several mass forest pests infection cases during these years. These vermins are usually oak-eater long-moustached insect and non-couple silkworm. Besides, during over-rainy spring months there are infection cases of green oak leaf-wrapper worms here and in surrounding

forests. In all the vermin infection cases stated here, mass combating measures, as well as spraying with disinfectant by aviation were taken.

3.1.7. Infrastructure

Baku – Agsu highway passes through all along the territory from the north of the pilot plot to its south. This road is very useful and comfortable for traffic and it allows to go almost all points of the plot and the nearest distance.

Forest strips on the side of the highway passing through the area are very useful for the population recreation service.

At the moment these areas are broadly used for recreation.

3.1.8. Local Communities

Communities near the pilot area consist of Agsu City Municipality and Shamakhi Regional Villages Municipalities on the whole. Population of these villages are mainly occupied with cattle-breeding and agriculture. Population of the city of Agsu is mainly occupied with social services, state work and small enterprise.

In order to reduce negative influence of the population living in surrounding villages on project site and surrounding forest following measures must be taken:

1) Giving natural snow to surrounding villages,
2) Providing population of these villages with alternative work that does not have negative effect or has little negative effect on forests,
3) Involve the same population in work of public catering objects in the project site and its surroundings and at the same time on public grounds, to make them partners interested in forest restoration and protection here,
4) To use local population as labor force in realization of the project, directly in fencing, forest sowing, cultivation and service jobs,
5) To conduct broad enlightening work with ecological problems that this project surrounds as well as in general ecological sphere in surrounding villages.

3.1.6. Forest diseases and pests

For the last 20 years mass infection cases by forest diseases and pests at quarter of pilot plot of Yevlakh FPRE were not detected. Such cases were observed at individual trees and/or small groups forests and were immediately eliminated.

Within frames of conducting of current transformation measures, it is considered to spray seeds with disinfectants to be applied at forest sowing. During transformation measures and after it, for monitoring of forest pests and diseases in the area of pilot area forest pathological observation works will be conducted.

3.1.7. Infrastructure.

In direction from East to West in pilot area, Baku-Ganja road highway passes by dividing this area into 2 equal zones. This road is very beneficial and comfortable for visits and one may state, in all points of area allows covering short distances.

3.1.8. Local communities

The residential point close to pilot area is city Yevlakh. The population of this city is dealing mostly in social service, trade and partially production areas and state works.

This community of the city is not dealing with any economic activity directly negatively impacting forest. Only, individuals in outskirts of the city breeding cattle, endangers area. Moreover during summer months, the part of Baku-Ganja highway, which crosses project area, is occupied by local population trading with vegetables and fruit. And this endangers pollution of forest belt and creating of forest fire

For decreasing of negative impact project area and surrounding forests, local communities must undertake the following measures.

1) Removal of vegetable-fruit booths opened along highway passing project area

2) during realization of project local population may be involved directly at fencing, forest planting sowing and service works,

3) to conduct wide education works for surrounding villages both on ecological problems, covered by this project and generally in ecological area

Chapter 3. Description of natural environment Plot # 2

3.2.1 Description of existing forest

The whole area of pilot plot No. 2 consists on artificial forest belt made of pine trees planted in 1960 – 1965 along the sowing road.

Presently, this forest belt in the project area is dry and barren status partially in some places and completely in other places. Status of indicated pine trees may be considered, as average and satisfactory approximately at 45% of the plot (addition 1, section).

Average density of existing pine trees 0.5 – 0.6 average height is 10-12 m in some places 12 – 14 m, age category II - inoculation is in joined condition. Indicated pine forest consists of 1 species, 1 layered monoculture. 20% of the plot is covered by tamariks bushes in natural form. Natural rehabilitation in the area of pilot plot No.2 is in very poor condition, one may say is none. Natural rehabilitation in the area is presented only by tamariks bushes.

Grass cover of the area is mainly consists of semi-desert steppe specific to bitter wormwood and camel thorn.

3.2.2 Current application of soil

Area covering pilot plot No. 2 is in service area of Yevlakh FPRE and application of these soils is exclusive right of this enterprise. There are no other soil users and/or renters.

Though the enterprise doesn't allow pasturing of cattle in the pilot plot area, nevertheless cattle, belonging to population of surrounding residential point is grazing carelessly. As generally, quarter where pilot plot is located very close to city Yevlakh and other residential points, it is more subjected to anthropogenic impacts. For forest sows to be planted here undertaking of special protection measures is required.

3.2.3 Hydrography and climate

Kura-Araz plain, relating to pilot plot No. 2, is located in central part of the Azerbaijan Republic. Mountainous ridge of Greater and small Caucasus protects the bigger part of plain from cold Northern and hot Western winds.

Indicators of climatic characteristics of meteorological station

Month	Temperature (Co)			Precipitation, mm	Snow cover, cm	Relative air humidity	Wind		Note
	Multi-year	Absolut					Direction	Speed m/sec	
		Maximum	Minimum						
January	1.8	18	-18	14	1-6	76	N-W		
February	3.8	24	-14	11	1-4	74	"-"		
March	7.8	32	-11	11	1-2	71	NW		
April	13.3	33	-2	24	-	67	"-"		
May	19.7	34	4	41	-	63	S-E		
June	26.2	38	7	31	-	61	"-"		
July	27.1	39	11	20	-	54	S-E		
August	26.2	40	14	14	-	57	S-E		
September	21.6	35	3	25	-	68	NW		
October	15.6	32	-2	28	-	70	"-"		
November	9.0	25	-9	31	-	79	"-"		
December	4.3	22	-15	13	1-2	80	NW		
Average annual	14.5	31	9/-5	263	1-4	68	-	3-5	

Beginning and completion of vegetation period coincides during average 24 hours period with +10* above zero.

Duration of annual vegetation period in area covered by the project is 225 days.

Absolute maximum of temperature is + 428, absolute minimum is -18*.

Annual volume of sedimentation ranges within 263-280 mm.

Wind regime of the area is of monsoon nature. The dangerous winds for the area are dry Eastern winds. Such winds increase water evaporation and leads to drying of soil.

Pilot plot is completely located in basin of Kura river. Previously, waters of Kura river were flooding this area. However, in connection with construction of Mingechaur dam, due to change of bed of Kura river water regime is violated in this area and floods do not cover this area. Level of soil waters lowered and presently it is 3.0 – 4.5 m. None of hydro-irrigation measures were conducted in the area. Due to close location of the area of pilot plot to Kura river, it is possible to

apply water of that river for forest sowing. To achieve this, electric power water engines are installed in 2 places.

3.2.4 Biodiversity

Biodiversity of the area covering the pilot plot #2 is represented by different grass cover, tree and bush species, different birds and fauna world and insects specific to this zone. Grass, bushes and trees of xerophylous nature, specific to desert and semi-deserts, corresponding to this biodiversity and mostly to arid zone and relatively severe climatic conditions relates to this area. As the area is very close to city Yevlakh, fauna world of this place is not so abundant. There is no any evidence about any flora, fauna and or birds species under extinction.

3.2.5 Relief ad soil

The relief of pilot area is mostly less sloppy, dale area. Only small elements of micro-relief- former water flows and shallowness of small rivers and small slopes are represented. The following soil types are available in the area:

1. Gray - meadows;
2. Gray –strong meadow;
3. Gray – meadow poorly developed;

As for humidity degree, the whole part of soil consists of dry soils. All soils covered by projects are saline soils.

By mechanical composition 51% of these soils are sufficiently clayey and balance is of heavy clayey type.

Chapter 4 Description of natural environment

4.1. Natural vegetation zones of forest

4.2.1. Models of natural forest type

Forests of Yevlakh FPRE are related by grouping of National Commissar Board of Azerbaijan SSR dated 31.07.1945 to the forests of the I group.

According to forest pathological scheme composed by the doctor of biological sciences L.B.Maxatadze and candidate of agricultural sciences İ.D. Popov, Yevlakh FPRE forests are related to the central eastern Trans-Caucasian circle. According to that forest pathological scheme forests of enterprise are divided by following forest types.

1. Different grass cover - Ash-tree, Currant, Poplar
2. Wheat grass cover - Poplar
3. Clay grass cover - Ash-tree, Acacia, Willow
4.Blackberry - Mulberry
5. Dead type cover - Pine

Area covered by project relates to pine forest with dead cover.

4.2.2. Correspondence of tree and bushes types at area of pilot plot # 2

The soil and climatic conditions of located pilot area allows locating here only breeding trees and bushes xerophilous origin, resistant to arid zone and salinity of soil. The most optimal tree and bush type specific for this area are oleaster, oak common ash-tree, currant, pomegranate, black thorn and tamariks.

Sowing envisaged for open areas of pilot plot #2 will be conducted according to snow mixing scheme of 10 İ ,7 P3G, 5P5G, 5P5, in location schemes 3x1 and 3x2 m.

Forest sowing will be conducted in mixing schemes 10P, 6P4G.

Chapter 4. Description of environments close to natural forest. Plot #1

4.1. Natural forest vegetation zones

4.1.1. Models of natural forest types

The area where Pilot plot № 1 is situated belongs to medium uplands and down uplands plant zones.

The forests of Shamakhi LLJVC that include Pilot plot № 1 are situated in the bottom of southern slopes of Great Caucasus Mountains. As this forest belt is dry and its climate indicators and soil conditions change vertically from down zone to upwards, its plant cover also changes accordingly.

Atmospheric precipitation, the number of misty days and humidity increase in this zone as the altitude changes. Consequently, important changes happen in species content of the forest. Depending on height above sea level and exposition of the mountain hangs, notwithstanding natural forest cover is different for its content, mainly broad-leaved mountain forests outnumber here.

According to the forest belt regionalization the territory of Shamakhi LLJVC belongs to southern-east of the slopes of Great Caucasus Mountains of Eastern Zagatasia.

Forest areas of the company are divided into different forest types. The territory of the Pilot area № 1 of the project belongs to the grain-covered oak forests type. Such type forest land belongs to dry hydrotop group.

4.1.2. Conformity of tree and bush types in the territories of Pilot plot # 1

Because of hard climate indicators, little amount of rain and its irregular distribution during a year, low fertility indicators of the soil and because the area is mainly located in hard south-sloping south, during forest sowing and sowing here trees and bush species having close features with xerophyte and partly xerophytes plants and which will quickly conform to local circumstances should be preferred.

Concretely for the pilot plot № 1, on the open areas it's expedient to plant forest by 3x3 m and 3x2 m accommodation scheme and taking a main species long-stalked oak 5O5A, 7O2A1B, 6O4E, 6O3E1B, 5O4A1B, 5O5A mixing schemes.

At the same time there should be forest sowing with 10 O, 7 O 2 B 1E species content and by 3x1 m and 3x2 m accommodation scheme with sowing on open and hard sloping hangs. The

same species content should be used in underforest sowing and cultivation. In underforest restoration measures the accommodation scheme is changed according to the density of the trees remained unharmed. In all cases during the sowing and sowing process the species of local oak should be preferred as a main species and simple ash-tree should be preferred as an auxiliary species. Because both the oak and the ash-tree species outnumbers with elm during the restoration here and this guarantees successfulness and longevity of the artificial forests planted of them.

In forest restoration measures hawthorn, wild pomegranate, Christ's-thorn, medlar and cornel may be used for the formation of bottom layer.

S e c t i o n II. S p e c i a l P a r t

Chapter 5. Planning special transformation steps for 2012-2013 years

5.1. Transformation measures for Plot #1

5.1.1. Distinction of Transformation measures

Forest transformation at pilot plot № 1 shall be carried out by implementing forest planting and forest sowing steps. Therefore, open areas where forest planting, forest sowing intended to be carried out, areas where forest planting and forest sowing intended to be carried out complex, sparse where forest sowing intended to be carried out, as well as areas where natural restoration intended to be carried out should be defined at pilot plot № 1.

Forest planting and forest sowing Project suiting for all kind of area shall be prepared. All forest reconstruction works shall be carried out on this Project.

Forest transformation steps at pilot plot № 1 should be carried out in accordance with the below mentioned capacity.

1) Forest sowing at open area - 28.0 ha
2) forest planting at open area – 15.0 ha
3) Under forest sowing – 22.0 ha
4) Assistance to natural forest reconstruction - 11.0 ha

All forest reconstruction steps shall be carried out under the supervision of local specialists and participation of communities of surroundings dwelling units on the Agreement.

5.1.2 Selection of tree and bush species for sowing and planting and standard steps at pilot plot #1

Tree types shall be used during forest sowing are different species of long stem oak, oak, common ash-tree, hornbeam and birch trees. At the same time, for the formation of lower layer hawthorn, medlar, cornel tree, jerusalem thorn tree ant etc. shall be used.

All used planting materials must be suitable to forest conditions and shall be taken from the nearest sapling area.

All planting materials shall be corresponding to standards – one or two years-old, completely healthy and without any damages. Types of seeds of above mentioned trees and bushes intended to be used in the area shall be provided from nearest areas or forests corresponding to pilot plot № 1.

All provided seeds shall be undergone laboratory analysis before sowing. All seeds will be sprayed with disinfectant against pests, rodents and diseases. Pre-planting stratification shall be carried out for forest sowing to be qualitative.

5.1.3. Pre-planting land plot preparation and other preparatory works

Pre-planting removal of thorns-and-shrubs and dry waste materials from 50 hectare shall be carried out at pilot plot № 1. All these Works are intended to be carried out hand tools. Differenebt techniques are not intended to be used in preparation of land layer and forest planting. Firstly, thorns-and-shrubs will be cleaned by scythe, axe and other hand tools and gathered by harrow and pitchfork. Under forest dry waste materials, broken trees and etc. will be gathered by hand. Gathered thorns-and-shrubs, trees will be removed from the area by technique and it will provide completely cleaning of the area and avoid forest fires. Cleaning process shall be finished until September 1, 2012.

After the cleaning works preparation process for forest planting and planting will be carried out.

Relief of pilot plot is uneven. Plot preparation for tree planting shall be carried out in accordance with the Schedule mentioned in the Annex -----

Roots of each of the saplings are soaked in manure wash prepared beforehand. Manure is added to the soil of each hole in the amount of ¼. Planted saplings are watered in the following way: 20 l (2 bucket) for one hole.

After irrigation manure and soil mixture is added to the bottom saplings (2-30 sm density). Taking into the consideration that vegetation at plot plot zone begins earlier – in autumn, realization of all planting and planting in spring is expedient. The most optimal time for tree planting in this area is October-November. Trees planted in autumn months have a time for adaptation to soil. In spring planted saplings enter to joining phase and growing process in first vegetation happens.

Until the beginning of summer plants achieve completely stabile root system and stand durable against droughty. Therefore, all works intended will be carried out manually.

5.1.4. Lower layer planting (pine trees planting)

Lower layer planting or under forest planting will be carried out at 25 hectare of plot area. In these areas oak trees and ash-tree saplings will be used. Planting of approximately 700-800 saplings is intended in these areas, because adoption of concrete under forest planting plan is impossible. Under forest planting will be carried out in under pine forests, especially pine terraces, patches, if necessary in sparse areas between those patches.

Under forest planting preparation will be carried out by digging 0.40x, 0.40 x x 0.40 m holes. Saplings intended to be planted are soaked in manure wash prepared beforehand. Before planting 4/1 portion soil taken out of the holes are mixed with manure. After planting each of saplings are watered in the following way: 20 l (2 bucket) for one hole. Rotten manure and dry soil mixture shall be added bottom of planted saplings after irrigation process (2-5 sm density). It will avoid formation of cracks on irrigated soil and water percolation.

5.1.5. Open area planting

Forests planting in open spaces will be carried out at spaces made free from thorns-and-shrubs. In these spaces exists pine trees planted long ago. But new plants will be planted in terraces and empty spaces between terraces. In general, in open spaces planting will be carried out on 3 x 2 m and 3 x 3 m placement schedule in 0.40 x 0.40 x 0.40 m holes dug by hang. Open space planting is cover 25 hectare space. If necessary, small terraces will be made by hand tools. Depending on inclination, terraces width should be differ between 0.70 m - 1.0 m. Soil erosion risk shall be taken ion to the consideration, any activity resulted with weathering or erosion must be avoided.

5.1.6 Sowing

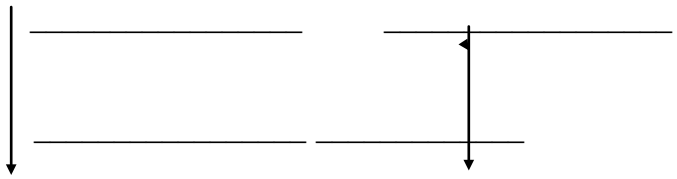
Sowing process will be cover 15.0 hectare space. These spaces will be included firm sloping hill-sides and areas not enough convenient for planting. Sowing process will be carried out in spaces intending natural reconstruction. Sowing process will be carried out in holes by using oak, birch and ash-tree seeds. Square sowing is impossible because of sloping and erosion. Not depending on types of seeds, sowing process will be carried out using 3x3 m and 3x2 m placing schedules.

5.1.7. Chopping branches and thinning out

One of steps should be carried out in thick pine woods in the pilot space № 1 are chopping down branches and thinning out. Thus, 4-5m trunk of trees is covered with dry branches. Such dry branches form risk of forest fires, thanks to broken, ill trees, falling leaves and dry waste materials. Therefore, such broken, ill trees, falling leaves and dry waste materials should be removed from the wood territory.

5.1.8 Fencing

Fencing of the space will be carried out along the whole territory of pilot space № 1. Fencing process will be carried out by means of iron pipes and thorny wire. Each of iron pipes will be planted with the distance of 2.0 m with the height of 2.0 m. Each of pipes will be dug into 0.40 m holes with concrete mixtures as posts. Depending on inclination thorny wire will be laid from 5 rows up to 8 rows. Thus, thorny wire in areas with less inclination and undergoing animal pressure will be laid 7-8 rows, but in areas undergoing animal pressure less than the first one thorny wire will be laid 5-6 rows. Two pieces of 25 sm armature are welded to iron pipes in the bottom part to provide their durability into the conctere solution. To temper thorny wire on the iron pipe thick, a plate (8-10 sm length) is welded on them.



5.1.9 Implementation of natural reconstruction assistance steps

Implementation of natural reconstruction assistance steps will be covered 8.0 hectare of pilot space №1. Intended space will be made free from thorns-and-shrubs, dry trees, waste materials, upper layer of soil will be cleaned from dry grass causing and soil will be loosen in 8-10 sm depth. Taking into the consideration relief, this process may be carried out in parts, in small or big squares. Tree seeds planting to loosen areas and smoothing of the land by rake is necessary. As there are no trees yielding fruit and suiting for natural reconstruction assistance surrounding, seeds will be brought for planting. In natural reconstruction assistance surrounding

process oak tree, common ash-tree, Jeruselem thorn, wild birch tree, white acacia, Gleditsia triacanthus and other tree seeds will be used.

5.1.10 Irrigation measures

All planted saplings should be immediately irrigated. After planting until the end of bonding of limb of tree Irrigation of these trees from May up to September is necessary. Although there is no natural irrigation mean in the surroundings, water intended for trees irrigation will be transported by water trucks. Intensity of irrigation will be defined out in accordance of air conditions and general condition of saplings. Additional roads will be laid for convenience of irrigation process and easy movement of water trucks to planting areas,.

5.1.11 Other measures

Small garden areas will be laid in pilot plot located near the catering establishments for the purpose to attract local communities and holders of those catering establishment acting nearby the Site to the project implementation. These gardens will be covered with the fruit trees easily adapting to new catering establishments. Pomegranate trees, apricot trees, mulberry trees, cherry trees, medlar trees and sea-buckthorn trees will be planted there. Labor and support of these communities and catering establishment employees in the surroundings will be widely used for garden laying.

5.2.1. Selection of transformation measures

Forest transformation at pilot plot # 2 will be conducted mostly by means of forest planting and sowing. One may state, that natural rehabilitation in the area is very weak, almost is none. That is why forest sowing and natural rehabilitation auxiliary measures will be jointly conducted.

Forest transformation measures in pilot plot #2 will be conducted in following order.

1) forest sowing in open area - 23.0 ha

2) under forest sowing - 22.0 ha

3)Forest sowing and natural rehabilitation auxiliary measures - 30.0 ha

All forest rehabilitation measures to be conducted in this area will be realized by management of local specialists and wide involvement of communities of surrounding residential points.

5.1.2. Selection of tree and bush species for planting and seed sowing at pilot plot No. 2 and selection of standard requirements for this

The priority at forest planting sowing is mostly given to the following species: long leafed oak, common ash-tree, elm-tree, wild pomegranate. Density of forest planting is considered by size of 3x2 m and 3x3 m. It will be conducted with forest areas by scheme of 3x1 m. Under forest planting will be conducted mostly in average by 500 units per hectare.

Planting and sowing materials will be taken from different facilities, which are corresponding to initial local forest planting condition.

Standard condition of all sowing materials are 1-2 year old, not exceeding this age, sound condition, root part and branch must be undamaged.

Seeds applied in forest condition at pilot plot will also be primarily prepared, in local enterprise, seeds which are not available will be brought from different facilities, close to local condition.

Seeds to be applied will be sown after corresponding laboratory analysis.

All seeds will be treated with disinfectants against pests, diseases and rodents.

5.1.3. Preparation of soil and other preventive works before sowing

Totally 40.0 ha of area at pilot plot #2 will be cleaned from thorns-and-shrubs and dry waste. Cleaning works will be conducted manually. Grass grown in the plot, thistle, thorns-and-shrubs will be cut collected and transported by traffic vehicles. Thorns-and-shrubs in the plot create danger of great fire.

Cleaning works from thorn-and-shrubs at plot will be completed till 15 August 2012 and then works on preparation of soil will start.

Plough works in the area with 38.0 ha will be conducted by means of tractor. With purpose of having higher quality plough, the works will be conducted 2 times. Lines will be again opened by tractor for tree sowing in prepared plough. Wells, corresponding to envisaged schemes and sizes will be dug by hand tools in open lines.

For tree planting and sowing, locating and mixing schemes will be indicated in table No.1.1.

As it is indicated in pilot plot # 1 vegetation starts here very early either. That is why it is considered to conduct works on tree planting and seeds sowing during autumn months, with aim planting and sowing will adapt to this before arid summer starts.

5.1.4. Under forest planting

Under forest planting in pilot plot is envisaged to be at 22 ha area. Under forest planting will be mostly conducted by means of seeds of oak and big species.

Different density and abundance of pine trees at under forest planting, doesn't allow applying specific planting scheme. That is why at under forest planting, 500 pieces in average per 1 hectare are envisaged to be planted.

For soils 500 pieces under forest planting wells with size of 0.30 x 0.10 x 0.10 m will be dug.

Seeds to be sown will be separately soaked preliminarily before planting in manure mixed solution. Additionally to planting manure up to 4/1 of soil from each pit is added. 20 liters (2 pails) of water is applied to young plants after planting. After watering, mixture of dry manure and dry soil is added to bottom part of young plants. (with thickness of 2-5 cm). Planted seeds are to be immediately watered.

5.1.5. Planting in open plots

Planting in open plots will be conducted according to location scheme 3x1 m in preliminarily ploughed and lined soil. Totally, planting by trees in open plot with area of 23 ha is considered.

Pits to be dug for planting of trees will be with size of 0.30 x 0.30 x 0.30 m.

Like in under forest planting, before planting manure will be applied here also to each pit before and after planting, seeds will be soaked in solution of manure with plant balance. Seeds for planting will be immediately ploughed.

5.1.6. Sowing of seeds

It is considered to conduct forest sowing works at 15.0 hectares.

Forest sowing for oak and ash-tree seeds will be conducted mostly in prepared plough and partially in virgin soil with location scheme of 3x1m.

Seed sowing works will also be conducted at places envisaged for natural rehabilitation or auxiliary measures.

5.1.7. Fencing

As the area of pilot plot #2 is divided by Bakı-Ganja highway into 2 parts, fencing works will be conducted separately at 2 plots. Both plots along the whole perimeter are to be fenced. Fencing will be conducted by means of iron pipes and barbed wire, balance operations will be conducted like in pilot plot # 1.

5.1.8. Undertaking of support measures of natural rehabilitation.

Support measures of natural rehabilitation at pilot plot 2 will be undertaken by fencing with aim to restrict entering here of cattle and by partial mineralization of upper part of soil at seed sowing. With aim to support natural rehabilitation, oak and ash-tree seed sowing will be applied here.

5.1.9. Irrigation measures

As it was indicated above, the climate of area of location of pilot plot is very hot and arid, and due to salinity of soil watering works of forest planting and sowing are to be conducted more intensively.

Water of Kura river passing nearby will be applied at irrigation. By this end for directing water from Kura river to the plot, 2 pieces of engines and 2000 m rubber pipe will be used.

5.3. Quantification and price calculation for transformation steps

5.3.1. Calculation of sowing materials required for forest planting in Plot No.1

Table 1.3.

Type of planting	Area (ha)	Mixing schemes	Placement schemes	Quantity of planting stock (trees)				Total
				Oak	Ash tree	Birch	Elm tree	
Under forest planting	11.0	6O2A2E	1000/ ha	6600	2200	-	2200	11000
	11.0	6O1A2E 1B	1000/ ha	5500	2200	1100	2200	11000
Open area planting	14.0	6O3A1B	3x2	13860	6930	2310	-	23100
	14.0	6O1A3E	3x2	13860	2310	-	6930	23100
Total		-	-	39820	13640	3410	11330	68200

5.3.2. Planting stock required for gardening at the Plot #1.

Table 1.4.

Tree species	Planting scheme	Area	Quantity	Note
Cherry	4x4	0.40	250	
Apricot	4x4	0.40	250	
Pomegranate	3x3	0.40	440	
Cornel	3x4	0.40	330	
Medlar	3x3	0.40	440	
Total		2.00	1710	

5.3.3. Seeding stock required for forest sowing at the Plot #1

Table 1. 5.

Mixing schemes for forest sowing	Placement scheme	Area	Quantity of seeding stock by species (kg)			
			Oak	Ash tree	Birch	Total
7 O 2A 1B	**2x1**	**5.0**	**260.0**	**1.00**	**1.50**	**-**
6O 4A	**3x1**	**5.0**	**150.0**	**1.50**	**-**	**-**
10 O	**2x1**	**5.0**	**375.0**	**-**		
Total		**15.0**	**785.0**	**2.50**	**1.50**	**789.0**

5.3.4. Materials required for fencing of the Plot

(Total length of a fence is 3501km)

1 Total length of used pipe is 4200m

2. Number of pipe supports is 1750 pc.

3. Barbed wire-21000m

4. Welded armoring for each support (total) 875m

5. Welded rolled wire for each support (total -1050m

6. Concrete solution for digging of support total -6.3m^3 (for each support 3.6 litres)

7. Barbed wire for binding to supports -80 kg

5.3.6. Evaluation of materials and technical facilities required for fencing of Pilot plot #1

Table 1.1.

Name of material	Unit of measure	Quantity	Cost per unit	Amount
Iron tube	m	4200.00	4.00	16800.00
Armature	m	875.00	1.50	1312.50
Katinka	m	1050.00	0.30	315.00
Barbed wire	m	21000.00	0.15	3150.00
Concrete	m^3	6.30	100.00	630.00
Simple wire	kg	80.00	1.50	120.00
Electrode box		5	50.00	250.00
Total	-	-	-	22577.50

Calculation cost of works to be performed for fencing of Pilot area #1

Table 1.2.

#	Name of work	Unit of measure	Scope of work	Daywork	Man/day required	Price for one man/day	Salary (manat)
1	2	3	4	5	6	7	8
1.	Digging of holes	unit	1750	50.0	35.00	15.00	525.00
2.	Welding	unit	1750	40	43.75	20.00	875.00
3.	Concrete casting of	unit	1750	50	35.00	15.00	525.00

	posts						
4.	Barbed wire installation	m	21000	80	262.50	15.00	3937.50
5.	Transportation expenses	-	-	-	-	-	1000.00
	Total:						6862.50

5.3.4. Evaluation of saplings and seeds required for Pilot plot #1

Table 1.6.

Name of planting stock	Unit of measure	Quantity	Price per unit (manat)	Amount (manat)
Oak seed	Kg	785.0	0.40	314.00
Ash tree seed	Kg	2.50	25.0	62.50
Birch seed	Kg	1.50	20.0	30.0
Oak saplings	unit	39820	0.40	19910.00
Ash tree saplings	unit	13640	0.30	6820.00
Birch saplings	unit	3410	0.30	1705.00
Elm tree saplings	unit	11330	0.30	3399.00
Cherry tree saplings	unit	250	1.0	250.00
Apricot saplings	unit	250	1.0	250.00
Pomegranate saplings	unit	440	0.50	220.00
Cornel saplings	unit	330	2.0	660.00

Medlar	**unit**	**440**	**1.0**	**440.00**
Total		**-**	**-**	**34060.00**

5.3.7. Calculation of cost of transformation measures to be performed in Pilot plot No.1

Table 1.7.

№	Name of works performed	Unit of measure	Scope of work	Day-work	Man/day required	Price per unit	Salary (manat)
1	2	3	4	5	6	7	8
1.	Cleaning from shrubs						
1.1	Cleaning of plots from shrubs and their removing away	Ha	50	0.24	208.33	15.00	3124.95
2.	Forest planting						
2.1	Digging of holes with size 0.40 x 0.40 x 0.40 m for forest planting	unit	69910	200	349.55	15.00	5243.25
2.2	Carrying of planting stock to a distance of up to 100 m and bringing them to a planting place	unit	69910	1200	58.26	15.00	873.90

2.3	**Sorting of saplings before planting, cutting of roots and sticks, soaking in manure water**	**unit**	**69910**	**4000**	**17.48**	**15.00**	**262.20**
2.4	**Manure carrying and putting to holes after mixing it with soil**	**unit**	**69910**	**680**	**102.81**	**15.00**	**1542.15**
2.5	**Planting of planting stocks to prepared holes**	**unit**	**69910**	**530**	**131.91**	**15.00**	**1978.65**
2.6	**Watering of planted saplings**	**unit**	**69910**	**1250**	**55.93**	**15.00**	**838.95**
2.7	**Putting of dry manure mixture under saplings after wayering**	**unit**	**69910**	**800**	**87.39**	**15.00**	**1310.85**
3.	**Forest sowing**						
3.1	**Digging of holes with size 0.20 x 0.10 x 0.20 m for forest sowing**	**unit**	**66500**	**600**	**110.83**	**15.00**	**1662.45**
3.2	**Proceeding of seeds with medicine before sowing**	**kg**	**788.00**	**82**	**9.61**	**15.00**	**144.15**
3.3	**Planting of seeds to prepared holes**	**unit**	**6650.00**	**1000**	**66.50**	**15.00**	**997.50**
4.	**Purchase of manure**	**ton**	**25.00**			**20.00**	**500.00**
5.	**Transportation**						**1000.00**

	expenses						
	Total						**19479.00**
6.	**Other expenses (additional 6 %)**						**1168.74**
	Total amount						**20647.74**

With aim to increase works on forest planting, works on softening of bottom of plants and sows during 2014-2018 by 15 times, irrigation works by 30 times, cutting of grass and bushes –by 5 times, conducting of inventory works in total by 5 times, forest pathological survey in total by 5 times, thus number of required working hours have been increased correspondingly-gr.6

For forest planting, sowing, service, watering and other works, working standards of acting in the Azerbaijan Republic "Standards of executed manual works in forestry" dated 1995, Baku were taken, as a basis.

Picture 1

Digging of wells in terraces and sowing

Picture 2

Digging of wells and sowing at slopes without terraces.

During digging of wells extracted soil is to be collected along the slopes, in lower part of wells. After sowing, conditions for collection of water in well and preservation for longer period are created.

5.3.8. Working time schedule for undertaking of transformation measures at pilot plot No.1

Table 1.8.

1. Preparation works			
1.1 Purchase of materials and equipment			
1.2. Cleaning of area from shrubs			
2. Fencing			
2.1. Fencing of an plot			
3. Land preparation			
3.1 Repair of terraces and making additional terraces for forest planting			
3.2 Digging of holes for tree planting			
3.3 Digging of holes for seed sowing			
3.4 Carrying of manure to the plot			
3.5 Carrying of planting stock to the plot and temporary planting			
4. Planting and sowing			
4.1. Planting of trees			
4.2. Treating of seeds with medicine			
4.3.Sowing of seeds to the holes			
5. Watering			
5.1. Watering of planted and sowed areas			

5.3. Calculation of quantification and prices for transformation measures

5.3.2 Calculation of sowing materials required for forest sowing in plot # 2

Type of planting	Area (ha)	Mixing schemes	Placement schemes	Quantity of planting stock (trees)				Total
				Oak	Ash tree	Birch	Elm tree	
Under forest planting	10	5O5A	5000 unit/ha	4000	4000	-	-	8000
	10	5O5E	5000 unit/ ha	2500	-	-	2500	5000
Open area planting	10	10B	3x1	-	-	33000		33000
	4	7O3A	3x1	9240	3960	-		13200
	4	5O5A	3x1	660	6600	-		13200
	5	5O5E	3x1	8250	-		8250	16500
Total				30590	14560	33000	10750	88900

5.3.2 Seed materials required for forest sowing in plot #2

Mixing schemes for forest sowing	Placement scheme	Area	Quantity of seeding stock by species (kg)		
			Oak	Ash tree	Total
10O	3x1	10.0	1000.0	-	1000.0
7O3A	3x1	5.0	350.0	10.0	360.0
-	-	15.0	1350.0	10.0	1360.0

5.3.3. Evaluation of required saplings and seeds for pilot plot # 2

Name of planting stock	Unit of measure	Quantity	Price per unit (manat)	Amount (manat)
Oak seed	kg	1350.0	0.40	540.00
Ash tree seed	kg	10.0	25.0	250.00

Oak seedlings	**unit**	**30590.00**	**0.50**	**15295.00**
Ash tree seedlings	**unit**	**14560**	**0.50**	**7280.00**
Elm tree seedlings	**unit**	**10750**	**0.30**	**3225.00**
Oleaster seedlings	**unit**	**33000.0**	**0.30**	**9900.00**
Total	**-**	**88900.00**	**-**	**36490.00**

5.3.4. Materials required for fencing of pilot # 2.

(total length of fence is 6685 km)

1. Total length of applied pipes is 8022 m

2. Number of pipe support is 3342 pc.

3. Barbed wire is 40110 m

4. Armoring welded to each support (total) is 1671 m

5. Rolled wire welded to each support (total) is 2005 m

6. concrete solution for installation of posts (total) is 12.03 m^3 (for each support 3.6 liters)

7. Barbed wire for supports is 150 kg

5.3.6. Evaluation of materials and technical equipment required for fencing of the pilot plot #2

Table 1.5.

Name of material	Unit of measure	Quantity	Price per unit	Amount
Iron tube	m	8022.0	4.00	32088.00
Armature	m	1671.0	1.50	2506.50
Katinka	m	2005.0	0.30	6015.00
Barbed wire	m	40110.0	0.15	6015.00
Concrete	m^3	12.03m^3	100.00	1205.00
Simple wire	kg	150.0	1.50	225.00
Electrode box	unit	8	50.00	400.00
Total	-	-	-	43038.50

Calculation of works to be executed for fencing of pilot plot #2 (Total length of a fence is 3501km)

#	Name of work	Unit of measure	Scope of work	Daywork	Man/day required	Price for one man/day	Salary (manat)
1	2	3	4	5	6	7	8
1.	Digging of holes	unit	3342	50.0	66.84	15.00	1002.60

2.	**Welding**	**unit**	**3342**	**40**	**83.55**	**20.00**	**1671.00**
3.	**Concrete casting of posts**	**unit**	**3342**	**50**	**66.84**	**15.00**	**1002.60**
4.	**Barbed wire installation**	**m**	**40110**	**80**	**501.38**	**15.00**	**7520.70**
5.	**Transportation expenses**	**-**	**-**	**-**	**-**	**-**	**1000.00**
	Total:						**11196.90**

5.3.7. Calculation of expenses for transformation works to be conducted in pilot plot # 2

#	Names of Works	Unit of mesare	Scope of work	Day-work	Man/day required	Price for one man/day	Salary (manat)
1	2	3	4	5	6	7	8
1.	Cleaning from shrubs						
1.1	Cleaning of areas from shrubs and their removing away	ha	40.0	0.24	166.67	15.00	2500.05
2.	Land preparation	ha	38.0				
2.1	Ploughing of area with DT-75 tractor (first time)	ha	38.0	-	-	30.0	1140.00
2.2	Ploughing of area with DT-75 tractor (second time)	ha	38.0	-	-	20.0	760.00
2.3	Making of channels with tractor in prepared tillage	ha	38.0	-	-	25.0	950.00
3.	Forest planting						
3.1	Digging of holes with size 0.30 x 0.30 x 0.30 m for forest planting in prepared tillage	unit	88900	330	269.39	15.00	4040.85

3.2	**Manure carrying and putting to holes after mixing it with soil**	**unit**	**88900**	**700**	**127.0**	**15.00**	**1905.00**
3.3	**Sorting of saplings before planting, cutting of roots and sticks, soaking in manure water**	**unit**	**88900**	**4000**	**22.23**	**15.00**	**333.45**
3.4	**Planting of seedlings to prepared holes**	**unit**	**88900**	**720**	**123.47**	**15.00**	**1852.05**
4.	**Forest sowing**						
4.1	**Treating of seedlings with medicine**	**kg**	**1360**	**82**	**16.59**	**15.00**	**248.85**
4.2	**Sowing of seeds in prepared land at depth 6-8 cm**	**unit**	**49500**	**1580**	**31.33**	**15.00**	**436.95**
5.	**Watering**	**ha**	**38.00**				
5.1	**Watering of planted and sowed areas**	**ha**	**60.0**	**1.04**	**57.69**	**15.0**	**865.35**
6.	**Purchase of manure**	**ton**	**50.0**			**20.00**	**1000.0**
7.	**Water motor**	**unit**	**2**	**-**	**-**	**1500.0**	**3000.0**
8.	**Transformer**	**unit**	**2**			**1250.0**	**2500.0**
9.	**Rubber tube 169**	**m**	**2000**	**-**	**-**	**3.0**	**6000.0**
	Total:						**27857.70**
	Other expenses (additional 6 %)						**1392.80**
	Total amount						**29250.50**

Chapter 6.

Planning of post-transformation measures during 2012-2013 and 2014-2018.

6.1. After-transformation measures for plot No.1

6.1.1 After-transformation measures during 2012-2013

Prevailingly at after-transformation measures, monitoring, watering and service work will be carried out in the area of the plot No.1. All measures will be undertaken under management and organizational activities of employees of Shamakhy Forest Protection and Rehabilitation Protection and Rehabilitation Enterprise.

The main inventory on all forest rehabilitation measures will be undertaken during autumn 2013, as a result of this inventory, the average growing percentage both in forest planting and forest sowing will be defined. The same year replacement, replenishment and repair works of not grown plants and seeds by new ones will be executed. Forest planting and sowing replenishment and repair works will be completed by the end of 2013.

6.1.2. Planning of after-transformation measures during 2014-2018

Service and irrigation works will be continuing in forest sowing parts of pilot plot during 2014-2018. During these years service work (cleaning bottom part of trees, irrigation, cleaning from weeds, manure spreading, cutting of grass and bushes between lines etc.) For these years the following works will be executed:

5 times in 2014

4 times in 2015

3 times in 2016

Twice in 2017

Once in 2018

The inoculation of forest sowing is planned during the autumn of 2018.

With purpose of protection of forest from cattle, disease, pests and rodents constant monitoring will be continuing in the territory. All these measures will be undertaken under management, participation and organizational activities of employees of Shamakhy Forest Protection and Rehabilitation Protection and Rehabilitation Enterprise.

6.3. Quantification of required works and materials and calculation of prices for plot No.1

6.3.1 Quantification of post-transformation measures and calculation of prices. (for 2012 – 2013)

Table 1.9.

#	Names of works will be performed	Unit of measure	Scope of work	Daywork	Man/day required	Price for one man/day	Salary (manat)
1.	Service and watering						
1.1	To serve forest plantations with hand tools (5 times)	unit	69910	580	120.53	15.00	9039.75
1.2	Watering of forest plantations and sown areas (5 times)	ha	65.0	1.04	62.50x(5)	15.00	4687.50
2.1	Conducting of inventory works	Ha	76.0	-	10.0	15.00	150.00
3.1	Performing of filling and repair works 10%	unit	69910	210	33.29	15.00	4993.50
3.2	Forest sowing of additional 30 %	unit	1300	1000	13.30	15.00	199.50
4.1	Required planting stock	unit	6990			0.30	2097.00
4.2	Required seeding stock	Kg	300	-		0.40	120.00
5.1	Forest pathological examination (3 times)	Ha	76	15	5.07x(3)	15.00	228.15
T o t a l							21515.40

6.3.2 Calculation of expenses for undertaken after transformation measures at plot No.1 (for 2014 – 2018)

Table 1.10.

#	Names of Works	Unit of mesare	Scope of work	Day-work	Man/day required	Price for one man/day	Salary (manat)
1	2	3	4	5	6	7	8
1	To serve forest plantations with hand tools .	unit	136410	780	174.88x(15)	15.00	39348.00
2	Watering of forest plantations	ha	65.0	1.04	62.50x(30)	15.00	28125.00
3	Grass and shrubs mowing at forest plantations and sown areas	ha	50.0	0.30	166.67x(5)	15.00	12500.25
4	Conducting of inventory works (annualy)	ha	76.0	-	10 x (5)	15.00	750.00
5.	Forest pathological control	ha	76.0	15	5.07 x (15)	15.00	1140.75
	Total:						81864.00

As it was envisaged to increase service works on forest planting, works on softening of bottom of plants and sows during 2014-2018 increased by 15 times, irrigation works by 30 times, cutting of grass and bushes–by 5 times, conducting of inventory works in total by 5 times, forest pathological survey in total by 5 times, the number of required working hours has been increased correspondingly- gr.6.

For forest planting, sowing, service, watering and other works, working standards of acting in the Azerbaijan Republic “Standards of executed manual works in forestry” dated 1995, Baku were used, as a basis.

6.3. Calculation of quantification and prices for materials and required works at plot #2

6.3.1. Calculation of quantification and prices for after-transformation measures (2012 – 2013)

#	Names of works will be performed	Unit of measure	Scope of work	Daywork	Man/day required	Price for one man/day	Salary (manat)
1.	Service and watering						
1.1	To serve forest plantations and sown areas with hand tools (5 times)	unit	138400	760	182.11 x (5)	15.00	13658.25
1.2	Watering of forest plantations (7 times)	ha	60.0	1.04	57.69 x (8)	15.00	6922.80
2.1	Conducting of inventory works	Ha	75	-	10.0	15.00	150.00
3.1	Performing of filling and repair works 10% additional planting	unit	8890	270	32.93	15.00	493.95
3.2	Forest sowing of additional 30 %	unit	14850	1000	14.85	15.00	222.75
4.1	Required planting stock	unit	8890	-	-	0.30	2667.0
4.2	Required seeding stock	Kg	350	-	-	0.40	140.0
5.1	Forest pathological examination	Ha	75	15	5x3	15.00	225.00

	(3 times)						
T o t a l							**24479.50**

6.3.2 Calculation of expenses at after-transformation works to be conducted in pilot plot #2 (for 2014 – 2018)

#	Names of works will be performed	Unit of measure	Scope of work	Daywork	Man/day required	Price for one man/day	Salary (manat)
1	2	3	4	5	6	7	8
1	To serve forest plantations and sown areas with hand tools	unit	138400	760	182.11x(15)	15.00	40974.75
2	Watering of forest plantations	ha	60	1.04	57.69 x	15.00	25960.50
3	Grass and shrubs mowing at forest plantations and sown areas	ha	50.0	0.30	166.67x(5)	15.00	12500.75
4	Conducting of inventory works (annually)	ha	50.0	0.30	166.67 x(15)	15.00	12500.75
5.	Forest pathological control	ha	75.0	15	15 x(5)	15.00	1125.00
	Total:						

ote: As it was envisaged to increase service works on forest planting, works on softening of bottom of plants and sows during 2014-2018 increased by 15 times, irrigation works by 30 times, cutting of grass and bushes–by 5 times, conducting of inventory works in total by 5 times, forest pathological survey in total by 5 times, the number of required work hours has been increased correspondingly- gr.6.

For forest planting, sowing, service, watering and other works, working standards of acting in the Azerbaijan Republic "Standards of executed manual works in forestry" dated 1995, Baku were used, as a basis.

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Calculations of total expenses on executed works and materials and goods in both areas.

Table # 12

№	Name of activity or material	Value (manat)		
		Plot #1	Plot #2	Total
1	Fencing materials	22577.50	43040.00	65617.50
2	Fencing works	6862.50	11196.90	18059.40
	Total:	29440.00	54236.90	83676.90
3	Purchase of saplings and seeds	34060.00	36490.00	70550.00
	Total:	34060.00	36490.00	70550.00
4	Transformation Works	20647.74	29219.48	49867.22
5	Serving, watering and other works after transformation (2012- 2013)	21515.40	24479.75	45995.15
	Total:	42163.14	53699.23	95862.37
6	Serving, watering and other works after transformation (2014 -2018)	81864.00	93061.25	174925.25
	Total:	81864.00	93061.25	174925.25
	Total amount	187527.14	237487.38	425014.52

Chapter 6

Planning of after-transformation measures for 2012– 2013 and 2014 -2018

6.1. After-transformation measures for plot # 2

6.1.1. After-transformation measures during 2012 – 2013

Prevailingly at after-transformation measures, monitoring, watering and service work will be carried out in the area of the plot #1. All measures will be undertaken under management and organizational activities of employees of Shamakhy Forest Protection and Rehabilitation Protection and Rehabilitation Enterprise.

The main inventory on all forest rehabilitation measures will be undertaken during autumn 2013, as a result of this inventory, the average growing percentage both in forest planting and forest sowing will be defined. During the same year replacement, replenishment and repair works of not grown plants and seeds by new ones will be executed. Forest planting and sowing replenishment and repair works will be completed by the end of 2013.

6.1.2 Planning of after-transformation measures during 2014-2018

Service and irrigation works will be continuing in forest sowing parts of pilot area during 2014-2018. During these years service work (cleaning of bottom part of trees, irrigation, cleaning from weeds, manure spreading, cutting of grass and bushes between lines etc.) For these years the following works will be executed:

5 times in 2014

4 times in 2015

3 times in 2016

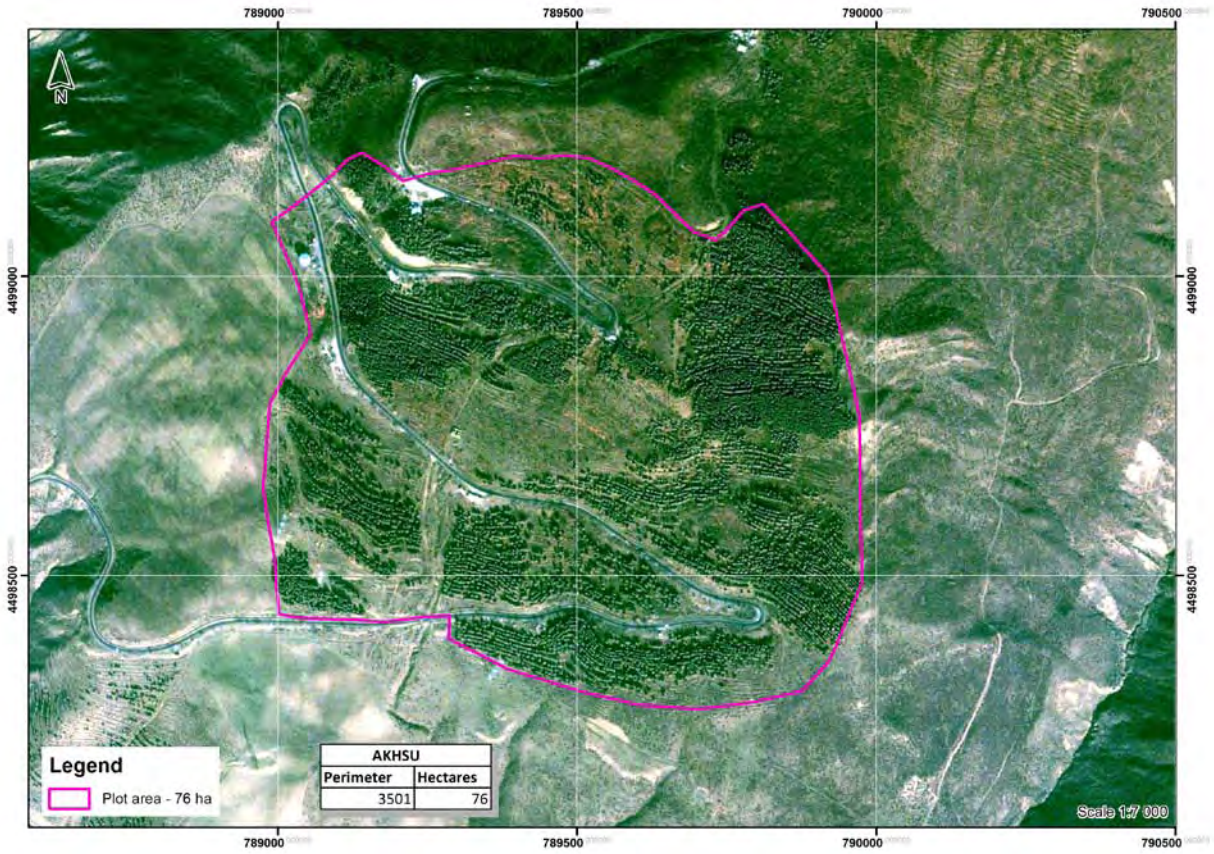
Twice in 2017

Once in 2018

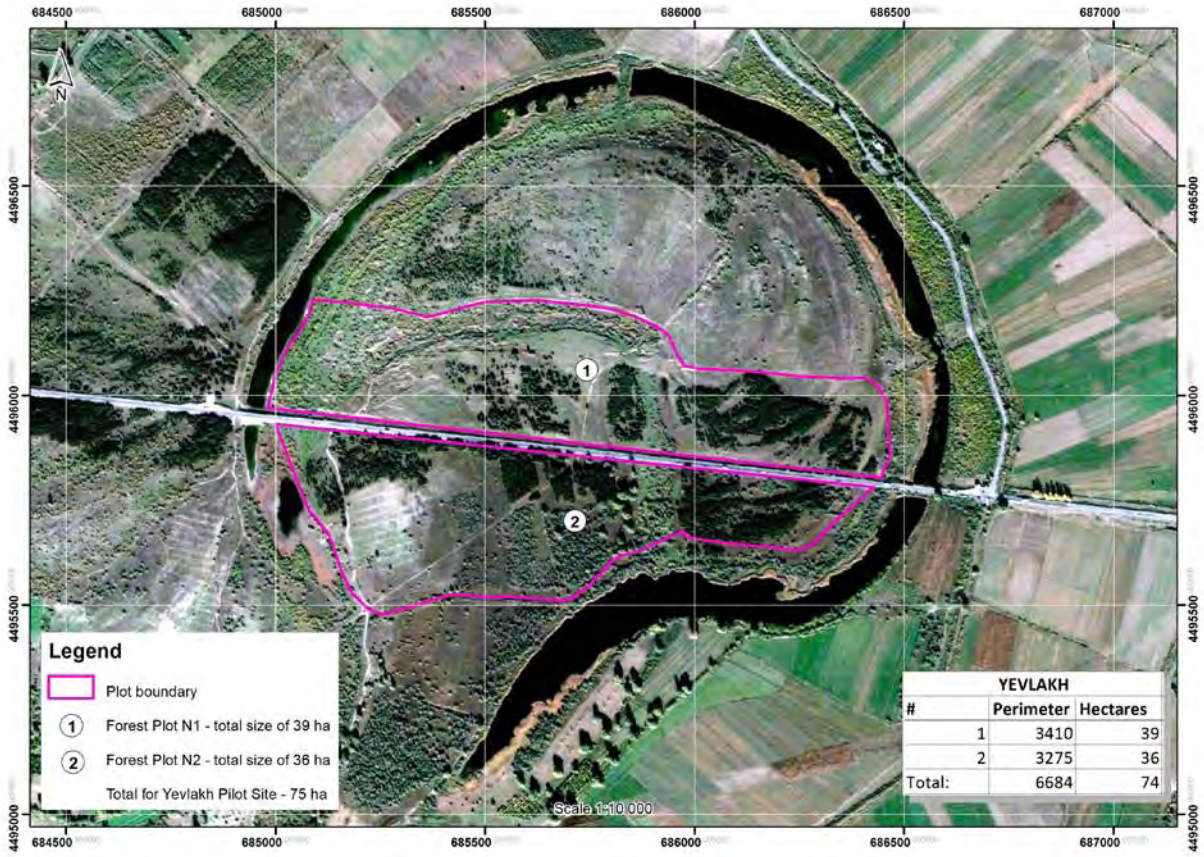
The inoculation of forest sowing is planned during the autumn of 2018.

With purpose of protection of forest from cattle, disease, pests and rodents constant monitoring will be continuing in the territory. All these measures will be undertaken under management, participation and organizational activities of employees of Shamakhy Forest Protection and Rehabilitation Protection and Rehabilitation Enterprise.

Plot #1


789000
789500
790000
790500
4499000
4498500
N
Legend
Plot area - 76 ha
AKHSU
Perimeter
Hectares
3501
76
Scale 1:7 000

Plot #2

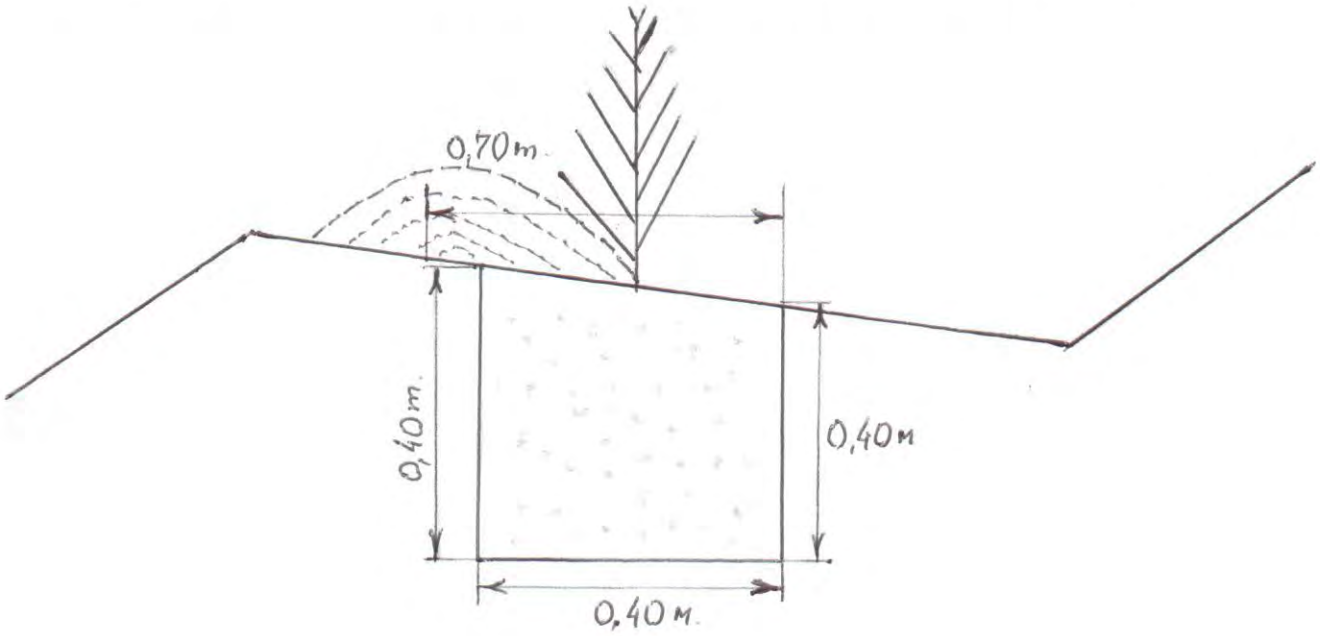

684500
685000
685500
686000
686500
687000
4496500
4496000
4495500
4495000
N
1
2
Legend
Plot boundary
1 Forest Plot N1 - total size of 39 ha
2 Forest Plot N2 - total size of 36 ha
Total for Yevlakh Pilot Site - 75 ha
Scale 1:10 000
YEVLAKH
Perimeter Hectares
1 3410 39
2 3275 36
Total: 6684 74

Photos of Pilot area # 1

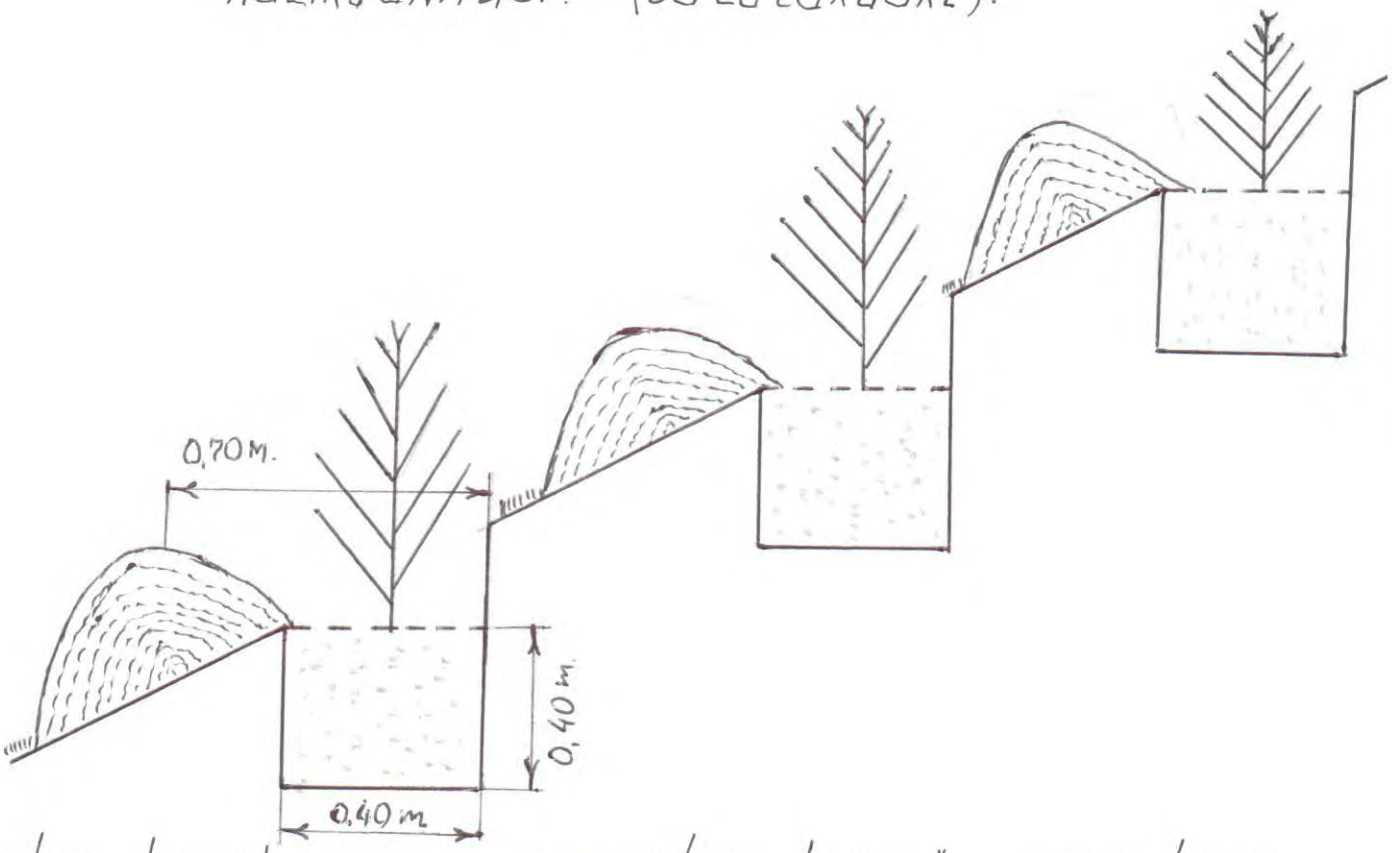




Şəkil 1.
Terraslarda quyuların hazırlanması və əkini.



Şəkil 2.
Terrasların olmadığı yamaclarda quyuların hazırlanması. (sututarları).

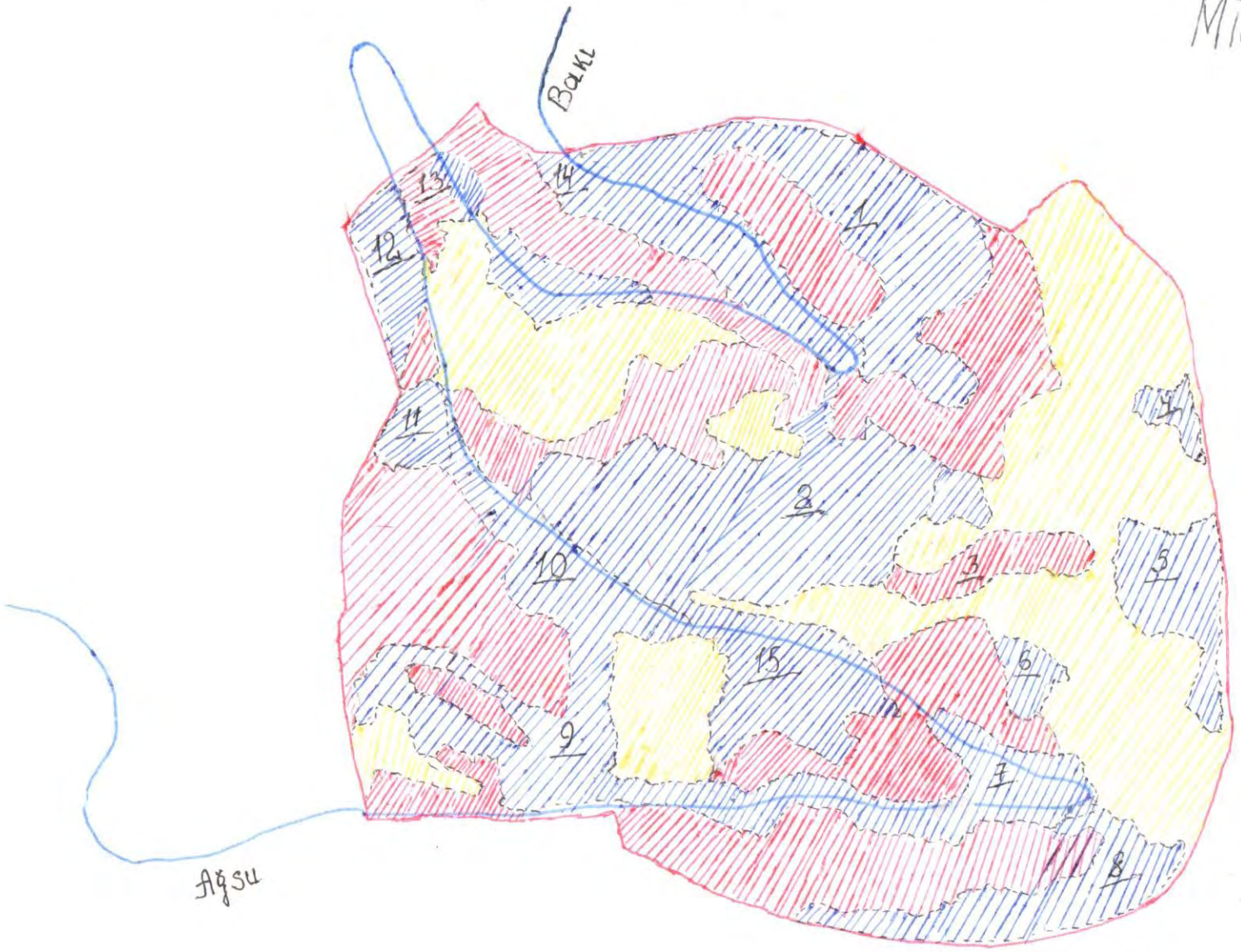


Quyular hazırlanarkən çıxarılan torpağı yamac boyu quyudan aşağı hissəyə toplamaq lazımdır. Bu əkindən sonra quyuya suyun yığılmasına və burada daha çox qalmasına şərait yaradır.

Pilot sahə №-1-də aparılacaq transformasiya tədbirlərinin aparılacağı ərazilər

S = 75,0 ha

Miqyas: 1:7000.



Şərti işarələr.

- Açıq sahələrdə əkin.
- Meşəaltı əkin.
- Şəhər və Təbii çərçə

aparılacağı ərazilər. S=75,0 ha.

Miqyas: 1:



Annex 21. Transformation Plan for the Selected Pilot Forest Sites in Georgia

INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION

EC THEMATIC PROGRAMME ON ENVIRONMENT AND SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

EuropeAid/128320/C/ACT/Multi External Actions of the European Union No. DCI-ENV/2010/221391

FOREST TRANSFORMATION PLAN

GEORGIA

(2012)

This document is the sole responsibility of the Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation and can in no way be taken to reflect the views of the European Union

This project is funded by the EU

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Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

FORESTINVENTPROJECT

FOREST TRANSFORMATION PLAN
(PLAN OF SILVICULTURAL MEASURES)
FOR SELECTED PILOT FOREST SITES
IN GEORGIA



TBILISI-2012

TERMS OF REFERENCE

FOR FOREST PLANNING ORGANISATION TO PREPARE THE FOREST TRANSFORMATION PLAN (PLAN OF SILVICULTURAL MEASURES) FOR SELECTED PILOT FOREST SITES IN GEORGIA

WWF-Caucasus in partnership with WWF-Germany is implementing the EU financed Project DCI-ENV/2010/221391 *On Increasing the resilience of forest ecosystems against climate change in the South Caucasus through forest transformation* ("the Project").

With the above regard, WWF- Caucasus awards a service contract FORESTINVENTPROJECT Ltd. under the above Project for preparation of Forest Transformation Plan (*Plan of Silvicultural Measures for Reconstruction of Forest Stands*) for selected sites in Georgia.

Background information on the Project

Climate change has already started to have significant impact on nature and people in the Southern Caucasus and in particular in Georgia – effects that will become even more severe in the future. Through increasing temperature, decreasing water availability, increased damage from floods and storms and associated risks, climate change will no doubt put a challenge to the future development in the country. To reduce impacts will require the enhancement of ecosystem resilience and the introduction of specific climate mitigation/adaptation measures with regard to forest and water management, land use, food production and health.

The overall objective of the Project is to increase the resilience of forest ecosystems in the Southern Caucasus, namely in Georgia, against climate change impacts and to improve biodiversity and livelihoods of local populations. The overall objective addresses the overarching threat of climate change to biodiversity and to forest ecosystem services which support the livelihoods of rural communities. Those services include protection of soils and water supply and quality, and timber and non-timber forest products. Objectively Verifiable Indicator (OVI) for the overall objective is that: by 2015 (two years after the completion of the Project), the national government will have adopted and started to implement policies that will make forests and the services they provide highly resilient to climate change.

The specific objective of the Project contributes to the overall objective by establishing the necessary conditions for the forest administrations in Georgia to develop and implement strategies for transforming monoculture forest stands into highly resilient, "close to nature" forest stands. It is proposed to do this through awareness raising about climate change impacts on forests, demonstrating practical measures to make forests more resilient, and providing forest administration staff and local community members who use forests with the necessary knowledge and skills to transfer the development and implementation of transformation measures to other forest stands.

To achieve the specific objective, the following OVIs are proposed by the end of the Project:
- forest stand structure has been transformed in such a way that they will be highly resilient to climate change on pilot sites;
- forest stand potential to enhance the livelihoods of neighbouring communities will have increased on selected pilot sites; and

- the chief executives and heads of the policy and planning departments of forest administrations and heads of relevant departments in the forest administrations show a demonstrable increase in their awareness of climate change impacts on forests and motivation to develop strategies for making forests more resilient.

Expected results of the Project are:
Result 1 - Selected forest stands vulnerable to climate change have been transformed into highly resilient "close to nature" forest stands;
Result 2 - Silvicultural guidelines for the transformation of monoculture stands into more resilient stands are elaborated, published in Georgian and English languages and made available for relevant officials and experts;
Result 3 - The capacities of forest administration experts to develop silvicultural strategies to transform monoculture stands into stable, site-adapted forests are increased;
Result 4 - The awareness of local communities about the importance of forest rehabilitation with regard to mitigating negative biotic and abiotic impacts of climate change is improved.

The Project is neither the continuation of a previous action nor part of a larger programme. It is however complementary to the recently completed German (BMU/KfW) financed WWF project "Mitigating Impacts of Climate Change through the Restoration of Forest Landscapes in the Southern Caucasus", the latter focusing on forest restoration.

Description of the assignment

Objective of the assignment is to prepare Forest Transformation Plan/ Plan* of Silvicultural Measures ("the Plan") with for the following selected pilot forest sites in Georgia :

Pilot Site N1 – *"KHASHURI"* with total area of 80 ha, located on the state forest lands of the former Khashuri State Forestry, Forest Unit N.3, Forest Sub-Units NN.5-7 and NN.9-30 - currently under the management of Shida Kartli Service of the Natural Resources Agency of the Ministry of Energy and Natural Resources of Geogria.

Pilot Site N2 – *"TSAVKISI"* with total area of 75 ha, located on the former state forest lands of Kojori Forest Unit of the former Tbilisi State Forestry - currently under the management of Municipaluty of Tbilisi.

Thus, total planning area shall cover about 155 ha.

The above forest sites have been selected by the Project team in cooperation with the forest authorities during the inception phase of implementation on a base of preliminary agreed selection criteria.

Selected pilot sites represent forest stands with artificially propagated monoculture pine plantations and therefore most vulnerable to climate change impacts.

Detailed location and boundaries of the selected sites already agreed with stakeholders, as well as relevant agreements with the stakeholders are available at the following web-pages:

For the Pilot Site N1 : http://awsassets.panda.org/downloads/mou_geo_site_khashuri.pdf

For the Pilot Site N2 : http://awsassets.panda.org/downloads/mou_geo_site_01_tsavkisi.pdf

* *Due regard has to be paid to the requirements under National Legislation of Georgia when preparing the Plan.*

Beyond the above pilot sites, there are more artificially propagated plantations in Gerogia which provide goods and services to adjacent rural communities. A large proportion of the plantations are degraded and highly vulnerable to climate change. The continued production and protective functions of most of the monoculture pine stands established in the past are no longer guaranteed due to the growing incidence of climatic extremes, the proliferation of diseases, the forests. limited capacity to adapt, and the lack of structural diversity. All these factors will aggravate the problems for local communities to maintain the flow of forest products and environmental services mentioned above. Local people shall benefit greatly from transformed forest stands that will be resilient to the impacts of climate change, provide a wider range and greater volume of products for household consumption (fuel wood, fruits and nuts), and sustained forest services such as watershed protection, prevention of soil erosion, protection of biodiversity etc. In future, the knowledge and experience gained from the implementation of transformation measures under the Plan will be transferable to other degraded and vulnerable stands; thus the final beneficiaries could include many thousands of rural households and city dwellers.

In the longer term, the people in the communities adjacent to the pilot sites will benefit from the measures carried out at the pilot sites in two ways:
- 155 hectares of forest will be made more resilient to climate change, thus maintaining the flow of goods and services to the communities adjacent to the pilot sites;
- the transformation measures will increase the range of goods and services and the volume of goods provided by the forests at the pilot sites to the adjacent communities.

Methodology

Forest Transformation Plan shall be aimed at elaborating of variety of silvicultural measures that will contribute to transformation of vulnerable to climate change forest stands into highly resilient "close to nature" forest stands with native mixed broadleaf species composition.

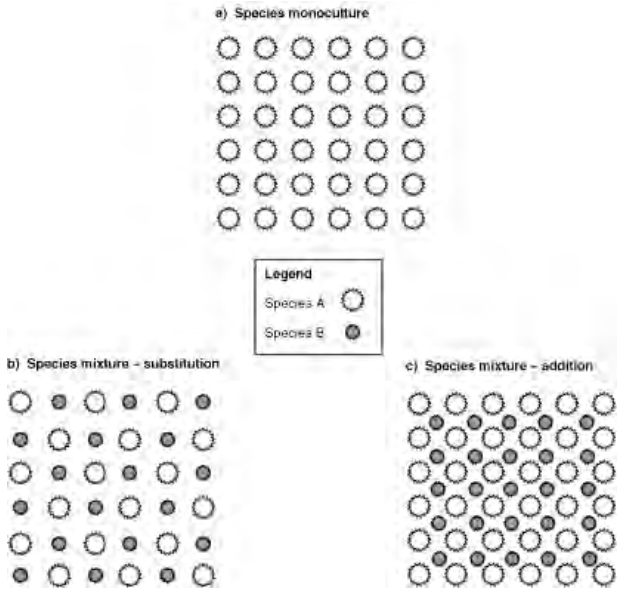
The transformation plan shall serve as a base for developing best practices and to obtain reliable information about costs and results.

The forest stands on pilot sites shall be surveyed to determine the necessary silvicultural (transformation/, reforestation/restoration/rehabilitation etc) measures.

The factors that have to be considered in planning process include, but are not limited to:
- tree and shrub species that can be used for under-planting (which will depend on natural for the pilot site area species composition, existing vegetation, and existing canopy (stock density);
- soil preparation methods;
- planting and seeding techniques and spacing;
- methods assisting natural regeneration;
- clearing of sod creating grasses and other competing vegetation from around the seeded and planted trees;
- physical protection (fencing of the pilot sites and if necessary single tree protection).

The main silvicultural idea is to transform vulnerable monoculture pine stands into close to nature forests by using the existing pine cover as a nurse crop to introduce tree and shrub species by under-planting and in addition, to reforest open areas. A common example is where a slower-growing, shade-tolerant species forms the lower layer beneath a canopy of a

faster-growing, shade-intolerant species. A monoculture can be altered by a) substituting or b) adding trees of another species – *see the scheme bellow*:



The trees and shrubs representing for the given area and vertical zone/elevation (nature-geographical forest vegetation zone) the natural composition of species are always showing greater resilience to changes of the natural conditions, which inter alia could be caused by climatic phenomena.

Technical Assistance and Supervision

The forest planning organization contracted by the WWF-Caucasus shall prepare the Plan under the supervision of the ***Project Country Coordinator*** and with technical assistance and advice from the ***Project International Forest Advisor*** and ***Regional GIS Expert*** both available at the Project regional partner organization – WWF-Caucasus. The Project partner have experience in planning, implementing, and managing silvicultural measures from their involvement in the similar projects.

The planning process has to be performed based on participatory planning approach. The forest planning organization shall involve local forestry administration staff and members of communities close to the pilot stands in the preparation of the transformation plans.

In addition, the forest planning organization will be provided with baseline digital map production (GIS shape files, satelite images and topographic maps) for the selected pilot sites.

Scope of Work

1. Elaborate a soil analyses for the selected sites and provide with recommendation for native species to plant/seed based on soil. The forest planning organization will elaborate a map illustrating the soils of the site. For each soil type recommendation for planting/seeding native species will be given. Other parameters as potential natural vegetation, relief, exposition and climate will be considered in this recommendation.

2. Elaborate a detailed plan (verbal description and visual illustration on maps) for fencing, tending, planting or seeding measures on the selected sites. For each selected site the plan illustrates at least following contents:

- Identification of seeding and planting areas
- Description and Visualization of transformation activities
    - Fence line
    - Areas of planting
    - Areas of seeding
    - Areas of tending
    - Areas for natural regeneration assisting measures
    - Areas for clearing of sod creating grasses and other competing vegetation from around the seeded and planted trees
- Design of planting method (groups, rows, spacing, etc)
- Technological scheme for forest transformation activities
- Measures for post-planting maintenance and care of pilot sites (5-year technological scheme of measures for post-planting care of pilot sites)
- Quantification of fence material, planting and seeding material
- Cost calculation of material

3. Elaborate a detailed work/time schedule plan for the implementing works.

Planning Period (Duration of the Plan)

All silvicultural measures (except that of 5-year technological scheme of measures for post-planting maintenance and care of pilot sites) envisaged under the Plan have to cover the following years: 2012 and 2013.

Format and Indicative Outline/Template for the Transformation Plan

The Plan has to be prepared in line with national forestry technical guidelines, rules and standards and therefore traditional formats for Forest Reconstruction, Reforestation and Forest Amelioration have to be used in combination when necessary.

Indicative (Recommended) Outline/Template for the Plan has to cover (but might be not limited to) the topics shown in Attachment 1 (attached).

Deliverables

- Electronic version (Microsoft Word and PDF and in other relevant formats) and 3 hard copies of full version of descriptive transformation plan in Georgian language including:
    - Work schedule for the implementation
    - Lists of all materials and supplies required for implementation works
    - Cost calculation (*all cost calculations shall be done in both National Currency and Euro*)
- Maps showing the following details:
    - Precise boundaries of the pilot sites

- Result of soil analyses on the selected sites

- Forest transformation activity zones on each site (Fence lines, areas of planting for open spaces, areas of seeding for open spaces, areas of substituting and adding trees to monoculture stands, areas of pruning/tending, areas of natural regeneration assisting measures)

- Design of planting method (groups, rows, spacing, etc….)

- GIS shape files created by the planning organization.

- Minutes of meetings with local community, local authority/ies and other stakeholder representatives.

Duration of the Assignment

Duration of the assignment shall be not more than 1,5 month.

Qualification requirements

The members of the forest planning organization hold M.Sc. degrees in forest sciences and related fields.
The forest planning organization has at least 5 years experience in planning of silvicultural measures.

Content

Technical Statement for Planning Work Design (*Client Organization; Planned Area, Planning Organization, Number of Experts Involved etc, Duration of Assignment, linkage with other institutions etc*)
Authors and Contributors
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3.2.5. Soil (Parent Material, Physical Properties of Soil, Mulch, Podzolization, pH/Acidity Value, Soil Profile, Soil Texture and Structure, Soil Classification)
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ATTACHMENTES (Maps, Schemes etc)

Summary

World Wildlife Fund for Nature (WWF) Caucasus Program Office, in the framework of EU-funded Project ("Raising of Forest Ecosystem Sustainability in South Caucasian Countries in the Context of Climate Change /NO DCI-ENV/2010/221391/") performs forest transformation activities on preliminarily selected test sites (Khashuri and Tsavkisi) on the territory of Georgia.

On the basis of the relevant agreement, Designing and Planning Organization "Tkeinventproekti" Ltd developed the plan of silvicultural activities required for forest reconstruction.

The plan, developed by the group, consisting of diverse specialists on the basis of various technical, statistical and scientific sources and field researches, provides the types of activities to be implemented according to specific districts (planting, planting in გაპს, seeding, maintenance), as well as their methods, terms, assortment of wood species to be planted, volumes of activities.

All the above mentioned is provided for the periods of 2012-2013 and 2014-2014 separately.

Introduction

Forest transformation plan was developed in accordance with the Terms of Reference of Agreement №02/30-30-2012/WWF Caucasus 01/01-SRV-GEO-2012/ENRTR-BI-5.2.1 concluded on March 30, 2012 between WWF Caucasus Program Office and Design Planning Organization "Tkeinventproekti" Ltd for the purpose of implementation of EU-funded Project ("Raising of Forest Ecosystem Sustainability in South Caucasian Countries in the Context of Climate Change /NO DCI-ENV/2010/221391/").

Special group, consisting of various specialists (forest planning specialists, botanist, forester-pathologist, soil scientist, GIS specialist) was formed for implementation of activities by "Tkeinventproekti". The client provided the group with the required cartographic, aerial photo, public register and legal materials.

The Group obtained required scientific, technical, forest management and other information concerning the territories subject to implementation of activities. These territories were preliminarily selected by the client and agreed with the relevant authorities, responsible for forest management. Two sites, covered with coniferous forests – mainly artificially planted – existing on the territory of the forest fund, were selected: one on the territory of Khashuri municipality (adjacent to Khashuri city) and the other – on the territory of Tbilisi city (adjacent to the village Tsavkisi). Detailed information about them will be provided below. For simplicity, these territories hereinafter will be referred to as "test sites" (Khashuri and Tsavkisi).

SECTION 1. GENERAL PART

CHAPTER 1. OBJECTIVES AND METHODOLOGY

1.1. OBJECTIVES

The purpose of the Plan is development of silvicultural measures required for reconstruction (transformation) of artificially created pine stands and forest restoration on their adjacent areas, selected on the territory of Georgia and agreed with the authorities responsible for Forest Fund management. Implementation of the developed activities shall facilitate the creation of mixed stands consisting of deciduous species adapted to local conditions and resistant to the impact of climate change instead of monocultures, relatively vulnerable in regard to the anticipated climate change in the future. Creation of such stands is envisaged on woodless areas existing on test sites as well.

1.2. METHODOLOGY

For the purpose of performance of activities, specified in the ToR, obtaining of information on natural-historical conditions, state of the test sites, other data, required for various measurements, soil sampling, etc. the group members made field trips, identified territories on aerial photo materials according to land territories of the so-called economic sites (forests, woodless areas), wood species, origin (natural, artificial), state, other data (forest age, density, slope angle, exposition, etc.) which are necessary for the planning of different silvicultural activities (planting, seeding, facilitation of natural regeneration, maintenance, etc.) (schedules are attached hereby – annexes **4; 11**). In the process of planning of restoration- reconstruction activities, out of normative documents, the Rule of Forest Maintenance and Restoration approved by the Resolution #241 dated August 13, 2010 of the Government of Georgia was used.

About 40 varieties of different wood species (trees, bushes, lianas) were registered on test sites. Out of them, only 10 species are artificially planted, the rest is of natural origin. The wood species were taken in to account while selecting wood species to be planned.

In the process of field trips National Project Coordinator and the members of the group, developing the plan, had meetings with the representatives of the authorities responsible for the Forest Fund management and local self-governance authorities. They were explained the purposes of the plan. They expressed willingness of cooperation in the case of need.

All the plan-related issues are provided according to the test sites.

CHAPTER 2. BASELINE DATA

2.1. BASELINE DATA (SITE No 1 – KHASHURI TEST SITE)

1.1.1. GEOGRAPHIC LOCATION AND STATUS

Khashuri site is located in extreme west part of East Georgia, on the territory of Khashuri municipality, adjacent to Khashuri city (in the north), on the south slope of one of the branches of Likhi (Surami) Ridge, in the altitude range of 720- 830 m above sea level. The total area of the territory is 79 ha. The geographic coordinates of its extreme points are: **W**-383851, 4652727; **N**-384789, 4653250; **E**-385119, 4652463; **S**-384880, 4652122. The site represents the Forest Fund and forms part of Khashuri Forestry Site of Shida Kartli Division of Forest and Wildlife Management Department of LPPL Agency of Natural Resources of the Ministry of Energy and Natural Resources of Georgia (part of the former Khashuri forest block #3 of Khashuri Forestry, taxation plots # 5-7, 9-30 according to the forest management data of 1989 – Annexes **2;3**). The site consists of three parts of unequal sizes, delimited from each other by earth roads.

2.1.2. EXISTING PLANNING DOCUMENTS (FORESTRY PLAN, ETC.)

Forest Management and Organization Plan of Khashuri Forestry (Forest Management Plan – 1988), aerial photo materials, data of public registry and statistical data of forestry were used in the process of implementation of activities.

2.1.3. SILVICULTURAL MEASURES TAKEN FOR THE PAST 5-10 YEARS

During the last 5-10 years no silvicultural measures and wood use activities were implemented on the test site. The local population collects pine cones in the forest for heating. It should be mentioned that single cases of illegal logging were encountered in the process of studying the territory.

2.2. BASELINE DATA (SITE No 2 – TSAVKISI TEST SITE)

2.2.1. GEOGRAPHIC LOCATION AND STATUS

Tsavlisi site is located on south slopes of Mtatsminda (Mamadaviti) Ridge of the south-east branch of Trialeti Ridge within Tbilisi city limits in the altitude range of 900-1125 m above sea level. The total area of the site is 74,2 m. The geographic coordinates of its extreme points are: **W**-477071, 4614826; **N**-478254, 4615198; **E**-479005, 4615179; **S**-478173, 4614711. Out of total area, 70 ha in the past formed part of the Forest Fund and is now subordinated to Tbilisi Mayor's Office (part of the Block #1 of Kojori Forestry of the Former Tbilisi Forestry), and 42 ha lies on the territory of the Sakrebulo of the village Tsavkisi (**Annexes $;10**). The site consists of two unequal parts, delimited from each other by an earth road.

2.2.2. EXISTING PLANNING DOCUMENTS (FORESTRY PLAN, ETC.)

Forest Management and Organization Plan of Tbilisi Forestry (Forest Management Plan – 2006), aerial photo materials, data of public registry and statistical data of forestry were used in the process of implementation of activities.

2.2.3. SILVICULTURAL MEASURES TAKEN FOR THE PAST 5-10 YEARS

During the last 5-10 years no silvicultural measures and wood use activities were implemented on the test site. It should be mentioned that single cases of illegal logging were encountered in the process of studying the territory.

CHAPTER 3. DESCRIPTION OF NATURAL CONDITIONS

3.1. NATURAL CONDITIONS (SITE No 1 – KHASHURI TEST SITE)

3.1.1. DESCRIPTION OF FOREST STANDS (ALTITUDE, AGE CLASS, DENSITY, FOREST TYPE, SPECIES COMPOSITION, VEGETATION ZONE AND TYPE, FAUNA, EXOTIC SPECIES, DEADWOOD (DRY, ROOTED OUT AND BROKEN WOOD), CHARACTERISTICS OF NATURAL REGENERATION, ETC.)

SCHEDULE OF SITE CHARACTERISTICS AND THE RELEVANT SILVICULTURAL MEASURES FOR FOREST REGENERATION-RECONSTRUCTION)

SITE		Brief characteristics of the sites and recommendations on the relevant silvicultural measures	Q-ty of required saplings	
# on the map	Area, ha		Per 1 ha	Total
1	2	3	4	5
		Test site No 1 "Khashuri"		
		High density deciduous stands of natural origin		
1.1.1	2.2	10 oaks of natural sprout (partially, seeds-based) origin, age – 15 years, height – 4 m, diameter 2 cm, density 07, exposition – west, slope angle 5^0. Measures: in the period of validity of the Plan – protection from cattle, prohibition of all kinds of cutting; in long-term outlook – implementation of maintenance cuts, facilitation of natural regeneration, formation of full-value high density seed- originated oak stand.	–	–
1.1.2	0,4		–	–
Sum	**2.6**		–	–
		Low and medium density deciduous stands of natural origin		
1.2.1	4.0	8 hawthorns, 1 oak, 1 pine + ash-tree, maple – age – 20 years, height – 2 m, diameter – 2 cm, density – 04, there are some canopy openings; exposition – south-east, slope angle - $10\text{-}15^0$.	1000	4000

		Measures: in the period of validity of the Plan – planting of oaks in canopy openings, weeding around saplings three times; in long term outlook - implementation of maintenance cuts, facilitation of natural regeneration for the purpose of formation of mixed stands of oaks and other deciduous trees.		
3.1.1 3.1.2 3.1.3 3.1.4 3.1.5	1.8 3.9 1.3 2.8 15.7	**High-density pine stands of artificial origin** 10 pine trees (black, in single cases Caucasian); artificial, age – 50 years, height – 18 m, diameter – 32 cm, density 0,8 (uneven, there are some small canopy openings); young growth in groups and singly – pine trees up to 10 years; oaks, ash-trees, maples- up to 5 years. Exposition – south, S-W, S-E, N-E, N-W, slope angle 10-25^0. Measures: in the period of validity of the Plan – planting of oaks and other deciduous trees in canopy openings, weeding around saplings three times; in long term outlook - cutting of dying and slowly-growing trees, implementation of cuts in the course of natural regeneration and successful development of planted saplings for the purpose of creation of provision of sprouts and young growth with sufficient light and successful formation of mixed stands of oaks and other deciduous trees in the future.		
Sum	**<u>25.5</u>**		**300**	**7700**
3.2.1 3.2.2 3.2.4 3.2.5 3.2.7 3.2.8	1.5 17.9 8.2 1.8 1.1 0.8	**Low and medium-density pine stands of artificial origin** 10 pine trees (black, in single cases Caucasian), age – 50 years, height – 18 m, diameter – 30 cm, density uneven - 03 – 06 (average 05); exposition – south, S-W, S-E. Slope angle 10-20^0. Growing in groups and singly – pine trees 10 years, oaks, ash-trees, maples 5-10 years.		

Sum:	**31.3**	Measures: in the period of validity of the Plan – planting in gaps of oaks and other deciduous trees in canopy openings, weeding around saplings three times; in long term outlook - cutting of drying and slowly-growing trees, facilitation of natural regeneration, implementation of cuts in the course of natural regeneration and successful development of planted saplings for the purpose of creating provision of sprouts and young growth with sufficient light and successful formation of mixed deciduous stands in the future.	1000	31300
3.2.3 3.2.6	6.8 0.7	**Low and medium-density pine stands of artificial origin with dense oak young growth** 10 pine trees (black and Caucasian), age – 50 years, height – 18 m, diameter – 26 cm, density 05 uneven, growing oaks, dense, age - 5-15 years, singly – maples, ash-trees, in groups – pine trees. Exposition – south, slope angle - 10-20^0. Measures: in the period of validity of the Plan – protection from cattle (fencing); in long term outlook - removal of pine trees in the course of development of young growth for the purpose of improvement of lighting conditions for oak and formation of full-value stand. Cuts of pine trees shall be performed while oak young growth is elastic and can easily go straight after leaning down as a result of cutting of trees (and not break or root out as a result of being hit by trees, but lean over).		
Sum	**7.5**		–	–
4.1.1 4.1.2 4.1.3 4.1.4 4.1.5	6.2 0.3 0.2 0.6 0.3	**Woodless territories** Singly – black pine trees, age 50 years, height - 18 m, diameter – 28 cm; in groups and singly – young growth of pine trees, oaks, maples, ash-trees – age 5-10 years; in groups – blackberry, dog-rose, hawthorn. Exposition – south, S-E, S-W, slope		

		angle 5-15$^{0.}$ Measures: in the period of validity of the Plan – planting of oaks and other deciduous trees (ash-trees, maples, wild pear, wild apple), weeding around saplings three times; in long term outlook - facilitation of natural regeneration, maintenance of young growth and sprouts for the purpose of		
Sum	7.6	formation of mixed deciduous stands with oak prevalence.	3000	22800
4.1.6	0.5		–	–
Total	**79.0**	Measures shall not be taken where there are power transmission lines.	–	65800

There is no deadwood (rooted out, broken and dry trees) on the test site.

Out of exotic species only black pine (Pinus nigra), which is planted artificially there, is represented on the test site.

Due to the close proximity of the site to settled areas and the frequent presence of population on the territory, out of fauna representatives some species of rodents and birds live there. Birds contribute to transfer of seeds of wood species and the progress of natural regeneration in this regard. The impact of rodents in this regard is two-sided: in some cases they destroy the seeds of wood plants (use them as food); in other cases they transfer them on the territory and thus contribute to natural regeneration.

3.1.2. WOOD USE AND LAND USE (INCLUDING GRAZING)

Wood use and land use have not been performed on the test site for the last 10 years. It shall be mentioned that excessive grazing occurs on the territory, negatively affecting the development of sprouts and young growth of deciduous species. Natural regeneration proceeds satisfactorily, fencing of the territory is required for its maintenance.

3.1.3. CLIMATE (TEMPERATURE, PRECIPITATION, HUMIDITY, WIND CONDITIONS)

The climate on the test site is subtropical, transferring from moderately humid to continental; winter is usually cold, snowy; summer is long and warm. Average air temperature is 9,6ºC, minimum temperature is - 29ºC, maximum temperature is 37ºC. Average temperature in January is -9,4, -1,9ºC, in July - 20-25ºC. Average annual precipitation is 700 mm. More precipitations falls in spring and summer than in winter. The prevalent wind is mostly from the west.

3.1.4. BIODIVERSITY (ENDANGERED SPECIES OF PLANTS AND ANIMALS)

About 30 wood species (trees and bushes), as well as a lot of grass species were registered on the test site ***(Annex 15).***

Endangered plants and animals weren't registered on the test site.

3.1.5. SOIL (SOIL TYPES, ACIDITY VALUE /pH/, SOIL PROPFILE DESCRIPTION, PHYSICAL-MECHANICAL STRUCTURE, ETC.)

As a result of relevant research it was determined that the studied soils of Khashuri site belong to the sub-type of brown leached soils, with brown-grey colour, low humus content (its content falls with depth) with grainy-granular structure. According to mechanical composition it belongs to heavy alumina. Soil reaction is near neutral.

As a result of study of soil conditions (granular structure and chemical composition) of the territory we could conclude that the mentioned territory is suitable for planting of deciduous plants in the case of properly selected wood species and observance of the relevant agri-technical conditions. The fact that natural regeneration of wood species proceeds successfully, proves it. ***(Annex 16).***

3.1.6. GRASSES (INCLUDING SOD FORMATION PROCESSES)

Grass cover is represented by grains and mixed grasses, leading species are: slender false bromegrass (*რაჭუპოდიუმ სყლვატიცუმ*), wood bluegrass (*ოა ნემორალის*), cocksfoot (*აცტყლის გლომერატა*), wild chervil (*ნტჩრისცუს სყლვესტრის*), fleawort (*Plantago spp.*), lion's-tooth (*Taraxacum spp.*), white clover (*თრიფოლიუმ რეპენს*), Voronov's primula (*რიმულა წორონოწიი*). Sod forming processes develop easily, grasses begin to overdry the soil, so weeding around saplings is necessary in the course of development of grasses.

3.1.7. FOREST PESTS AND DISEASES

As a result of general pathological research is was determined that diseases causing serious harm to woody plants weren't registered on the test site. For the purpose of successful development of artificial plantations in the future, it is recommended to study the territories in advance in order to identify extremely dangerous pests and diseases and to ensure that planting material brought from sapling farm in not diseased: otherwise harm could be caused both to the territory subject to planting and adjacent forests ***(Annex 16).***

3.1.8. WATERS

There are no rivers on the test site. There is only one little brook, the length of which within the site doesn't exceed 300 m.

3.1.9. THE EXISTING INFRASTRUCTURE (ROADS, ETC.) AND RECREATION RESOURCES

There are earth roads along the whole perimeter of Khashuri test site and its central part, where movement is possible by cart and off-road transport. These roads connect to Khashuri.

A high voltage power transmission line goes through the territory of the site for a distance of 180 m.

Forests and fresh air without emissions and harmful gases could be regarded as a recreational resource. It is notable that the test site is located near the famous resort Surami.

3.1.10. ADJACENT COMMUNITIES (NAMES, QUANTITY)

Khashuri city is directly adjacent to the Khashuri site.

3.2. NATURAL CONDITIONS (SITE No 2 – TSAVKISI TEST SITE)

3.1.1. DESCRIPTION OF FOREST STANDS (ALTITUDE, AGE CLASS, DENSITY, FOREST TYPE, SPECIES COMPOSITION, VEGETATION ZONE AND TYPE, FAUNA, EXOTIC SPECIES, DEADWOOD (DRY, ROOTED OUT AND BROKEN WOOD), CHARACTERISTICS OF NATURAL REGENERATION, ETC.)

SCHEDULE OF SITE CHARACTERISTICS AND THE RELEVANT SILVICULTURAL MEASURES FOR FOREST REGENERATION-RECONSTRUCTION)

Site		Brief characteristics of the sites and recommendations on the relevant silvicultural measures	Required q-ty of saplings	
# on the map	Area, ha		Per 1 ha	Total
1	2	3	4	5
		Test site #2 – "Tsavkisi"		
		High-density natural deciduous stands		
1.1.1 1.1.2 1.1.3	6.6 1.8 0.1	6 oaks, 1 hornbeam, 1 ash-tree, 1 maple, 1 oriental hornbeam, singly – wild cherry, wild plum. 50 years, height – 10 m, diameter – 16 cm, density – 07. In the undergrowth – hawthorn, cornel, gaiter-tree, dog-rose, medlar, etc. Exposition – south-east, slope angle 10-25^0. Measures: in the period of validity of the Plan – fencing, in long term outlook - maintenance of diversity of species, facilitation of natural regeneration for the purpose of formation of mixed deciduous stands with oak prevalence.		
Sum	8.5		–	–
		Low-density natural degraded deciduous stands		
1.2.1 1.2.2 1.2.3	0.2 0.3 0.3	Hornbeam, ash-tree, maple, oriental hornbeam, elm, willow-leaf pear, nettle tree. 15-30 years, height – 3-6 m, diameter – 4-6 cm, density – uneven 03 – 05. Undergrowth – cornel, gaiter-tree,		

1.2.4 1.2.5 1.2.6 1.2.7 1.2.8 1.2.9 Sum	1.4 0.1 0.2 0.1 0.1 0.1 <u>2.8</u>	medlar, Jerusalem thorn, buckthorn, fustic, smoke-tree, meadow-sweet, dog-rose, blackberry, blackthorn. Exposition – south, S-E, S-W, slope angle - 10-25$^{0.}$ Measures: in the period of validity of the Plan – planting of deciduous trees in canopy openings (oak, ash-tree, maple, wild pear, wild apple, smoke-tree, nettle tree, sumach), on rocky slopes – planting of oriental hornbeam, smoke-tree, sumach. Weeding around saplings two times; in long term outlook - maintenance activities for the purposes of maintaining species diversity and of formation mixed deciduous stands.	1000	2800
2.2.1 2.2.2 2.2.3 2.2.4 2.2.5 2.2.6 2.2.7 2.2.8 2.2.9 2.2.10 2.2.11 Sum:	0.6 0.3 0.8 0.5 0.7 1.7 0.1 0.1 0.5 0.1 0.2 <u>5.6</u>	**Low-density degraded artificial deciduous stands** (Maple, ash-tree, oak, almond, wild apricot, golden-chain, soap tree), age – 15-20 years, height – 5-6 m, diameter – 6-10 cm; density – 0,2 – 0,4, uneven, exposition – south, south-east, south-west, slope angle - 10-25^{0}. Measures: in the period of validity of the Plan – cutting of over-dry trees in canopy openings and their removal, planting of deciduous trees (oak, ash-tree, maple, wild pear, wild apple, smoke-tree, nettle tree, sumach), on rocky slopes – planting of oriental hornbeam, smoke-tree, sumach. Weeding around saplings two times; in long term outlook - maintenance activities for the purpose of maintaining of diversity of species and formation of mixed deciduous stands.	1000	5600
3.1.1 3.1.2 3.1.3 3.1.4 3.1.5	3.9 0.1 1.0 3.9 1.5	**High-density artificial black pine stands** Age – 30-40 years, height – 15-20 m, diameter – 20-28 cm, density 08 (uneven). There are some small canopy openings. Singly growing deciduous trees, undergrowth – hawthorn, cornel		

3.1.6 3.1.7 3.1.8 3.1.9 3.1.10 3.1.11 3.1.12 3.1.13 3.1.14 3.1.15 3.1.16 3.1.17 3.1.18 3.1.19 3.1.20	8.5 1.4 0.4 0.2 0.3 0.1 0.2 0.6 0.4 0.1 1.1 1.0 0.1 1.0 1.0	simultaneously. Exposition – south, S-E, S-W, slope angle - 10-25^0. Measures: in the period of validity of the Plan – planting of oaks and other deciduous trees in canopy openings, weeding around saplings two times; in long term outlook – cutting of drying and slow-growing trees, facilitation of natural regeneration, implementation of cuts in the course of natural regeneration and successful development of planted saplings for the purpose of creation of provision of sprouts and young growth with sufficient lighting conditions and successful formation of mixed deciduous stands in the future.		
Sum	26.8		300	8000
		Medium and low-density black pine stands (at the same time, Caucasian pine) with mixture of ash-trees and maples Height – 19 m, diameter – 24 cm, density 04 – 05.		
3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6	0.2 0.1 0.6 0.1 0.1 0.1	Growing oak, maple, ash-tree in groups, 3-10 years. Exposition – south, S-E, S-W; slope angle 10-20^0. Undergrowth – dog-rose, Jerusalem thorn, blackberry, meadow-sweet, buckthorn. Measures: in the period of validity of the Plan – planting of oaks and other deciduous trees in canopy openings, weeding around saplings two times; in long term outlook – cutting of drying and slow-growing trees, facilitation of natural regeneration, implementation of cuts in the course of natural regeneration and successful development of planted saplings for the purpose of creation of provision of sprouts and young growth with sufficient lighting conditions and successful formation of mixed deciduous stands in the future.		
Sum:	1.2		1000	1200

		Woodless territories; exposition – south, S-E, S-W, on 5-35^0 angle slopes		
4.1.1	4.4	At some places – coming of parent material to ground surface; with thin and medium-depth dry soils. In groups – blackberry, Jerusalem thorn, buckthorn, meadow-sweet, astragalus (*Astragalus pycnophyllus* Stev.). Singly – natural regeneration – elm, ash-tree, maple, oak, oriental hornbeam. Singly and in small groups – pine, almond, wild apricot, ash-tree, etc.; degraded. Measures: in the period of validity of the Plan – cleaning from dry trees, cutting of branches on pine trees, planting of saplings (oak, ash-tree, maple, wild pear, wild apple, nettle tree, smoke-tree, sumach), planting of oriental hornbeam, smoke-tree, sumach, nettle tree on rocky sections. Smoke-tree, sumach, nettle tree shall be planted in terraces on rocky and washed sections. Sizes and shapes of plots depend on location conditions; in long term outlook maintenance of plantations as required is recommended for the purpose of formation of deciduous stands through facilitation of natural growth.		
4.1.2	5.5			
4.1.3	0.1			
4.1.4	0.1			
4.1.5	0.4			
4.1.6	2.5			
4.1.7	0.2			
4.1.8	0.4			
4.1.9	0.2			
4.1.10	0.3			
4.1.11	1.7			
4.1.12	2.5			
4.1.13	3.0			
4.1.14	0.3			
4.1.15	0.7			
4.1.16	3.9			
4.1.17	0.1			
4.1.18	0.3			
4.1.19	0.2			
4.1.20	0.1			
4.1.21	0.1			
4.1.22	0.2			
4.1.23	0.1			
4.1.24	0.4			
4.1.27	0.1			
4.1.28	0.9			
Sum	28.7	Planting will not be performed where there are underground communications	3000	86100
4.1.25	0.1			
4.1.26	0.5			
Sum:	0.6		–	–
Total:	74.2		–	103700

Deadwood (rooted out, broken and over-dry trees) on Tsavkisi test site is mainly represented in artificially planted pine stands. They occupy about 5% of total area. Removal of those trees is envisaged in the process of maintenance cuts in 2014-2018.

Out of exotic species, black pine (*Pinus nigra*), almond (*Amygdalos canpestre*), wild apricot (*Armeniaca vulgaris*), golden-chain (*Laburnum anagiroides*), soap-tree (*Coelreuteria paniculata*), which are planted artificially, are represented here.

Due to close proximity to settled areas and frequent presence of population on this territory, out of fauna representatives some species of rodents and birds live there. Birds contribute to transfer of seeds of wood species and the progress of natural regeneration in this regard. The impact of rodents in this regard is two-sided: in some cases they destroy the seeds of wood plants (use them as food), in other cases they transfer them on the territory and thus contribute to natural regeneration.

3.2.2. WOOD USE AND LAND USE (INCLUDING GRAZING)

Wood use and land use have not been performed on the test site for the last 10 years. It shall be mentioned that excessive grazing occurs on the territory, negatively affecting the development of sprouts and young growth of deciduous species. Natural regeneration proceeds satisfactorily, fencing of the territory is required for its maintenance.

3.2.3. CLIMATE (TEMPERATURE, PRECIPITATION, HUMIDITY, WIND CONDITIONS)

The climate on the test site is transferring from steppe to moderately humid subtropical; winter is moderately cold, summer is hot. Average air temperature is 12,7ºC, in January - 0,9ºC; minimum temperature is - 23ºC, maximum temperature is +40ºC. Average annual precipitation is 560 mm. May is characterized by abundant precipitations (90 mm), January – with low precipitations (20 mm). Prevalent wind is mostly from the north and north-west; south-east winds also often occur.

3.2.4. BIODIVERSITY (ENDANGERED SPECIES OF PLANTS AND ANIMALS)

About 40 wood species (trees and bushes), as well as a lot of grass species were registered on the test site ***(Annex 15).***

Endangered plants and animals weren't registered on the test site.

3.2.5. SOIL (SOIL TYPES, ACIDITY VALUE /pH/, SOIL PROPFILE DESCRIPTION, PHYSICAL-MECHANICAL STRUCTURE, ETC.)

As a result of relevant research it was determined that the studied soils of Tsavkisi test site belong to the sub-type of brown soils, are characterized with light brown- straw colour, with low humus content (its content falls with depth) with fine grainy structure. According to mechanical composition it belongs to heavy alumina. Soil reaction is weak acid. Woodless territories on Tsavkisi site are represented by the slopes of different expositions and angles, mostly with thin and medium-depth soils, rocks, is characterized by high percentage of coming out of parent material to the ground surface. ***(Annex 16).***

As a result of study of soil conditions (granular structure and chemical composition) of the territory we could conclude that the mentioned territory is suitable for planting of deciduous plants in the case of properly selected wood species and observance of the relevant agri-technical conditions. The fact that natural regeneration of the above mentioned wood species proceeds successfully, proves it.

Drought-resistant and xerophilous wood species – nettle tree, willow-leaf pear, smoke-tree, sumach, etc. could be planted here.

3.2.6. GRASSES (INCLUDING SOD FORMATION PROCESSES)

Grass cover is of steppe grass type, leading species are: steppe fescue, feather grass, coronilla, etc. Sod forming processes develop easily; grasses begin to overdry the soil, so weeding around saplings is necessary in the course of development of grasses.

3.2.7. FOREST PESTS AND DISEASES

As a result of general pathological research is was determined that diseases, causing serious harm to woody plants, weren't registered on the test site. For the purpose of successful development of artificial plantations in the future, it is recommended to study the territories in advance in order to identify extremely dangerous pests and diseases and to ensure that planting material brought from sapling farm in not diseased; otherwise harm could be caused both to the territory subject to planting and adjacent forests ***(Annex 17).***

3.2.8. WATERS

There are no rivers on the territory of Tsavkisi test site. There is only one little brook, the length of which within the site doesn't exceed 150 m, besides there are several dry ravines, where water flows only as a result of snow melting or rain.

3.2.9. THE EXISTING INFRASTRUCTURE (ROADS, ETC.) AND RECREATION RESOURCES

Tsavkisi test site is divided into two parts by earth road, so the sites will be fenced separately. Besides, along the west and north borders, as well as through the territory, at three locations, an earth road passes from north to south, where movement is possible by cart and off-road transport. Along the north border and on through the site itself water pipelines pass for supplying of drinking water to adjacent villages.

In the vicinity of the test site (in 50 m from north-west border) there is a water-pumping station for supplying of water to the villages, located to the south of Tbilisi.

Forests and fresh air without emissions and harmful gases could be imagined as recreational resource. It is remarkable that the test site is located near the famous resort Surami.

3.2.10. ADJACENT COMMUNITIES (NAMES, QUANTITY)

Villages Okrokana and Tsavkisi are located adjacent to Tsavkisi site. There also are land plots of Tbilisi residents with summer houses and the office and infrastructure of a commercial company.

CHAPTER 4. NATURAL FOREST VEGETATION

4.1. NATURAL FOREST VEGETATION TYPE AND MATCHING SPECIES FOR TEST SITE (SITE 1)

4.1.1. NATURAL FOREST VEGETATION TYPE (ACCORDING TO FOREST VEGETATION DISTRICT, VERTICAL ZONE AND FOREST TYPE)

According to the Scheme of Division of Caucasian Forest Vegetation in Districts and Vertical Zones, developed by Academician Vasil Gulisashvili, the planned territory is included in the district of humid part of east Georgia (Zemo and Shua Kartli district). According to vertical zoning, four zones are included in this district: I – oak zone in the range of 600- 1000 m above sea level; II – maple zone in the range of 1000- 1500 m above sea zone; III - spruce and fir-tree zone in the range of 1500 – 2000 m above sea level; IV – subalpine thin zone in the range of 2000- 2300 m above sea level.

The planned territory is completely in the oak zone. The basic wood species, creating the forests of this zone is Georgian oak (*Quercus iberica*); besides, the forest consists of: hornbeam (*Carpinus caucasica*), light maple (*Acer laetum*), field maple (*Acer campestre*), ash (*Fraxinus excelsior*), oriental hornbeam (*Carpinus orientalis*), wild pear (*Pyrus caucasica*), wild apple (*Malus orientalis*), lime-tree (*Tilia caucasica*), elm (*Ulmus carpinifolia*). Undergrowth species are diverse – cornel (*Cornus mas*), hazelnut (*Corylus avellana*), gaiter-tree (*Svida australis*), *Euonymus verrucosa*, dog-rose (*Rosa canina*), medlar (*Mespilus germanica*), buckthorn (*Rhamus catartica*), hawthorn (*Crataegus spp.*), privet (*Ligustrum vulgare*), etc. Oak and oriental hornbeam forests occupy large area in this zone. ***(Annex 5)***.

Over 90% of the Khashuri site is represented by areas covered with forest. Out of it, about 80% of areas are represented by artificial forests of black pine (*Pinus nigra*) of the age up to 45 years; in small quantities, in groups and singly, Caucasian pine (*Pinus sylvestris* var. *hamata*) is mixed therein. Relatively small areas are occupied by sprout-originated Georgian oak stands, areas, covered with hawthorn and other shrubs. About 10% of the whole territory is represented by areas with little and medium slope. Almost half of pine stands have low and medium density. Natural regeneration with pine (black and Caucasian), Georgian oak, field maple, ash-tree and other wood species (trees and shrubs) actively proceeds there.

4.1.2. NATURAL TREE AND SHRUB SPECIES

Information on tree and shrub species – see **Annex 1.**

4.1. NATURAL FOREST VEGETATION TYPE AND MATCHING SPECIES FOR TEST SITE (SITE 2)

4.1.1. NATURAL FOREST VEGETATION TYPE (ACCORDING TO FOREST VEGETATION DISTRICT, VERTICAL ZONE AND FOREST TYPE)

According to the Scheme of Division of Caucasian Forest Vegetation in Districts and Vertical Zones, developed by Academician Vasil Gulisashvili, the planned territory is included in Central and East Caucasian District.

According to vetical zoning, six zones are distinguished in this district: I – desert and semi-desert zone in the range of 100 – 400 m above sea level; II – “light forest” zone in the range of 400 – 600 m above sea level; III - Georgian oak zone in the range of 600 – 1000 m above

sea level; IV - beech forest zone in the range of 1000 – 1600 m above sea level; V - east oak forest zone in the range of 1600 – 2000 m above sea level; VI – subalpine thin forest zone in the range of 2000 – 2300 m above sea level.
Planned territory is completely located in Georgian oak forest zone. The main forest forming species is oak (*Quercus iberica*), besides, hornbeam (*Carpinus caucasica*), field maple (*Acer campestre*), oriental hornbeam (*Carpinus orientalis*), ash (*Fraxinus exelsior*), etc. are represented here. Undergrowth is represented by *Euonymus verrucosa*, dog-rose (*Rosa canina*), medlar (*Mespilus germanica*), etc. (***Annex 12***)

Almost half of Tsavkisi test site is covered with forest. About 70% thereof is of artificial origin (black pine, ash-tree, maple, wild apricot, almond, soap tree, golden-chain). Natural stands are represented by prevalence of Georgian oak, with mixture of hornbeam, oriental hornbeam, ash-tree, maple, wild pear, wild apple, wild cherry, elm, at the same time – lime-tree, nettle tree. Out of shrubs – meadow-sweet, Jerusalem thorn, medlar, hawthorn, astragalus, smoke-tree are represented. Natural regeneration of all above mentioned wood species proceed satisfactorily. In the case of protection against grazing and the relevant maintenance, forest growth and prevalence of target species will be guaranteed.

One important phenomenon was fixed in the course of field researches: natural regeneration of black pine doesn't occur at all. It allows us to conclude that black pine has fewer prospects for this specific region and it shall be replaced by other species in relatively short time.

4.2.2. NATURAL TREE AND SHRUB SPECIES

Information on tree and shrub species – see **Annex 8.**

SECTION II. SPECIAL PART

CHAPTER 5. PLANNING OF TRANSFORMATION MEASURES FOR 2012-2013

5.1. TRANSFORMATION MEASURES (SITE 1 – KHASHURI TEST SITE)

5.1.1. PLANNING/ SELECTION OF TRANSFORMATION MEASURES

According to land categories, total area of the test site is distributes as follows:

Artificial pine stands	64,3 ha
Natural deciduous stands	6,6 ha
Woodless territories, total	8,1 ha
Including those with power transmission lines	0,5 ha
Total	79,0 ha

Out of 79 ha, 68,4 ha is subject to regeneration- reconstruction, including:

a) planting:

- low and medium density deciduous stands of natural origin (in canopy openings) – 4,0 ha;
- high density pine stands of artificial origin (in canopy openings) – 25,5 ha;
- woodless territories – 7,6 ha.

Total 37,1 ha.

b) planting in gaps

- low and medium density pine stands of artificial origin – 31,3 ha.

10,6 ha area is not subject to measures, including:

- high density deciduous stands of natural origin – 2,6 ha;
- low and medium density pine stands of artificial origin with thick oak young growth – 7,5 ha.
- Woodless territory with power transmission line – 0,5 ha.

Distribution of territory according to measures – see ***Annex 6.***

5.1.2. SELECTION OF TREE AND SHRUB SPECIES FOR TEST SITE (GENERAL LIST OF THE RECOMMENDED SPECIES) AND STANDARD REQUIREMENTS FOR PLANTING AND SEED MATERIAL

Forest planting will be fully carried out by planting saplings.

Recommended species for saplings: Georgian oak, ash-tree, field maple, wild pear, wild apple. Saplings can be with enclosed, as well as naked root system. Oak shall mostly have enclosed root system. Where possible (especially for oak), saplings with enclosed root system shall be preferred; the probability of their successful growth is high, as mechanical damage and drying of root system during transportation and planting is practically excluded; if required, it's easy to water (soak) them; the period of planting of saplings is not limited, they can be planted at any time of the year – in the winter as well as in the summer. Height of saplings shall not exceed 50-60 cm.

According to wood species, the following proportion shall be maintained: 60% - oak, 40% - other deciduous species. Such proportion conditions formation of mixed deciduous stands with oak prevalence. It's also important because oak needs accompanying, so called "nurse" species; besides, forests composed of several species are more resilient to all kinds of natural disasters.

As the soil conditions on the planned territory are not homogenous (soil depth, slope angle, humidity level, proximity of parent material, etc.) and for the purpose of achieving higher probability of successful growth of saplings, it's recommended to plant in staggered rows. The scheme of the order of saplings between rows and in rows is as follows:

After each 20-30 saplings in the row the wood species shall change; other wood species shall be planted in neighbouring row at this distance. Besides, the above mentioned proportion of wood species shall be maintained – 60% oak, 40% - other deciduous species. Schematic diagram of the order of saplings is attached ***(Annex 7)***.

5.1.3. PREPARATION OF SOIL

Planting should be performed in the late fall or early spring in pits. Pits should be located along the slope in rows. The distance between the rows should be 2 m, between saplings in rows – 1,5 m. Trees of deciduous species, grown up and shrubs, existing on the territory subject to planting, shall both be cut; if required, their formation (cutting of branches) is admissible. The sapling shall be placed in the pit up to the root neck and soil shall be compacted. A depression shall be formed around the sapling so that moisture remains in the pits after precipitation (the region is characterized by low precipitation level, hot summer, the possibility of artificial watering is limited and efficient use of natural precipitations is necessary).

5.1.4. UNDER-PLANTING IN EXISTING STANDS (SCHEME OF PLANTING, ETC.) 5.1.5. PLANTING FOR OPEN SPACES (SCHEME OF PLANTING, ETC.)

The technology and scheme of planting of forest crops on woodless territories (planting), in the canopy openings of high density stands (planting) and low and medium density stands (planting in gaps) is the same. The only difference is in quantity of planting material. The technology and scheme of planting of forest crops are provided above.

5.1.6. SEEDING

Seeding is not planned on Khashuri test site.

5.1.7. PRUNING AND THINNING

Pruning measures are not planned in 2012- 2013.

5.1.8. FENCING

Khashuri test site will be completely fenced; at the road entrances installation of gates is planned. The total length of fence will be 4611 m.

5.1.9. NATURAL REGENERATION ASSISTING MEASURES OTHER THAN FENCING (E.G. SCARIFICATION, ETC.)

Fencing shall be considered as the measure for facilitation of natural regeneration on the test site; it will prevent pasturing of cattle on this site, which will facilitate self-regeneration of natural young growth of wood species (trees and shrubs).

5.1.10. WATERING

In the framework of observance of standards of planting materials (oak saplings with enclosed root system, saplings of deciduous trees with max. height 60 cm) watering is not planned.

5.1.11. DEADWOOD REMOVAL

No deadwood has been registered on the test site.

5.1.12. OTHER MEASURES

Hay-harvesting shall be completely prohibited on the occupied territories, because it will cause destruction of naturally regenerated wood species. As it was already mentioned, natural regeneration with wood species proceeds quite successfully here and if we facilitate it (protection against cattle, maintenance – if required), desired results shall be expected from it.

In the period following the planned activities maintenance of saplings shall be carried out untill mixed deciduous stands with oak prevalence are formed on the whole territory. In the course of successful development of plantations, the slopes of artificial pine stands shall be thinned, arificial canopy openings shall be widened, crops shall be produced there are natural regeneration shall be facilitated. Optimal period for the formation of totally deciduous stands on test sites can be 20 years.

5.2. TRANSFORMATION MEASURES (SITE 2 – TSAVKISI TEST SITE)

5.2.1. PLANNING/ SELECTION OF TRANSFORMATION MEASURES

According to land categories, total area of the test site is distributes as follows:

Artificial pine stands	28,0 ha
Natural deciduous stands	11,2 ha
Artificial deciduous stands	5,6 ha
Woodless territories, total	29,3 ha
Including those with underground communications	0,6 ha
Total	74,2 ha

Out of 74,2 ha, 65,1 ha is subject to regeneration- reconstruction, including:

a) planting:

- low density degraded deciduous stands (in canopy openings) – 2,8 ha;
- high density pine stands of artificial origin (in canopy openings) – 26,8 ha;
- woodless territories – 27,7 ha.

Total 58,3 ha.

b) planting in gaps

- low density deciduous stands of artificial origin – 5,6 ha.
- low and medium density pine stands of artificial origin – 1,2 ha;

Total – 6,8 ha.

9,1 ha area is not subject to measures, including:

- high density deciduous stands of natural origin – 8,5 ha;
- woodless territory with underground communications – 0,6 ha.

Distribution of territory according to measures – see ***Annex 13.***

5.2.2. SELECTION OF TREE AND SHRUB SPECIES FOR TEST SITE (GENERAL LIST OF THE RECOMMENDED SPECIES) AND STANDARD REQUIREMENTS FOR PLANTING AND SEED MATERIAL

Recommended species for saplings: Georgian oak, ash-tree, field maple, wild pear, wild apple, nettle tree, smoke-tree, sumach, willow-leaf pear. Saplings can be with enclosed,

as well as naked root system. Oak shall mostly have enclosed root system. Height of saplings shall not exceed 50-60 cm.

According to woody species, the following proportion shall be maintained: 60% - oak, 40% - other deciduous species. Such proportion conditions formation of mixed deciduous stands with oak prevalence. It's also important because oak needs accompanying, so called "nurse" species; besides, forests, represented by several species are more sustainable to all kinds of natural disasters.

As the soil conditions on the planned territory are not homogenous (soil depth, slope angle, humidity level, proximity of parent material, etc.) and for the purpose of achieving a higher probability of successful growth of saplings, it's recommended to plant in staggered rows. The scheme of the order of saplings between rows and in rows is as follows:

After each 20-30 saplings in the row the wood species shall change; other wood species shall be planted in neighbouring row at this distance. Besides, the above mentioned proportion of wood species shall be maintained – 60% oak, 40% - other deciduous species. Schematic diagram of the order of saplings is attached ***(Annex 14)***.

5.2.3. PREPARATION OF SOIL

Planting shall be performed in the late fall or early spring in pits. Pits shall be located along the slope in rows. The distance between the rows shall make 2 m, between saplings in rows – 1,5 m. Trees of deciduous species, grown up and shrubs, existing on the territory subject to planting, shall both be cut; if required, their formation (cutting of branches) is admissible. The sapling shall be placed in the pit up to the root neck and soil shall be compacted. A depression shall be formed around the sapling so that moisture remains in the pits after precipitation (the region is characterized by low precipitation level, hot summer, the possibility of artificial watering is limited and efficient use of natural precipitations is necessary).

5.2.4. UNDER-PLANTING IN EXISTING STANDS (SCHEME OF PLANTING, ETC.) 5.1.5. PLANTING FOR OPEN SPACES (SCHEME OF PLANTING, ETC.)

The technology and scheme of planting of forest crops on woodless territories (planting), in the canopy openings of high density stands (planting) and low and medium density stands (planting in gaps) in the same. The only difference is in quantity of planting material. The technology and scheme of planting of forest crops are provided above.

5.2.6. SEEDING

Forest planting will be maibly carried out by planting saplings. Seeding of drought-resistant shrubs on local areas (rocky slides ეხპოსედ სოილ, fragments of steep slopes with thin soils with small rocks) for the purpose of soil strengthening, retention of surface run-off and maintenance of humidity could be considered as additional measures.

It is well known that oriental hornbeam make branches from the very bottom and the branches have abundant leaves. It will reduce the process of soil washing-off, facilitate accumulation of humidity and humus. It will also be a kind of "nurse" species for oak.

It's better to carry out seeding in the fall. During the winter period seeds will be places in the existing small cracks, which will accumulate humidity and good conditions will be created for germination, sprouting and growth.

The periods of ripeness of seeds of the listed wood species are as follows according to the months:

Oriental hornbeam – VII – IX;

Smoke-tree – VII;

Nettle tree – IX – X;

Wild pistachio – IX;
Sumach – IX – X;
Willow-leaf pear – VIII – IX.

Seeding shall be carried out by spreading. For the purpose of convenience and more or less even distribution on the territory, seeds shall be mixed with sand of 10-fold volume and this mixture shall be spread manually.

5.2.7. PRUNING AND THINNING

Pruning measures are not planned in 2012- 2013. Based on needs, these activities can be performed in subsequent periods.

5.2.8. FENCING

The test site consists of two parts and will be fenced separately. The total length of fence will be 6336 m.

5.2.9. NATURAL REGENERATION ASSISTING MEASURES OTHER THAN FENCING (E.G. SCARIFICATION, ETC.)

Fencing shall be considered as the measure for facilitation of natural regeneration on the test site; it will prevent pasturing of cattle on this site, which will facilitate self-regeneration of natural young growth of wood species (trees and shrubs).

5.2.10. WATERING

Taking into account complex soil conditions and low amount of precipitations, watering will be necessary in the case of long drought during the summer of 2013, once or twice.

5.2.11. DEADWOOD REMOVAL

The territory should be cleaned from dead and dying, dry and drying trees and shrubs. Their volume is insignificant.

5.2.12. OTHER MEASURES

Hay-harvesting shall be completely prohibited on the occupied territories, because it will cause destruction of naturally regenerated wood species. As it was already mentioned, natural regeneration with wood species proceeds quite successfully here and if we facilitate it (protection against cattle, maintenance – if required), desired results shall be expected from it.

In the period following the planned activities maintenance of saplings shall be carried out until mixed deciduous stands with oak prevalence are formed on the whole territory. In the course of successful development of plantations, the stands of artificial pine stands shall be thinned, artificial canopy openings shall be widened, crops shall be produced there are natural regeneration shall be facilitated. The optimal period for the formation of totally deciduous stands on test sites can be 20 years.

5.3. QUANTIFICATION AND COST CALCULATION FOR TRANSFORMATION MEASURES

5.3.1. QUANTIFICATION OF PLANTING/ SEEDING MATERIALS AND ESTIMATE COST CALCULATION (SITES 1 AND 2 – KHASHURI AND TSAVKISI TEST SITES)

For implementation of planting and planting in gaps on Khashuri test site a total of 65 800 saplings are required, including Georgian oak – 39 500, other deciduous species (ash, maple, wild pear, wild apple) – 26 300 saplings. Seeding is not planned on this site.

For implementation of planting and planting in gaps on Tsavkisi test site a total of 103 700 saplings are required, including Georgian oak – 62 200, other deciduous species (ash, maple, wild pear, wild apple, nettle tree, smoke-tree, wild pistachio, willow-leaf pear, sumach) – 41 500 saplings.

Sowing of the seeds of wood species will be carried out on about 10% of woodless areas, which makes 3 ha. For this measure a total of 10 kg seeds will be sufficient, including, according to wood species:

oriental hornbeam – 2 kg;
smoke-tree – 1 kg;
nettle tree – 5 kg;
wild pistachio – 1 kg;
sumach – 1 kg.

5.3.2. QUANTIFICATION OF OTHER REQUIRED MATERIALS (IF REQUIRED FOR MECHANIZATION WORKS) AND COST CALCULATION (SITES 1 AND 2 – KHASHURI AND TSAVKISI TEST SITES)

5.3.3. WORK/ TIME SCHEDULE FOR IMPLEMENTING OF TRANSFORMATION WORKS (SITES 1 AND 2 – KHASHURI AND TSAVKISI TEST SITES)

In 2012, in the late fall, planting of saplings should be implemented partially and seeding – in full.

In 2013, in the early spring, planting of the remainder part of saplings should be implemented as well as maintenance of crops – in July and August.

Planting should be implemented in limited time frame (shall not last for more than one month), as well as weeding – it should not last for more than two weeks.

In the period following 2013 the measures should be implemented as required, with observance of the above mentioned rules.

CHAPTER 6. POST- TRANSFORMATION MEASURES FOR THE PERIODS OF 2012 – 2012 AND 2014 – 2018

6.1. POST-TRANSFORMATION WORKS FOR SITE # 1 – KHASHURI TEST SITE (MEASURES FOR THE PERIODS OF 2012 – 2012 AND 2014 – 2018 TO BE SEPARATED)

In 2012 – 2013 the following measures will be implemented: fencing of territory, planting and planting in gaps of saplings, weeding around saplings and removal of grass three times. Saplings should be planted in the late fall of 2012 and early spring of 2013.

The following measures will be implemented in 2014-2018: replenish of dead crops (about 10% of total quantity), weeding around saplings and removal of grass two times per year, total 8 times during 4 years and maintaining cuts.

Description of measures	Unit of measurement	Volume of works	Daily norm of works	Number of required man/days	Cost of works, GEL		Note
					man/day	Total	
1	2	3	4	5	6	7	8
Khashuri test site a) 2012 - 2013							
1.Planting of saplings	unit	65 800	80	822			
2.Seeding	-	-	-	-	-	-	
3. Maintenance (weeding)	unit	197 400	500	395	-	-	shall be implemented 3 times
4. Maintenance cuts	-	-	-	-	-	-	
Total				1 217			
b) 2014 – 2018							
1.Planting of saplings (replenishments)	unit	6 600	80	83			10% of total volume
2. Seeding	-	-	-	-	-	-	
3. Maintenance (weeding)	unit	526 400	500	1 053			shall be implemented 8 times
4. Maintenance cuts	Cub. m	350	3	117			

Total				1253			

6.1.1. CONTROLLING UNWANTED VEGETATION (CLEANING OF PLANTATIONS FROM GRASSES AND WEEDS)

Cleaning of plantations from grasses and weeds shall be carried out during maintaining of saplings (weeding).

6.1.2. PEST CONTROL MEASURES

For the purpose of planning of pest control measures, the status of forests and plantations shall be studied periodically and the relevant measures shall be taken is required.

6.1.3. OTHER MEASURES (SOIL CULTIVATION, APPLYING FERTILIZERS, MANURING, HERBICIDES, ETC.)

No other measures are planned on test site. The need of implementation of specific measures shall be determined on the basis of the results of monitoring, performed periodically (specially). As the territory belongs to high fire risk, special attention shall be paid to observance of prevention rules.

6.2. POST-TRANSFORMATION WORKS FOR SITE # 2 – TSAVKISI TEST SITE (MEASURES FOR THE PERIODS OF 2012 – 2012 AND 2014 – 2018 TO BE SEPARATED)

The following measures will be implemented in 2012 – 2013: fencing of territory, planting and planting in gaps of saplings, sowing of seeds, weeding around saplings and removal of grasses three times.

The following measures will be implemented in 2014 – 2018: replenishment of dead crops (about 10% of total volume), weeding around saplings and removal of grasses twice a year, total 8 times in 8 years and maintenance cuts.

COST CALCULATION FOR PLANTING AND MAINTAINING OF WOOD CROPS

Description of measures	Unit of measurement	Volume of works	Daily norm of works	Number of required man/days	Cost of works, GEL		Note
					Man/day	Total	
1	2	3	4	5	6	7	8
Tsavkisi test site a) 2012 – 2013							
1.Planting of saplings	unit	103 700	80	1296			
2.Seeding	m^2	30 000	1500	20	-	-	
3. Maintenance (weeding)	unit	311 100	500	622	-	-	shall be implemented 3 times
4. Maintenance cuts	-	-	-	-	-	-	
Total				1938			
b) 2014-2018							
1.Planting of saplings (replenishments)	unit	10 400	80	130			10% of total volume
2. Seeding	-	-	-	-	-	-	
3. Maintenance (weeding)	unit	829 600	500	1 659			shall be implemented 8 times
4. Maintenance cuts	cub.m	100	3	33			
Total				1 822			

6.2.1. CONTROLLING UNWANTED VEGETATION (CLEANING OF PLANTATIONS FROM GRASSES AND WEEDS)

Cleaning of plants from grass and weeds will be carried out in the process of maintaining (weeding) of saplings.

6.2.2. PEST CONTROL MEASURES

For the purpose of planning of pest control measures, the status of forests and plantations shall be studied periodically and the relevant measures shall be taken is required.

6.2.3. OTHER MEASURES (SOIL CULTIVATION, APPLYING FERTILIZERS, MANURING, HERBICIDES, ETC.)

No other measures are planned on test site. The need of implementation of specific measures shall be determined on the basis of the results of monitoring, performed periodically (specially). As the territory belongs to high fire risk, special attention should be paid to observance of prevention rules.

6.3. QUANTIFICATION AND COST CALCULATION FOR POST-TRANSFORMATION MEASURES ((MEASURES FOR THE PERIODS OF 2012 – 2012 AND 2014 – 2018 TO BE SEPARATED)

6.3.1. QUANTIFICATION OF MATERIALS AND WORKS NEEDED AND COST CALCULATION (SITES 1 AND 2 – KHASHURI AND TSAVKISI TEST SITES)

In 2012, in the late fall, planting of saplings will be implemented partially and seeding – in full.
In 2013, in the early spring, planting of the remainder part of saplings will be implemented as well as maintenance of crops – in July and August.
Planting should be implemented in a limited time frame (should not last for more than one month), as well as weeding – it should not last for more than two weeks.
In the period following 2013 the measures should be implemented as required, with observance of the above mentioned rules.

CHAPTER 7. SUMMARY FOR ALL SILVICULTURAL MEASURES

7.1. SUMMARY FOR TRANSFORMATION AND POST-TRANSFORMATION WORKS AND COST CALCULATION FOR 2012-2013

Description of works	Unit of measurement	Volume of works	Daily norm of works	Number of required man/ days	Cost of works. GEL		Note
					man/ days	Total	
1	2	3	4	5	6	7	8
Khashuri test site 2012 – 2013							
1.Planting of saplings	Unit	65 800	80	822			
2.Seeding	m^2	–	–	–	–	–	
3.Maintenance (weeding)	Unit	197 400	500	395	–	–	Shall be implemented 3 times
4.Maintaining cuts	–	–	–	–	–	–	
Total				1217			
Tsavkisi test site 2012 – 2013							
1.Planting of saplings (replenishment)	Unit	103 700	80	1296			10% of total q-ty
2.Seeding	m^2	30 000	1500	20	–	–	
3.Maintenance (weeding)	Unit	311 000	500	622			Shall be implemented 3 times
4. Maintenance cuts	cub.m	–	–	–	–	–	
Total				1 938			
Total on both sites							
1.Planting of saplings (replenishment)	Unit	169500	80	2118			
2.Seeding	m^2	30000	1500	20			
3.Maintenance (weeding)	Unit	508400	500	1017			
4. Maintenance cuts	cub.m	–	–	–			
Sum				3155			

7.2. SUMMARY FOR POST- TRANSFORMATION WORKS AND COST CALCULATION FOR 2014-2018

Description of measures	Unit of measurement	Volume of works	Daily norm of works	Number of required man/ days	Cost of works, GEL		Note
					Man/ days	Total	
1	2	3	4	5	6	7	8
Khashuri test site 2014-2018							
1.Planting of saplings (replenishment)	Unit	6 600	80	83			10% of total q-ty
2.Seeding	–	–	–	–	–	–	
3.Maintenance (weeding)	Unit	526 400	500	1 053			Shall be implemented 8 times
4.Maintaining cuts	cub. m	350	3	117			
Total				1253			
Tsavkisi test site 2014-2018							
1.Planting of saplings (replenishment)	Unit	10 400	80	130			10% of total q-ty
2.Seeding	–	–	–	–	–	–	
3.Maintenance (weeding)	Unit	829 600	500	1 659			Shall be implemented 8 times
4. Maintenance cuts	cub. m	100	3	33			
Total				1822			
Total on both sites							
1.Planting of saplings (replenishment)	Unit	17 000	80	213			
2.Seeding	–						
3.Maintenance (weeding)	Unit	1356000	500	2712			
4.Maintenance cuts	cub. m	450	3	150			
Sum				3075			

List of the Used Statutory and Methodological Documents

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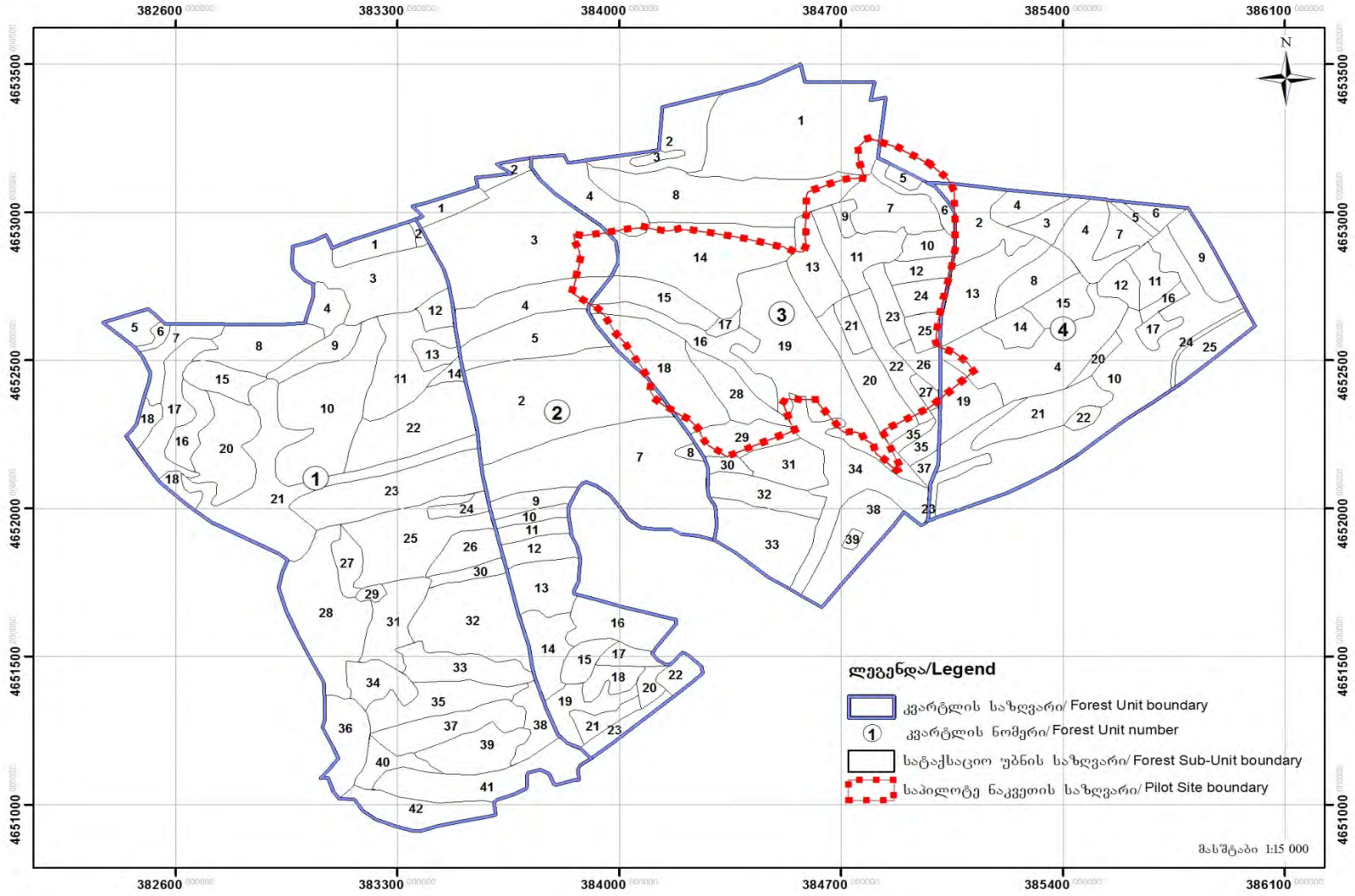
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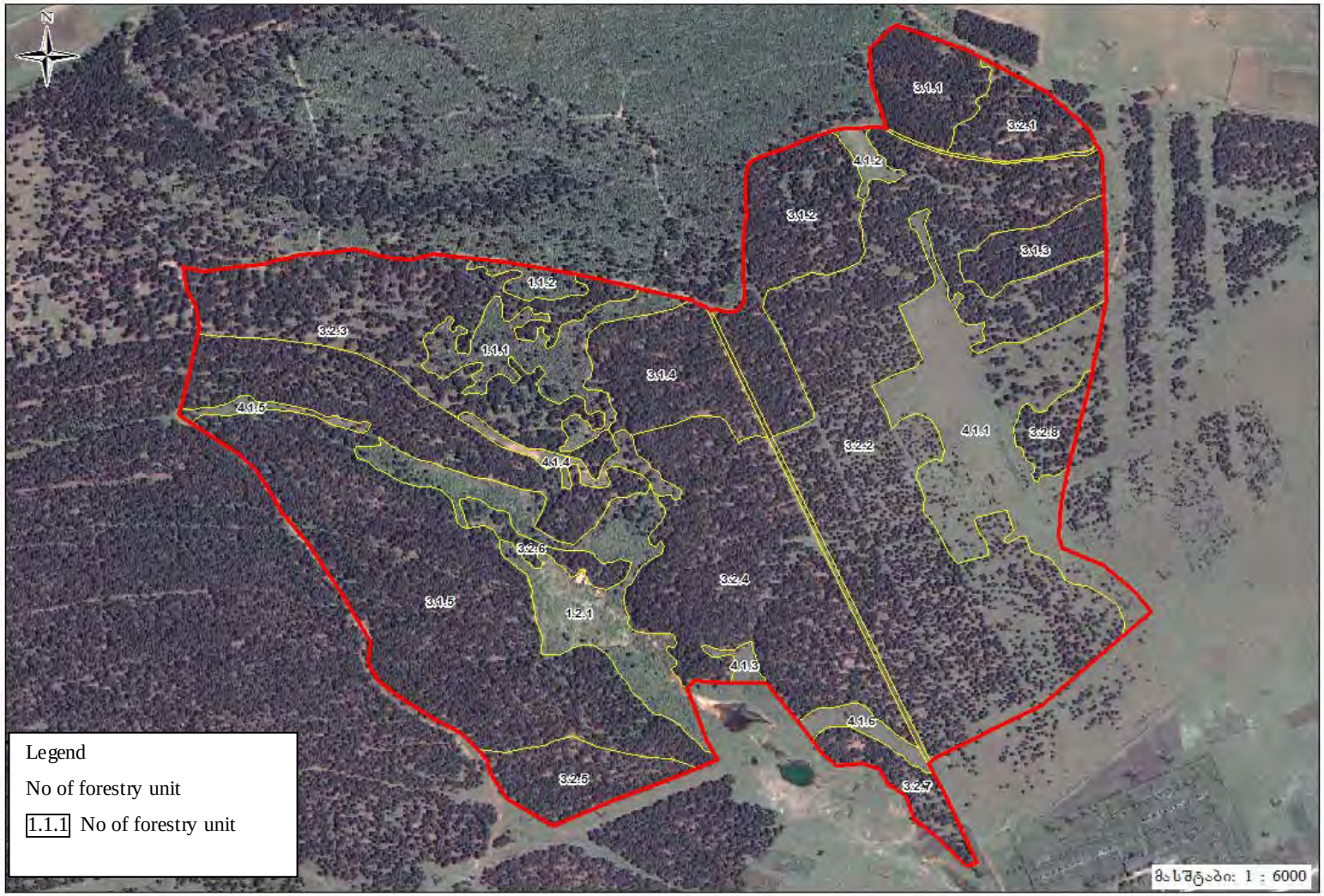
ANNEX 1. THE LIST OF WOOD SPECIES EXISTING ON KHASHURI TEST SITE

#	Name of wood species		Life form			Origin			Regeneration
	Georgian	Latin	Wood	Shrub	Liana	Natural	Artificial	Local	
1	2	3	6	7	8	9	10	11	12
1.	Black pine	Pinus nigra	+	–	–	–	+	–	+
2.	Caucasian pine	Pinus hamata, Kochinana	+	–	–	–	+	+	+
3.	Oriental spruce	Picea orientalis	+	–	–	+	–	+	+
4.	Georgian oak	Quercus iberica	+	–	–	+	–	+	+
5.	Field maple	Acer campestre	+	–	–	+	–	+	+
6.	Ash-tree	Fraxinus lexcelsior	+	–	–	+	–	+	+
7.	Hornbeam	Carpinus caucasica	+	–	–	+	–	+	+
8.	Elm	Ulmus carpinifolia	+	–	–	+	–	+	+
9.	Lime-tree	Tilia caucasica	+	–	–	+	–	+	+
10.	Wild pear	pirus caucasica	+	–	–	+	–	+	+
11.	Wild apple	Malus orientalis	+	–	–	+	–	+	+
12.	Wild cherry	Carasus avium	+	–	–	+	–	+	+
13.	Wild plum	prunus divaricata	+	–	–	+	–	+	+
14.	Oriental hornbeam	Carpinus orientalis	–	+	–	+	–	+	+
15.	Jerusalem thorn	Paliurus spina	–	+	–	+	–	+	+
16.	Black hawthorn	Crataegus pentagyna	–	+	–	+	–	+	+
17.	Red hawthorn	Crataegus microphylla	–	+	–	+	–	+	+
18.	Medlar	Mespilus germanica	–	+	–	+	–	+	+
19.	Blackthorn	prunus spinosa	–	+	–	+	–	+	+
20.	Buckthorn	Rhamnus pallasii	–	+	–	+	–	+	+
21.	Meadow sweet	Spiraea hypercifolia	–	+	–	+	–	+	+
22.	Honeysuckle	Lonicera iberica	–	+	–	+	–	+	+
23.	Goat's leaf	Lonicera carpinifolium	–	–	+	+	–	+	+
24.	Caucasian honeyberry	Lonicera caucasica	–	+	–	+	–	+	+
25.	Dog-rose	Rosa canina	–	+	–	+	–	+	+
26.	Blackberry	Rubus sp.	–	+	–	+	–	+	+
27.	Hag-weed	Chamaecytisus caucasicus	–	+	–	+	–	+	+
28.	Gaiter-tree	Swida australis	–	+	–	+	–	+	+

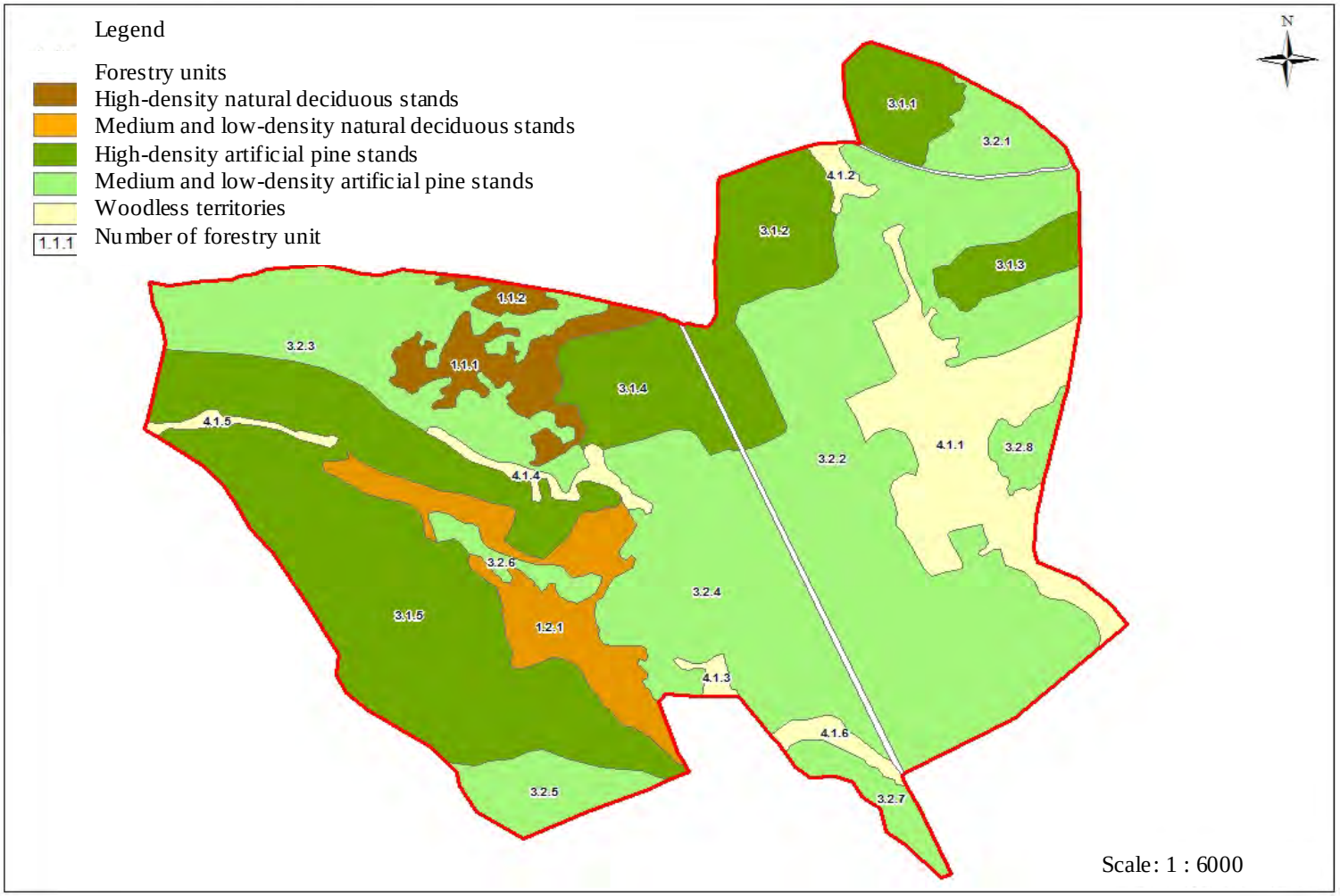
ANNEX 2. KHASHURI TEST SITE ON THE LAYOUT OF KHASHURI FOREST STANDS OF KHASHURI FORESTY



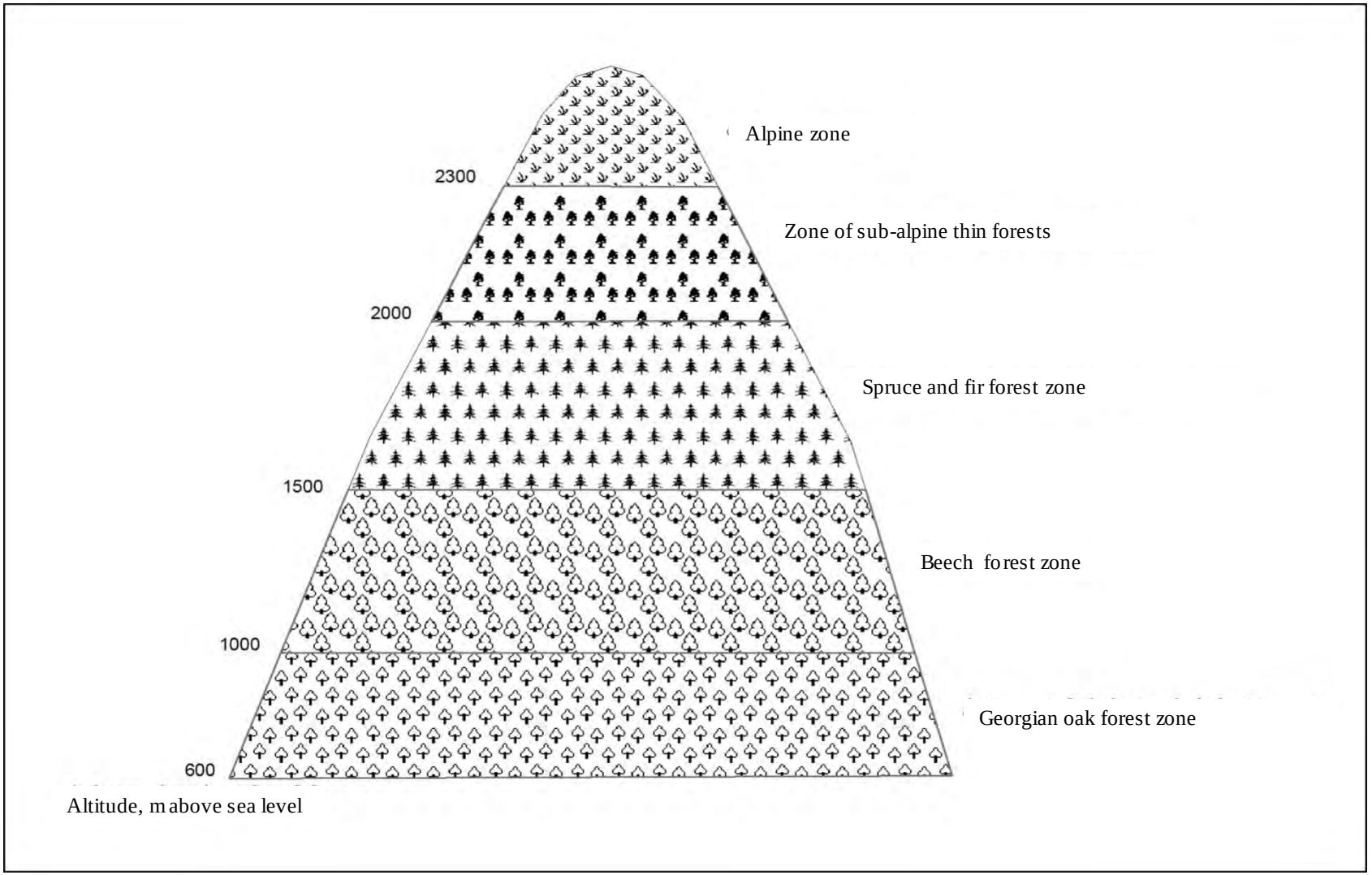
ANNEX 3. DIVISION OF KHASHURI TEST SITE INTO FOREST UNITS IN ORTHOPHOTO



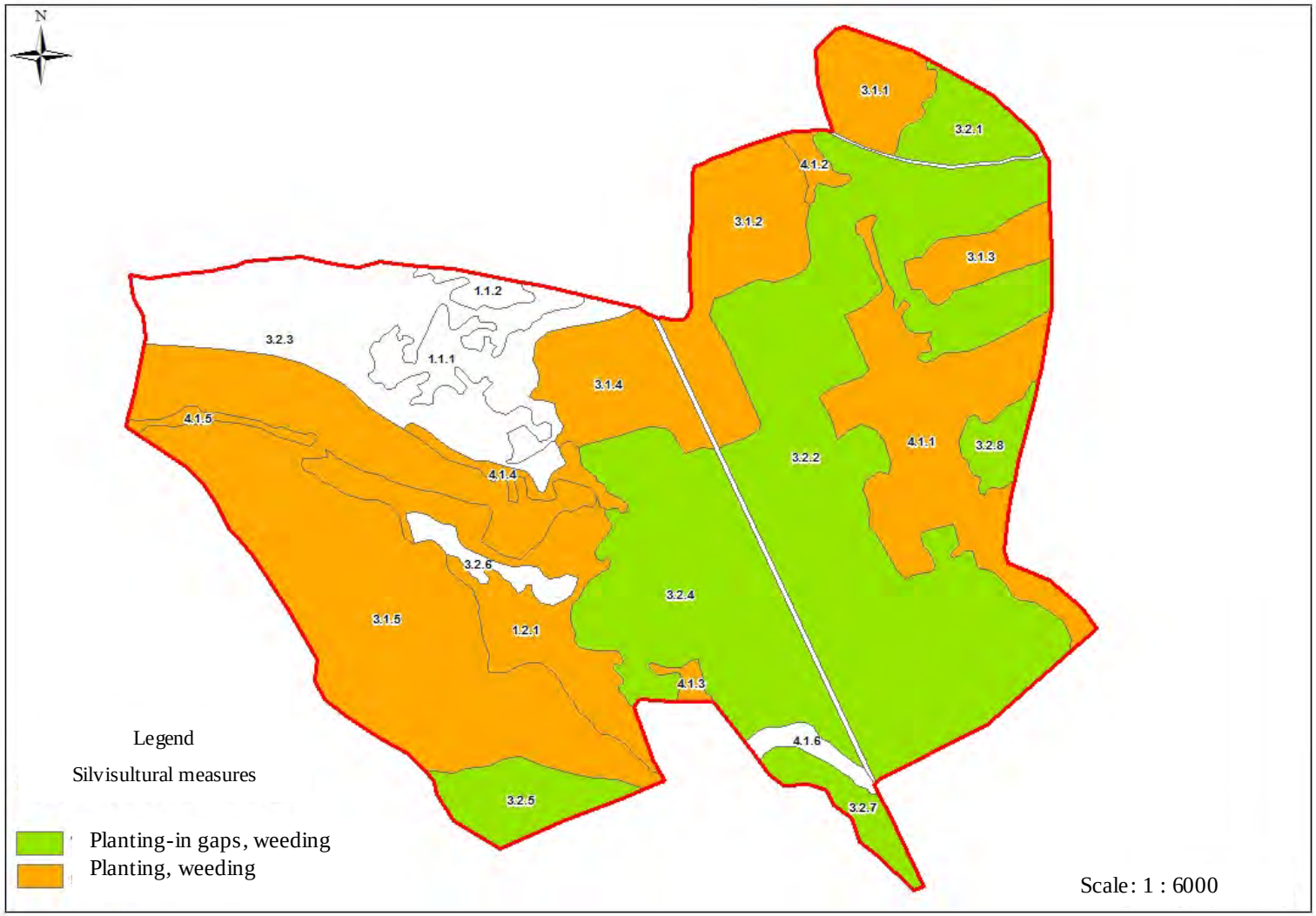
ANNEX 4. DIVISION OF KHASHURI TEST SITE INTO FOREST UNITS



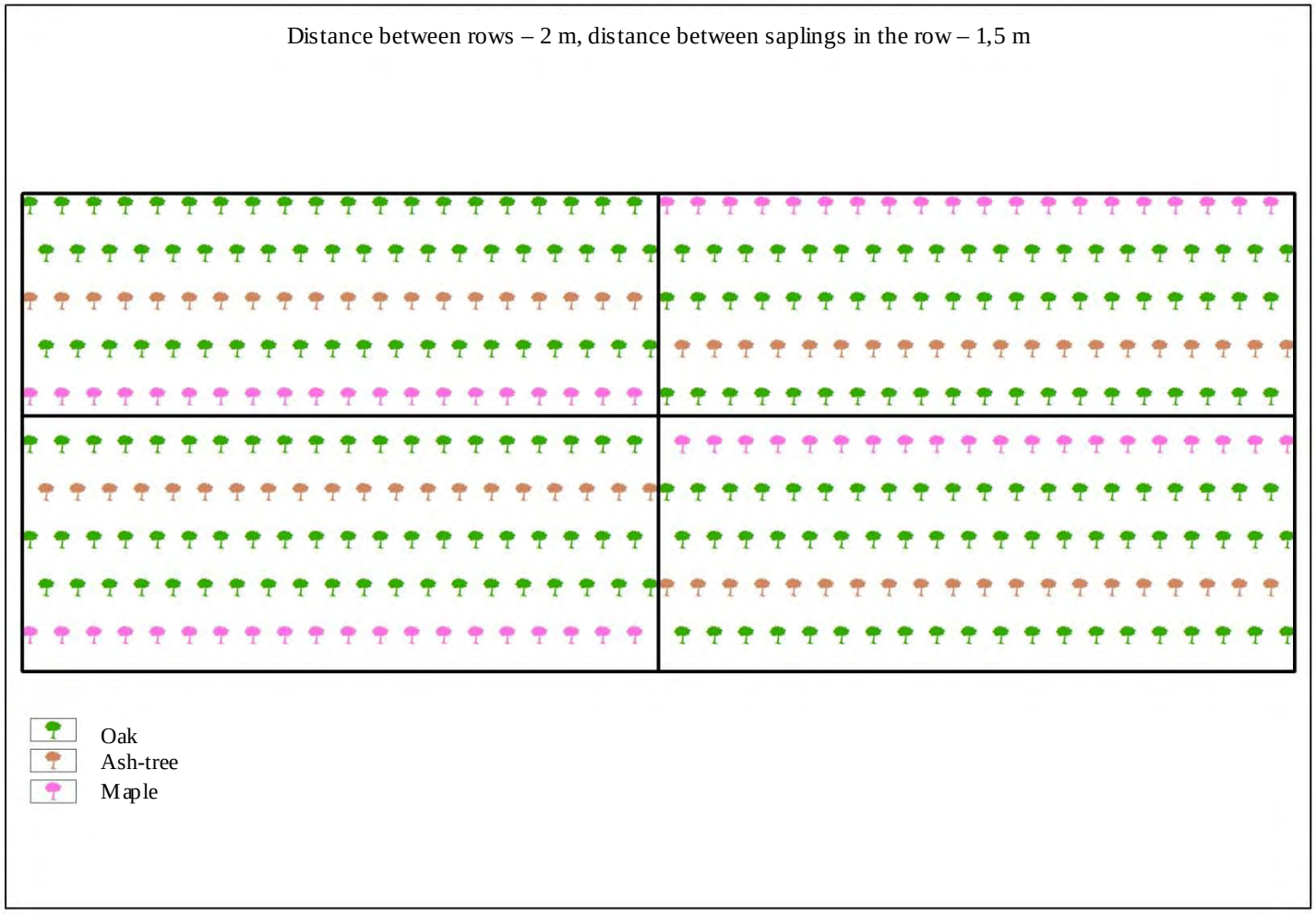
ANNEX 5. VERTICAL ZONING SCHEME OF ZEMO AND SHUA KARTLI FOREST VEGETATION DISTRICT



ANNEX 6. DIVISION OF KHASHURI TEST SITE ACCORDING TO SILVICULTURAL MEASURES



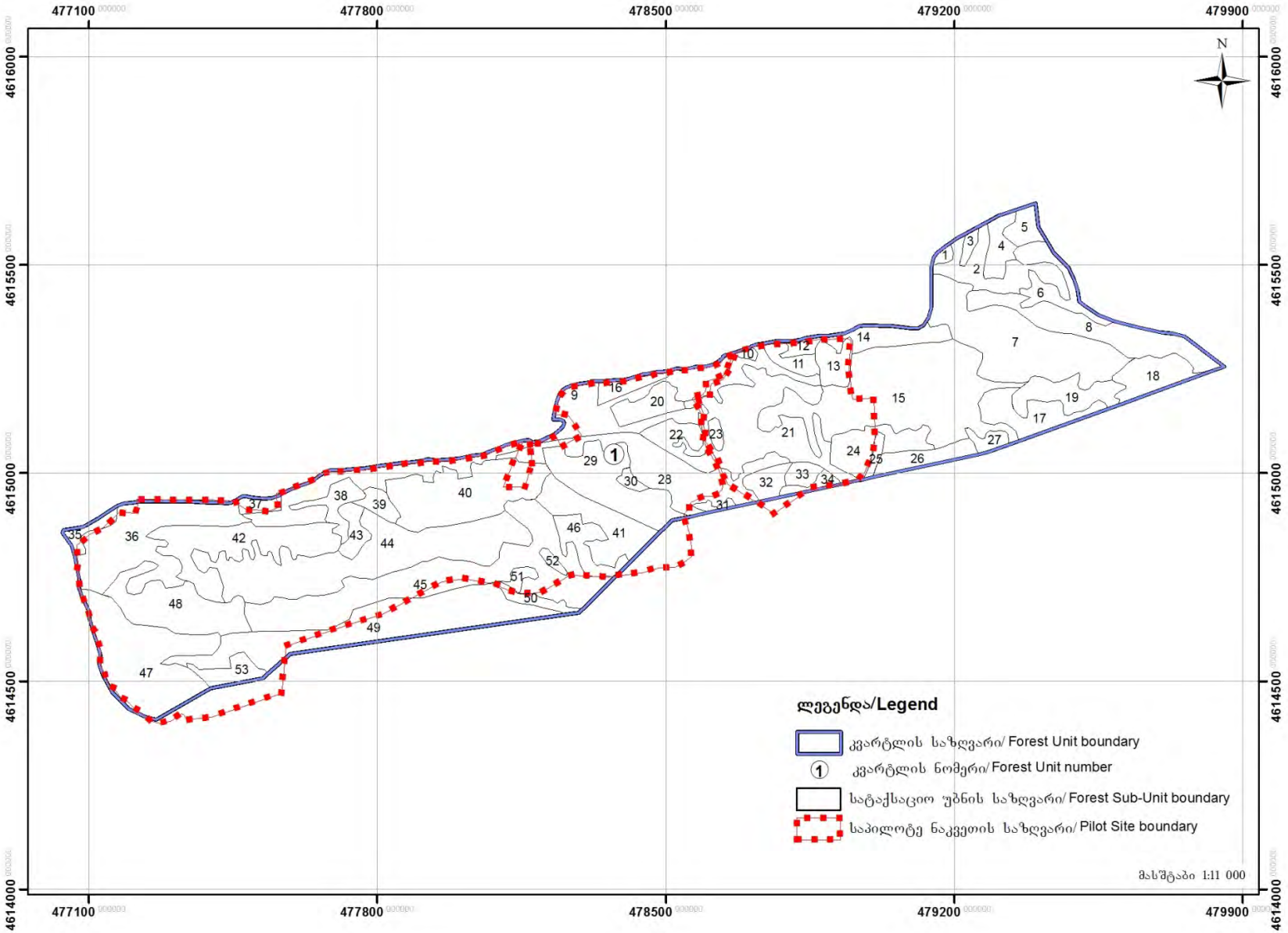
ANNEX 7. SCHEMATIC DIAGRAM OF DISLOCATION OF ROWS AND WOOD SPECIES ON KHASHURI TEST SITE



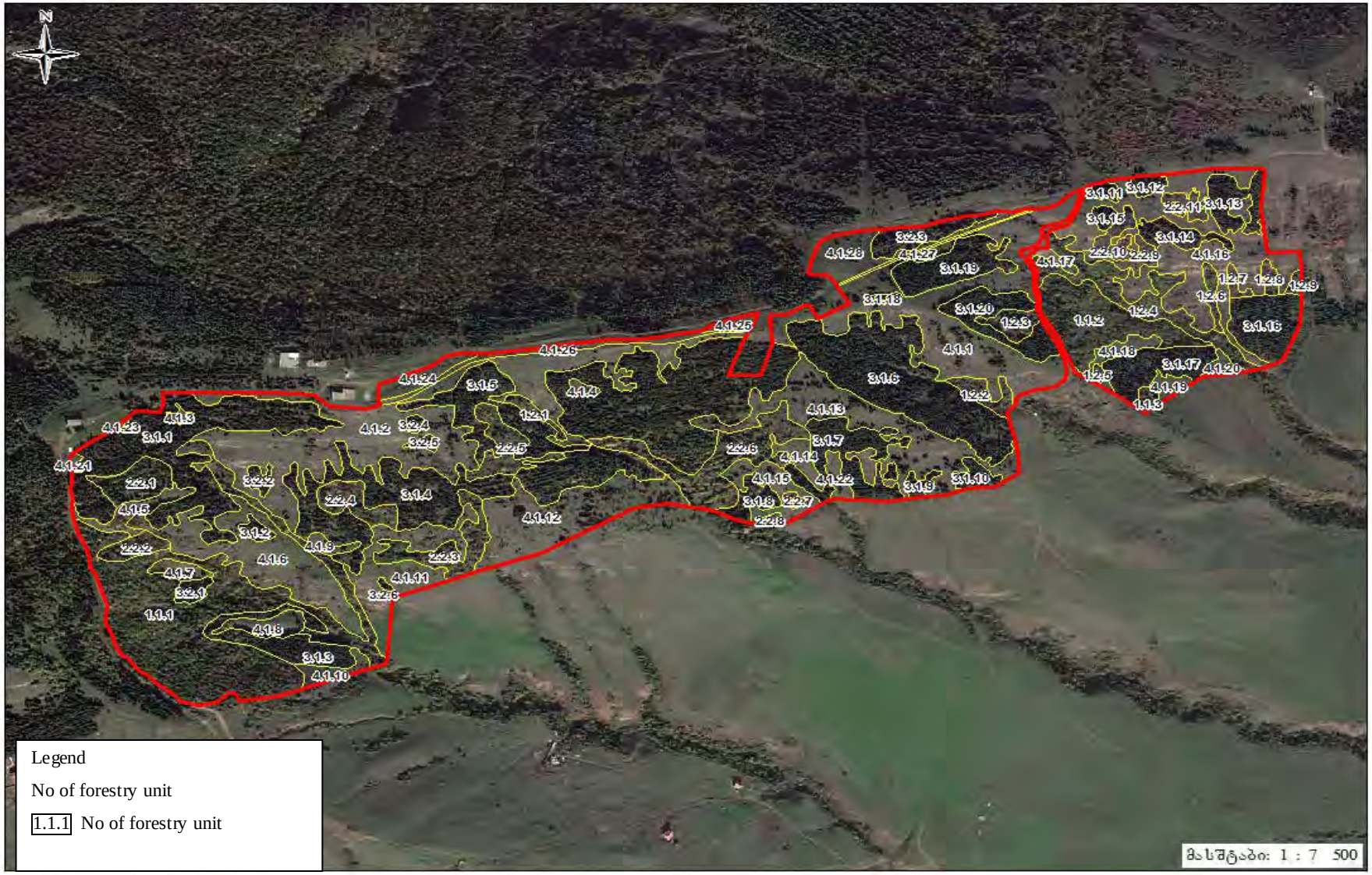
ANNEX 8. THE LIST OF WOOD SPECIES EXISTING ON TSAVKISI TEST SITE

#	Name of wood species		Life form			Origin			Regeneration
	Georgian	Latin	Tree	Shrub	Liana	Natural	Artificial	Local	
1	2	3	6	7	8	9	10	11	12
1.	Black pine	Pinus nigra	+	–	–	–	+	–	–
2.	Caucasian pine	Pinus hamata, Kochinana	+	–	–	–	+	+	+
3.	Georgian oak	Quercus iberica	+	–	–	+	+	+	+
4.	Field maple	Acer campestre	+	–	–	+	+	+	+
5.	Ash-tree	Fraxinus lexcelsior	+	–	–	+	+	+	+
6.	Hornbeam	Carpinus caucasica	+	–	–	+	–	+	+
7.	Elm	Ulmus carpinifolia	+	–	–	+	–	+	+
8.	Lime-tree	Tilia caucasica	+	–	–	+	–	+	+
9.	Wild pear	pirus caucasica	+	–	–	+	–	+	+
10.	Wild apple	Malus orientalis	+	–	–	+	–	+	+
11.	Wild cherry	Carasus avium	+	–	–	+	–	+	+
12.	Wild plum	prunus divaricata	+	–	–	+	–	+	+
13.	Goat willow	Salix caprea	+	–	–	+	–	+	+
14.	Caucasian nettle tree	Celtis caucasica	+	–	–	+	–	+	+
15.	Oriental hornbeam	Carpinus orientalis	–	+	–	+	–	+	+
16.	Willowleaf pear	Pirus salicifolia	–	+	–	+	–	+	+
17.	Almond	Amygdalus campestre	+	–	–	–	+	–	–
18.	Wild apricot	Armeniaca vulgaris	+	–	–	–	+	–	–
19.	Golden-chain	Laburnum anagiroides	–	+	–	–	+	–	+
20.	Soap tree	Coelreuteria paniculata	+	–	–	–	+	–	–
21.	Smoke-tree	Cotinus coggygria	–	+	–	+	–	+	+
22.	Jerusalem thorn	Paliurus spina	–	+	–	+	–	+	+
23.	Black hawthorn	Crataegus pentagyna	–	+	–	+	–	+	+
24.	Red hawthorn	Crataegus microphylla	–	+	–	+	–	+	+
25.	Medlar	Mespilus germanica	–	+	–	+	–	+	+
26.	Blackthorn	prunus spinosa	–	+	–	+	–	+	+
27.	Buckthorn	Rhamnus pallasii	–	+	–	+	–	+	+
28.	Meadow sweet	Spiraea hypercifolia	–	+	–	+	–	+	+
29.	Honey suckle	Lonicera iberica	–	+	–	+	–	+	+
30.	Goat's leaf	Lonicera carpinifolium	–	–	+	+	–	+	+
31.	Honeyberry	Lonicera caucasica	–	+	–	+	–	+	+
32.	Dog-rose	Rosa canina	–	+	–	+	–	+	+
33.	Barberry	Berberis vulgaris	–	+	–	+	–	+	+
34.	Blackberry	Rubus sp.	–	+	–	+	–	+	+
35.	Hag-weed	Chamaecytisus caucasicus	–	+	–	+	–	+	+
36.	Scarlet firethorn	Piracantha caccinea	–	+	–	+	–	+	+
37.	Cornel	Cornus mas	–	+	–	+	–	+	+
38.	Gaiter-tree	Swida australis	–	+	–	+	–	+	+
39.	Wahoo	Euonymus verrucosa	–	+	–	+	–	+	+

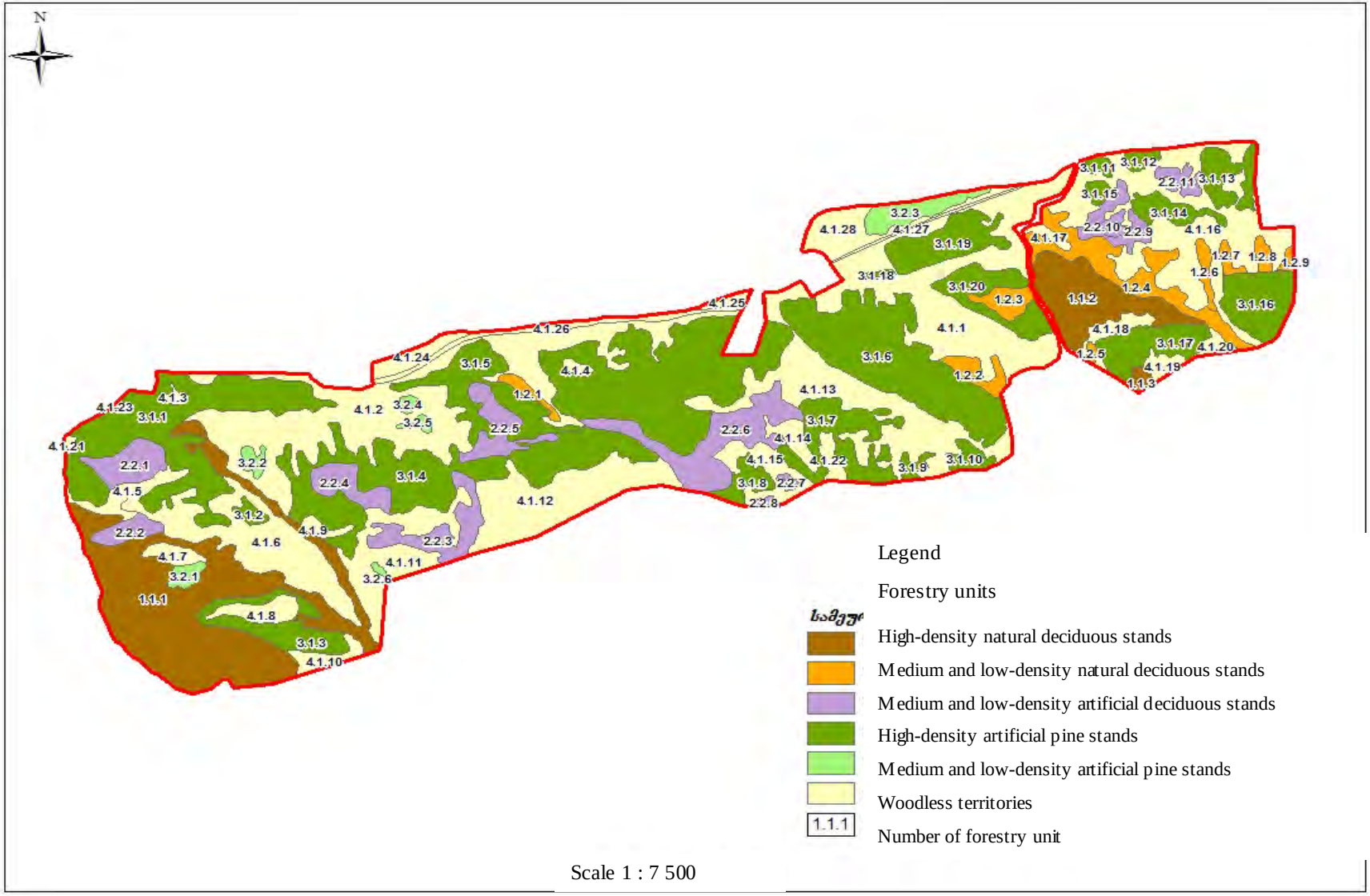
ANNEX 9. TSAVKISI TEST SITE ON THE LAYOUT OF TSAVKISI FOREST STANDS OF TBILISI FORESTRY



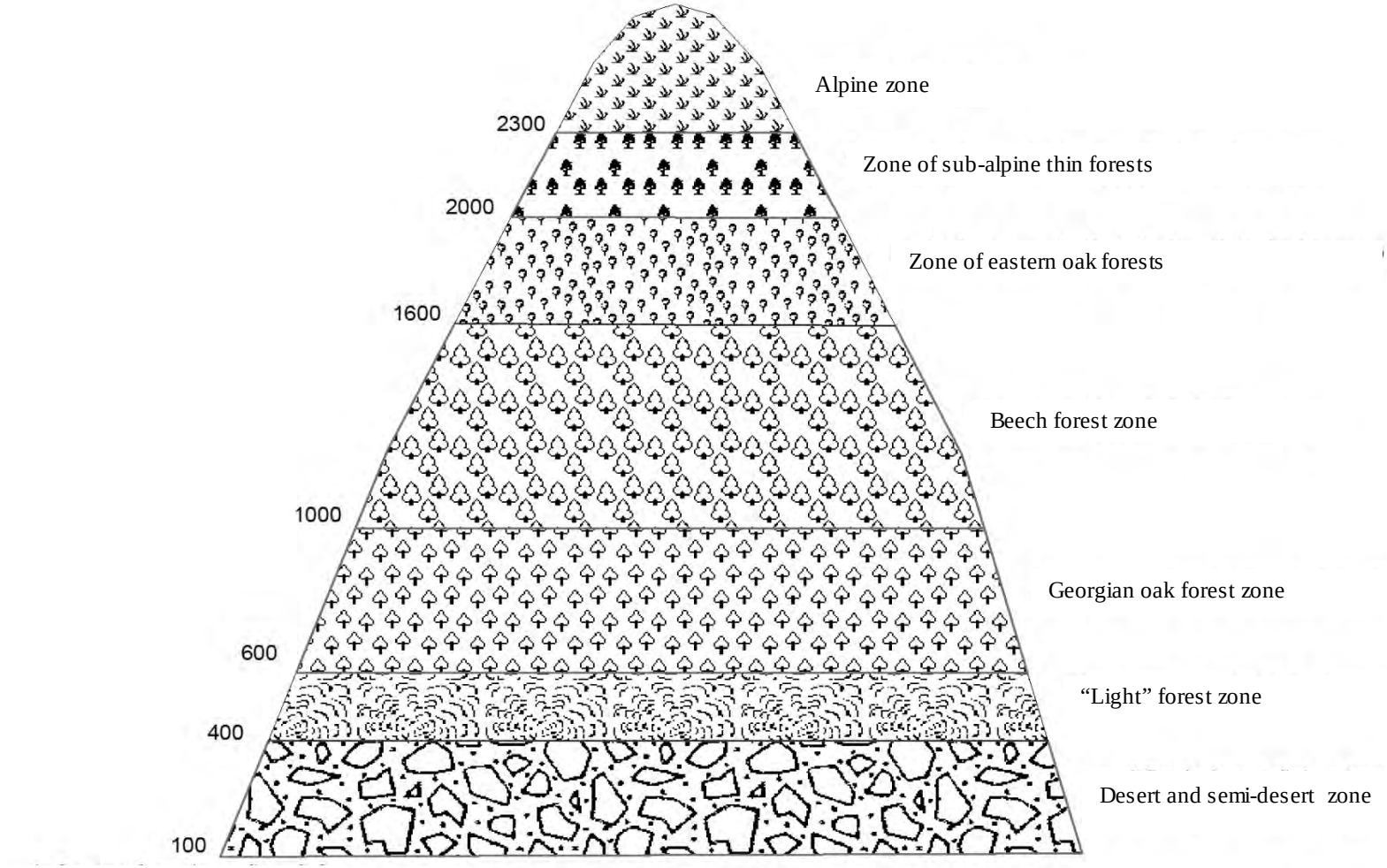
ANNEX 10. DIVISION OF TSAVKISI TEST SITE INTO FORESTRY UNITS IN ORTHOPHOTO



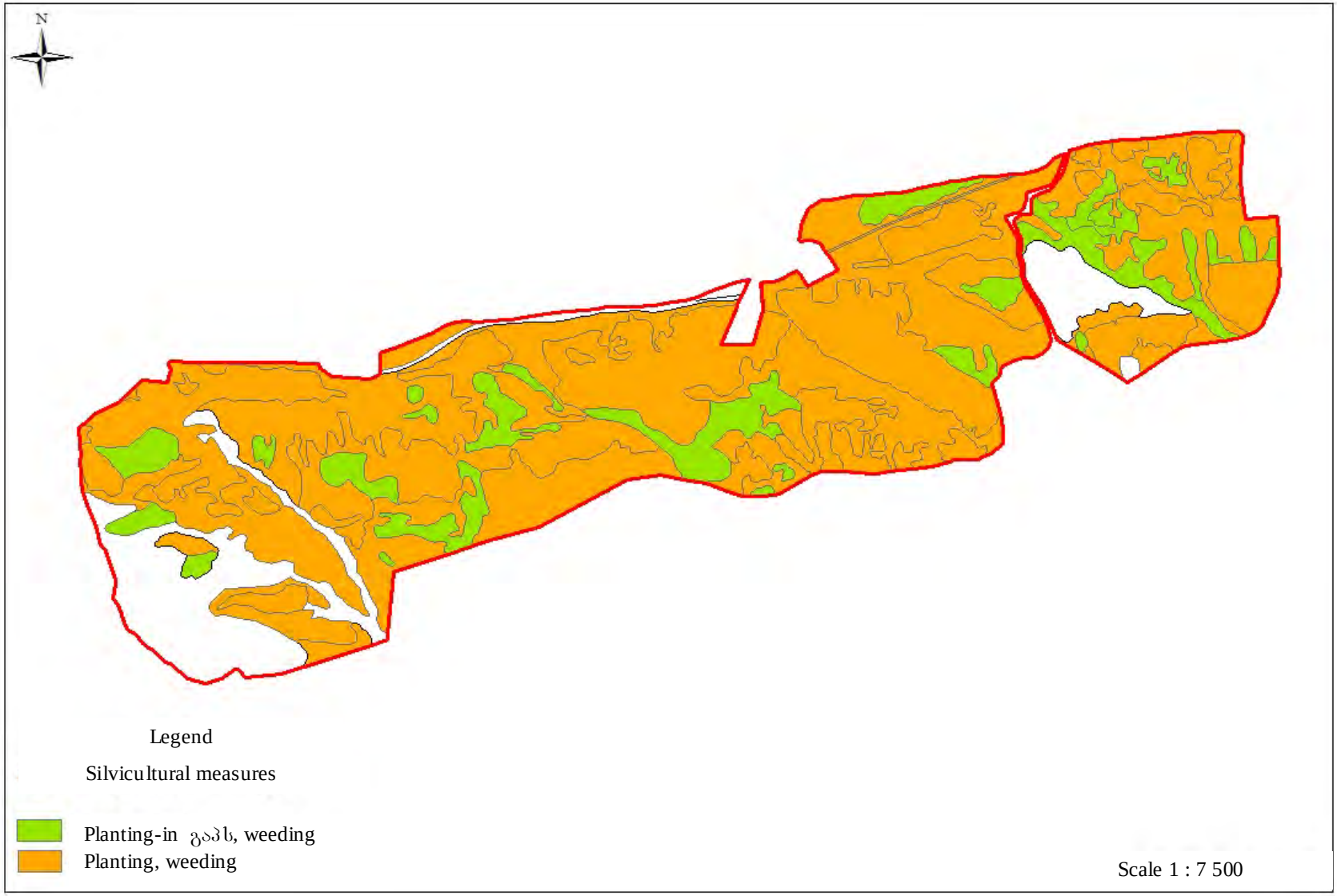
ANNEX 11. DIVISION OF TSAVKISI TEST SITE INTO FORESTRY UNITS



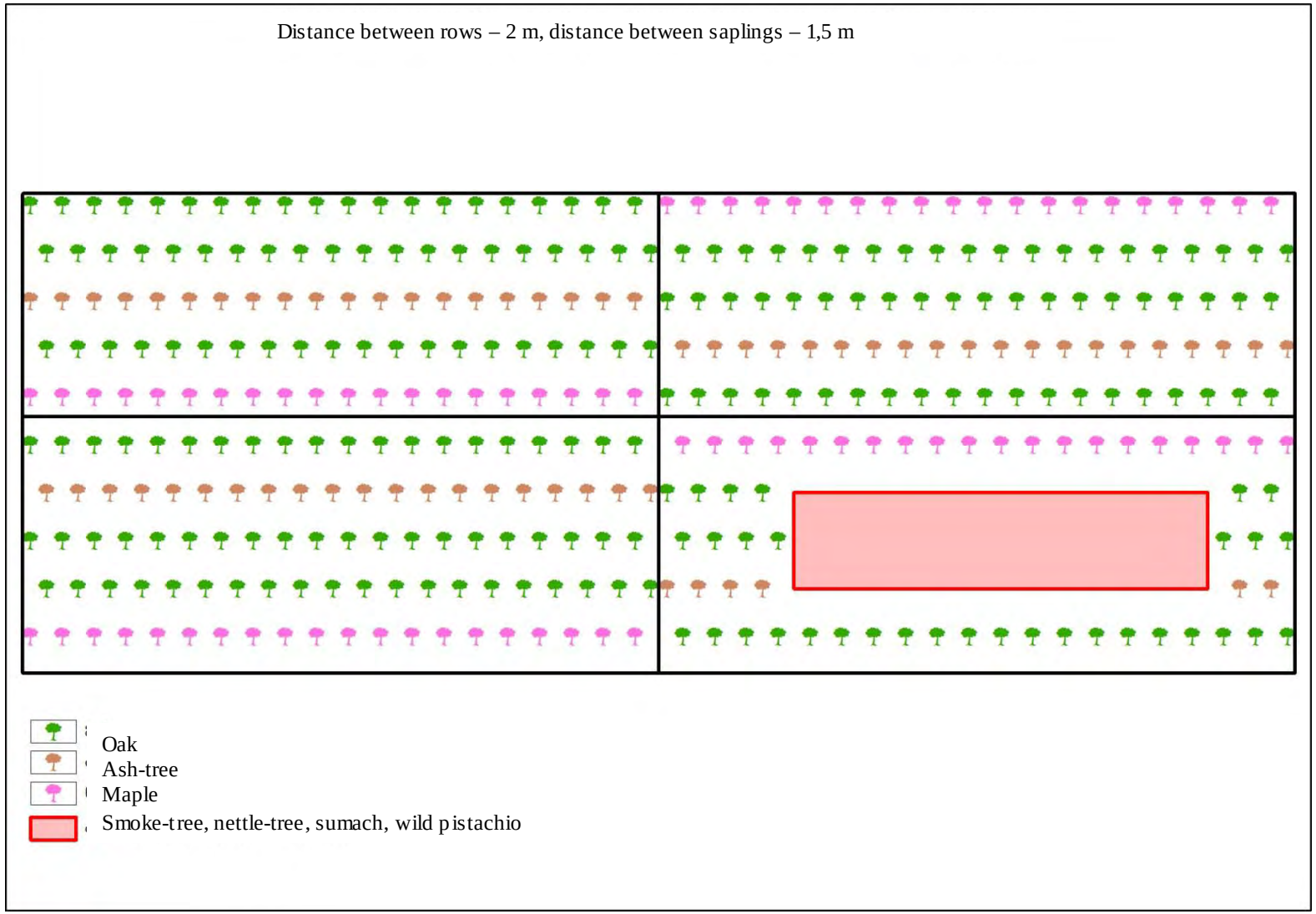
ANNEX 12. SCHEME OF VERTICAL ZONING OF CENTRAL AND EAST CAUCASIAN FOREST VEGETATION



ANNEX 13. DIVISION OF TSAVKISI TEST SITE ACCORDING TO SILVICULTURAL MEASURES



ANNEX 14. SCHEMATIC DIAGRAM OF DISLOCATION OF ROWS AND WOOD SPECIES ON TSAVKISI TEST SITE



ANNEX 15. BOTANICAL CHARACTERISTIC OF THE TEST SITE

KHASHURI SITE

Pine forest tract subject to reconstruction, with the area about 80 ha is located near Khashuri, on the ridge included in the system of Likhi Ridge, on the slope of south exposition with angle of 6-10^0, in the range of 750 – 850 m above sea level.

General geo-botanical characteristics of the forest are as follows:

Soil – forest brown, medium depth, skeletal, dryish. Black pine dominates in the forest composition with mixture of Caucasian (Sosnovsky) pine in few quantities. Forest density is uneven, varies in the range of 0.3 – 0.7 (average 0.4 – 0.6). Average ცანოპყ დენსიტყ is 0.5 – 0.7. Age – 45 – 50 years. Undergrowth is not developed, dog-rose, red hawthorn, Caucasian blackberry are encountered singly. The composition of grass is grain – mixed grasses, leading species are slender false bromegrass, wood bluegrass, cockfoot, wild chervil, fleawort, lion's-tooth, forest violet, white clover, Voronov's primula, etc. Natural regeneration of pine stands practically doesn't occur under the forest cover. Locally, mainly in thinned forest sections and forest edges, shrubby young growth of Georgian oak, with height of 10-30 cm (rarely – 2 – 3 m) is noticed. Young growth of pine is also encountered locally, in well-lighted districts.

There are small (diameter 10 – 15 m) and medium (diameter 15 30 m) canopy openings and thinned (density 0 -.2 – 0.3) districts.

The forest performs recreational function (mainly for Khashuri city population). It is systematically grazed (be cattle).

The pine forest, according to geo-botanical zoning of vegetation cover of Georgia, is located in oak tree sub-zone of forest zone. Basic oak forest (Georgian oak), strongly transformed under anthropogenic impact (sprout-based, low productivity), still survived locally on adjacent territories.

In the process of gradual reconstruction of the present pine forest with deciduous forest, local climatic-soil conditions and the basic forest composition existing in the past shall be primarily taken in the account. Consequently, we consider it appropriate to focus on restoration of Georgian oak forest (*Quercus iberica*), which is naturally formed and well adapted to local conditions.

Planting of Georgian oak stands (with 2-year planting; locally planting of oak stands by sowing acorn according to the method of hole-group sowing can be used) is possible in small and medium size canopy openings in pine forests, thin (with density 0.1 – 0.2) pine stand districts and forest edges, where the lighting regime is favorable for the development of oak young growth (up to certain age – 4 – 5 years).

In the process of planting of oak stands the use of ash-tree (*Fraxinus excelsior*) and field maple (*Acer campestre*) as mixed (characteristic, accompanying) species is expedient.

Anticipated risks and the Measures for their Prevention

1. Grazing by all types of cattle is absolutely excluded in pine forest tract subject to reconstruction. Special roads and paths will be used for recreational purposes.
2. Periodically, mainly in the summer and early fall, excessive drying of soil is anticipated, which includes the risk of damage of saplings (death of some saplings isn't even excluded). Thus, watering of lands shall be taken into consideration – according to need.
3. In the period of active growth of grasses (may – June) the risk of their invasion in plantations is quite high. In this regard, performance of the relevant maintaining activities will be required in plantations (weeding- loosening of soil in the holes of trees, cleaning from grasses).
4. The probability of fire in pine forest tract is quite high, especially in dry period of the year (summer, fall), which seriously damages newly planted trees. Thus, efficient fire monitoring, fire signs, etc. shall be provided for).
5. On the 3-4th year from planting the need of additional lighting (light) will emerge for the purpose of normal growth of oak and accompanying species. In this regard, starting from this period, canopy openings (artificial canopy openings) in pine stands shall be gradually widened based on methods, generally applied in forestry.

TSAVKISI SITE

Pine forest tract subject to reconstruction, about 75 ha, is located in Tbilisi outskirts, near the village Tsavkisi, on the south slope of Mamadaviti ridge – east end of Trialeti Ridge, in the range of 925 – 1130 m above sea level. General exposition of the slope – south, angle varies from 15^0 to 25^0. General geo-botanical –silvicultural characteristics of the forest are as follows:

Soil – medium and little depth (from 15 to 40 cm), dry, rocky-sliderock (ხრეში) ecotopes.

Black pine prevails in the forest composition. In small quantities (mainly on the forest edges) ash-tree, wild apple is mixed. Forest density varies in the range of 0.3 – 0.8. Average canopy density – 0.5 – 0.8. Age – 35 – 40 years. Undergrowth is not developed, oriental hornbeam, red hawthorn, dog-rose, Caucasian blackberry occur singly and in groups on the edges of forest stands. Grass cover is of steppe grass type, leading species are steppe fescue, feather grass, timothy, bloodwort, coronilla, etc.

The forest performs recreational function (for Tbilisi and Tsavkisi population, tourists). It is systematically grazed (by cattle).

Pine forest is located in Georgian oak forest sub-zone of forest zone. On the territories adjacent to pine forest steppe vegetation is developed, mainly with feather grass and fescue. On the north exposition slopes small plots of modified variants of basic forest – sprout-originated Georgian oak stands occur.

On the mentioned territory (east end on Trialeti Ridge) the climate is dry, steppe-type – hot and droughty (average annual precipitation make 500 mm). Basic oak forest, which was prevailing in the natural landscape during the last 2-3 centuries, was gradually replaced by dry steppe and xerophilous shrub (oriental hornbeam, meadow-sweet, Jerusalem thorn shrubs) vegetation.

There are many small, medium and large canopy openings in artificially planted pine forest. Artificial plantation of Georgian oak (*Quercus iberica*) forest (dominant – Georgian oak, mixed species – ash-tree, field maple, willow-leaf pears) is appropriate in these canopy openings, as well as thinned forest districts, forest edges and territories adjacent to forest, medium and small depth soils.

On the territory subject to afforestation, locally, there are some steep-sloped (30^0 and over) dry rocky ecopotes, where, in my opinion, plantation of thin forest (about 150-200 grown-up trees per 1 ha) of resistant species – nettle tree (*Celtis caucasica*) is appropriate with planting, in-between the crowns, highly decorative drought-resistant shrubs – smoke-tree (*Cotinus coggygria*) and sumach (*Rhus coriaria*).

Anticipated risks and the Measures for their Prevention

1. Damage by cattle (proper protection of plantations is required).
2. Periodically, in droughty summer period the risk of damage of saplings is high. Thus, periodic watering of saplings shall be taken into consideration, especially during 3-5 years from planting.
3. In the period of active growth of steppe vegetation – in the spring and first half of summer - the risk of invasion of steppe grasses in tree plantations is quite high. In this regard, performance of the relevant maintaining activities will be required in plantations (loosening of soil in the holes of trees, cleaning from grasses).
4. Due to close proximity with village and great recreational loading, the risk of fire in pine stands and adjacent steppe vegetation is quite high all year round. Thus, efficient fire- prevention measures shall be taken (removal of grass mass accumulated in pine forest tract, fire monitoring, warning fire signs).

Revaz Kvachakidze
Doctor of Biology, Professor

ANNEX 16. DESCRIPTION OF SOILS OF TES SITES
Khashuri Site

For the purpose of study of soils field works were performed on the territory adjacent to Khashuri.

To sections were made for study of soil in the forest as well as open area. Morphological description of soil was carried out in accordance with Methodological Guidelines developed by S. Zonn and T. Urushadze (1974). Mechanical composition of soil was determined in laboratory (by pipette method), as well as some chemical parameters; soil solution reaction (pH) – by electric potentiometer.

The studied territory represented the sub-type of brown leached soils.

Morphological description of sections is provided for soil characterization:

Section #3. Woody area.

0 – 5 m – brown-greyish colour, grainy- granular structure, moist, dense alumina, thin grass roots, doesn't hiss under the impact of 10% HCl.

5 - 20 cm - brown-greyish colour, grainy- granular structure, alumina, moist - denser, single thick grass roots, single tree roots, doesn't hiss under the impact of 10% HCl.

20- 30 - < cm - brown-greyish colour, grainy structure, dense alumina, moist, tree roots, doesn't hiss under the impact of 10% HCl.

Section #4. Woodless area.

0 – 5 m – brown-greyish colour, grainy- granular structure, moist, dense alumina, thin grass roots, doesn't hiss under the impact of 10% HCl.

5 - 20 cm - brown-greyish colour, grainy- granular structure alumina, moist, denser, single thick grass roots, single tree roots, doesn't hiss under the impact of 10% HCl.

20- 30 - < cm - brown-greyish colour, grainy structure, dense alumina, moist, tree roots, doesn't hiss under the impact of 10% HCl.

Basic morphological signs of soils are: - brown-greyish colour; grainy- granular structure; alumina; mechanical composition; very dense; carbonate-free.

Some Physical- chemical parameters of studied soils

Section #	Horizon, depth (cm)	pH	$CaCO_3$%	Humus %	N %	Mechanical fractions %	
						<0.001	<0.01
3. Woody, Khashuri	0-5	6.7	_	4.4	0.22	34.42	57.56
	5-20	6.8	_	2.8	0.14	36.64	59.34
	20-30	6.7	_	0.7	0.03	35.72	58.12
4. Woodless, Khashuri	0-5	6.6	_	3.2	0.16	34.88	59.08
	5-20	6.7	_	1.1	0.06	35.94	62.24
	20-30	6.7	_	0.5	0.02	34.40	61.48

According to mechanical composition it belongs to heavy alumina. Content of sediment fraction varies in the range of 57.56 – 62.24%. Besides, Accumulation of sediment fraction and physical clay fraction is noticed in the middle of the profile.

The studies soil trends to neutral, p = 6.6 – 6.8. Humus content in upper humus-bearing horizon is 4.4 – 320.22 %, decreases with the depth and equals to 0.7 – 0.5 % in lower horizon. General nitrogen content is correspondingly 0.22 – 0.16 % and 0.03 – 0.02 %.

Thus, the studied soils belong to brown leached soil sub-type, with brown- greyish colour, low humus content, decreasing with the depth, grainy- granular structure; according to mechanical composition they belong to heavy alumina, the reaction of soils trends to neutral.

Based on the results of study of soil (granular structure and chemical composition) conditions of the territory it could be concluded that the mentioned territory is suitable for planting in the case of correctly selected plant species and observance of proper agri-technical conditions.

Tsavkisi site

Medium and small depth, rocky- pebbled soils are represented here. The studied soils are developed on clay- shale.

2 sections were made for the purpose of study of soils in pine plantation as well as in woodless area. Morphological description of soil profile was carried out in accordance with Methodological Guidelines developed by S. Zonn and T. Urushadze (1974). Mechanical composition of soil was determined in laboratory (by pipette method), as well as some chemical parameters; soil solution reaction (pH) – by electric potentiometer, humus content - according to Turin, general nitrogen.

The studied territory is represented by brown soil.

Morphological description of sections is provided for soil characterization:

Section #3. Pine plantations.

0 – 5 m – brown, light alumina of fine grainy structure, moist, a lot of thin grass roots, small-size rock debris, doesn't hiss under the impact of 10% HCl.

5 - 20 m – light brown, light alumina of fine grainy structure, moist, a lot of thin grass roots, small-size rock debris, doesn't hiss under the impact of 10% HCl.

20 - 30 m – light straw-colour - brown, light alumina of fine grainy structure, moist, thin grass roots, a lot of large rock debris, doesn't hiss under the impact of 10% HCl.

30 cm - <– rock, slates.

Section #2. Woodless area.

0 – 5 m – light brown, light alumina of fine grainy structure, moist, a lot of thin grass roots, small-size rock debris, doesn't hiss under the impact of 10% HCl.

5 - 20 m – lighter brown- straw colour, light alumina of fine grainy structure, moist, thin grass roots, small-size rock debris, doesn't hiss under the impact of 10% HCl.

20 - 30 m – light straw-colour - brown, light alumina of fine grainy structure, moist, thin grass roots, a lot of large slate debris, doesn't hiss under the impact of 10% HCl.

30 cm - <– rock, slates.

Some Physical- chemical parameters of studied soils

Section #	Horizon, depth (cm)	pH	$CaCO_3$ %	Humus %	N %	Mechanical fractions %	
						<0.001	<0.01
1.	0-5	6.2	_	3.2	0.16	6.54	25.64
	5-20	6.2	_	2.3	0.14	8.12	29.26
	20-30	6.0	_	0.8	0.06	6.98	27.44
2.	0-5	6.4	_	3.4	0.17	10.08	27.36
	5-20	6.5	_	1.7	0.08	14.74	31.82
	20-30	7.0	Insignificant	0.8	0.04	12.32	29.48

The studied soils are characterised by light alumina mechanical composition, light brown-staw colour, fine grainy structure, are carbonate-free, soil surface of open area is covered with grass.

As it is seen in the Table, the soils, according to mechanical content, belong to light alumina. Physical clay content (<0.01 mm) varies in the range of 6.54 - 14.74 %.

The considered soils are not canbonated, some rock fragments in the depth weakly hiss under the impact of 10% HCl.

Reaction of soil solution (pH) is weak acid, the indicator of which varies in the range of 6.0 – 6.5. The layer at 20 – 30 cm of section #2 is neutral.

While characterizing soil, the content of humus substances and their distribution in soil profile is very important. The mentioned soils have low humus content, in upper humus horizons it is in the range of 3.2 - 3.4%, decreases with the depth and equals to 0.8 % in low horizon; general nitrogen content is 0.04 - 0.17 %.

Thus, the studied soils belong to brown soil type, are characterized by light brown- staw colour, low humus content, its content decreases with depth, fine grainy structure; according to mechanical composition they belong to light alumina; soil reaction is weak acid.

Based on the results of study of soil (granular structure and chemical composition) conditions of the territory it could be concluded that the mentioned territory is suitable for planting in the case of correctly selected plant species and observance of proper agri-technical conditions.

Research Officer of the Department
of Forest Biodiversity, Planning and Expertise
of Vasil Gulisashvili Forestry Institute,
Academic Doctor Giuli Tsereteli

ANNEX 17. PATHOLOGICAL CHARACTERISTIC OF FORESTS OF THE TEST SITE

RISKS ANTICIPATED IN THE PROCESS OF PLANTATION OF DECIDUOUS SAPLINGS (OAK, ETC.) IN KHASHURI (80 HA) AND TSAVKISI (70 HA)

Sapling farm represents an ecological enterprise where artificial reproduction of wood species is carried out up to certain age, after which forest crop plantations are developed using the obtained planting material.

Many varieties of pests and diseases, causing great harm to young trees, are spread in sapling farms. Some pests feed on root system and if it's newly sprouted, as a rule, lead to its death. Root pests are very harmful for saplings too. For this reason, in regard to future plantation of forests, healthy saplings (stem as well as roots of sapling) shall be selected in sapling farms to make sure that the saplings are not damaged by either pests or diseases.

Compositions of species of pests on the areas allocated for sapling farming is also very important. Various pests can be spread here, which will easily move to saplings and damage them. So silvicultural- pathological research of the allocated site is necessary prior to planting of saplings. If a great number of soil pests such as wireworms (larvae of the beetle family Elateridae) which greatly damage stems, roots and leaves of young saplings (in our case), measures against them shall be taken in advance.

Researches shall be conducted in the area subject to afforestation in regard to residence and reproduction of rodents (forest mouse, red-backed mouse), feeding on root neck bark (phloem), after which tree either dries or becomes the victim of stem pests.

Researches shall also be conducted in the outskirts of the areas subject to planting of saplings in regard to spreading of pests and diseases so that they don't spread on newly planted saplings.

The area, planted with saplings shall be fenced with wire net so that cattle can't eat young saplings; besides, if saplings are only damaged, they become weaker and pests easily settle on weakened plant.

Saplings, located near forest tracts, easily get damaged; some – by pests residing in forest – butterfly worms, bugs, etc. For prevention of spreading of pests by movement of saplings, quarantine measures shall be necessarily observed.

Forest Protection Specialist
Doctor of Biology Archil Supatashvili

ANNEX 18. PHOTOS OF CHARACTERISTIC LANDSCAPES OF TEST SITES
A) KHASHURI TEST SITE



1. General view of the site



2. Power transmission line on the site



3. Thin pine stand



4. Spruce young growth in pine forest



5. Pine young growth in pine stand



6. Oak young growth in pine stand

B) TSAVKISI TEST SITE



1. General view of the site. Artificial pine stand natural oak and oriental hornbeam stand are seen



2. Smoke-tree shrub



3. Astragalus shrubs and on dry, steep slope



4. Blooming corner shrub



5. Willow-leaf pear and smoke-tree



6. Oak young growth in pine stand

Annex 22. Project Leaflet in English

For more information

Malkhaz Dzneladze
Project Regional Coordinator in the South Caucasus
WWF Caucasus Programme Office (WWF-Caucasus)
M. Aleksidze Str. 11, 0193 Tbilisi, Georgia
Tel.: + (995 32) 237 500
Fax : + (995 32) 237 501
E-mail: mdzneladze@wwfcaucasus.ge
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/projects/eu_enrtp_caucasus/

This project is implemented by the WWF partner organizations in the South Caucasus. The views expressed in this publication do not necessarily reflect the views of the European Commission

"The European Union is made up of 27 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development whilst maintaining cultural diversity, tolerance and individual freedoms.

The European Union is committed to sharing its achievements and its values with countries and peoples beyond its borders".

The European Commission is the EU's executive body.

This project is funded by the European Union



Thematic Programme on Environment and Natural Resources, including Energy (ENRTP) Country"

EU Financed Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the South Caucasus Countries through Forest Transformation

(Project Nr. DCI-ENV/2010/221391)

WWF for a living planet

Project regional component in the South Caucasus implemented by WWF Caucasus Programme Office

Regional Component of the EU financed Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the South Caucasus Countries

The Concept

The overall objective of the Project is to increase the resilience of forest ecosystems in the Southern Caucasus, against climate change impacts and to improve biodiversity and livelihoods of local populations.

The overall objective addresses the overarching threat of climate change to biodiversity and to forest ecosystem services which support the livelihoods of rural communities. Those services include protection of soils and water supply and quality, and timber and non-timber forest products.

Objectively Verifiable Indicator for the overall objective is that: by 2015, relevant national authorities will have adopted and started to implement policies that will make forests and the services they provide highly resilient to climate change.

The specific objective of the Project contributes to the overall objective by establishing the necessary conditions for the national forest administrations to develop and implement strategies for transforming monoculture forest stands into highly resilient, “close to nature” forest stands.

Expected Results

Result 1: Selected forest stands in all three countries of the South Caucasus region vulnerable to climate change have been transformed into highly resilient "close to nature" forest stands.

Result 2: Silvicultural guidelines for the transformation of monoculture stands into more resilient stands are elaborated, published in three languages and made available for relevant officials and experts.

Result 3: The capacities of forest administration experts to develop silvicultural strategies to transform monoculture stands into stable, site-adapted forests are increased.

Result 4: The awareness of local communities about the importance of forest rehabilitation with regard to mitigating negative biotic and abiotic impacts of climate change is improved.

Target groups

Forest administrations and community members and local NGOs, CBOs, and self-governance bodies in the pilot site’s locality.

View of Khashuri Pilot Forest Site © M.Dzneladze, WWF-Caucasus

Project Work Packages

The activities of the Project are arranged into four work packages:

1. Research and demonstration package, which will develop and pilot silvicultural measures for forest transformation and provide practical experience in the target countries.

2. Dissemination package for the forest administrations that includes information and materials on forest transformation measures.

3. Capacity-building package, which is designed to train staff of the forest administrations to develop and implement strategies for forest transformation.

4. Awareness raising package, which is aimed at building the awareness in the communities adjacent to the pilot sites and local NGOs and CBOs.



Annex 23. Project Leaflet in Armenian

ԱԿՆԿԱԼՎՈՂ ԱՐԴՅՈՒՆՔՆԵՐ

Արդյունք 1. Կլիմայի փոփոխության նկատմամբ խոցելի անտառային տարածքները տրանսֆորմացիայի են ենթարկվել ավելի կայուն և «բնականին մոտ» տարածքների:

Արդյունք 2. Մշակվել, հրատարակվել և համապատասխան պաշտոնյաներին ու փորձագետներին տրամադրվել են միատարր ծառուտները տրանսֆորմացիայի ենթարկելու անտառմշակութային ուղեցույցներ՝ հետագայում ծրագրի ավարտից հետո ավելի լայն կիրառելու համար:

Արդյունք 3. Ավելացել են անտառային ոլորտի աշխատողների ունակությունները միատարր անտառները տրանսֆորմացիայի ենթարկելու ոլորտում:

Արդյունք 4. Բարձրացել է տեղական համայնքների իրազեկությունը կլիմայի փոփոխության բացասական բիոտիկ և աբիոտիկ հետևանքների նվազեցման նպատակով անտառվերականգնում իրականացնելու կարևորության վերաբերյալ:

ՓՈԽԸՄԲՌՆՄԱՆ ՀՈՒՇԱԳԻՐ

2011թ-ի դեկտեմբերի 29-ին WWF-Հայաստանի և «Հայանտառ» ՊՈԱԿ-ի միջև ստորագրվեց Փոխըմբռնման հուշագիր ընտրված պիլոտային տարածքներում 150 հա ընդհանուր մակերեսով միատարր անտառային ծառուտները տրասնֆորմացիայի ենթարկելու վերաբերյալ:

Հուշագիրը կհանդիսանա գործընկերության և համագործակցության հիմք՝ ի նպաստ ծրագրի գործողությունների սահուն իրականացմանը:



Մանրամասն տեղեկությունների համար դիմել.

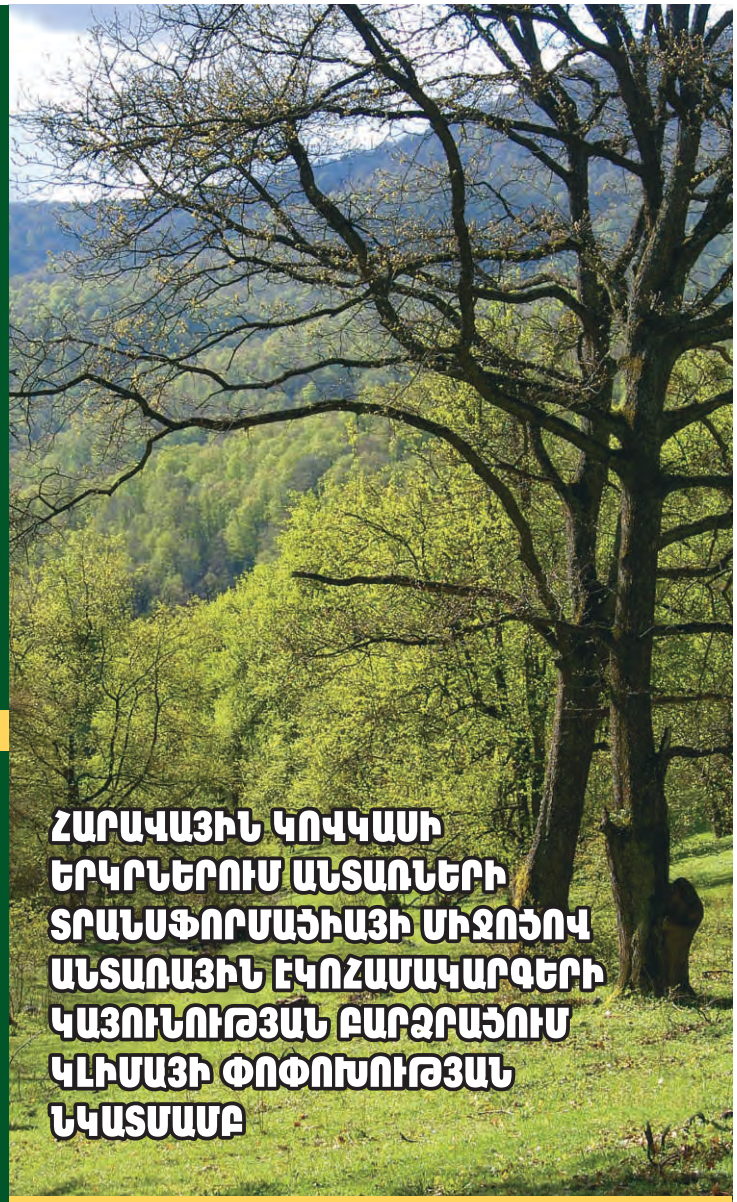
WWF-Հայաստան
ՀՀ, Երևան 0019, Պռոշյան 11,
Հեռ/Ֆաքս. +374 (10) 58 89 83, 54 61 56
էլ. փոստ՝ office@wwfcaucasus.am

Ինտերնետային կայք՝ www.panda.org/armenia

Սույն բրոշյուրը պատրաստվել է
WWF-Հայաստանյան գրասենյակի կողմից
Եվրոպական միության աջակցությամբ:

Բրոշյուրում զետեղված բովանդակությունը որևէ ձևով չի արտահայտում Եվրոպական միության տեսակետները:

Այս ծրագիրը ֆինանսավորվում է
Եվրամիության կողմից:



ՀԱՐԱՎԱՅԻՆ ԿՈՎԿԱՍԻ ԵՐԿՐՆԵՐՈՒՄ ԱՆՏԱՌՆԵՐԻ ՏՐԱՆՍՖՈՐՄԱՑԻԱՅԻ ՄԻՋՈՑՈՎ ԱՆՏԱՌԱՅԻՆ ԷԿՈՀԱՄԱԿԱՐԳԵՐԻ ԿԱՅՈՒՆՈՒԹՅԱՆ ԲԱՐՁՐԱՑՈՒՄ ԿԼԻՄԱՅԻ ՓՈՓՈԽՈՒԹՅԱՆ ՆԿԱՏՄԱՄԲ

ՆԿԱՐԱԳՐՈՒԹՅՈՒՆ

Եվրամիության կողմից ֆինանսավորվող «Հարավային Կովկասի երկրներում անտառների տրանսֆորմացիայի միջոցով անտառային էկոհամակարգերի կայունության բարձրացում կլիմայի փոփոխության նկատմամբ» տարածաշրջանային ծրագիրն իրականացվում է Բնության համաշխարհային հիմնադրամի (WWF-Հայաստան) կողմից Հայաստանում, Վրաստանում և Ադրբեջանում WWF-Գերմանիայի ղեկավարությամբ: Հայաստանում ծրագիրն իրականացնում է WWF-Հայաստանը: Ծրագրի տևողությունը 3 տարի է (2011-2014): Այն նպատակաուղղված է միատարր անտառտնկարկները տրանսֆորմացիայի ենթարկելու գործողությունների իրականացման համար անհրաժեշտ պայմանների ստեղծմանը՝ արդյունքում կլիմայի փոփոխության նկատմամբ ավելի կայուն և «բնականին մոտ» անտառային տարածքներ ունենալու համար:
Դա կիրականացվի անտառների վրա կլիմայի փոփոխության ազդեցության վերաբերյալ իրազեկության բարձրացման, անտառներն ավելի կայուն դարձնելու գործնական միջոցառումների ցուցադրման, ինչպես նաև անտառային ոլորտի անձնակազմին, անտառօգտագործող համայնքներին, տեղական ՀԿ-ներին և համայնքահեն կազմակերպություններին տրանսֆորմացիայի միջոցառումների մշակման և իրականացման անհրաժեշտ գիտելիքներ և հմտություններ փոխանցելու միջոցով:





ՆՊԱՏԱԿ

Ծրագրի ընդհանուր նպատակն է բարձրացնել Հարավային Կովկասի անտառային էկոհամակարգերի դիմադրողականությունը կլիմայի փոփոխության ազդեցության նկատմամբ և բարելավել կենսաբազմազանությունն ու տեղական բնակչության կենսամիջոցները:
Ծրագրի հատուկ նպատակ է անտառկառավարող մարմնի համար ստեղծել անհրաժեշտ պայմաններ, որպեսզի մշակվեն և իրականացվեն ռազմավարություններ միատարր անտառտնկարկները տրանսֆորմացիայի ենթարկելու ուղղությամբ՝ արդյունքում կլիմայի փոփոխության նկատմամբ ավելի կայուն և «բնականին մոտ» տարածքներ ունենալու համար:

ԳՈՐԾՈՂՈՒԹՅՈՒՆՆԵՐ

Ծրագրի գործողությունները խմբավորված են 4 հիմնական բաղադրիչներում

- Հետազոտություն և պիլոտային տարածքներում տրանսֆորմացիայի միջոցառումների իրականացում
- Տեղեկատվության տարածում
- Հզորությունների ստեղծում
- Իրազեկության բարձրացում

ԹԻՐԱԽԱՅԻՆ ԽՄԲԵՐ ԵՎ ՏԵՂԱԿԱՆ ԳՈՐԾԸՆԿԵՐՆԵՐ

- Պիլոտային տարածքներին հարակից տեղական համայնքներ
- Տեղական ՀԿ-ներ և համայնքահեն կազմակերպություններ
- Պետական անտառկառավարող մարմին

ՊԻԼՈՏԱՅԻՆ ՏԱՐԱԾՔՆԵՐ

«Հայանտառ» ՊՈԱԿ-ի հետ սերտ համագործակցությամբ Հայաստանում ընտրվել են 2 պիլոտային տարածքներ՝ 150 հա ընդհանուր մակերեսով:

- Պիլոտային տարածք N1.«Սպիտակ», ընդհանուր 72 հա, «Հայանտառ» ՊՈԱԿ-ի Գուգարքի անտառտնտեսության Սպիտակի անտառապետությունում (Լոռու մարզ):
- Պիլոտային տարածք N2.«Նոյեմբերյան», ընդհանուր 78 հա, «Հայանտառ» ՊՈԱԿ-ի Նոյեմբերյանի անտառտնտեսության Կողբի անտառապետությունում (Տավուշի մարզ):

Անտառի տրանսֆորմացիայի պլանների մշակումից հետո այս տարածքներում կիրականացվեն տրանսֆորմացիայի միջոցառումներ:



Annex 24. Project Leaflet in Azerbaijanian

Daha geniş məlumat üçün aşağıdakı ünvana müraciət edə bilərsiniz.

Elşad Əsgərov
Azərbaycan üzrə layihə rəhbəri
WWF-Ümumdünya Təbiəti Mühafizə Fondunun Azərbaycan Nümayəndəliyi
Bakı ş., M. Müşfiq küç., döngə 501, 2K
Az1073, Azərbaycan

Tel/Faks : + 994 12 5385316

E-mail: easkerov@wwfcaucasus.org

http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/projects/eu_enrtp_caucasus/

Bu layihə Cənubi Qafqazda partnyor təşkilat olan WWF tərəfindən icra edilir. Bu nəşrdə ifadə olunan fikirlər Avropa Komissiyasının fikirlərini əks etdirmir.

"Avropa İttifaqi" öz nou-haularını, ehtiyyatlarını və talelərini tədricən birləşdirmək qərarı vermiş 27 üzv dövlətdən təşkil olunmuşdur. 50 il genişlənmə dövründə onlar stabillik, demokratiya və davamlı inkişaf zonası yaratmış, həmçinin mədəni müxtəlifliyi, tolerantlığı və fərdi azadlıqları inkişaf etdirmişlər.

Avropa İttifaqı nailiyyətlərini və dəyərlərini öz hüdudlarından kənarda yerləşmiş ölkə və insanlarla bölüşməyi öz üzərinə öhdəlik götürmüşdür.

Avropa Komisiyası Aİ-nın icra orqanıdır.

Bu layihə Avropa İttifaqı tərəfindən maliyyələşdirilir



Thematic Programme on Environment and Natural Resources, including Energy (ENRTP) Country"

Aİ tərəfindən maliyyələşdirilən "Cənubi Qafqaz ölkələrində meşə ekosistemlərinin transformasiya yolu ilə iqlim dəyişmələrinə qarşı dözümlülüyünün artırılması" layihəsi

(Layihə N. DCI-ENV/2010/221391)

Layihənin Azərbaycandakı komponentləri WWF-Azerbaijan tərəfindən icra olunur.

Aİ tərəfindən maliyyələşdirilən "Cənubi Qafqaz ölkələrində meşə ekosistemlərinin transformasiya yolu ilə iqlim dəyişmələrinə qarşı davamiyyətinin dözümlülüyünün artırılması" layihəsinin Azərbaycan üzrə komponentləri

Konsept

Layihənin ümimi məqsədi Cənubi Qafqazda meşə ekosistemlərinin iqlim dəyişmələrinin təsirlərinə qarşı dözümlüyünü artırmaq, biomüxtəlifliyi və yerli əhalinin yaşayışını zənginləşdirməkdir.

Ümumi məqsəd kənd əhalisinin yaşayış tərzinə dəstək verən biomüxtəliflik və meşə ekosistemləri xidmətlərinə iqlim dəyişmələrinin yarada biləcəyi təhlükələri qabaqlamağı nəzərdə tutur. Bu xidmətlərə torpaqların mühafizəsi, su təchizatı, meşə və qeyri oduncaq məhsulları daxildir.

Məqsədə yetişməyin səviyyəsini yoxlamaq üçün aşağıdakı indikatordan istifadə oluna bilər: 2015-ci ilə kimi müvafiq milli qurumlar meşələri və meşənin ekosistem xidmətlərini iqlim dəyişmələrinə qarşı dözümlü edən qanunvericiliklər qəbul edəcək və onları icra etməyə başlayacaqlar.

Layihənin xüsusi məqsədi ümumi məqsəddən irəli gəir və süni salınmış monokultura əkinlərini iqlim dəyişmələrinə qarşı dözümlü olan "təbii hala yaxın" meşələrə transformasiya etməyi nəzərədə tutur.

Gözlənilən nəticələr

Nəticə 1: Cənubi Qafqazın bölgələrində iqlim dəyişmələrinə həssas olan seçilmiş süni meşə əkinləri "təbii hala yaxın" dözümlü meşələrə çevrilmişdir.

Nəticə 2: Monokultura əkinlərini daha dözümlü meşələrə transformasiya etmək üçün silvikultura təlimat kitabları hazırlanıb, milli dillərə tərcümə olunub və müvafiq mütəxəssislər və işçilərə təqdim olunmuşdur.

Nəticə 3: Yerli meşə administrasiyası ekspertlərinin monokultura əkinlərini daha dözümlü, stabil, əraziyə uyğun meşələrə transformasiya etmək bacarıqları artırılmışdır.

Nəticə 4: Yerli icmaların iqlim dəyişmələrinin biotik və abiotik neqativ təsirləri baxımdan meşələrin bərpasının vacibliyinə dair bilikləri və məlumatlılığı artırılmışdır.

Hədəf qruplar

Layihə ərazilərindəki meşə administrasiyası, icma üzvləri, yerli QHT-lər və özünü idarəetmə orqanları

Ağsu layihə ərazisindən görüntü © WWF

Layihənin iş səhifələri

Layihənin tədbirləri dörd işçi paketə bölünür:

1. Tədqiqat və nümayiş paketi meşə transformasiyası üçün pilot silvikultura tədbirləri hazırlayacaq və hədəf ölkələri praktiki təcrübəylə təmin edəcəkdir.

2. Meşə administrasiyaları üçün Yayım paketi meşə transformasiyası tədbirlərinə dair informasiya və materialları özündə cəmləşdirir.

3. Potensialın inkişafı paketi meşə administrasiyası işçilərinə meşə transformasiyası strategiyaları hazırlamaq və icra etmək üçün təlimləri nəzərədə tutur.

4. Məlumatlandırma paketi pilot ərazilərdə yerli icmaları, QHT-ləri və s məlumatlandırmağı nəzərdə tutur.



Annex 25. Project Leaflet in Georgian

დამატებითი ინფორმაციისთვის

ზვიად გოცირიძე
პროექტის ეროვნული კოორდინატორი საქართველოში
ბუნების დაცვის მსოფლიო ფონდის (WWF)
წარმომადგენლობა კავკასიაში
მერაბ ალექსიძის ქ. 11, თბილისი 0193, საქართველო
ტელ.: + (995 32) 237 500
ფაქსი: + (995 32) 237 501
ელ-ფოსტა: zgotsiridze@wwfcaucasus.ge
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/projects/eu_enrtp_caucasus/

Zviad Gotsiridze
Project Country Coordinator in Georgia
WWF Caucasus Programme Office (WWF-Caucasus)
M. Aleksidze Str. 11, 0193 Tbilisi, Georgia
Tel.: + (995 32) 237 500
Fax: + (995 32) 237 501
E-mail: zgotsiridze@wwfcaucasus.ge
http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/projects/eu_enrtp_caucasus/

პროექტი ხორციელდება ბუნების დაცვის მსოფლიო ფონდის *(WWF)* ქსელში შემავალი პარტნიორი ორგანიზაციების მიერ. აქედან გამომდინარე, წინამდებარე პუბლიკაცია შესაძლოა არ ასახავდეს საკუთრივ ევროკავშირის შეხედულებებსა და მოსაზრებებს.

"ევროკავშირში შემავალმა 27 წევრმა სახელმწიფომ გადაწყვიტა ერთმანეთთან თანდათანობით დაეკავშირებინა საკუთარი შესაძლებლობები, რესურსები და ბედი. ევროკავშირის არსებობის ნახევარსაუკუნოვანი პერიოდის განმავლობაში მათ შეძლეს შეექმნათ სტაბილურობის, დემოკრატიისა და მდგრადი განვითარების ერთიანი სივრცე და ამავე, დროს შეენარჩუნებინათ კულტურული მრავალფეროვნება, შემწყნარებლობისა და ადამიანის უფლებათა დაცვის უზრუნველყოფის უნარი.

ევროკავშირი მოწოდებულია გაუზიაროს საკუთარი მიღწევები და ფასეულობები იმ ქვეყნებსა და ხალხებს, რომლებიც მისი საზღვრების მიღმა იმყოფებიან."

ევროკომისია - ევროკავშირის აღმასრულებელი ორგანო

პროექტი დაფინანსებულია ევროკავშირის მიერ



ევროკავშირის თემატური პროგრამა „გარემოს დაცვა და ბუნებრივი რესურსების მდგრადი გამოყენება — ენერგეტიკის საკითხების ჩათვლით" (ENRTP)

კლიმატის ცვლილების პირობებში ტყის ეკოსისტემების მდგრადობის ამაღლება სამხრეთ კავკასიის ქვეყნებში

ევროკავშირის მიერ დაფინანსებული რეგიონალური პროექტი

(პროექტის № DCI-ENV/2010/221391)

პროექტს საქართველოში ახორციელებს ბუნების დაცვის მსოფლიო ფონდის (WWF) წარმომადგენლობა კავკასიაში

კლიმატის ცვლილების პირობებში ტყის ეკოსისტემების მდგრადობის ამაღლება სამხრეთ კავკასიის ქვეყნებში

პროექტის კონცეფცია

პროექტი მიზნად ისახავს სამხრეთ კავკასიის ქვეყნებში (მათ შორის საქართველოში) კლიმატის ცვლილებებისადმი ტყის ეკოსისტემების მდგრადობის ამაღლებას, ბიომრავალფეროვნების დაცვას და ადგილობრივი მოსახლეობის ცხოვრების პირობების გაუმჯობესებას.

პროექტის ზოგადი მიზანი უკავშირდება ისეთი პრობლემების გადაჭრას, როგორებიც არის კლიმატის ცვლილებით გამოწვეული უარყოფითი ფაქტორების გავლენის შედეგად ბიომრავალფეროვნების კარგვა და ამავე ფაქტორების გავლენის შედეგად ტყის ეკოსისტემების (ტყეების) სასარგებლო და დაცვითი ფუნქციების შესუსტება.

თავის მხრივ, ბიომრავალფეროვნება და ტყეების სასარგებლო და დაცვითი ფუნქციები ხელს უწყობს ადგილობრივი (განსაკუთრებით სოფლად მცხოვრები) მოსახლეობის საარსებო პირობების — შემოსავლების წყაროების შენარჩუნებას.

პროექტის ამოცანები

საცდელ სატყეო ფართობებზე (75 ჰა სიდიდის ორი საცდელი ფართობი — სულ საქართველოში 150 ჰა საერთო საცდელი ფართობი) ხელოვნურად გაშენებულ ტყეებში მათი ბუნებრივ ტყეებად ტრანს/ფორმირების მიზნით იმგვარი სატყეო-სამეურნეო ღონისძიებების განხორციელება, რაც ხელს შეუწყობს კლიმატის ცვლილებებისადმი მათი მდგრადობის დონის ამაღლებას;

საცდელი ფართობების მიმდებარე ტერიტორიებზე ადგილობრივი (სოფლად მცხოვრები) მოსახლეობის საარსებო პირობების გაუმჯობესება;

უფლებამოსილი სატყეო ორგანოების მუშაკთა ცოდნისა და ინფორმირებულობის დონის საგრძნობი გაუმჯობესება ტყეებზე კლიმატის ცვლილების ზემოქმედების სფეროში და მათი მოტივაცია შეუმუშაონ და განახორციელონ კლიმატის ცვლილებებისადმი ტყეების მდგრადობის ამაღლებისთვის საჭირო საადაპტაციო ღონისძიებები.

ფოტო: ხაშურის საცდელი სატყეო უბანი © მ.ძნელაძე, WWF

მოსალოდნელი შედეგები

1. საცდელ ფართობებზე ხელოვნურად გაშენებული ტყეების ბუნებრივ ტყეებად ტრანს/ფორმირება, რაც ხელს შეწყობს კლიმატის ცვლილებებისადმი მათი მდგრადობის დონის ამაღლებას.

2. სატყეო-სამეურნეო მეთოდიკის შემუშავება ტყეების ტრანს/ფორმირების შესახებ.

3. კლიმატის ცვლილებებისადმი ტყეების მდგრადობის ამაღლების სფეროში უფლებამოსილი სატყეო ორგანოების შესაძლებლობათა ზრდა.

4. საზოგადოებისა და ადგილობრივი მოსახლეობის ინფორმირებულობისა და ცნობიერების დონის ამაღლება.



Annex 26. Project Communication Plan - Armenia

COMMUNICATION AND VISIBILITY PLAN

Name of project and CRIS number:	EU ENRTP Caucasus - Increasing the resilience of forest ecosystems against climate change in the South Caucasus Countries through forest transformation
CRIS contract N°	C-221391
CRIS decision N°	D-020656
Duration:	2011-2014

GENERAL COMMUNICATION STRATEGY

Objectives

1. Overall communication objectives

In general, the communication activities will be aimed at communicating the project widely in Armenia, including its main aim and objectives, planned and implemented activities, achievements, EU financing of the project and others.

The objective of project's communication activities is to raise awareness about climate change impacts on forests, as well as about the importance of forest rehabilitation with regard to mitigating negative biotic and abiotic impacts of climate change, demonstrating practical measures to make forests more resilient, and providing forest administration staff and local community members who use forests with the necessary knowledge and skills to transfer the development and implementation of transformation measures to other forest stands.

2. Target groups

The target groups of the communication and visibility activities are;

- High level representatives of the relevant state institutions, including the RA Ministry of Agriculture;
- Forest administration staff ("Hayantar" SNCO Head office and branches);
- Local NGOs and CBOs which are active in the pilot site;
- Local self-governing bodies - communities adjacent to project pilot sites.

3. Specific objectives for each target group, related to the action's objectives and the phases of the project cycle

The overall objective of the communication activities is to provide relevant information on the project, project partners and founders, main purpose and objectives, main fields of focus and expected results. However, each of the activities is aimed at certain target group with certain objectives. In particular:

- Activities directed to high level representatives of the relevant state institutions are aimed at awareness rising about the project, its scope and partners. The result of the activities will be raised awareness of the targeted policy makers about the project scope and background, as well as provision of information on impacts of climate change on forests, which will in turn improve their attitude towards taking action on climate change issues.
- Activities directed to forest administration staff (head office and branches) are aimed at creating supportive policy environment for the forest administrations to be able to develop and implement strategies for making forests more resilient to the impacts of climate change.
- Activities directed to local NGOs and CBOs which are active in the pilot site are aimed at raising awareness on the potential impacts of climate change on forest services, and generate interest to participate in the action and support for extending the results of the action to other forest stands after the action has ended.
- Activities directed to communities adjacent to project pilot sites are aimed at raising overall awareness on climate change and its possible negative impacts, resulting in the increased awareness of possible climate change impacts on livelihoods as well as of the relationship between livelihoods and the resilience of forests, in particular local forests.

COMMUNICATION ACTIVITIES

4. Main activities that will take place during the period covered by the communication and visibility plan

- A **leaflet** will be prepared and disseminated to explain project objectives, expected results, and activities; it will be distributed at various visibility events, including those with participation of high level officials and media representatives.
- **Silvicultural guidelines** will be prepared and disseminated to forestry administration and other relevant stakeholders. The guidelines will include information and advice on how to develop and implement measures to increase the resilience of forest stands.
- **"Popular report"** on the action will be prepared and disseminated. It will include an explanation of the climate change impact on forests and description of the activities and results of the action and lessons learned.
- **Events** for high level officials. Visibility events to launch the action and publicize EU financing will be organized to publicize action completion, activities carried out, and results achieved. The events will be aimed at country's high level officials and senior staff of international, regional and national NGOs. The media will be invited so as to communicate the action widely in the region. The project completion events will launch the popular version of the action report and the silvicultural guidelines developed within the project.
- **Media events.** National TV, radio and print media will be invited to record and report on the action launch and closing. Media events will be arranged at the pilot sites to coincide with the events for the communities, involved in the action.
- **Awareness raising events for the communities,** aimed at learning about the importance of forests for local communities and potential impact of climate change on forests and forest services to be used for extension of transformation activities to additional forests within the communities administrative units.
- **Regular, ongoing communication** of the action in WWF Armenia web page and regional Newsletter. The action's objectives, expected results, and progress will be communicated

through the web page. Information about project activities and milestones will be widely circulated through the Caucasus Regional Newsletter to various audiences, including state institutions, donor organizations, international, regional, and national NGOs and others.

- A **study tour** to the state of Hessen in Germany, where the forestry administration has been conducting transformation measures for many years, will be organized for a group of policy makers from Armenia.
- **Signs** will be erected at the pilot sites to communicate, among others, the EU financing of the action.
- **Baseball caps and tee shirts** will be produced to provide to participating community members at the pilot sites and local forest administration staff who participate in "on-the-job" training.

All visibility measures will conform to EC's Communication and Visibility Manual guidelines. All events will communicate EU financing of the action.

5. Communication tools chosen

The following communications tools will be used during the project:

- Workshops, meetings, seminars, trainings and a study tour;
- Media events with publication of articles in mass media and reports by national/province TV channels;
- Electronic media tools, such as WWF-Armenia web-site and electronic Caucasus Regional Newsletter
- Publications

INDICATORS OF ACHIEVEMENT

6. Completion of the communication objectives

The following verifiable indicators can be considered for various communications activities:

- Workshops, meetings, seminars, trainings and a study tour: invitations, list of participants, photos, reports on events, questionnaires to assess the results of the trainings.
- Media events: press releases, articles in media and broadcast by TV channels.
- Publications and electronic media: leaflets/guidelines/reports published/disseminated, articles posted on web-sites and in newsletters.

7. Provisions for feedback (when applicable)

Questionnaires (pre/post) trainings and workshops will serve as a tool to assess the increase of knowledge on the topic in focus.

RESOURCES

8. Human Resources

The following staff members are responsible for and will be continuously involved in organization and implementation of communication activities:

- Project Coordinator (in case of need with backstopping from regional and international project staff);
- Partnership Development Manager;
- WWF Armenia technical staff (drivers, administrative staff) if necessary.

9. Financial resources

The total budget for communication activities is 37400 EUR (8.7% of the total project budget)

Schedule of Public Events

Project name: **"EU ENRTP Caucasus - Increasing the resilience of forest ecosystems against climate change in the South Caucasus Countries through forest transformation"**

CRIS contract N° **C-221391**

CRIS decision N° **D-020656**

Event name	Preliminary Date	Preliminary location	Target audience	Purpose
Kick-off workshop (completed)	June 2011	Armenia	Representatives of respective ministries, forestry institutions, NGOs, international organizations	To introduce the project, main objectives and expected outcomes, discuss site selection criteria and possible sites.
Production and dissemination of a leaflet	Mid 2012	Armenia	Wide public	To explain the objectives, expected results, and activities of the project
Production and dissemination of guidelines on forest transformation	2013	Armenia	Forest administration staff, other relevant audiences	To provide information and advice on how to develop and implement measures to increase the resilience of forest stands
Production and dissemination of a "popular report"	2013	Armenia	Wide public	To explain the climate change impact on forests and description of the activities and results of the action and lessons learned
Media events when transformation measures start	Spring-Autumn 2012	Armenia	Wide public	To present the project, upcoming activities, expected results and the role of the site adjacent communities.
Media events when transformation measures end	Spring 2014	Armenia	Wide public	To present the results of transformation measures implemented.
A workshop for high level officials (senior ministry and forestry officials) at the end of project	Spring 2014	Armenia	Country's high level officials (ministers, development counsellors of embassies), representatives of regional and national NGOs	To present project outcomes.
Study tour to	2013	Germany	Policy makers	To get familiar with the state

Event name	Preliminary Date	Preliminary location	Target audience	Purpose
Germany				and achievements in the state of Hessen in Germany, where the forestry administration has been conducting transformation measures for many years
Trainings for forestry staff	Mid 2013	Armenia	Forestry staff	To present the climate change and forest resilience issues, the aims and principles of forest transformation, and others.
Awareness raising events for the communities	2012-2013	Armenia	Local communities adjacent to pilot sites	To learn about the importance of forests for local communities and potential impact of climate change on forests and forest services to be used for extension of transformation activities to additional forests within the communities administrative units

Schedule of Public Events

for the period of 1 July 2012 - 1 January 2013

Project name: **"EU ENRTP Caucasus - Increasing the resilience of forest ecosystems against climate change in the South Caucasus Countries through forest transformation"**

CRIS contract N° **C-221391**

CRIS decision N° **D-020656**

Event name	Preliminary Date	Preliminary location	Target audience	Purpose
Training for local staff of forest administrations responsible for the pilot sites	Mid Autumn 2012	Armenia	Forest administration staff	The staff will receive training in all of the techniques and in the use of all the equipment which will be employed during the implementation of transformation measures and during subsequent maintenance, including personal safety training.
One day workshops for communities adjacent to 2 pilot sites (Lori Marz and Tavush Marz)	Mid Autumn 2012	Armenia	Communities	▪ to provide the adjacent communities with more information about the activities to be implemented ▪ to learn about the importance of forests for local communities and potential impact of climate change on forests and forest services to be used for extension of transformation activities to additional forests
Media events when transformation measures start	Mid Autumn 2012	Armenia	Wide public	To present the project, upcoming activities, expected results and the role of the site adjacent communities.
Study tour to Germany	October 2012	Germany	Policy makers	To get familiar with the state and achievements in the state of Hessen in Germany, where the forestry administration has been conducting transformation measures for many years
Project Regional Workshop	November 2012	Georgia	Project Staff and relevant stakeholders	Discussion of Project's stand, achievements and future activities.

Annex 27. Draft Terms of Reference for the Project Steering Committee – Armenia

Increasing the Resilience of Forest Ecosystems against Climate Change in the South Caucasus Countries through Forest Transformation

Steering Committee

Terms of Reference

Background Information on the Project

WWF - World Wide Fund for Nature Armenian Branch in partnership with WWF-Germany has been involved in implementation of the EU Financed Project "EU ENRTP Caucasus - Increasing the Resilience of Forest Ecosystems against Climate Change in the South Caucasus Countries through Forest Transformation" /DCI ENV/2010/221391/ (Project).

Climate change has already started to have significant impact on nature and people in the Southern Caucasus and in particular in Armenia – effects that will become even more severe in the future.
The overall objective of the Project is to increase the resilience of forest ecosystems in the Southern Caucasus, namely in Armenia, against climate change impacts and to improve biodiversity and livelihoods of local populations. The overall objective addresses the overarching threat of climate change to biodiversity and to forest ecosystem services which support the livelihoods of rural communities.
The specific objective of the Project contributes to the overall objective by establishing the necessary conditions for the forest administration in Armenia to develop and implement strategies for transforming monoculture forest stands into highly resilient, "close to nature" forest stands. It is proposed to do this through awareness raising about climate change impacts on forests, demonstrating practical measures to make forests more resilient, and providing forest administration staff and local community members who use forests with the necessary knowledge and skills to transfer the development and implementation of transformation measures to other forest stands.
Expected results of the Project are:
Result 1 - Selected forest stands vulnerable to climate change have been transformed into highly resilient "close to nature" forest stands;
Result 2 - Silvicultural guidelines for the transformation of monoculture stands into more resilient stands are elaborated, published in three languages and made available for relevant officials and experts;
Result 3 - The capacities of forest administration experts to develop silvicultural strategies to transform monoculture stands into stable, site-adapted forests are increased;
Result 4 - The awareness of local communities about the importance of forest rehabilitation with regard to mitigating negative biotic and abiotic impacts of climate change is improved.

Main Functions of the Steering Committee

Steering Committee, in cooperation with the Project team is set up to promote:

1. Support to general coordination and implementation of the Project on the national level, contributing to smooth implementation of the Project;
2. Establishment of links between the Project and respective stakeholder organization, supporting information sharing on the Project within relevant institutions;
3. Provision of consultancy on planning, implementation, monitoring and evaluation of Project activities on the national level;
4. Provision of recommendations on Project activities and their successful implementation.
5. Enabling increase of Project's influence and duplication of Project Activities in other areas on national level.
6. Provision of recommendations and comments to the Project documents provided.
7. Support to Project team in solving potential issues hampering the Project implementation.

Composition of the committee

- The Chairperson of the Steering Committee is the director of WWF-Armenia (EU ENRTP Caucasus Project Country Manager in Armenia).
- Project National Coordinator and Committee Secretary assist the Chairperson. They are responsible for organizing the meetings, preparing and circulating agenda, relevant documents and drawing minutes.
- The members of the Steering Committee are officially nominated by respective stakeholder organizations on the basis of request by WWF-Armenia.

Financing

- ✓ Members of the Committee fulfill their functions on a voluntary no-pay basis, without a financial compensation.
- ✓ The expenses related to preparation of documents and organizations of meetings are covered by WWF-Armenia.

Terms and frequency of meetings

The Steering Committee will operate during Project implementation period.
The meetings are organized at least once a year to discuss annual plans of the project, activities implemented and other issues. Additional meetings can be organized upon necessity.

Working Language

The working language of the Steering Committee is Armenian.

Annex 28. Technical Specification for the Organization and Implementation of the Study Tour for Senior Officials of Relevant Organizations in the Target Countries

This document is the sole responsibility of the Project on Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern Caucasus through Forest Transformation and can in no way be taken to reflect the views of the European Union

SERVICE CONTRACT No.WWF-CAUCASUS-01/01-SRV-REG-2011/ENRTP
SERVICES OF TECHNICAL ASSISTANCE OF AN INTERNATIONAL FORESTRY EXPERT TO THE PROJECT "INCREASING THE RESILIENCE OF FOREST ECOSYSTEMS AGAINST CLIMATE CHANGE IN THE SOUTHERN CAUCASUS THROUGH FOREST TRANSFORMATION"
(EuropeAid/128320/C/ACT/Multi External Actions of the European Union No. DCI-ENV/2010/221391)

TECHNICAL SPECIFICATION FOR THE ORGANISATION AND IMPLEMENTATION OF THE STUDY TOUR FOR SENIOR OFFICIALS OF RELEVANT ORGANISATIONS IN THE TARGET COUNTRIES

This project is funded by the EU

This project is co-financed and implemented by the WWF Germany in collaboration with the South Caucasus partner organizations

Project head office in Germany:
WWF Germany
Reinhardtstr. 14
10117 Berlin, Germany
Tel.: +49 (0)30-311777-274
Fax: +49 (0)69-79144 4166
info@wwf.de
www.wwf.de

Project regional office in the South Caucasus:
WWF Caucasus Programme Office (WWF Caucasus)
Merab Aleksidze St. 11
0193 Tbilisi, Georgia
Tel.: + (995 32) 2-237-500
Fax: + (995 32) 2-237-501
office@wwfcaucasus.ge
www.panda.org/caucasus

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1. Introduction

WWF Caucasus Programme Office (WWF-Caucasus) in partnership with WWF-Germany, WWF-Armenia and WWF-Azerbaijan is implementing the project "*Increasing the resilience of forest ecosystems against climate change in the South Caucasus Countries*[1] *through forest transformation*" (the Project). The Project is being financed by the European Union (EU) in the framework of the EU's Thematic Programme on Environment and Natural Resources including Energy (ENRTP).

Information about the objectives, expected results and planned activities of the Project can be found on the project's web pages at http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/caucasus/projects/eu_enrtp_caucasus/

One of the Project's activities is a study tour for staff from the target countries' relevant governmental agencies, forestry administrations and local authorities. The study tour will be organised and led by an entity selected by competitive tender. These Terms of Reference specify the objectives of the study, the topics and the types of site which should be included in the programme, and the duration, numbers of persons and other logistical matters.

2. Specification

2.1. Study tour objective

The objective of the study tour is for forestry policy holders and practitioners from the region to learn how climate change has been addressed in the forestry policy and strategy of an EU member state and to see at first hand the silvicultural techniques which forest managers in that member state are using to make forests more resilient to the projected impacts of climate change.

The Project has chosen Germany as the destination country for the study tour: many of Germany's federal states have been implementing policies of converting poorly adapted monocultures to more diverse and more resilient stands for a number of years, and forest managers in Germany - in the state and private sectors - have a lot of practical experience in forest transformation.

2.2. Participants

17 persons will participate in the study tour: 2 senior staff from each of the countries' relevant governmental agencies and local authorities, 2 staff from each of the countries' relevant local forestry administrations and 1 member of the Project team from each of the country. In addition, International Project Advisor and Regional Project coordinator will participate.

In addition to the above mentioned *participants* the entity contracted to organise the study tour will be required to supply a person or persons to lead it (and who will deal with logistical matters during it) and one or more interpreters (see section 3 below).

[1] The Project's target countries are Armenia, Azerbaijan and Georgia.

2.3. Duration and dates

The study tour is to be scheduled over 7 days. The first day (*Sunday*) and the 8th day (*Sunday*) are to be planned as arrival and departure days.

1. Sunday (*arrival*)
2. Monday – working day 1
3. Tuesday – working day 2
4. Wednesday – working day 3
5. Thursday – working day 4
6. Friday – working day 5
7. Saturday – partly working day 6 (*first half of a day – lessons learned and closing meeting / second half of a day – free time*)
8. Sunday – (*departure*)

The Project team expects the study tour to take place tentatively in October 2012.

2.4. Specific points that are to be incorporated into the programme

- Indoor presentation of one of the German state forest service's policy on forests and climate change.
- Indoor presentation of a state forest district's and a communal forest's strategy for converting its monoculture forest stands to more resilient, mixed forest stands and the silvicultural measures which it uses.
- In compliance with WWF forest policies all visited sites should preferably be part of forests with valid FSC-Certification.
- Field visits show different stages in the transformation of various types of monoculture forest stands into forest stands that are expected to be more resilient to climate change.

The stands that are selected for the field visits should include some stands that are as close as is practically possible to the stands at the pilot sites in the target countries in terms of the silvicultural measures that will be applied to them, i.e.:

- Pine (spruce) stands of different ages and qualities
- canopy densities in some parts of the stands that are low enough for light demanding successor species to prosper but in other parts so high that only shade tolerant species will be able to prosper unless canopy density is reduced;
- grazing by domestic livestock (respectively game) is preventing the development of natural regeneration (and will prevent establishment by seeding / planting);
- the potential for natural regeneration of tree species that are native to the site is very good in some parts of some of the stands and very poor in other parts;
- there is a tall, dense herb layer in some parts of some of the stands and a tall, dense herb and shrub layer will develop in many parts if livestock/game are excluded.

Field visits should be planned so that by the end of the study tour participants will have seen the following in an appropriate sequence:

- monocultural stands before any transformation operations have been carried out (stands possibly damaged by drought, bark beetle, etc.)

- stands in which no transformation operations have been carried out yet but which are typical of stands in which natural transformation has started
- transformation by introducing shade tolerant species and transformation by introducing shade intolerant species
- adequate planting and seeding concepts and methods for forest transformation with native species
- transformation: crown thinning in progress
- if appropriate in terms of season: ground preparation, planting and seeding in progress
- techniques for controlling competing vegetation
- techniques of site protection against domestic livestock/game
- a nursery or nurseries where participants can see adequate and cost-efficient seedling and seed production technologies.

3. Obligations of the contracted organisation

The contracted organisation will have the following obligations:

1. Arrange two-way flights to and from Germany for the 17 participants from their home airports (Yerevan/Armenia, Baku/Azerbaijan, Tbilisi/Georgia).
2. Facilitate participants' visa applications as far as is reasonably practical, including by providing invitation letters from host institutions.
3. Arrange airport transfers in Germany for participants on the day of arrival and day of departure.
4. Arrange all of the meetings, site visits and other activities in the study tour programme.
5. Make interpretation between **Russian and German** available whenever will be necessary for the achievement of the study tour's objectives and the objectives of specific activities and events.
6. Arrange the transport of the participants from their accommodation to and from the places which they will visit during the study tour.
7. Arrange single room accommodation for the participants for the 7 nights of the study tour.
8. Arrange breakfast, lunch and dinner for the participants for the 6 full days of the study tour and in addition, dinner on the arrival day, and breakfast on the departure day.
9. Ensure, as far as is reasonably practical, the comfort and safety of the participants from the moment of their arrival in Germany to the moment of their departure.