Trench with recently planted pine seedlings (Pinus sylvatica) in Saralanj community (Kirchmeir, H.)

High-altitude afforestation for erosion control (Armenia)

DESCRIPTION

Afforestation is a key technologies to protect soil against erosion and provide a wide range of ecosystem services. In this case, afforestation at high altitudes, which is particularly challenging, with the primary purpose of erosion control were planted in small patches with different methods. They form the basis for future community forests in Armenia.

Forests are - in terms of biomass accumulation and stability - the most successful ecosystems in the world. Natural forest ecosystems offer multiple ecosystem services, such as timber and fuel wood provision, water purification, carbon sequestration. In mountainous landscapes, forests have an additional protective function against erosion and natural hazards (e.g., avalanches, landslides, debris flows or rock falls). In the South Caucasus, two natural limits restrict forest expansion: at 2.300-2.600m a.s.l. the upper tree line is visible, whereas steppe and semi-desert ecosystems form the lower tree line.

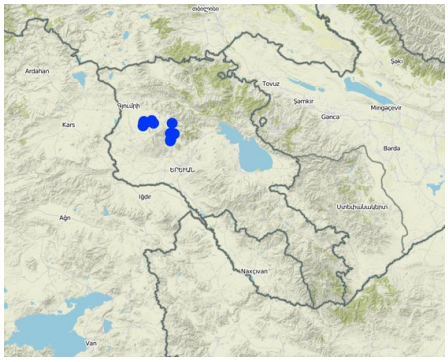
Socio-economic and geo-physical living conditions:
The intervention area is located at the northern to eastern slopes of Mount Aragats (4013m). The villages are located at 1600 to 1800 m above sea level where the slope meets a plain with stepic soils and crop production while the slopes of the mountains are used for livestock grazing (sheep and cattle).

Purpose of afforestation:
By means of afforestation of degraded pastures, mountainous areas that suffer from erosion and overgrazing should be rehabilitated and erosion protection capacity enhanced. At the same time, the afforestation sites should form the basis for future community forests providing a wide range of ecosystem services, a concept that has not yet been established in Armenia.

Implementation
Between 2014 and 2017 more than 200 hectares were fenced for afforestation, 145 ha were actively afforested in 10 different communities around Mount Aragats in Armenia. The average size of the 20 plots is 10 ha (35 ha being the largest site, 1 ha the smallest one).
The afforestation included different species combinations, planting schemes and methods to determine most cost-efficient afforestation methods for Armenian conditions. All afforestation took place at elevations between 1900 and 2300 m.a.s.l.. The afforestation included fencing of the area to protect the afforestation site against grazing, the preparation of the planting sites according to fixed planting schemes, the actual planting in lines with trenches, single plant holes and group plantings. For some sites, additional irrigation was established for the first years. Particular attention was paid to the species selection which explicitly included fruit trees and shrubs to ensure local economic returns.

Practical experiences
A wide range species was tested. Within the given climate context, pine (Pinus sylvestris), the main non-native species as well as native maple (Acer trautvetteri), Persian Oak (Quercus macranthera) and birch (Betula litwinowii) showed the best results. Particular attention was paid to adapted species to create resilient forest-shrubland with a large number of tree species. In general, planting in trenches shows highest survival rates. Bare root system and containerized seedlings were used for planting. Containerized

LOCATION



Location: Lusagyugh, Saralanj, Harich, Arayi, Quchak, Hnaberd, Mets Manatash, Pokr Mantash, Nahapetavan, Shirak and Aragatsotn Marzes, Armenia

No. of Technology sites analysed: 10-100 sites

Geo-reference of selected sites

- 44.03408, 40.60734
- 44.15521, 40.61765
- 44.38562, 40.61728
- 44.03523, 40.63233
- 44.13295, 40.64011
- 44.05501, 40.61872
- 44.02974, 40.61975
- 44.36409, 40.44722
- 44.371, 40.45878
- 44.41472, 40.51481
- 44.02905, 40.59833
- 44.0215, 40.59193
- 44.36129, 40.5197
- 44.36186, 40.45786

Spread of the Technology: evenly spread over an area (approx. < 0.1 km2 (10 ha))

Date of implementation: less than 10 years ago (recently)

Type of introduction

through land users' innovation
as part of a traditional system (> 50

seedlings definitely provide better survival rate in comparison with bare root system seedlings. Additionally, mulch cover was provided to protect seedlings and keep soil humidity. The main maintenance measures are repeated mulching and weed control and irrigation during the first 3 years. Furthermore, some replanting is continuously taking place as the sites are facing tough environmental conditions (hot summers, drought, short vegetation period).
The plantation was organised and supervised by local NGO's (ATP Armenian Tree Project, ESAC Environmental Sustainability Assistance Center) in close cooperation with the local village population. In a Memorandum of Understandig between the Armenian Ministry of Territorial Administration and Development, the local village administration and GIZ the share of payed labour and own contribution was fixed beforehand.

Impacts and perception
After the first years already first successes are becoming visible contributing to increased vegetation cover, increased biomass and improved soil protection. The communities are proud to be amongst the first in Armenia with a community forest. However, slow growth will require continuous commitment and care on behalf of the community.

years)
☐ during experiments/ research
☑ through projects/ external interventions


Planting of different tree seedlings in trenches in Arayi, Armenia (Kirchmeir, H.)


Oak (Quercus macranthera) planted in a hole to protect seedling (Kirchmeir, H.)

CLASSIFICATION OF THE TECHNOLOGY

Main purpose
- ☐ improve production
- ☑ reduce, prevent, restore land degradation
- ☑ conserve ecosystem
- ☐ protect a watershed/ downstream areas – in combination with other Technologies
- ☑ preserve/ improve biodiversity
- ☐ reduce risk of disasters
- ☐ adapt to climate change/ extremes and its impacts
- ☑ mitigate climate change and its impacts
- ☐ create beneficial economic impact
- ☐ create beneficial social impact

Land use


Grazing land - Extensive grazing land: Semi-nomadism/ pastoralism
Main animal species and products: Cattle and sheep


Forest/ woodlands - Tree plantation, afforestation: Mixed varieties
Products and services: Fuelwood, Fruits and nuts, Grazing/ browsing, Protection against natural hazards

Water supply
- ☐ rainfed
- ☑ mixed rainfed-irrigated
- ☐ full irrigation

Number of growing seasons per year: 1

Land use before implementation of the Technology: The afforestation sites were previously used as (partly overgrazed) pastures for grazing of mainly cattle. Thus, this technology included a land-use change from grassland/pasture to forest/shrubland.

Livestock density: 1-2/ha

Purpose related to land degradation
- ☑ prevent land degradation
- ☑ reduce land degradation
- ☐ restore/ rehabilitate severely degraded land
- ☐ adapt to land degradation
- ☐ not applicable

Degradation addressed


soil erosion by water - Wt: loss of topsoil/ surface erosion, Wg: gully erosion/ gullying


biological degradation - Bc: reduction of vegetation cover, Bs: quality and species composition/ diversity decline

SLM group
- natural and semi-natural forest management
- area closure (stop use, support restoration)
- ecosystem-based disaster risk reduction

SLM measures

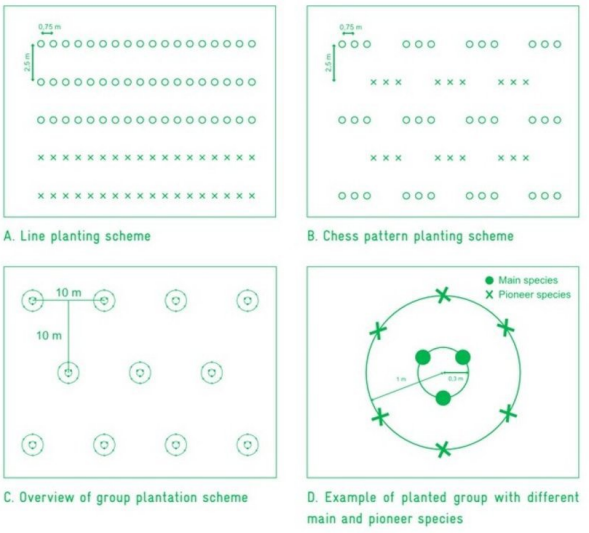
vegetative measures - V1: Tree and shrub cover

management measures - M1: Change of land use type

TECHNICAL DRAWING

Technical specifications
Needed resources for 1 ha afforestation:
- 2.000-5.000 seedlings
- 10-50 t water (for initial irrigation)
- 40 – 100 working days
- Shuffles or soil driller
- Means of transport

Selection of species
It is recommended to use different local tree species for any afforestation activity, as they can cope best with the given environmental conditions and, therefore, are more resilient towards pests and climatic variations.
Most suitable species for afforestation:
-Trautvetters maple (Acer trautvetteri)
-Birch (Betula letwinowii)
-Wild Oriental Apple (Malus orientalis)
-Scott's Pine (Pinus sylvestris var. hamata)
-Persian Oak (Quercus macranthera)
-Raspberry (Rubus idaeus)
-Mountain ash (Sorbus aucuparia)
For selecting suitable species, screening of the wider project area is essential in order to prepare a list of species, which would naturally grow under the given ecological conditions



Author: GIZ IBiS

Planting scheme
The technical drawings describe different potential planting schemes. A further figure describes the advantages and disadvantages of each scheme.

Planting season
The climate in the South Caucasus region shows low precipitation rates in the summer period. As seedlings have a small root system, young trees are more sensitive to drought. The best time for planting is either autumn or early spring as during autumn, winter and spring, more moisture is available that helps the seedlings to develop deeper root systems to survive during summer droughts.

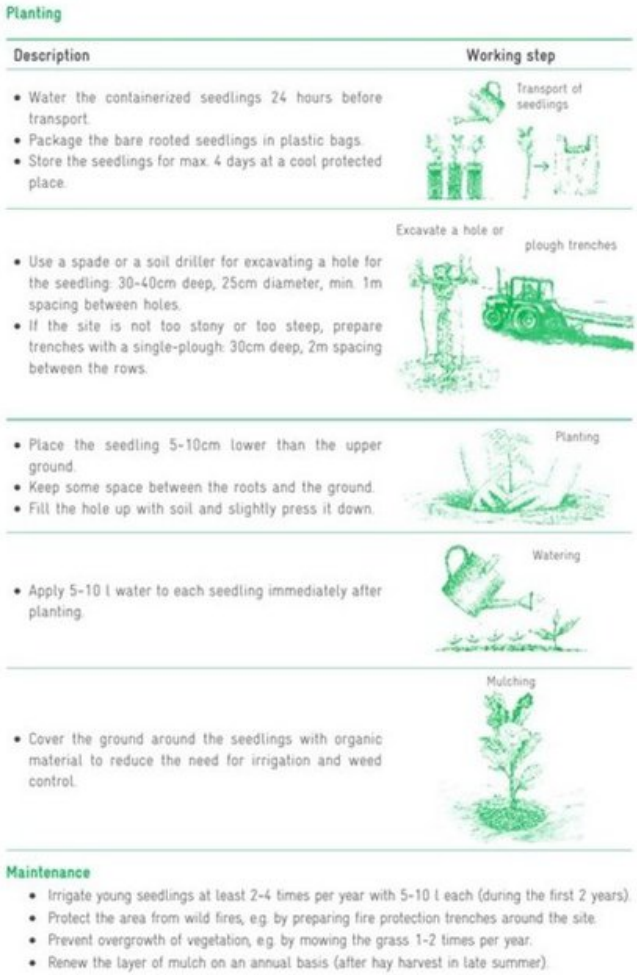
Fencing
In many cases, afforestation sites are located on pasture land. To protect the planted seedlings from browsing by livestock or wild game, it is recommended to fence the afforestation site before starting the plantation of the seedlings.

Planting
The planting process is specified in one of the technical drawings. With a hole driller planting of one tree takes 2-4 minutes, planting by hand 8-10 min. Each seedling is waterered with an intial 5-10 l of water.

Fig. 7A: Oak seedlings in a trench plantation

Fig. 7B: Oaks planted in plant holes

Author: GIZ IBiS



Author: GIZ IBiS

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated: per Technology area (size and area unit: **1 ha**)
- Currency used for cost calculation: **US Dollars**
- Exchange rate (to USD): 1 USD = n.a
- Average wage cost of hired labour per day: n.a

Most important factors affecting the costs

With costs of approximately 5,700 USD/ha including fencing (30%), planting (30%) and seedlings (40%) afforestation is very intensive in financial resources. It is very likely that these high costs will limit the upscaling of the afforestation process. There are some options to reduce costs: •Fence large areas and try to have sites in square or circle shape •Increase number of seedlings planted by person by using soil-drillers •Use cheaper fencing material (e.g. game protection fence, poles without concrete) •Reduce seedling number to 2000-3000 seedlings/ha •Using seeds (e.g. oak) instead of seedlings •Regrow seeds in local low-cost nurseries (e.g. Lusagyugh)

Establishment activities

1. Selection of afforestation site, plantation scheme and species (Timing/ frequency: anytime)
2. Fencing of the area (if area is being grazed or wild game is browsing seedlings (Timing/ frequency: before planting)
3. Prepare and transfer seedlings to the site (Timing/ frequency: before planting)
4. Excavate whole for the seedling (30-40cm deep, 25 cm diameter, 1m spacing between wholes) (Timing/ frequency: autumn, early spring)
5. Place the seedling and fill hole with soil (Timing/ frequency: autumn, early spring)
6. Apply 5-10 l of water immediately after planting (Timing/ frequency: after planting)
7. Cover soil around seedling with mulch and organic material (Timing/ frequency: after planting)

Establishment inputs and costs (per 1 ha)

Specify input	Unit	Quantity	Costs per Unit (US Dollars)	Total costs per input (US Dollars)	% of costs borne by land users
Labour					
Local workers for plantation of trees	seedlings	2500.0	0.27	675.0	10.0
Installation of fence and posts	person day	191.0	12.3	2349.3	
Equipment					
Equipment (hummer, driller, etc.)	set	1.0	141.8	141.8	30.0
Plant material					
Tree seedlings	pieces	2500.0	0.31	775.0	
Mulching	kg	1250.0	0.03	37.5	
Construction material					
Fencing (permanent mesh wire fence)	meter	317.0	1.35	427.95	10.0
Irrigation system	set	1.0	889.0	889.0	15.0
Metal posts for fence (1.8m)	pieces	106.0	2.97	314.82	
sand	kg	3444.0	0.012	41.33	
Other material(electrode, wire armature, metal disc)	set	1.0	386.9	386.9	20.0
Cement	kg	1148.0	0.12	137.76	
Other					
Transporation of mulch	time	1.0	102.8	102.8	
Transporation of construction materials	time	5.0	92.5	462.5	
Transporation of workers to the field	time	15.0	30.2	453.0	
Transporation of seedlings	time	1.0	51.4	51.4	
Total costs for establishment of the Technology				**7'246.06**	

Maintenance activities

1. Irrigation of young seedlings with 5-10 l (Timing/ frequency: 2-4 times per year for the first two years)
2. Preparation of fire protection trenches (Timing/ frequency: if needed)
3. Mowing to prevent overgrowth of seedlings (Timing/ frequency: 1-2 times per year)
4. Renew mulch layer (Timing/ frequency: annually after hay harvest in summer)
5. Replanting of seedlings (10% each year) (Timing/ frequency: annually to be done for the first 5 years)

Maintenance inputs and costs (per 1 ha)

Specify input	Unit	Quantity	Costs per Unit (US Dollars)	Total costs per input (US Dollars)	% of costs borne by land users
Labour					
Irrigation of young seedlings with 5-10 l	Man/day	1.0	10.0	10.0	100.0
Preparation of fire protection trenches	rm	150.0	0.34	51.0	100.0
Mowing to prevent overgrowth of seedlings	Man/day	4.0	10.0	40.0	50.0
Renew mulch layer (including mulch value)	Man/day	5.0	10.0	50.0	50.0
Plant material					
Seedlings for replantation (including labour)	seedlings	1200.0	0.51	612.0	50.0
Other					
Petrol for irrigation	liter	7.0	0.8	5.6	
Total costs for maintenance of the Technology				**768.6**	

NATURAL ENVIRONMENT

Average annual rainfall

- ☐ < 250 mm
- ☐ 251-500 mm
- ☑ 501-750 mm
- ☐ 751-1,000 mm
- ☐ 1,001-1,500 mm
- ☐ 1,501-2,000 mm
- ☐ 2,001-3,000 mm
- ☐ 3,001-4,000 mm
- ☐ > 4,000 mm

Agro-climatic zone

- ☐ humid
- ☐ sub-humid
- ☑ semi-arid
- ☐ arid

Specifications on climate

Average annual rainfall in mm: 521.0
Precipitation peak between May and June.
Name of the meteorological station: Aparan, Aragatsotn Marz, Armenia
According to Köppen and Geiger, the climate is classified as Dfb (Cold/continental, no dry season, warm summers). Annual mean temperature is 5.2. °C. The warmest month of the year is August, with an average temperature of 16.4 °C. January has the lowest average temperature of the year with -6.9 °C.
based on data from the following source:
https://www.arcgis.com/home/webmap/viewer.html?layers=3ac478a468c245ef9bfd5533f7edbf93

Slope

- ☐ flat (0-2%)
- ☑ gentle (3-5%)
- ☑ moderate (6-10%)
- ☐ rolling (11-15%)
- ☐ hilly (16-30%)
- ☐ steep (31-60%)
- ☐ very steep (>60%)

Landforms

- ☐ plateau/plains
- ☐ ridges
- ☑ mountain slopes
- ☐ hill slopes
- ☑ footslopes
- ☐ valley floors

Altitude

- ☐ 0-100 m a.s.l.
- ☐ 101-500 m a.s.l.
- ☐ 501-1,000 m a.s.l.
- ☐ 1,001-1,500 m a.s.l.
- ☑ 1,501-2,000 m a.s.l.
- ☑ 2,001-2,500 m a.s.l.
- ☐ 2,501-3,000 m a.s.l.
- ☐ 3,001-4,000 m a.s.l.
- ☐ > 4,000 m a.s.l.

Technology is applied in

- ☐ convex situations
- ☐ concave situations
- ☑ not relevant

Soil depth

- ☐ very shallow (0-20 cm)

Soil texture (topsoil)

- ☐ coarse/ light (sandy)

Soil texture (> 20 cm below surface)

Topsoil organic matter content

- ☐ high (>3%)

- [x] shallow (21-50 cm)
- [ ] moderately deep (51-80 cm)
- [ ] deep (81-120 cm)
- [ ] very deep (> 120 cm)

- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

- [ ] coarse/ light (sandy)
- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

- [x] medium (1-3%)
- [ ] low (<1%)

Groundwater table
- [ ] on surface
- [ ] < 5 m
- [x] 5-50 m
- [ ] > 50 m

Availability of surface water
- [ ] excess
- [ ] good
- [x] medium
- [ ] poor/ none

Water quality (untreated)
- [ ] good drinking water
- [x] poor drinking water (treatment required)
- [ ] for agricultural use only (irrigation)
- [ ] unusable

Is salinity a problem?
- [ ] Yes
- [x] No

Occurrence of flooding
- [ ] Yes
- [x] No

Species diversity
- [ ] high
- [x] medium
- [ ] low

Habitat diversity
- [ ] high
- [ ] medium
- [x] low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- [ ] subsistence (self-supply)
- [x] mixed (subsistence/ commercial
- [ ] commercial/ market

Off-farm income
- [ ] less than 10% of all income
- [x] 10-50% of all income
- [ ] > 50% of all income

Relative level of wealth
- [ ] very poor
- [x] poor
- [x] average
- [ ] rich
- [ ] very rich

Level of mechanization
- [x] manual work
- [ ] animal traction
- [x] mechanized/ motorized

Sedentary or nomadic
- [x] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

Individuals or groups
- [ ] individual/ household
- [x] groups/ community
- [x] cooperative
- [ ] employee (company, government)

Gender
- [x] women
- [x] men

Age
- [ ] children
- [ ] youth
- [x] middle-aged
- [x] elderly

Area used per household
- [ ] < 0.5 ha
- [ ] 0.5-1 ha
- [x] 1-2 ha
- [x] 2-5 ha
- [ ] 5-15 ha
- [ ] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

Scale
- [x] small-scale
- [ ] medium-scale
- [ ] large-scale

Land ownership
- [ ] state
- [ ] company
- [x] communal/ village
- [ ] group
- [ ] individual, not titled
- [ ] individual, titled

Land use rights
- [ ] open access (unorganized)
- [x] communal (organized)
- [ ] leased
- [ ] individual

Water use rights
- [ ] open access (unorganized)
- [x] communal (organized)
- [ ] leased
- [ ] individual

Access to services and infrastructure

health	poor ✓	good
education	poor	✓ good
technical assistance	poor	✓ good
employment (e.g. off-farm)	poor ✓	good
markets	poor ✓	good
energy	poor ✓	good
roads and transport	poor	✓ good
drinking water and sanitation	poor	✓ good
financial services	poor ✓	good

IMPACTS

Socio-economic impacts

fodder production — decreased ... ✓ ... increased

forest/ woodland quality — decreased ... ✓ ... increased

non-wood forest production — decreased ... ✓ ... increased

product diversity — decreased ... ✓ ... increased

Within the fenced afforestation site, the grass could be cut and used as hay. The protection from grazing helps biomass development which leads to better protection from Surface water Erosion and this lead to soil-regeneration and increase of productivity.

The natural forest was removed for the purpose of grazing and the forest cover will be now re-established on the afforestation sites.

We mixed shrub species like raspberries and fruit-trees (wilde plumb) between the main tree species to create short time Benefit for the village people.

In addition to the wide spread grazing land use now the hay production in the fenced afforestation site is increased for the first 1-2 decades (until the canopy is

production area (new land under cultivation/ use)	decreased ✓ increased	too dense) and the collection of berries and fruits give additional income opportunities. In the Long terme fuel wood production can be expected from the forested land.
workload	increased ✓ decreased	The grazing range is limited by the fenced afforestation site. This is relevant in the first couple of years before hay or fruit/berry productivity is able to fully compensate the loss of grazing range. The maintenance of the afforestation site lead to increase of workload especially in the first 2-4 years when hay cutting and Irrigation is needed until the tree seedlings are well established.
Socio-cultural impacts		
recreational opportunities	reduced ✓ improved	As there is almost no forest near to the villages every woodland is very attractive for recreational purpose, but it will Need 2-3 decades until this function will be fulfilled by the afforestation site.
SLM/ land degradation knowledge	reduced ✓ improved	The local stakeholders got hands on training on fencing, afforestation and maintenance of afforestation sites.
Ecological impacts		
surface runoff	increased ✓ decreased	The fencing of the afforestation site immediately stops the heavy grazing Impact which leads to fast recovery of the Vegetation. The improved Vegetation cover and better development of the root System reduce Surface water run of Speed and increase water Infiltration.
evaporation	increased ✓ decreased	An increase of vegetation and the leaf area index will lead to an increase of evaporation.
soil loss	increased ✓ decreased	Increase of vegetation cover and reduction of water runoff will lead to decrease of soil loss.
soil organic matter/ below ground C	decreased ✓ increased	The increase of vegetation leads to an increase of root development. Additionally, the increase of vegetation produces more litter, as no grazing is applied. The increase in litter leads to an increase of an humus layer and therefore to more below ground carbon.
vegetation cover	decreased ✓ increased	Especially the fencing leads to fast increase of vegetation cover.
biomass/ above ground C	decreased ✓ increased	The local stakeholders got hands on training on fencing, afforestation and maintenance of afforestation sites.
plant diversity	decreased ✓ increased	The stop of grazing and the new micro-habitats created by the shadow of the tree seedlings have let to an increase in plant diversity. This process might be reverse when the tree canopy is closed and less light is available for the herb-layer, but this will take several decades.
habitat diversity	decreased ✓ increased	The plain grasslands habitats are diversified by patches of forest.
Off-site impacts		
buffering/ filtering capacity (by soil, vegetation, wetlands)	reduced ✓ improved	The decrease of water run off increase the water capacity of the habitat and the afforested area will provide increase buffer capacity in the case of intensive rainfalls.
wind transported sediments	increased ✓ reduced	The high grass and trees reduce wind speed at ground level.

COST-BENEFIT ANALYSIS

Benefits compared with establishment costs

Short-term returns	very negative ✓	very positive
Long-term returns	very negative ✓	very positive

Benefits compared with maintenance costs

Short-term returns	very negative	very positive
Long-term returns	very negative	very positive

In the first decade the efforts on maintenance are high and it can be expected that the return of natural resources (hay, berries, fruits) is significantly lower the the maintenance efforts. As soon the trees are established and larger than 1.3 the root system is well establish and the trees are resistant to droughts, no vegetation cutting is needed and even game or cattle browsing will not necessarily lead to lethal damage.

CLIMATE CHANGE

Climate-related extremes (disasters)

local thunderstorm	not well at all	very well
local hailstorm	not well at all	very well
local snowstorm	not well at all	very well
insect/ worm infestation	not well at all	very well

Other climate-related consequences

extended growing period	not well at all	very well

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

- ✓ single cases/ experimental
- 1-10%
- 10-50%
- more than 50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?

- ✓ 0-10%
- 10-50%
- 50-90%
- 90-100%

Has the Technology been modified recently to adapt to changing conditions?

- ✓ Yes
- No

drought-adapted species, adaptation of planting schemes

To which changing conditions?

- ✓ climatic change/ extremes
- changing markets
- labour availability (e.g. due to migration)

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

- Extension of forest cover of communities, new habitat for wild creators, forest will be a fire wood and non timber products source for local inhabitants, attraction of tourists into the communities, increased water regulating function, improved soil quality, increased vegetation, microclimate formation function, wind velocity reduction, reduced land degradation, nice view of the area due to afforestation,increased fodder for cattle
- empowerment of the local capacities on sustainable land management
- successful demonstration of erosion control measures

Strengths: compiler's or other key resource person's view

- Diversification of land use options for local stakeholders. Future options for sustainable firewood supply, non-timber forests products (berries) and recreation
- Option to use grass from cutting in between as fodder/hay production
- side-effect of fencing is increase in biodiversity of grassland species due to exclusion from grazing.

Weaknesses/ disadvantages/ risks: land user's view → how to overcome

- Reduces pasture land of community, which was converted into a forest → Villagers/farmers need to increase the amount of hay from their homestead gardens using irrigation

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's view → how to overcome

- strong need for care taking in the first years → community commitment, strong ownership
- Expensive due to high costs for fencing → Consider alternative, cheaper fencing methods (e.g. wildlife protection fence)
- Complicated decision making processes by the project → More mandate given to the implementing NGOs

REFERENCES

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Date of documentation: Oct. 4, 2018

Last update: March 21, 2019

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Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_4101/

Linked SLM data
Approaches: Sustainable managements on pasture and forest lands based on natural regeneration by electrified fences https://qcat.wocat.net/en/wocat/approaches/view/approaches_2451/
Approaches: Afforestation/Tree planting https://qcat.wocat.net/en/wocat/approaches/view/approaches_2587/

Documentation was faciliated by

Institution

- GIZ Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Project

- Integrated Biodiversity Management, South Caucasus (IBiS)

Key references

- Handbook on Integrated Erosion Control A Practical Guide for Planning and Implementing Integrated Erosion Control Measures in Armenia, GIZ (ed.), 2018, ISBN 978-9939-1-0721-9: GIZ Armenia

Links to relevant information which is available online

- Project website of the GIZ program: http://biodivers-southcaucasus.org/