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

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Regional Technical Assessment Report on Results of Transformation Measures in the South Caucasus Countries

Armenia, Azerbaijan, Georgia

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Under the EU financed Project DCI-ENV/2010/221391" EU ENRTP-Caucasus- Increasing the resilience of forest ecosystems against climate change in the South Caucasus through forest transformation'

Technical Assessment Report on results of transformation measures in Armenia, Azerbaijan and Georgia

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1. Background and objectives

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").

Climate change has already started to have significant impact on nature and people in the Southern Caucasus and 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 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 governments 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 South Caucasus 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 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 neighboring 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 national 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.

2. Assessment of results of project preparatory stage

2.1. Site selection criteria and site surveys

For the practical implementation of project objectives two pilot sites in each country were selected. The main precondition for site selection was to identify monoculture forest stands and start their transformation into highly resilient, "close to nature" forest stands. Therefore, it was a primary objective for every selected area.

The pilot forest sites have been selected based on above mentioned requirement. In addition to basic requirement following site selection criteria (see Box 1) were agreed for consideration by the Project team in cooperation with the forest authorities during the inception phase of implementation.

Box 1. 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 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 land owner
ii)Capacity of land owner
iii)Possibility of follow-up financing
b) Visibility

Each pilot site was selected according to above mentioned objectives and criteria. Results of site evaluation are given in relevant country reports. Figure 1 below shows pilot sites distribution by countries. In total 448.07 hectares of monoculture forest stands to be transformed, of which 153 ha are located in Armenia, 151 in Azerbaijan and 144.07 in Georgia.

Figure 1.

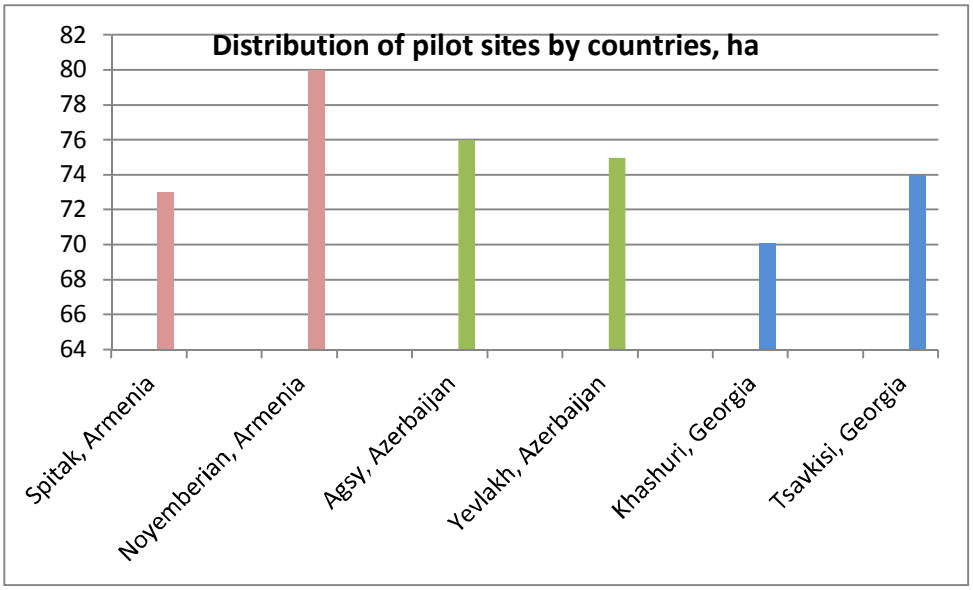


Table 1 bellow provides short description of pilot sites and their specific objectives.

Table 1. Description of pilot sites and their specific objectives

Project sites	Description of sites	Specific Objectives
Spitak, Armenia	Monoculture pine stands (4-11 years old), rather dense, never thinned with the open areas in between, erosion (sometimes rather severe) present in some places. Limited presence of other species.	1.To connect fragmentized habitats (eco-corridor) 2. To protect against erosion 3. To protect against grazing and fires 4. Support and interest of local population and government 5. Generation of temporary employment opportunities for local population
Noyemberian, Armenia	Old mainly destroyed pine stands (more than 30 years old), which continue to get destroyed yearly due to wind and snow; presence of bush vegetation, in some places old planted broadleaf species (apple, maple) and natural regeneration with poor growth due to grazing	1. Support and interest of local population and government 2. To protect against erosion and grazing 3. Generation of temporary employment opportunities for local population 4.Increase visibility and recreational capacity
Agsu, Azerbaijan	Artificially established monoculture pine strands 40-50 years. Mainly composed from one layer, only in low density areas second layer with young oak and ash tree and some shrubs. Some areas with wind fallen trees.	1. To protect against erosion 2. To protect against fires 3. Support and interest of local population and government 4. Generation of temporary employment opportunities for local population
Yevlakh, Azerbaijan	Artificially established monoculture pine strands 50-60 years. Totally one layer with tamariks bushes in under storey. No natural regeneration.	1. To protect against fires 2. Support and interest of local population and government 3. Generation of temporary employment opportunities for local population
Khashuri, Georgia	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 coppice Georgian oak stands with hawthorn and other shrubs. Almost half of pine stands have low and medium density.	1.To connect fragmentized habitats (eco-corridor) 2. To protect against erosion 3. To protect against grazing and fires 4. Generation of temporary employment opportunities for local population 5.Increase visibility and recreational capacit

Tsavkisi, Georgia	High and medium density monoculture pine (*Pinus nigra*) stands scattered throughout natural stands represented by prevalence of Georgian oak , with mixture of hornbeam, oriental hornbeam, ash-tree, etc.	1.To connect fragmentized habitats (eco-corridor) 2. To protect against erosion 3. To protect against grazing and fires 4. Generation of temporary employment opportunities for local population 5.Increase visibility and recreational capacity

2.2. Land tenure

Areas under pilot sites in all three countries are state owned delivered for management responsibilities to different state organizations.

Armenia

Pilot Site N1 – Spitak Forest District of Gugark Forest Enterprize branch of "Hayantar" State Non Commercial Organization.

Pilot Site N2 – Noyemberian Forests of Noyemberian Forest Enterprize branch of "Hayantar" State Non Commercial Organization.

Azerbaijan

Pilot Site N1 – Aghsu Forests is under the management of Shamakhi Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of Azerbaijan.

Pilot Site N2 – Yevlakh forests belong completely to Yevlakh Forest Protection and Restoration Enterprise of the Ministry of Ecology and Natural Resources of Azerbaijan.

Georgia

Pilot Site N1 – "KHASHURI" with area of 70.07 ha in Khashuri Municipality is 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 National Forest Agency of the Ministry of Environment Protection and Natural Resources of Georgia.

Pilot Site N2 – "TSAVKISI" with area of 74 ha in Tbilisi Municipality is located on the former state forest lands of Kojori Forest Unit of the former Tbilisi State Forestry office - currently under the management o the Municipality of Tbilisi.

2.3. Forest transformation plans

To make detail description of transformation activities in each pilot site relevant transformation plans by eligible organizations have been prepared (see table 2). WWF Caucasus Program Office elaborated Terms of Reference used as a basis for Transformation Plans.

Table 2. Name of organizations responsible for elaboration FPTs

Country	Pilot Site	Name of organization
Armenia	Spitak Noyemberian	"Kanach Desine" LLC
Azerbaijan	Agsu Yevlakh	Forestry Development Department of the Ministry of Ecology and Natural Resources
Georgia	Khashuri Tsavkisi	"Tkeinventproekti" LLC

Special group, consisting of various specialists (forest planning specialists, botanist, forester-pathologist, soil scientist, GIS specialist) was formed for implementation of activities by planning organizations. The client (WWF CauPO) provided the group with the required cartographic, aerial photo, public register and legal materials.

Scope of work defined by Terms of Reference of Agreement was as follows:

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 (written 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.

Based on these requirements FTP has been elaborated and served as a baseline document for the practical works conducted. Recommended outline for FTPs is provided in Annex 2.

According to FPTs each site were carefully studied to identify special silvicultural activities described below.

Armenia

Table 3. Description of Spitak pilot site by silvicultural measures

# on the map	Area, ha	Brief characteristics of the site	Proposed measures	Proposed quantity of required seedlings	
				Per 1 ha	Total (during 3 planting seasons)
1-1	8.4	monoculture pine stands, average density, open areas, some erosion, in some places good natural regeneration of pine in some places	Fencing, additional planting, agro-technical maintenance	3000	33880
1-2	2.9	monoculture pine stands, rather dense	Fencing, thinning would be needed	-	-
1-3	10.5	monoculture pine stands, average density, open areas, some erosion	Fencing, additional planting, agro-technical maintenance	3000	41260
1-4	4.4	monoculture pine stands, rather dense	Fencing, thinning would be needed	-	-
1-5	13.2	monoculture pine stands, average density, open areas, some erosion	Fencing, additional planting, agro-technical maintenance	3000	51245
1-6	8.3	some monoculture pine stands, mainly open areas	Fencing, additional planting, agro-technical maintenance	3300	36825
2-1	5.0	monoculture pine stands, average density, open areas, erosion (sometimes severe)	Fencing, additional planting, agro-technical maintenance	3000	25600
2-2	0.9	monoculture pine stands, average density, some open areas, erosion (sometimes severe)	Fencing, additional planting, agro-technical maintenance	1250	2050
2-3	6.8	monoculture pine stands (sometimes rather dense), some erosion	Fencing, additional planting, agro-technical maintenance, thinning would be needed	1250	14250

2-4	4.0	monoculture pine stands, rather dense	Fencing, thinning would be needed	-	-
2-5	1.9	monoculture pine stands (average density), mainly open areas, erosion (sometimes rather severe)	Fencing, additional planting, agro-technical maintenance	3000	9860
2-6	0.8	monoculture pine stands, rather dense	Fencing, thinning would be needed	-	-
2-7	3.0	monoculture pine stands (average density), some open areas, erosion (sometimes rather severe)	Fencing, additional planting, agro-technical maintenance, thinning would be needed	1250	5660
2-8	2.1	some monoculture pine stands (average density), mainly open areas, erosion (sometimes rather severe)	Fencing, additional planting, agro-technical maintenance	3300	6960
Total	**72.2**				**227590**

Table 4. Description of Noyemberian pilot site by silvicultural measures

# on the map	Area, ha	Brief characteristics of the site	Proposed measures	Proposed quantity of required seedlings	
				Per 1 ha	Total (planted during 3 seasons)
1-1	19.5	Destroyed pine stands, open areas, presence of bush vegetation, in some places old planted broadleaf species and natural regeneration with poor growth due to grazing.	Fencing, additional planting, agro-technical maintenance	1500	33560
1-2	37.4	Destroyed pine stands, presence of sparse tree and bush vegetation, poor natural regeneration due to grazing	Fencing, additional planting, agro-technical maintenance	693	27400
1-3	10.7	Destroyed pine stands, presence of sparse tree and bush vegetation, poor natural regeneration due to grazing	Fencing, additional planting, agro-technical maintenance	1061	11960

2-1	7.7	Destroyed pine stands, open areas, presence of bush vegetation, in some places old planted broadleaf species and natural regeneration with poor growth due to grazing.	Fencing, additional planting, agro-technical maintenance	98	738
2-2	0.9	Destroyed pine stands, presence of sparse tree and bush vegetation, poor natural regeneration due to grazing	Fencing, additional planting, agro-technical maintenance	1370	1240
3-1	1.4	Destroyed pine stands, open areas, presence of bush vegetation, in some places old planted broadleaf species and natural regeneration with poor growth due to grazing.	Fencing, additional planting, agro-technical maintenance	80	125
3-2	2.0	Destroyed pine stands, open areas, presence of bush vegetation, in some places old planted broadleaf species and natural regeneration with poor growth due to grazing.	Fencing, additional planting, agro-technical maintenance	80	142
Total	**79,6**				**75165**

Azerbaijan

Table 5. Description of Agsu pilot site by silvicultural measures

№ on the map	Area, ha	Brief Characteristics of the site	Proposed measures	Proposed Q-ty of required seedlings	
				Per 1 ha	Total
1.1.1 1.1.2 1.1.3 1.1.4 1.1.5 1.1.6 1.1.7 1.1.8	2,9 0,7 3,9 4,1 0,6 0,6 0,8 2,1	High density (0,7-0,8) artificial pine stands	Protection from grazing, timber cut and forest fires. Conduct fire prevention measures through arrangement of mineralized lines, removal of thorns-and-shrubs, and pruning of trees.		
Total	15,7				
2.1.1 2.1.2 2.1.3 2.1.4 2.1.5	3,2 2,3 2,7 3,6 2,9	Low density (0,2-0,4) artificial pine stands, with some signs of natural regeneration of local species	Planting od oak, ash, elm and maple. Tending and watering during 5 years.	800	17600

2.1.6 2.1.7 2.1.8 2.1.9	1,4 1,3 3,3 1,3				
Total	22,0				17600
3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 3.1.6 3.1.7 3.1.8 3.1.9 3.1.10 3.1.11 3.1.12 3.1.13	1,1 1,0 2,3 2,5 2,2 1,4 3,4 2,2 7,0 0,8 2,2 0,8 4,2	Open lands with some individual trees. Some areas with natural regeneration of oak, ash, elm, pomegranate, hawthorn	1.Planting of 1-2 year seedlings of oak, ash, maple, elm and pomegranate. 2.Seeding of oak, ash, maple and elm. Tending and watering during 5 years.	1100	34210
Total	31,1				34210
4.1.1 4.1.2 4.1.3	0,5 0,5 0,5	Open forest lands with no tree cover	Planting of fruit species (cherry, plum, apricot,pomegranate, dogwood, briar, loquat) to establish fruit gardens Tending for 4 years, watering 5 years.	1100	1760
Total	1,5				1760
5.1.1	3,4	Territory under highway Baku-Agsu			
Total	3,4				
6.1.1	1,3	Territory under high voltage power transmission line			
Total	1,3				
Total	**75,0**				**53570**

Table 6. Description of Yevlakh pilot site by silvicultural measures

№ on the map	Area, ha	Brief Characteristics of the site	Proposed measures	Proposed Q-ty of required seedlings	
				Per 1 ha	Total
1.1.1 1.1.2 1.1.3 1.1.4 1.1.5 1.1.6 1.1.7	4,5 1,4 1,2 1,4 1,0 1,9 0,9	High and medium density artificial pine stands	Protection from grazing, timber cut and forest fires. Conduct fire prevention measures through arrangement of mineralized lines, removal of thorns-and-shrubs, and pruning of trees.		

1.1.8 1.1.9 1.1.10 1.1.11 1.1.12	4,1 1,6 1,3 0,4 1,2				
Total	20,9				
2.1.1 2.1.2 2.1.3 2.1.4 2.1.5 2.1.6 2.1.7 2.1.8	5,2 3,2 2,5 1,9 3,7 5,6 2,6 0,7	Open lands and low density artificial pine stands	Planting of oak, ash, elm, pomegranate and sylver berry. Seeding oak and ash. Support natural regeneration. Tending and watering for 5 years.	1100	27940
Total	25,4				27940
3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 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	4,6 1,4 2,6 3,7 2,8 0,5 1,0 1,4 2,2 0,8 0,6 0,4 1,1 0,4	Open forest lands with no tree cover	Planting of oak, ash, elm, pomegranate, sylver berry. Seeding oak and ash. Tending and watering for 5 years.	2500	58750
Total	23,5				58750
4.1.1	5,2	Territory under BTC pipeline			
Total	5,2				
Total	**75,0**				**86690**

Georgia

Table 7. Description of Khashuri pilot site by silvicultural measures

# on the map	Area, ha	Brief Characteristics of the site	Proposed measures	Proposed Q-ty of required seedlings	
				Per 1 ha	Total
1.1.1 1.1.2 **Sum**	2,2 0,4 **2,6**	High density deciduous stands of natural origin	Protection from cattle, prohibition of all kinds of cutting	-	-
1.2.1	4,0	Low and medium density deciduous stands of natural origin	Planting of oaks in canopy openings, weeding around seedlings three times	1000	4000

3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 **Sum**	1.8 3.9 1.3 2.8 15.7 **25.5**	High-density pine stands of artificial origin	Planting of oaks and other deciduous trees in canopy openings, weeding around seedlings three times	300	7700
3.2.1 3.2.2 3.2.4 3.2.5 3.2.7 3.2.8 **Sum**	1.5 17.9 8.2 1.8 1.1 0.8 **31,3**	Low and medium-density pine stands of artificial origin	Planting in gaps of oaks and other deciduous trees in canopy openings, weeding around seedlings three times	1000	31300
3.2.3 3.2.6 **Sum**	6.8 0.7 **7,5**	Low and medium-density pine stands of artificial origin with dense oak young growth	Protection from cattle (fencing)	-	-
4.1.1 4.1.2 4.1.3 4.1.4 4.1.5 **Sum**	6.2 0.3 0.2 0.6 0.3 **7,6**	Woodless territories	Planting of oaks and other deciduous trees (ash-trees, maples, wild pear, wild apple), weeding around seedlings three times	3000	22800
4.1.6	0,5	Territory under high voltage power transmission line		-	-
Total	**79.0**				**65800**

Table 8. Description of Tsavkisi pilot site by silvicultural measures

# on the map	Area, ha	Brief Characteristics of the site	Proposed measures	Proposed Q-ty of required seedlings	
				Per 1 ha	Total
1.1.1 1.1.2 1.1.3 **Sum**	6.6 1.8 0.1 **8,5**	High density deciduous stands of natural origin	Protection from cattle, prohibition of all kinds of cutting	-	-
1.2.1 1.2.2 1.2.3 1.2.4 1.2.5 1.2.6 1.2.7 1.2.8 1.2.9 **Sum**	0.2 0.3 0.3 1.4 0.1 0.2 0.1 0.1 0.1 **2,8**	Low-density natural degraded deciduous stands	Planting of deciduous trees in canopy openings (oak, ash-tree, maple, wild pear, wild apple, smoke-tree, nettle tree, sumac), on rocky slopes – planting of oriental hornbeam, smoke-tree, sumac. Weeding around seedlings two times	**1000**	**2800**
2.2.1 2.2.2 2.2.3 2.2.4 2.2.5 2.2.6	0.6 0.3 0.8 0.5 0.7 1.7	Low-density degraded artificial deciduous stands	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, sumac), on rocky slopes – planting of oriental		

2.2.7 2.2.8 2.2.9 2.2.10 2.2.11 **Sum**	0.1 0.1 0.5 0.1 0.2 **5.6**		hornbeam, smoke-tree, sumac. Weeding around seedlings two times	**1000**	**5600**
3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 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 **Sum**	3.9 0.1 1.0 3.9 1.5 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 **26,8**	High-density artificial black pine stands	Planting of oaks and other deciduous trees in canopy openings, weeding around seedlings two times	**300**	**8000**
3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 **Sum**	0.2 0.1 0.6 0.1 0.1 0.1 **1,2**	Medium and low-density black pine stands (at the same time, Caucasian pine) with mixture of ash-trees and maples	Planting of oaks and other deciduous trees in canopy openings, weeding around seedlings two times	**1000**	**1200**
4.1.1 4.1.2 4.1.3 4.1.4 4.1.5 4.1.6 4.1.7 4.1.8 4.1.9 4.1.10 4.1.11 4.1.12 4.1.13 4.1.14 4.1.15 4.1.16 4.1.17 4.1.18 4.1.19	4.4 5.5 0.1 0.1 0.4 2.5 0.2 0.4 0.2 0.3 1.7 2.5 3.0 0.3 0.7 3.9 0.1 0.3 0.2	Woodless territories; exposition – south, S-E, S-W, on 5-350 angle slopes	Planting of seedlings (oak, ash-tree, maple, wild pear, wild apple, nettle tree, smoke-tree, sumac), planting of oriental hornbeam, smoke-tree, sumac, nettle tree on rocky sections. Smoke-tree, sumac, nettle tree shall be seeded in terraces on rocky and washed sections		

4.1.20 4.1.21 4.1.22 4.1.23 4.1.24 4.1.27 4.1.28 **Sum**	0.1 0.1 0.2 0.1 0.4 0.1 0.9 **28,7**			 **3000**	 **86100**
4.1.25 4.1.26 **Sum**	0.1 0.5 **0,6**	No planting due to existing underground communication		-	-
Total	**74,2**				**103700**

2.4. Protection of the pilot sites

According to FPTs at every site fencing is considered as the measure for facilitation of natural regeneration; it will prevent pasturing of cattle on this site, which will facilitate self-regeneration of natural young growth of wood species (trees and shrubs). Also provide protection from massive human intervention by local population as well as tourists because of close location some sites to popular recreational areas.

Therefore all sites are completely fenced. In Armenia and Georgia wooden poles with regular non-galvanized barbed wire were used for fencing, and in Azerbaijan due to legal restrictions concerning of forest use metal poles fixed in concrete basement with galvanized barbed wire.

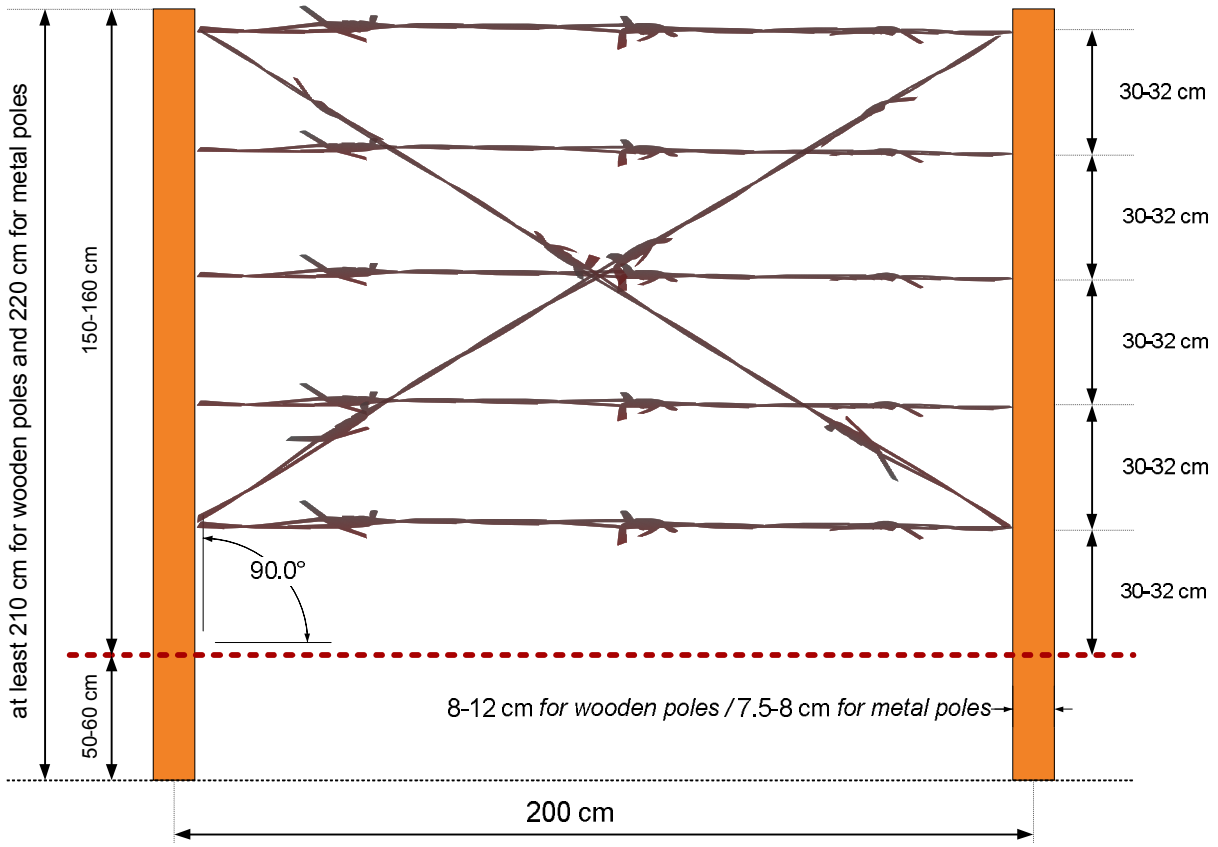
Total fence length by sites proposed by FPTs is given in Table 3.

Table 9. Total fence length by pilot sites

Country	Pilot Site	Fence length, m
Armenia	Spitak	9250
	Noyemberian	5750
Azerbaijan	Agsu	2290
	Yevlakh	5739
Georgia	Khashuri	4224
	Tsaavkisi	6247
Total for South Caucasus		**34200**

Technical specification for fencing is shown in drawing bellow.

Drawing 1. Technical specification for fencing



2.5. Transformation techniques

FPTs identified basic approach to undertake practical works which includes: selection of species for planting or seeding, soil preparation, planting/or seeding.

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 seedlings in rows – 1,5 m. The seedling shall be placed in the pit up to the root neck and soil shall be compacted. A depression shall be formed around the seedling so that moisture remains in the pits after precipitation (the regions are characterized by low precipitation level, hot summer, the possibility of artificial watering is limited and efficient use of natural precipitations is necessary).

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 in all three countries. The only difference is in quantity of planting material. In Azerbaijan (pilot site Yevlakh) an open woodless area was completely plowed using a special technique before planting.

For seeding of selected tree species in close monoculture forest stands and on open areas in Azerbaijan and Armenia preliminary arranged pits were used with dimensions adequate to requirements of particular tree species.

In Georgia seeding was carried out by spreading of drought-resistant shrubs on local areas (rocky slides exposed soil, 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.

2.6 Maintenance activities

Weeding around seedlings is a basic activity recommended by FPTs to provide maintenance of newly established plantations.

3. Lessons learned

This chapter provides assessment of results of works conducted and main lessons learned derived in the course of practical implementation of forest transformation measures in selected pilot sites in all three countries based on relevant field inspections made by national coordinators in 2012 and 2013 and Regional Coordinator in autumn 2013.

3.1. Land tenure

All sites allocated for the project implementation are under management of state authorities. According to national rules fencing is considered as one of the most efficient approach to protect forest plots identified for restoration. Therefore, decision on practical application of fencing on pilot sites is within of existing legal norms. From other hand it is unusual for local villagers around pilot sites to see that territories which they consider as part of their cattle grazing ground or the area which they visit often for different purposes (recreation, collecting of wild berries, mushrooms and pine cones for heating) are restricted for entrance at all. This may cause some conflict situation due to reduce of grazing areas and limitation of their livelihood opportunities. To predict possible negative affect from surrounding population and rise project “ownership” filling to them project actively did involve local labor in all silvicultural measures and proposes to continue over whole maintenance period. At the same time further explanation of project ideas, in particular importance of forest restoration for their future as well as overall objectives of sustainable forest management for ecological stability and economic development of respected countries seems also very efficient mechanism for final success of the project.

Therefore, additional income opportunities as well as raising environmental awareness are two essential measures, which could prevent potential conflicts with local population in the future.

3.2. Site surveys

Transformation works were conducted in close cooperation of contractors and WWF Caucasus Program Office at every stage of its implementation. Each planting season was accompanied with field inspection by National Coordinators and results of inspection were provided in relevant country reports. Results of these works by countries are provided below.

Armenia

Implementation of forest transformation measures on both pilot sites were organized by local brunches of State Forest Enterprise "Hyantar". Table 4 provides summarized figures about works conducted.

Table 10. Summary on planted species in Armenia

N	Species	Planted, Spitak				Planted, Noyemberian				Total by species
		2012, Autumn	2013, Spring	2013, Autumn	Total	2012, Autumn	2013, Spring	2013, Autumn	Total	
1	*Fraxinus excelsior*		51195	20000	71195	3750	5000		8750	
2	*Acer trautvetteri*		15000	10000	25000			1500	1500	
3	*Malus orientalis*		10000	10000	20000	3750	4355	9352	17457	
4	*Pyrus caucasica*		5000	2000	7000					
5	*Querqus macranthera*					7500	26960	11500	45960	
6	*Yuglans regia*						455	1048	1503	
7	**Total planted**				**123195**				**75170**	**198365**

According to summary table total 198365 seedlings were planted of which in Spitak site 123195 and Noyemberian 75110. At Spitak site seeding of 369, 5 kg oak acorns is also conducted.

Azerbaijan

Local forest district offices of the Forestry Development Department were responsible for field works according to transformation plan. Table 5 provides information about results of these works:

Table 11. Summary of planted species in Azerbaijan

#	Species	Planted, Agsu					Planted, Yevlakh					Total by species
		2012 Automn	**2013 Spring**	**2013 Automn**	**2014 Spring**	**Total**	**2012 Automn**	**2013 Spring**	**2013 Automn**	**2014 Spring**	**Total**	
1	*Fraxinus exselsior*	-	-	1580	-	1580		-	*15750*	*5625*	21375	22955

2	*Quercus longipes*	-	-	1580	-	1580	-	-	-	-	-	1580
3	*Melia* (Persian lilac)	-	-	-	-	-	-	-	10500	3750	14250	14250
5	*Elaegnus angustifolia*	-	-	-	-	-	-	-	7000	2500	9500	9500
6	*Punica granatum*	-	-	-	-	-	-	-	1750	625	2375	2375
7	**Total planted**					**3160**					**47500**	**50660**

Two maps below provide overall picture of works conducted at each site.

Figure 2. Agsu map of silvicuture measures

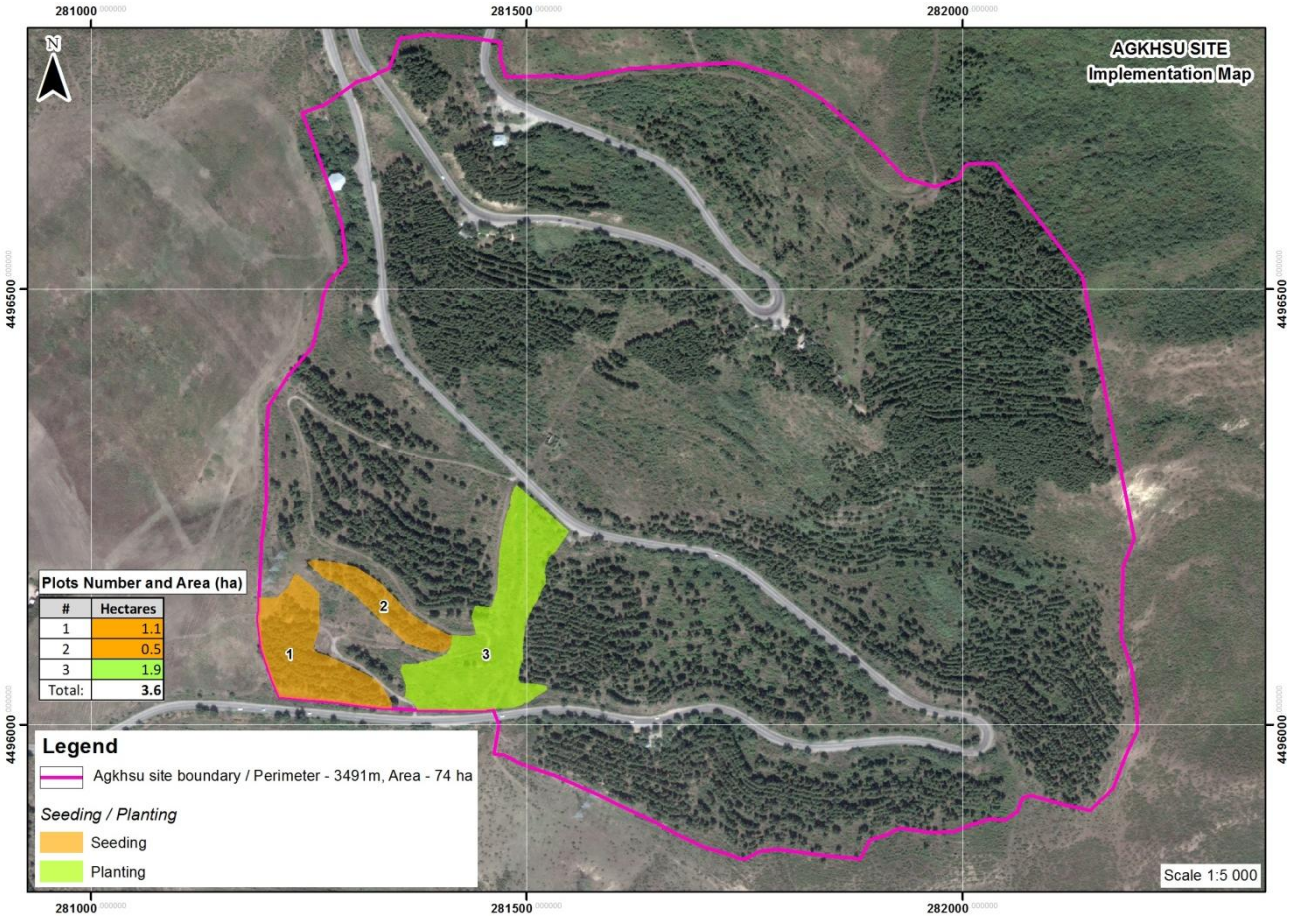
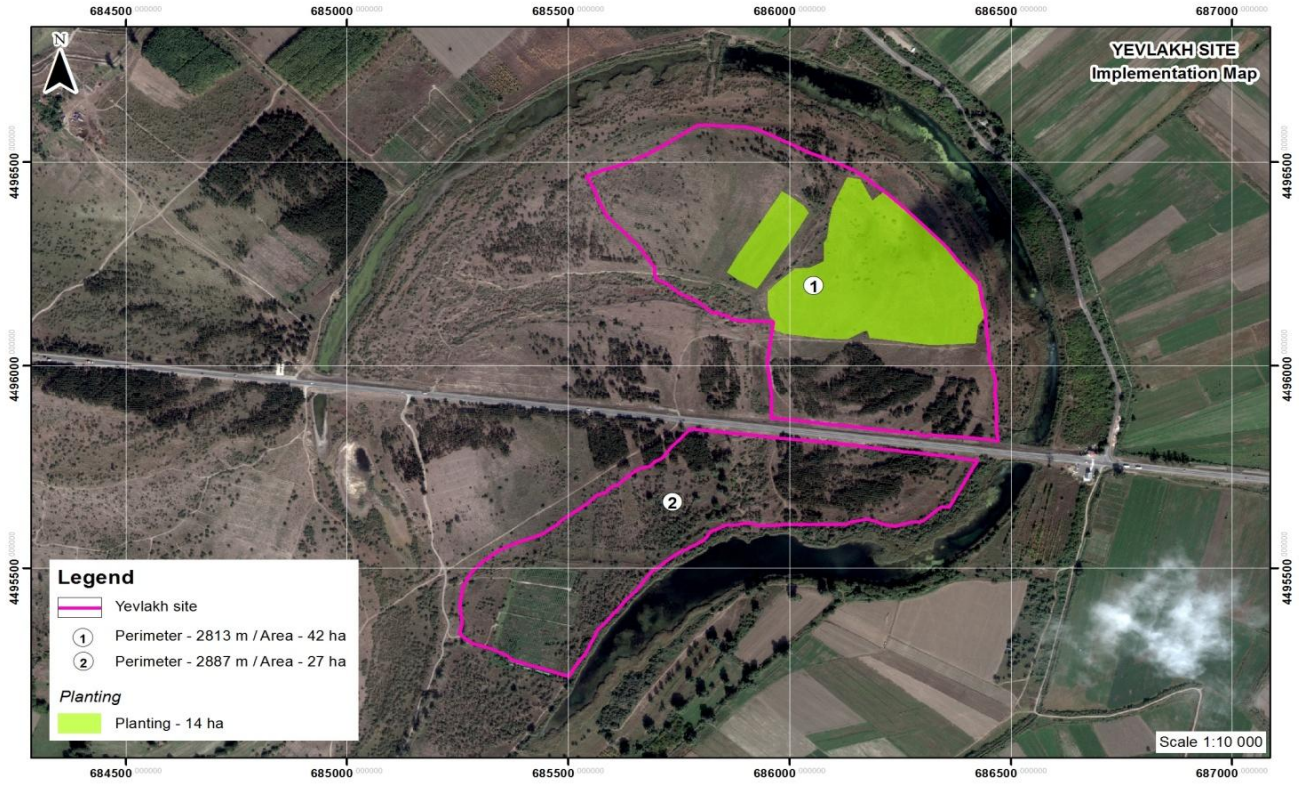


Figure 3. Yevlakh map of silviculture measures



In total 50660 seedlings were planted in Azerbaijan of which 3160 on the 1,9 ha at Agsu site and 47500 seedlings at 14 ha of Yevlakh site. At the Agsu pilot site 180 kg oak acorns were seeded on the area of 1, 6 ha.

Georgia

Implementation of Forest Transformation Plans were conducted by specialized company "Georgian Seedlings" based on contract with WWF Caucasus Program Office. Table 6 provides summarized figures about results of transformation activities.

Table 12. Summary on planted species in Georgia

#	Species	Planted, Khashuri				Planted, tsavkisi				Total by species
		2012, Autumn	2013, Spring	2013, Autumn	Total	2012, Autumn	2013, Spring	2013, Autumn	Total	
1	*Quercus iberica*	8500	21500	17000	47000	3000	4200	1950	9150	56150
2	*Fraxinus excelsior*	-	2000	400	2400	-	1000	730	1730	4130
3	*Fraxinus oxycarpa*	1800	2160	4460	8420	1000	-	-	1000	9420

4	*Acer campestre*	1780	5800	-	7580	1000	750	170	1920	9500
5	*Acer velitinum*	600	1000	4000	5600	-	-	-	-	5600
6	*Tilia caucasica*	600	1000	2000	3600	-	-	-	-	3600
7	*Pirus caucasica*	-	-	-	-	-	250	-	250	250
8	*Malus orientalis*	-	-	-	-	-	350	-	350	350
9	*Cotinus cotigria*	-	-	-	-	-	200	-	200	200
10	*Celtis caucasica*	-	-	400	400	-	-	400	400	800
11	**Total planted**				**75000**				**15000**	**90000**

Two maps below show all planting activities undertaken by each planting season at each pilot site.

Figure 4. Khashuri map of silviculture measures

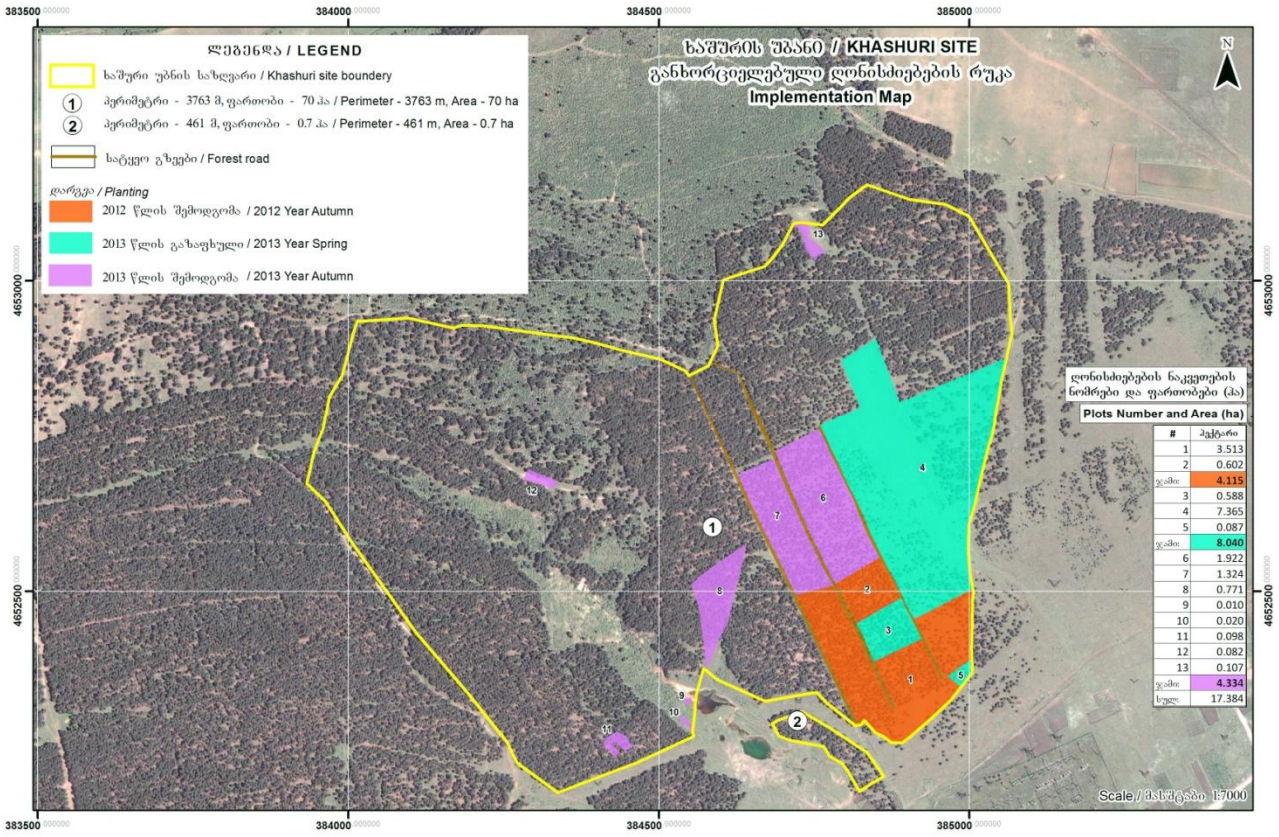
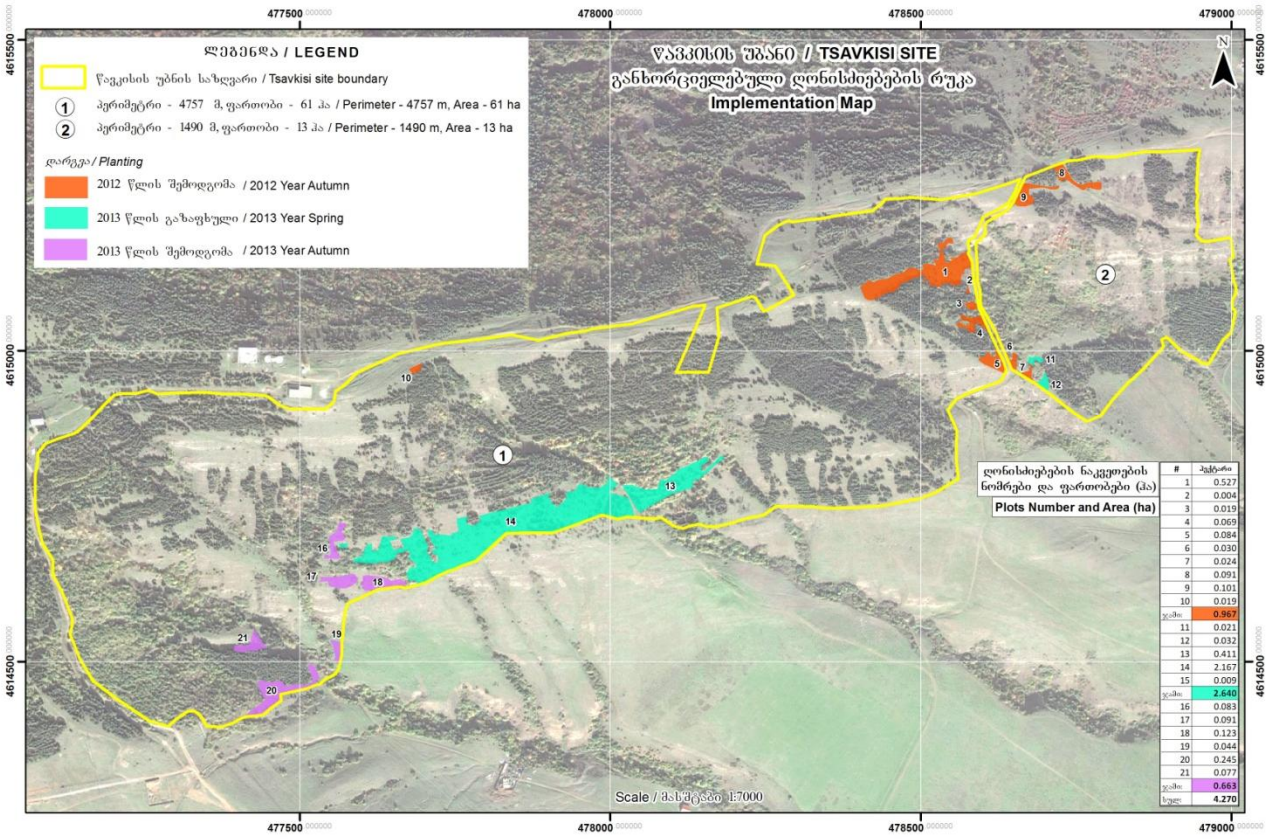


Figure 5. Tsavkisi map of silviculture measures



According to final figures at Khashuri site 17,384 ha were planted, at Tsavkisi 4270 ha. Total number of seedling used is 90000. Additionaly about 0,5 ha at Tsavkisi site were seeded by 10 kg seeds of different species (5 kg- Celtis caucasica; 2 kg- Carpinus orientalis; 1 kg-Cotinus coggygria; 1kg-Pistacia mutica; 1kg-Rhus coriaria). Generally, further growing potential for new plants seems to be promising, except of the open area in Khashuri site where is an obvious trend of soil trenching which cause a problems for young seedlings (see photo in annex 3). There should be a special attention for this area during a maintenance period.

Table 13. Summary of total planted by countries

Country	Pilot site	Subtotal
Armenia	Spitak –123 195 Noyemberian -75 170	**198 365**
Azerbaijan	Agsu –3160 Yevlakh -47 500	**50 660**
Georgia	Khashuri –75 000 Tsavkisi -15 000	**90 000**
Total		**339025**

3.3. Site preparation, protection

Different approaches were used as it was proposed by FPTs. Site preparation at all pilot areas aimed to arrange pits prior planting. Pits are located along the slope in rows. The distance between the rows are 2 m, between seedlings in rows – 1,5 m. Schematic diagram of dislocation of rows and species at each site are provided in Forest Transformation Plans. Pits were arranged manually using special forest spade or with drilling machine provided by WWF Caucasus PO. Whole area of pilot sites are well fenced, though it was noted at both sites that population is still have an attempt to move inside for grazing or other purposes (see photos in annex).

3.4. Seedlings procurement and quality, planting/seeding technique and maintenance requirements

Seedling for selected wood species were provided by Contractors. In Armenia and Azerbaijan manly from forest nurseries of official forest management enterprises, in Georgia from contractor's private nursery. According to wood species, the focus was to plant deciduous species, mainly oak, also ash tree, maple, apple, pear, etc. 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 seedlings, planting was done in staggered rows. The scheme of the order of seedlings between rows and in rows is as follows:

After each 20-30 seedlings in the row the wood species shall change; other wood species shall be planted in neighboring row at this distance. Besides, the above mentioned proportion of wood species is maintained – 60% oak, 40% - other deciduous species.
Maintenance requirement for new plantations are identified mainly as weeding around seedlings two-three times.

3.5 Cost efficiency and cost models

General financial results (fencing and planting costs, purchase of seedlings and other materials) under the project activities are summarized in table 14a and 14b below. Information by countries is provided in Annex 1.

Table 14a. Financial summary of project activities (South Caucasus) – de-facto as of March 1, 2014

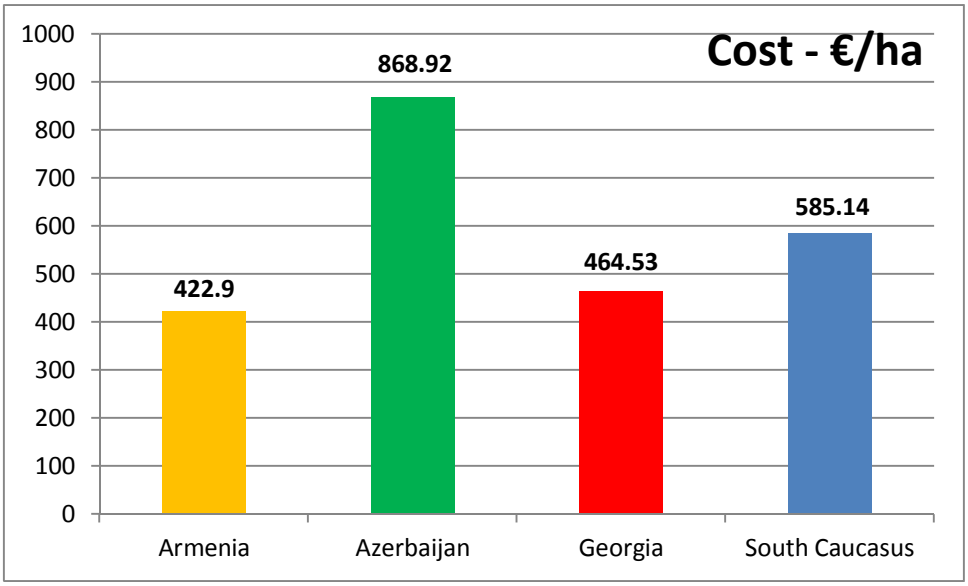
SOUTH CAUCASUS	Contractual Cost	Contractual Unit Name	Contractual No. Units	Contractual Unit Cost		Unit Name in de-facto hectares	No. de-facto Units	Unit cost per de-facto hectares
Supply of Fencing Materials	170275.50	km	40.00	4 256.89		ha	443.87	383.62
Installation of Fence	89450.00	km	34.200	2 615.50		ha	443.87	201.52
SUB-TOTAL FOR FENCING	**259725.50**					**ha**	443.87	**585.14**
Supply of Seeds	2861.00	kg	3876.70	0.738		ha	443.87	6.45
Supply of Seedlings	175625.00	seedling	337640	0.520		ha	443.87	395.67
SUB-TOTAL FOR PLANTING MATERIAL	**178486.00**					**ha**	443.87	**402.11**
Preparation of Sites	29991.89					ha	443.87	67.57
Seeding and Planting	119967.54					ha	443.87	270.28
Maintenance (weeding)	29991.89					ha	443.87	67.57
Other Measures	19994.59					ha	443.87	45.05
SUB-TOTAL FOR PLANTING, SEEDING, WEEDING and OTHER MEASURES	**199945.90**					**ha**	443.87	**450.46**
SUB-TOTAL FOR TOOLS & INSTRUMENTS	**92901.90**					**ha**	443.87	**209.30**
TOTAL without TOOLS & INSTRUMENTS	**638157.40**					**ha**	443.87	**1437.71**
GRAND TOTAL	**731059.30**					**ha**	443.87	**1647.01**

Table 14b. Financial summary of project activities (South Caucasus) – expected by the end of the project - March 1, 2015

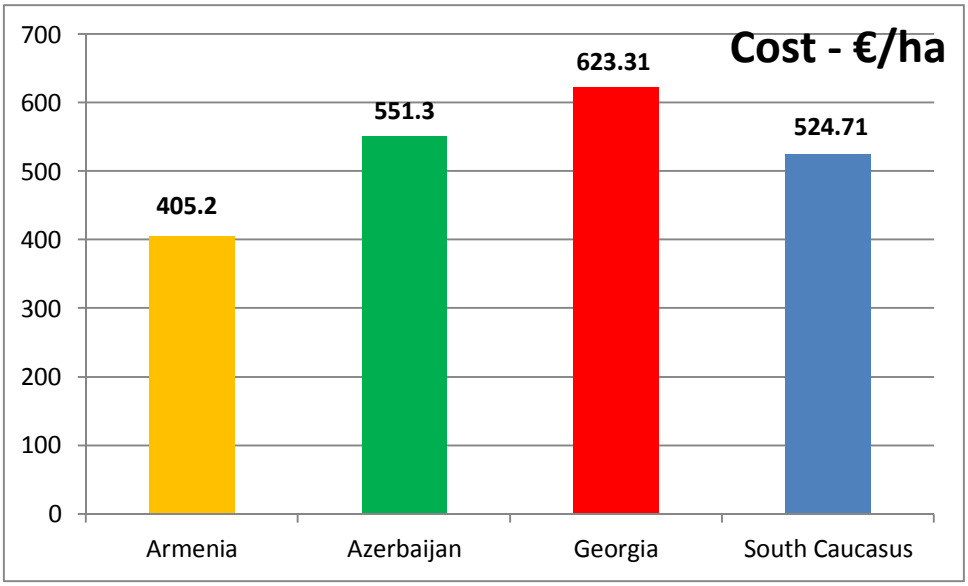
SOUTH CAUCASUS (expected upon completion of supply of seedlings/transformation works in Azerbaijan by the end of the Project - March 01, 2015)	**Contractual Cost**	**Contractual Unit Name**	**Contractual No. Units**	**Contractual Unit Cost**		**Unit Name in de-facto hectares**	**No. de-facto Units**	**Unit cost per de-facto hectares**
Supply of Fencing Materials	170,275.50	km	40.00	4,256.89		ha	443.87	383.62
Installation of Fence	89,450.00	km	34.200	2,615.50		ha	443.87	201.52
SUB-TOTAL FOR FENCING	**259,725.50**					**ha**	443.87	**585.14**
Supply of Seeds	2,861.00	kg	3,876.70	0.738		ha	443.87	6.45
Supply of Seedlings	230,040.00	seedling	445,790	0.516		ha	443.87	518.26
SUB-TOTAL FOR PLANTING MATERIAL (expected with view of completion of transformation works in Azerbaijan by the end of the Project - March 01, 2015)	**232,901.00**					**ha**	443.87	**524.71**
Preparation of Sites	38,276.25					ha	443.87	86.23
Seeding and Planting	153,105.00					ha	443.87	344.93
Maintenance (weeding)	38,276.25					ha	443.87	86.23
Other Measures	25,517.50					ha	443.87	57.49
SUB-TOTAL FOR PLANTING, SEEDING, WEEDING and OTHER MEASURES (expected with view of completion of transformation works in Azerbaijan by the end of the Project - March 01, 2015)	**255,175.00**					**ha**	443.87	**574.89**
SUB-TOTAL FOR TOOLS & INSTRUMENTS	**92,901.90**					**ha**	443.87	**209.30**
TOTAL without TOOLS & INSTRUMENTS	**747,801.50**					**ha**	443.87	**1,684.73**
GRAND TOTAL	**840,703.40**					**ha**	443.87	**1,894.03**

According to summary table total cost for transformation measures in all three countries by March 2014 comprise 731 059.30 €. About 88% of these amount were mainly used for conducting following components: (i) costs of planting, seeding and maintenance - 199 945.9 €, 27.3 %; (ii) fencing costs – 259725.5 € - 35.5%; (iii) costs for planting and seeding material – 178 486.0 € - 24.4%. Figures 6,7 and 8 show cost distribution for the above mentioned components by countries.

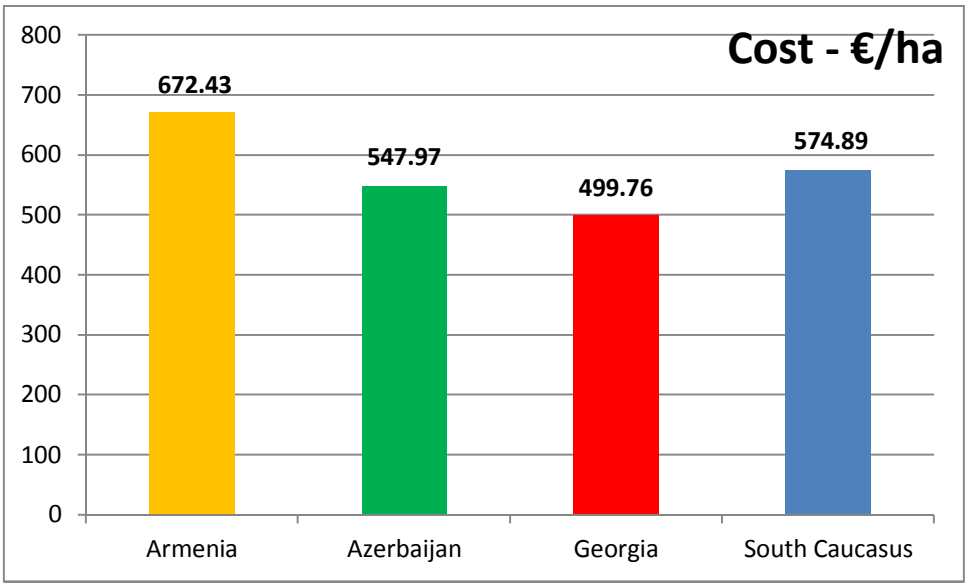
Fencing costs



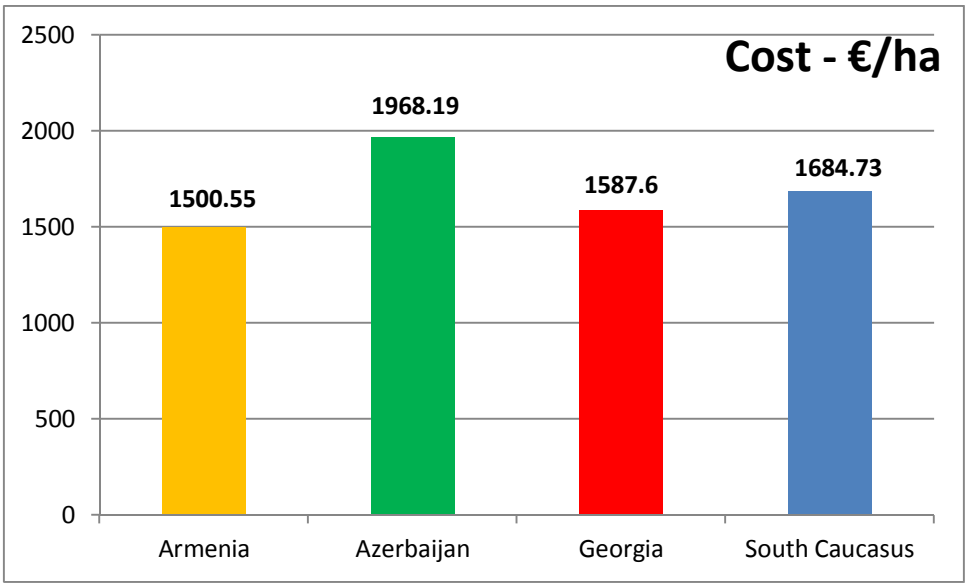
Planting material costs (*incl. expected by the end of the project complete cost for Azerbaijan*)



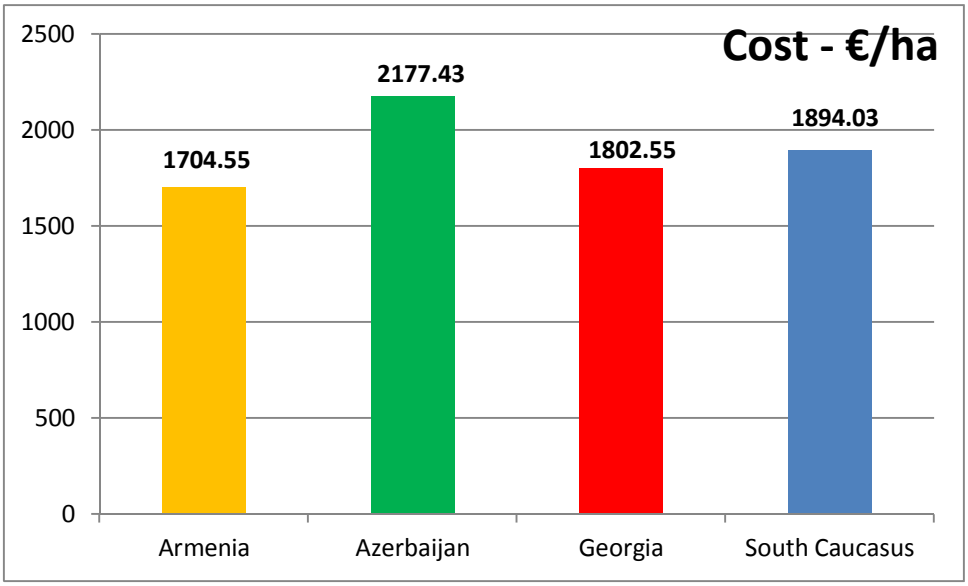
Planting, seeding and maintenance costs (*incl. expected by the end of the project complete cost for Azerbaijan*)



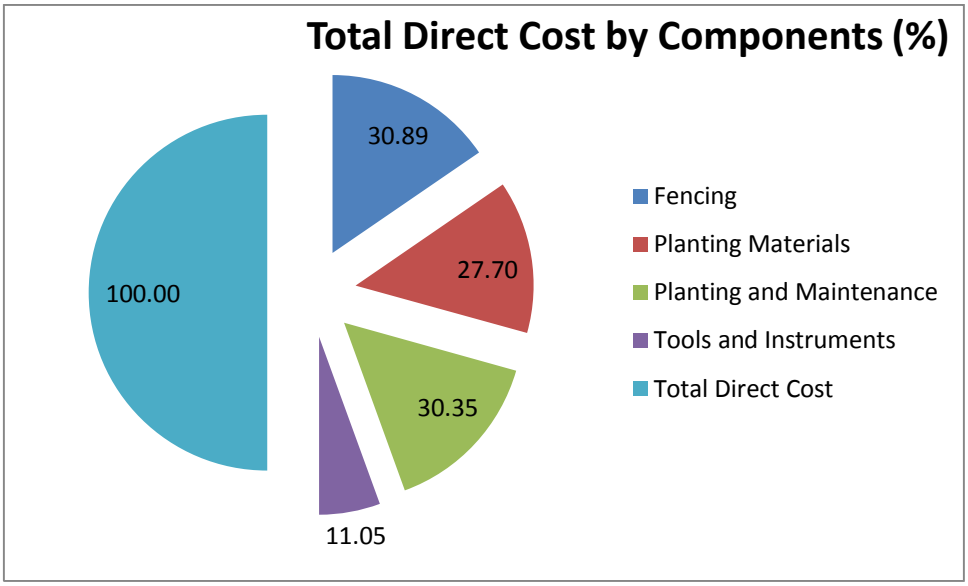
Total for fencing, planting materials and planting, seeding and maintanance (*incl. expected by the end of the project complete cost for Azerbaijan*)



Total direct cost for transformation measures (*fencing, planting materials, planting and maintanance, tools and instruments*) - *incl. expected by the end of the project complete cost for Azerbaijan*



Total direct cost by the components for the South Caucasus



Fencing costs in Azerbaijan significantly differs from Armenia and Georgia due to official restriction on timber use for poles in this country which forced to use metal poles with concrete basements and galvanized barbed wire for installation of fence at pilot sites.

Availability of planting material (seeds and seedlings) from the nurseries in Armenia and Azerbaijan, adjacent to pilot sites reduced their costs compared to Georgia, where limited number of nurseries, mainly private ones had been

resulted in high market price for seedlings. As a result project pilot sites had been supplied by a private nursery located in another region of Georgia at a remarkable high price.

3. Summary and outlook

It is obvious that significant work is done towards achievement a main objective of the project – increasing resilience of forest ecosystems against climate change through practical implementation on selected pilot sites within the period of project duration. These results are reflected as a visible indicator (a well-protected area, new plantations established) and also on such factors as an involvement of all stakeholders like Central and local government, private companies designing and implementing Forest Transformation Plan and most important – intensive involvement local population in the works and with this making them "closer" to project and providing some alternative revenue opportunities.

Therefore, first step is done successfully. Detailed analysis of more reliable outcomes tested by time could only be made after several years and maybe decades since silviculture is a long term activity and consequently needs long term observation for final conclusion about success (or not success) of particular measure. Nevertheless, already at this very early stage we may conclude that basis for future success is done through honest and hard work.

In order, that the work done will not be wasted, further maintenance and protection of pilot sites to be continued. Site protection measures could include maintenance of fences and hiring of field monitor/ranger from the local population. Young seedlings planted also to be maintained through weeding to ensure better condition for their growth as it is recommended by FTP. There are also number of issues listed below which to be taken in account:

A monitoring programme (system) is to be established for the pilot sites. The monitoring programme (system) will be based on the manual of monitoring methodology developed by the project consultant.

A team of local scientists that will include but not limited to the botanists, zoologists, forest specialists, soil specialists is to be established to conduct monitoring field visits and research at least once in a year and prepare monitoring reports. The issue of sustainability and the necessity to maintain monitoring data of the area beyond the project lifetime needs to be considered in the establishment of a monitoring group. To ensure capacity development of decision makers, scientists, relevant faculty students, technicians and workers in monitoring ecological processes and ecosystem restoration techniques as well as in basics of best European standards in sustainable forestry the training materials and modules to be developed which may play an important role for further development of a training system in the forest sector.

To raise awareness in local population and main stakeholders planning and implementation of particular activities could be arranged. These activities are to be organized through particularly targeted meeting or posters for locals, meetings with school children and university students and other stakeholders.

Annexes

Annex 1- Financial summary of the project activities for Armenia, Azerbaijan and Georgia

ARMENIA	Contractual Cost	Contractual Unit Name	Contractual No. Units	Contractual Unit Cost		Unit Name in de-facto hectares	No. de-facto Units	Unit cost per de-facto hectares
Supply of Fencing Materials	47250.00	km	15.00	3 150.00		ha	151.80	311.26
Installation of Fence	16950.00	km	15.00	1 130.00		ha	151.80	111.66
SUB-TOTAL FOR FENCING	**64200.00**					**ha**	151.80	**422.92**
Supply of Seeds	1174.00	kg	1727.70	0.680		ha	151.80	7.73
Supply of Seedlings (*incl. first class seedlings*)	60335.00	seedling	196980	0.306		ha	151.80	397.46
SUB-TOTAL FOR PLANTING MATERIAL	**61509.00**					**ha**	151.80	**405.20**
Preparation of Sites	15311.25					ha	151.80	100.86
Seeding and Planting	61245.00					ha	151.80	403.46
Maintenance (weeding)	15311.25					ha	151.80	100.86
Other Measures	10207.50					ha	151.80	67.24
SUB-TOTAL FOR PLANTING, SEEDING, WEEDING and OTHER MEASURES	**102075.00**					**ha**	151.80	**672.43**
SUB-TOTAL FOR TOOLS & INSTRUMENTS	**30967.30**					**ha**	151.80	**204.00**
TOTAL without TOOLS & INSTRUMENTS	**227784.00**					**ha**	151.80	**1500.55**
GRAND TOTAL	**258751.30**					**ha**	151.80	**1704.55**

AZERBAIJAN (de-facto- Supply of seedlings and transformation measures completed by 31.9% as of March 01, 2014)	**Contractual Cost**	**Contractual Unit Name**	**Contractual No. Units**	**Contractual Unit Cost**		**Unit Name in de-facto hectares**	**No. de-facto Units**	**Unit cost per de-facto hectares**
Supply of Fencing Materials	75600.00	km	12.00	6 300.00		ha	148.00	510.81
Installation of Fence	53000.00	km	8.729	6 071.71		ha	148.00	358.11
SUB-TOTAL FOR FENCING	**128600.00**					**ha**	148.00	**868.92**
Supply of Seeds	1687.00	kg	2149.00	0.785		ha	148.00	11.40
Supply of Seedlings ***(Total contractual number of seedlings - 158,810 and Total contractual cost - 79,905 EUR / Supply of seedlings not completed - as of March 01, 2014)***	25490.00	seedling	50660	0.503		ha	148.00	172.23
SUB-TOTAL FOR PLANTING MATERIAL	**27177.00**					**ha**	148.00	**183.63**
Preparation of Sites	3880.64					ha	148.00	26.22
Seeding and Planting	15522.54					ha	148.00	104.88
Maintenance (weeding)	3880.64					ha	148.00	26.22
Other Measures	2587.09					ha	148.00	17.48
SUB-TOTAL FOR PLANTING, SEEDING, WEEDING and OTHER MEASURES (*Total contractual cost - 81,100 EUR / Transformation measures not completed - as of March 01, 2014*)	**25870.90**					**ha**	148.00	**174.80**
SUB-TOTAL FOR TOOLS & INSTRUMENTS	**30967.30**					**ha**	148.00	**209.24**
TOTAL without TOOLS & INSTRUMENTS	**181647.90**					**ha**	148.00	**1227.35**
GRAND TOTAL	**212615.20**					**ha**	148.00	**1436.59**

AZERBAIJAN (expected by the end of the Project - March 01, 2015)	**Contractual Cost**	**Contractual Unit Name**	**Contractual No. Units**	**Contractual Unit Cost**		**Unit Name in de-facto hectares**	**No. de-facto Units**	**Unit cost per de-facto hectares**
Supply of Fencing Materials	75,600.00	km	12.00	6,300.00		ha	148.00	510.81
Installation of Fence	53,000.00	km	8.729	6,071.71		ha	148.00	358.11
SUB-TOTAL FOR FENCING	**128,600.00**					**ha**	148.00	**868.92**
Supply of Seeds	1,687.00	kg	2,149.00	0.785		ha	148.00	11.40
Supply of Seedlings	79,905.00	seedling	158,810	0.503		ha	148.00	539.90
SUB-TOTAL FOR PLANTING MATERIAL (expected by the end of the Project - March 01, 2015)	**81,592.00**					**ha**	148.00	**551.30**
Preparation of Sites	12,165.00					ha	148.00	82.20
Seeding and Planting	48,660.00					ha	148.00	328.78
Maintenance (weeding)	12,165.00					ha	148.00	82.20
Other Measures	8,110.00					ha	148.00	54.80
SUB-TOTAL FOR PLANTING, SEEDING, WEEDING and OTHER MEASURES (expected by the end of the Project - March 01, 2015)	**81,100.00**					**ha**	148.00	**547.97**
SUB-TOTAL FOR TOOLS & INSTRUMENTS	**30,967.30**					**ha**	148.00	**209.24**
TOTAL without TOOLS & INSTRUMENTS	**291,292.00**					**ha**	148.00	**1,968.19**
GRAND TOTAL	**322,259.30**					**ha**	148.00	**2,177.43**

GEORGIA	Contractual Cost in EUR	Contractual Unit Name	Contractual No. Units	Contractual Unit Cost in EUR		Unit Name	No. de-facto Units	Unit cost in EUR per de-facto hectare
Supply of Fencing Materials	47,425.50	km	13.00	3,648.12		ha	144.07	329.18
Installation of Fence	19,500.00	km	10.471	1,862.29		ha	144.07	135.35
SUB-TOTAL FOR FENCING	**66,925.50**					**ha**	144.07	**464.53**
Supply of Seeds								
Supply of Seedlings	89,800.00	seedling	90,000	0.998		ha	144.07	623.31
SUB-TOTAL FOR PLANTING MATERIAL	**89,800.00**					**ha**	144.07	**623.31**
Preparation of Sites	10,800.00					ha	144.07	74.96
Planting	43,200.00					ha	144.07	299.85
Maintenance (weeding)	10,800.00					ha	144.07	74.96
Other Measures	7,200.00					ha	144.07	49.98
SUB-TOTAL FOR PLANTING, SEEDING, WEEDING and OTHER MEASURES	**72,000.00**					**ha**	144.07	**499.76**
SUB-TOTAL FOR TOOLS & INSTRUMENTS	**30,967.30**					**ha**	144.07	**214.95**
TOTAL without TOOLS & INSTRUMENTS	**228,725.50**					**ha**	144.07	**1,587.60**
GRAND TOTAL	**259,692.80**					**ha**	144.07	**1,802.55**

Annex 2-Indicative (Recommended) Outline/Template for FTP

TITLE : FOREST TRANSFORMATION COUNTRY PLAN (PLAN OF SILVICULTURAL MEASURES) FOR SELECTED PILOT FOREST SITES

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*)

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