



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 Assessment Report on Results of Transformation Measures in Azerbaijan

(March 01, 2011 - March 01, 2014)

Jabbar Garibov
National Forest Expert, Azerbaijan

March, 2014 - Baku



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 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

**“Increasing the Resilience of Forest Ecosystems against Climate Change in the Southern
Caucasus through Forest Transformation” under the EC-funded project DCI-
ENV/2010/221391” EC ENRTP-Caucasus**

Technical report on outcomes of forest transformation in Azerbaijan

Contents

1. Assessment of outcomes of preparation phase of project in Azerbaijan.....	2
1.1 Assessment of sites.....	2
1.3 Criteria for site selection and site survey.	3
1.4 Plan of forest transformation	10
1.5 Protection of experimental sites.....	15
1.6 Transformation of the methods.....	16
1.7 Maintenance of activity	16
1.8 Cost effectiveness and model values.....	17
1. Lessons learned in Azerbaijan.....	19
2.1 Land-tenure system.....	19
2.2 Criteria for site selection and site survey	20
3. Summary and forecast for Azerbaijan.....	24
Annexes	26

1. Assessment of outcomes of preparation phase of project in Azerbaijan

1.1 Assessment of sites

Within the overall period of implementation of forest project transformation measures carried out in separate experimental sites in Aghsu (site # 1) and Yevlakh (site #2) with total area of 148 ha. The presented report called upon for provision of results of this activity based on proper inspection sites which carried out by national coordinator in autumn 2013 and spring 2014.

1.2 Land-tenure system

Forests of pilot site N1 – “Aghsu” with total area 74 ha.

Forests of pilot site N2 – “Yevlakh” with total area 74 ha.

Figure 1. Site map of “Aghsu”

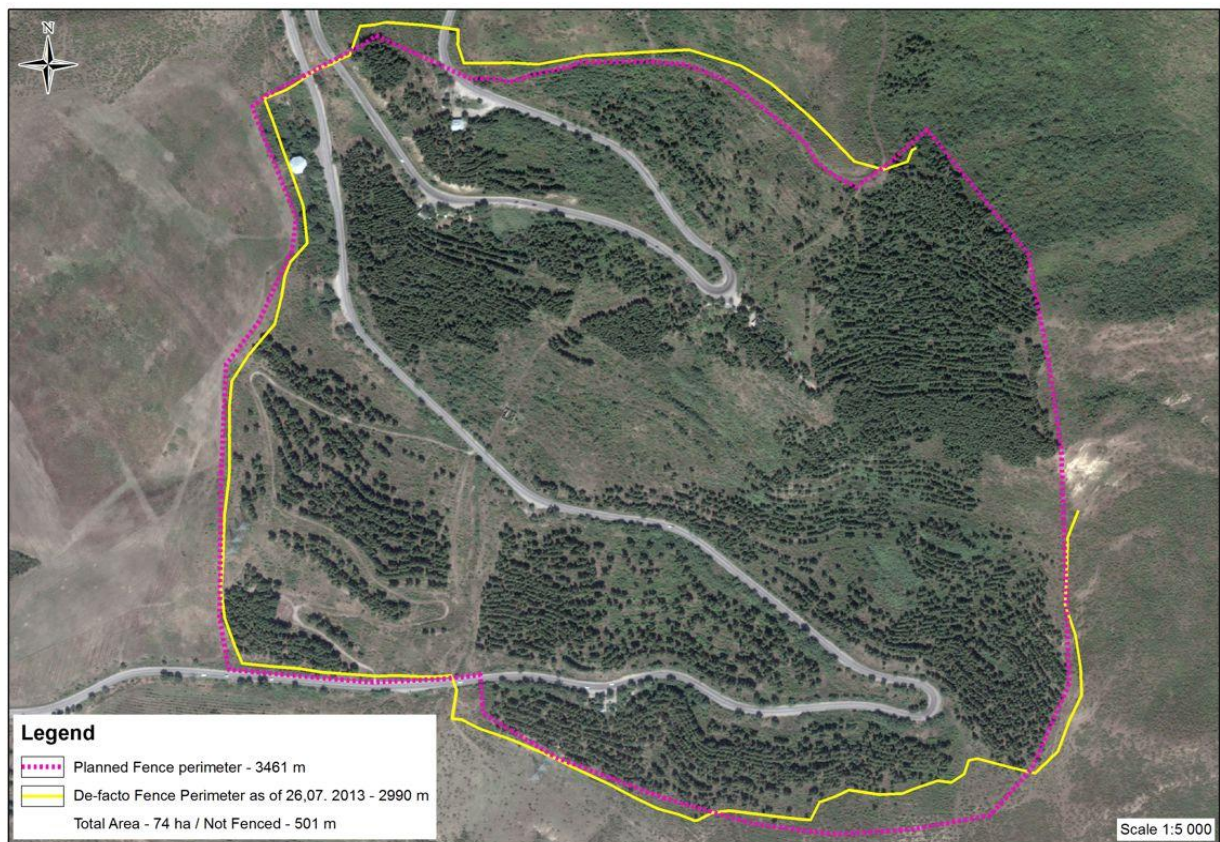
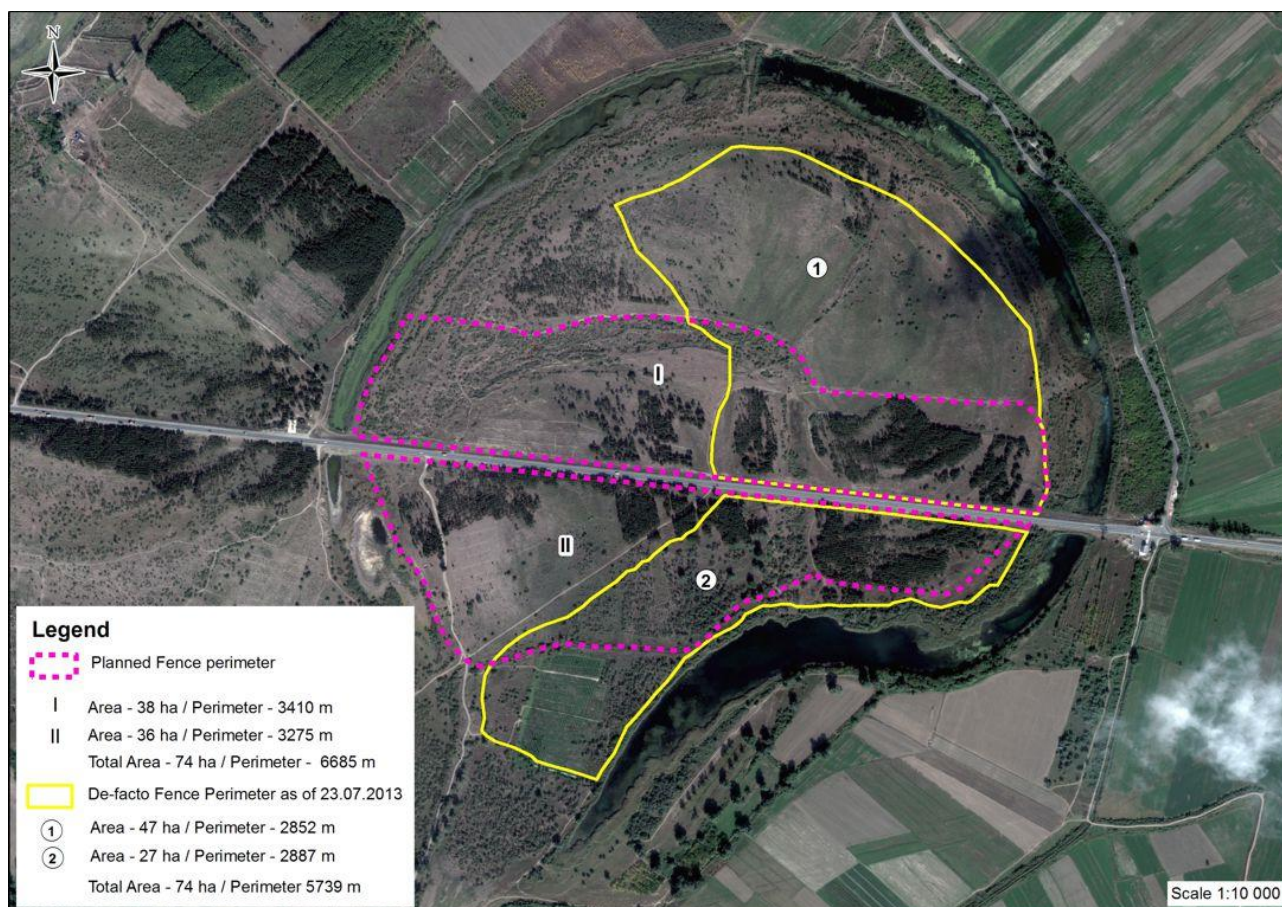


Figure 2. Site map of “Yevlakh”



1.3 Criteria for site selection and site survey.

Overall objective of the project aims to enhance sustainability of forest ecosystems in South Caucasus, namely in Azerbaijan concerning impact of climate change and in respect to improvement of biological diversity and livelihood of local population. Common goal targets major danger of climate change and biological diversity of forest ecosystems which maintain livelihood of rural community. These services include soil protection as well as water supply and quality of wood and non-wood products. Objective verifiable indicator (OVI) for this common goal: by 2015 the national government will adopt and start to pursue a policy which makes forests and its services provided by them, more sustainable to climate change.

Specific objective of the project helps toward attainment of common goal by creating necessary conditions for local forest administrations for the purpose of development and implementation of strategy for transformation of monoculture forest plantation being most sustainable and closer to

natural forest. It is suggested to carry out this through awareness of the consequences of climate change in forests by demonstrating practical actions of administration officers and members of local community who use forests with necessary knowledge and skills in view of more sustainability of the forests in order to deliver development, performance of actions and transformation in other forests.

Experimental forest plots have been picked out by project team in cooperation with local authorities on the basis of aforesaid requirements for the forests in initial phase of implementation in accordance with provisionally agreed selection criteria (See insert 1)

Insert 1. Criteria for selection of a site

1) criteria for maintenance of character

- a) diversity of indicators for appearance of endemic and endangered species
- b) importance for Shredded habitation (ECO corridor)

2) silvicultural / ecological criteria

- a) crown cover
- b) survey measurement
- c) soils and nutrient situation
- d) hydrological
- e) potential of natural regeneration
- f) availability of adapted transplants
- g) protective function of timber stands
- i) waterproofing
- II) water zone
- III) erosion protection
- h) risk factors
- (i) ranging
- II) forest fires

3) legal criteria

- a) land tenure
- b) condition of forest ranges
- c) legal restrictions for forest transformation actions

4) social-economic criteria

- a) support and interest of local peoples and government
- b) opportunities for participation of local population in work process
- c) distance to populated areas
- d) importance for rest and environmental education

5) other

- a) sustainability of actions
 - i) obligation of landowners
 - II) number of landowners
 - III) opportunity for subsequent financing
- b) vision

Consequences of changes of the selected pilot sites reflect timber stands with artificially propagated pine monoculture that are more vulnerable for the climate. Detailed layout and borders of separate patches have been agreed with the parties concerned and proper agreements with the interested parties are available at the following web pages:

For experimental site N1: http://awsassets.panda.org/downloads/mou_shamakhi.pdf

For experimental site N2: http://awsassets.panda.org/downloads/mou_yevlakh.pdf

Detailed description of separate facilities given in Table 1 and Table 2 are as follows:

Table 1. Survey of pilot site №1

Project Site	Agsu
Coordination of transformation measures	WWF Caucasus Programme Office
Country	Azerbaijan
Grid references	
Total area	75 ha

Ownership	Ministry of Ecology and Natural Resources, Forest Development Department
Climatic conditions	
Mean annual temperature	11°C
Mean temperature vegetation period (April-October)	17°C
Min / Max temperatures	-16°C/37°C
Min / Max temperatures	490mm
Precipitation in vegetation period (April-October)	300mm
Site conditions	
Altitude	500 m
Soil type	Grey-Brown forest soils in transitional stage from brown forest soils to dark chestnut soils
Natural nutrient situation	Humus composition 6-8%
Hydrological situation (ground water level, flooding, wind)	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. Only precipitation provide source of water
Exposition	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.

Vegetation	
Potential Natural Vegetation	<p>Oak – <i>Quercus longipes</i></p> <p>Maple – <i>Acer platanoides</i></p> <p>Ash – <i>Fraxinus excelsior</i></p> <p>Elm – <i>Ulmus</i></p> <p>Pomegranate – <i>Punica granatum</i></p> <p>Hornbeam – <i>Carpinus orientalis</i></p> <p>Cherry – <i>Prunus avium</i> (= <i>Cerasus avium</i>)</p> <p>Apricot - <i>Armeniaca vulgaris</i> (= <i>Prunus armeniaca</i>)</p> <p>Plum – <i>Prunus domestica</i></p> <p>Briar – <i>Rosa canina</i></p> <p>Dogwood – <i>Cornus mas</i></p> <p>Loquat- <i>Mespilus germanica</i></p>
Actual vegetation/ land use type	<p>All the plot of pilot №1 is consisting of artificial pine forest which was developed in 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 density of existing pine forests is 0.5 – 0.6, average height is 8 -10 m, in some plots 12 – 14 m. 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. Baku – Agsu highway passes through all along the territory from the north of the pilot plot to its south. Also High voltage power transmission line goes through the territory.</p>

History of the area	No timber harvesting last 20 years on the site area, though grazing of animals is obvious which highly affect natural regeneration process. Fencing is the best solution to protect site.
----------------------------	---

Table 2. Survey of pilot site №2

Project Site	Yevlakh
Coordination of transformation measures	WWF Caucasus Programme Office
Country	Azerbaijan
Grid references	
Total area	75 ha
Ownership	Ministry of Ecology and Natural Resources, Forest Development Department
Climatic conditions	
Mean annual temperature	15°C
Mean temperature vegetation period (April-October)	20°C
Min / Max temperatures	-18°C/40°C
Min / Max temperatures	280mm
Precipitation in vegetation period (April-October)	200mm
Site conditions	
Altitude	250 m

Soil type	<p>1. Gray - meadows;</p> <p>2. Gray –strong meadow;</p> <p>3. Gray – meadow poorly developed;</p> <p>Dry saline soils, by mechanical composition 51% of these soils are sufficiently clayey and balance is of heavy clayey type.</p>
Natural nutrient situation	Low humus composition
Hydrological situation (ground water level, flooding, wind)	Only precipitation provide source of water. Ground waters depth 3-4,5 m.
Exposition	Valley
Vegetation	
Potential Natural Vegetation	<p>Oak –<i>Quercus Longipes</i></p> <p>Maple– <i>Acer platanoides</i></p> <p>Ash – <i>Fraxinus excelsior</i></p> <p>Elm –<i>Ulmus</i></p> <p>Pomigranate – <i>Punica granatum</i></p> <p>Sylver berry – <i>Elaegnus angustifolia</i></p>
Actual vegetation/ land use type	<p>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.</p> <p>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.</p> <p>Average density of existing pine trees 0.5 – 0.6 average height is 10-12 m in some places 12 – 14 m. 20% of the plot is covered by tamarix bushes in natural form. Natural rehabilitation in the area is in very poor condition, one may say is none. Natural rehabilitation in the area is presented only by tamarix bushes.</p> <p>Grass cover of the area is mainly consists of semi-desert steppe specific to bitter wormwood and</p>

	camel thorn.
History of the area	No timber use. Intensive grazing highly affects territory. Obvious need for fencing to protect site after transformation measures.

1.4 Plan of forest transformation

Forest transformation plan (FTP) for both pilot sites was developed in 2012 and agreed with respective forest authorities.

Special group of planners with various specialists was established (forest management specialists, botanist, wood-grower, pathologist, agrologist and GIS specialists) for implementation of activity. WWF presented necessary cartographic and aerial data, state registration and legal materials to the group.

Scope of the works determined by terms of reference of the agreement is as follows:

1. To develop soil analysis for separate sites and to submit recommendations for local species of plant/seed on the basis of soil. Forest management organization will develop maps illustrating soil of the site. In view of each soil type, the recommendations will be given for planting and sowing of local species. These recommendations will address other parameters such as potential, natural vegetation, relief, exposition and climate.
2. To develop detailed plan (word description and visual illustration on maps) for fence, planting and sowing in separate sites. In regard to each selected site, the plan shows the following:
 - Identification of sowing and plantation zones
 - Description and visualization of transformational activity
 - Fencing
 - Plantation zones

- Sowing zones
- Care areas
- Areas for natural regeneration support
- Areas for de-weeding of quitch and swardy
- Design of planting methods (groups, rows, interval etc.)
- Chart for transformation of forestry
- Maintenance and caring for experimental plots after plantation actions
- Quantity assessment of enclosure materials as well as planting and sowing materials
- Calculation of materials

3. To develop detailed time schedule for contractors.

Under these requirements FTP was developed in the capacity of framework document and served for practical works. Details of forest transformation plan are available from web-page as follows:

http://awsassets.panda.org/downloads/forest_transformation_plan_az1.pdf

According to data of FTP, each site was elaborately surveyed in order to determine special forestry practices.

Figure 3. Map of reafforestation activities to be carried out in Agsu site.

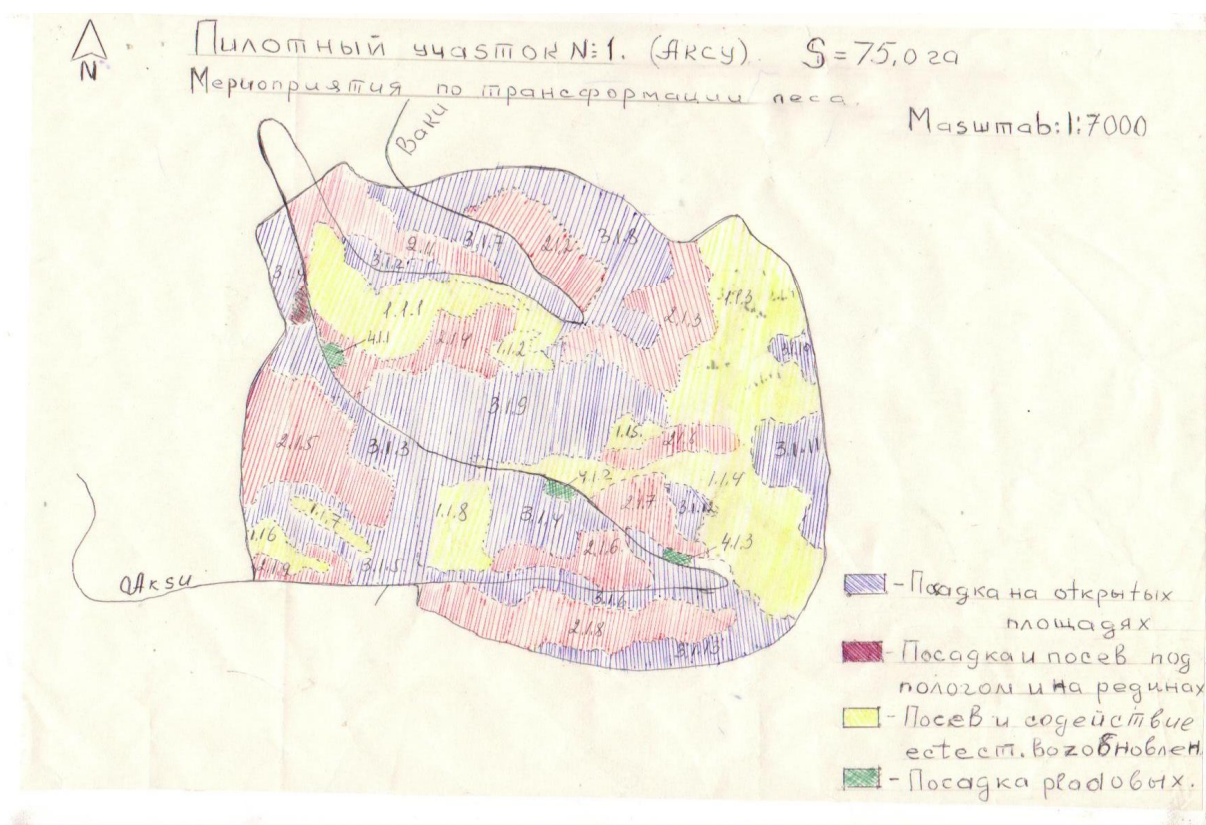


Table 3. Description of reforestation activities to be carried out in Aksu site.

№ on map	Area ha	Brief characteristics of part	Suggested actions	Number of necessary plants	
				Per 1 ha	Total
1.1.1	2,9	Pinetum with high density (0.7 - 0.8 of artificial origin)	Protection from cattle, prohibition of any tree cutting, protection of forests from fires, taking anti-fire actions (fire lines, disposal of fallen timbers and dead-wood and cutting of brushwood.		
1.1.2	0,7				
1.1.3	3,9				
1.1.4	4,1				
1.1.5	0,6				
1.1.6	0,6				
1.1.7	0,8				
1.1.8	2,1				
Sum	15,7				
2.1.1	3,2	Artificial pine forest plantations with low density (0.2- 0.4) partly through regenerated local	Planting of oak, ash, elm, maple. Care for sowing and planting within 5 years. Watering of	800	17600
2.1.2	2,3				
2.1.3	2,7				
2.1.4	3,6				

2.1.5	2,9	rocks.	plantings within 5 years		
2.1.6	1,4				
2.1.7	1,3				
2.1.8	3,3				
2.1.9	1,3				
Sum	22,0				17600
3.1.1	1,1	Open unforested areas and hessians (individually standing tree). Natural regeneration is observed partly in some places (oak, ash, elm, granatum, aglet)	1. Planting of annual biennial seedlings, of rangy oak, common ash, acutifoliate elm, maple and granatum. 2. Sowing of oak acorns and of seeds of ash, elm and maples. Care for sowing and planting within 5 years. Watering of plantings and sowings within 5 years.	1600-1650	50600
3.1.2	1,0				
3.1.3	2,3				
3.1.4	2,5				
3.1.5	2,2				
3.1.6	1,4				
3.1.7	3,4				
3.1.8	2,2				
3.1.9	7,0				
3.1.10	0,8				
3.1.11	2,2				
3.1.12	0,8				
3.1.13	4,2				
Sum	31,1				
4.1.1	0,5	Open unforested areas.	Planting of fruit trees for orcharding. Planting of cherry, plum, apricot, granatum, medlar, cornel, dogrose. Care for sowing and planting within 4 years. Watering of plantings within 5 years.	1100	1710
4.1.2	0,5				
4.1.3	0,5				
Sum	1,5				1710
5.1.1	3,4	Trunk road territory			
Sum	3,4				
6.1.1	1,3	Territory under high voltage transmission lines.			
Sum	1,3				
Total	75,0				69910

Figure 4. Map of reafforestation activities to be carried out in Yevlakh site



Table 4. Description of reafforestation activities to be carried out in Yevlakh site

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	4,5	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.		
1.1.2	1,4				
1.1.3	1,2				
1.1.4	1,4				
1.1.5	1,0				
1.1.6	1,9				
1.1.7	0,9				
1.1.8	4,1				
1.1.9	1,6				
1.1.10	1,3				
1.1.11	0,4				
1.1.12	1,2				
Total	20,9				

2.1.1	5,2	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
2.1.2	3,2				
2.1.3	2,5				
2.1.4	1,9				
2.1.5	3,7				
2.1.6	5,6				
2.1.7	2,6				
2.1.8	0,7				
Total	25,4				27940
3.1.1	4,6	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
3.1.2	1,4				
3.1.3	2,6				
3.1.4	3,7				
3.1.5	2,8				
3.1.6	0,5				
3.1.7	1,0				
3.1.8	1,4				
3.1.9	2,2				
3.1.10	0,8				
3.1.11	0,6				
3.1.12	0,4				
3.1.13	1,1				
3.1.14	0,4				
Total	23,5				58750
4.1.1	5,2	Territory under BTC pipeline			
Total	5,2				
Total	75,0				86690

1.5 Protection of experimental sites

According to FTP, fencing is addressed as actions for facilitation of natural regeneration in the sites. It allows for prevention of ranging in these sites which would help to regeneration of natural vegetation of young tree species (trees and shrubs). It also provides safeguarding from massive human intervention, in particular in Yevlakh site due to its location in the vicinity of Yevlakh city. Moreover, Baku-Ganja highway crosses through middle of this site. Therefore, both sites are fully enclosed. Length of overall fence constitutes 5739 m and 3461 m in in Yevlakh and Agsu sites respectively.

1.6 Transformation of the methods

Basic approach determined by FTP for performance of practical works which include soil cultivation / tillage, planting and or replenishment.

The plantation should be carried out at late autumn or at the beginning of spring in the pits. The pits should be located along hillside in lines. Distance between rows should be 3.0-4.0m, between seedlings in lines 1.0-2.0 m. The planting should be placed in a pit up to root neck and soil should be compressed. The plantation should be carried out with sturdy and standard transplants. Roots of the seedlings should be dampened with thick dung solution before planting. There is a necessity for watering after plantation because of shortage of moisture in both sites, particularly in Yevlakh site. Furthermore, soil of this site saline and therefore, spraydown (water pump and rubber pipe) is needed to be arranged here.

Technology and scheme for planting of forest culture at treeless bare area (planting), underplants with high density as well as low and middle density (planting in intervals) need the same. The only difference is quantity of planting material.

Sowing will be carried out in both sites. Sowing of seeds of drought-resistant shrubs at hillslope of Agsu site is addressed as additional actions in order to fix and stabilize soil, preserve direct runoff/land drainage and maintenance of moisture.

Sowing will be carried out through oak acorns and ash and maple seeds. Before sowing all seeds should be stratified for good results. In view of convenience and hypodispersion or underdispersion at the territory of seeds, there should be 10-fold volume mixed with sands and this mixture is applied manually.

1.7 Maintenance of activity

Crop weeding around seedlings constitutes main activity recommended by FTP for ensuring maintenance of recently created plantation.

1.8 Cost effectiveness and model values

FTP presents information on costs related to all forestry actions which are divided into two periods: initially for 2012-2013 and then for 2014-2018 that are as follows:

Table 5. Summary for transformation works and cost estimate for 2012-2013

Description of works	Unit of measurement	Scope of work	Daily work norm	necessary man-days	Cost of works		Note
					man-days	Total	
1	2	3	4	5	6	7	8
Site of Agsu 2012-2013							
1. Stump planting	pcs	69910	80	874			
2. Replenishment	m ²	–	–	–	–	–	
3. Maintenance (crop weeding)	pcs	349550	500	699	–	–	Will be carried out for 5 times
4. Siftings	–	–	–	–	–	–	
Total				1573			
Site of Yevlakh 2012-2013							
1. Stump planting (recruits)	pcs	88900	80	1111			
2. Replenishment	m ²				–	–	
3. Maintenance (crop weeding)	pcs	444500	500	889			Will be carried out for 5 times
4. Siftings	cubic meter	–	–	–	–	–	
Total				2000			
Total at both sites							

1. Stump planting (recruits)	pcs	158810	80	1985			
2. Replenishment	m ²						
3. Maintenance (crop weeding)	pcs	533400	500	1588			
4. Sittings	cubic meter	–	–	–			
Sum				3573			

Table 6. Summary for transformation works and cost estimate for 2014-2018

Description of actions	Unit of measurement	Scope of work	Daily work norm	Number of necessary man-days	Cost of works, gel		Note
					Man-days	Total	
1	2	3	4	5	6	7	8
At the site of Agsu in 2014-2018							
1. Stump planting (recruits)	pcs	7000	80	88			10% of total quantity
2. Replenishment	–	–	–	–	–	–	
3. Maintenance (crop weeding)	pcs	559280	500	1118			Will be carried out for 8 times
4. Sittings	cubic meter	350	3	117			
Total				1323			
At the site of Yevlakh in 2014-2018							

1. Stump planting (recruits)	pcs	8900	80	111			10% of total quantity
2. Replenishment	–	–	–	–	–	–	
3. Maintenance (crop weeding)	pcs	711200	500	1422			Will be carried out for 8 times
4. Siftings	cubic meter	100	3	33			
Total				1566			
Total at both sites							
1. Stump planting (recruits)	pcs	15900	80	199			
2. Replenishment	–						
3. Maintenance (crop weeding)	pcs	1270480	500	2541			
4. Siftings	cubic meter	450	3	150			
Sum				3075			

1. Lessons learned in Azerbaijan

This section contains assessment of work results and main lessons learned in the course of practical realization works.

2.1 Land-tenure system

The places allotted for project implementation refer to State Forest Fund which is subject to management of Forest Development Department of Ministry of Ecology and Natural Resources. Pursuant to Forestry legislation of Azerbaijan, fencing is deemed as one of more effective approaches for safeguard of the timberlands and forest ranges that are identified to be restored. Thus, decision on practical application of fencing and enclosures in both sites are within existing legal norms. On the other hand, it is unusual for local inhabitants around experimental sites as well

as for overall rural population in order to see the territories which they consider them as integral part of their pasture land or areas where they visit frequently for several purposes (rest, berry, mushroom, pinecone for heating), have been restricted. It may cause several conflict situation due to reduction of pasture and restraining of their opportunities for maintenance of life.

In respect to forecasting of eventual negative influence of surrounding population, it needs actively to involve local labor resources to all forestry actions to be held in sites for whole period of the project implementation. For the time being, additional explanation of project ideas, in particular importance of forest restoration for their future as well as common goals of sustainable forest use for ecological integrity and economical development of country are supposed to be effective mechanism towards ultimate success of the project.

2.2 Criteria for site selection and site survey

The project team has agreed to selection criteria for well large site which used for selection of experimental area. Both sites comply with and conform to criteria of performance which are vulnerable for negative impact of climate change to monoculture for forest plantation with high risk of fire and other human intervention factors. Both sites are crucial because of high risk factors such as pasture and fire as well as their protective functions against erosion. In view of social-economic index, close location to habitats and its importance for rest and environmental education are very necessary attributes as well.

Implementation of forest transformation plans were developed by local specialists – foresters, agrologists and geodesists on contractual basis under the Office programme of World Wildlife Fund Caucasus. Due to financial difficulties, implementation of plan in the contract was corrected for financial capacities of the project. Therefore, planting activity in Agsu pilot site was decreased because of existing transformation signs of broad-leaved and deciduous forests (shrubs and trees) and to some extent increase of planting activity in Yevlakh site where very mild natural regeneration and forest stands were represented by clean monoculture coniferous species.

Transformation works were carried out in close cooperation in all phases of its implementation by contractor and bureau programme World Wildlife Fund Caucasus. National coordinator followed up

every sowing season with field checks and outcomes of the checks were presented in relevant reports which briefly described in Table 7.

Table 7. Distribution of planting material on species (autumn 2012 - spring 2014)

#	Виды	Посадка в Агсу					Посадка в Евлахе					Всего по видам
		2012 Осень	2013 Весна	2013 Осень	2014 Весна	Итого	2012 Осень	2013 Весна	2013 Осень	2014 Весна	Итого	
1	<i>Fraxinus excelsior</i>	-	-	1580	-	1580		-	15750	5625	21375	22955
2	<i>Quercus longipes</i>	-	-	1580	-	1580	-	-	-	-	-	1580
3	<i>Melia</i> (Persian lilac)	-	-	-	-	-	-	-	10500	3750	14250	14250
5	<i>Elaeagnus angustifolia</i>	-	-	-	-	-	-	-	7000	2500	9500	9500
6	<i>Punica granatum</i>	-	-	-	-	-	-	-	1750	625	2375	2375
7	Всего посажено					3160					47500	50660

The following two maps show overall planting activity in every sowing season in each pilot site.

Figure 5. Map of silvicultural treatment in Agsu site

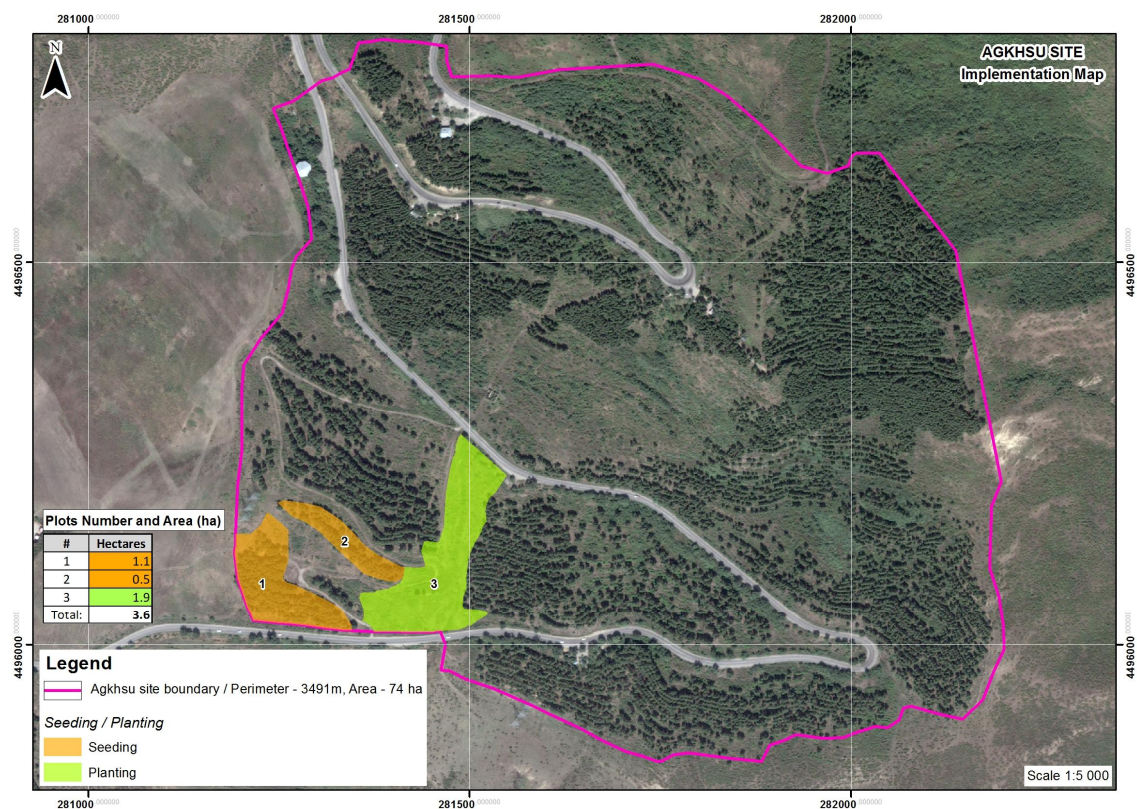
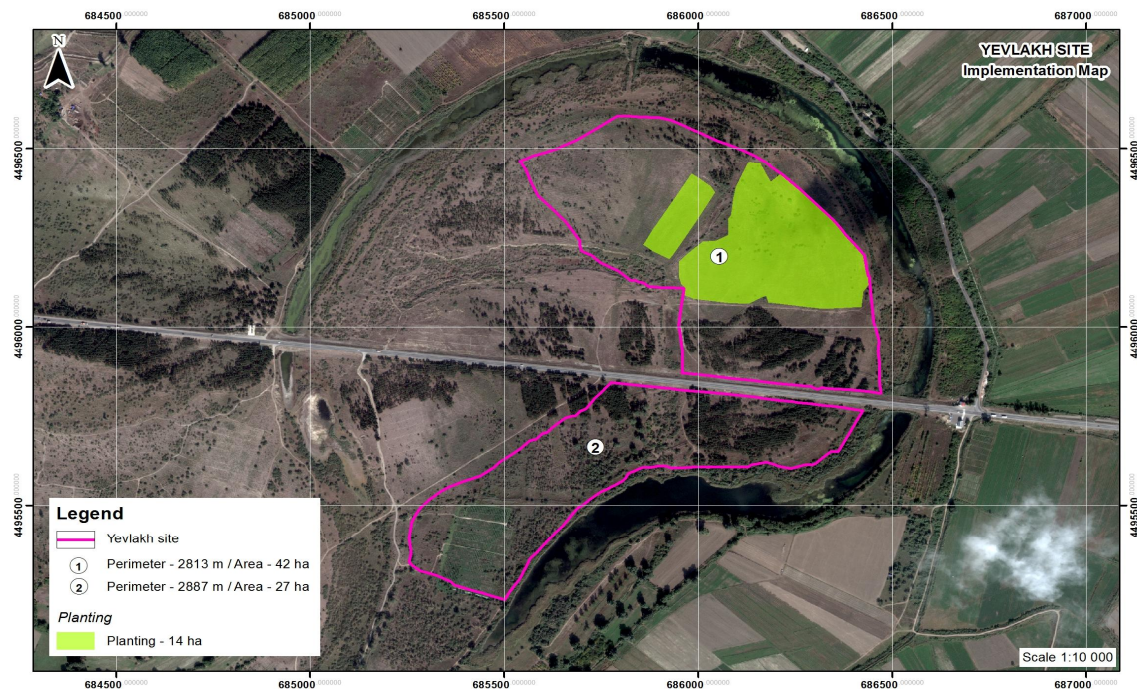


Figure 6. Map of silvicultural treatment in Yevlakh site



As to final figures 1.90 ha seedlings were planted in Aghsu site, 19.0 ha in Yevlakh site in the capacity of total number of the used planting material. In addition, in Aghsu site 180 kg seeds of different species were sowed 1.6 ha site. (*Quercus longepedunculata*, *Acer platanoides*, *Fraxinus excelsior*)

2.3 Site preparation and safeguards

According to FTP, preparation of sites for both pilot regions assigned should be accompanied with pits up to plantings. The pits were located along hillside in lines. Distance between rows should be 3.0-4.0m, between seedlings in lines 1.0-2.0 m. Scheme of dislocation of species in each site and lines was inserted in the forest restoration plan. The pits were arranged manually through special forest spade or drill unit submitted by Programme Office of WWF Caucasus. Overall region of experimental sites were enclosed as well.

2.4 Seedlings, procurements, quality, planting/sowing, technology, maintenance and requirements

Planting materials for separate timber species were delivered from private orchard of the contractor. Dimension of 1-2 year seedlings were approximately 50-80 cm above ground and length of roots were 15-25 cm. Composition of mixture of tree species is maintained likely: in Yevlakh site - 30% ash, 30% *Angustifolia*, 15% - azedarac and other broad-leaved species; in Aghsu site - 50% ash and 50% oak. Such mixture of broad-leaved species is preferred as mixed composite is more resistant to change of exogenous natural factors, including climate change. All selected tree species are endemic for the present forest site where the areas are located.

Care for forest stands is reckoned upon for 5 years under scheme as per 1st year – 5 times, 2nd year – 4 times, 3rd year – 3 times, 4th year – 2 times and 5th year – 1 year. Watering is compulsory in both sites, particularly in Yevlakh site due to its location in semi-desert zone and semiarid zone with minimal number of annual precipitation and therefore soil hereof is dominantly saline.

General finance results (enclosure and planting costs, purchase of seedlings and other materials) within the framework of the project are briefly described in Appendix 1.

3. Summary and forecast for Azerbaijan

Obviously, considerable works are carried out for achievement of main purpose of the project - increasing the resilience of forest ecosystems against climate change through practical realization in the duration of the project in selected pilot sites in Agsu and Yevlakh. Such results have been reflected as a visible indicator (well protected areas and creation of new plantations) and other factors such as participation of all parties concerned in the capacity of central and local authorities, private companies, development and realization of forest transformation plan and more important – intensive involvement of local population in work and herewith, it makes them closer to the project and opens up several opportunities for alternative incomes.

Thus, first step is carried out successfully. Detailed analysis of reliable and timely checked outcomes can be performed only after several years and probably, decade as from forestry is long-term activity and subsequently, long-term observation is necessary for final conclusion about success (or failure) of specified actions. However, in this early stage we can come to a conclusion that success attends hard work in view of bases of future successes.

Further maintenance and safeguard of experimental sites will be continued so as works will not be carried out in vain. Site protection actions can include maintenance of enclosure and recruitment of field monitor/ranger from local population. Also, young planted seedlings are maintained through crop weeding in order to ensure best conditions for growth of them as recommended by FTP.

Programme of monitoring (system) should be established for experimental sites. The programme of monitoring (system) will be based upon manual on methodologies to be developed by consultant of the monitoring project.

Team of local scientists will include, but not be limited to botanists, zoologists, foresters and soil scientists will be set up for monitoring of site visits and survey at least annually and preparation of report on monitoring. The question of sustainability and necessity of upkeeping of monitoring data of the area beyond the project duration should be necessarily considered in setting up observation group. For ensuring of development of potential of decision-making body, scholars, students of relevant college, technicians and workers in monitoring of environmental process and methods of ecosystem restoration as well as fundamentals of best European standards in the sphere of sustainable forestry, educational materials and modules have been developed which might play an important role for further expansion of preparation system in forest sector.

Specific types of activity can be organized in order to raise awareness level of local population and major stakeholders in planning and implementation. Such actions should be arranged through special primary assembly or posters for inhabitants as well as meetings with pupils and students of universities and other concerned parties.

Annexes

Annex 1- Financial summary of the project activities

AZERBAIJAN (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	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 (<i>Total contractual number of seedlings - 158,810 and Total contractual cost - 79,905 EUR / Supply of seedlings not completed - as of March 01, 2014</i>)	25,490.00	seedling	50,660			ha	148.00	172.23
SUB-TOTAL FOR PLANTING MATERIAL	27,177.00					ha	148.00	183.63
Preparation of Sites	3,880.64					ha	148.00	26.22
Seeding and Planting	15,522.54					ha	148.00	104.88
Maintenance (weeding)	3,880.64					ha	148.00	26.22
Other Measures	2,587.09					ha	148.00	17.48
SUB-TOTAL FOR PLANTING, SEEDING, WEEDING and OTHER MEASURES (<i>Total contractual cost - 81,100 EUR / Transformation measures not completed - as of March 01, 2014</i>)	25,870.90					ha	148.00	174.80
SUB-TOTAL FOR TOOLS & INSTRUMENTS	30,967.30					ha	148.00	209.24
TOTAL without TOOLS & INSTRUMENTS	181,647.90					ha	148.00	1,227.35
GRAND TOTAL	212,615.20					ha	148.00	1,436.59



1. Agsu Transformation Forest Pilot Site – check of seeding works - Jan-2014



2. Agsu Transformation Forest Pilot Site – Fence – Jan-2014



3. Agsu Transformation Forest Pilot Site – Measuring of seedlings – Jan-2014



4. Yevlakh Transformation Forest Pilot Site – Jan-2014



5. Yevlakh Transformation Forest Pilot Site – Nov-2013



6. Yevlakh Transformation Forest Pilot Site – Nov-2013



7. Agsu Transformation Forest Pilot Site – Nov-2013



8. Agsu Transformation Forest Pilot Site – Nov-2013



9. Agsu Transformation Forest Pilot Site – Nov-2013