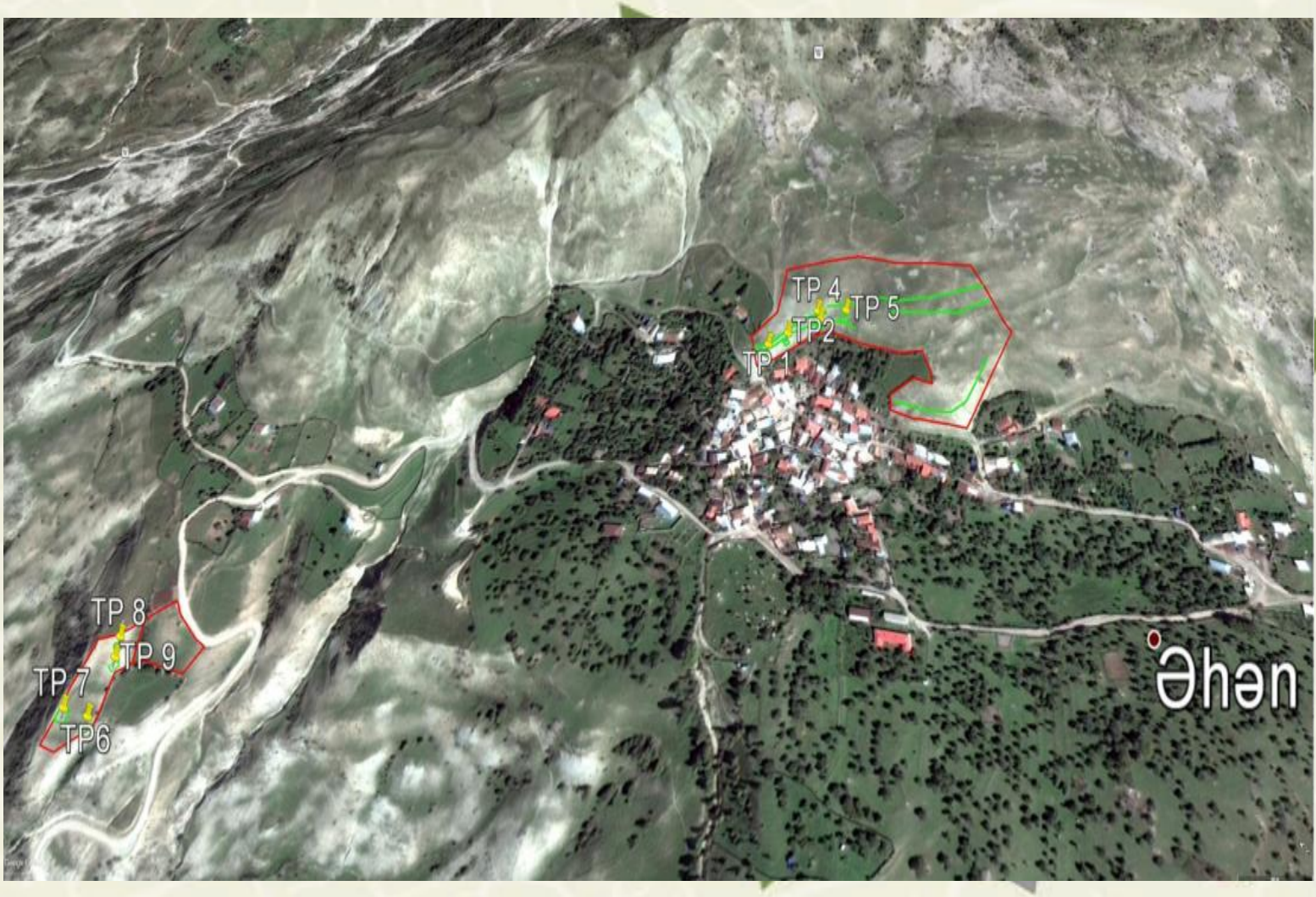
Integrated Biodiversity Management, South Caucasus

Implementation of erosion control measures in Ehen village, Ismayilli district



Vugar Bashirov

Report

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german cooperation
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Executive summary

The purpose of this report is to describe the participatory implementation process of erosion control measures (ECM) in Ehen village, Ismayilli district (Azerbaijan) as carried out by the GIZ Programme “Integrated Biodiversity Management, South Caucasus” (IBiS) between 25.07.2016 - 30.11.2016. ECM is part of a concept for an integrated management of biodiversity that has been agreed on by IBiS and the Ministry of Environment and Natural Resources (MENR) in Azerbaijan.

A successful participatory process makes it mandatory to include the concerned community in the planning phase and later in the implementation of the project. After several field visits, consultations with international experts and discussions with community members, a concept for the implementation of ECM in Ehen was developed in 2015.

From 2016 onwards the implementation phase was initiated. For that purpose a GIZ consultant met with different members of Ehen community, including the local executive committee, members of the municipality and activist villagers. During the meeting community members reselected a Community Management Group (CMG), ensuring acting as focal point for IBiS and ensuring active participation of the community in the implementation process. Besides that Ehen municipality, CMG and the local executive committee agreed to sign a Cooperation Memorandum in order to officially support each other in the implementation of ECM. Together, the CMG and IBiS decided to implement the following ECM in Ehen:

A. Stabilization (fencing, terrace construction and tree planting) of erosion on 2,72 ha steep slope above the village;
B. Setup of 0,52 ha Hay-Meadow 1;
C. Setup of 0,32 ha Hay-Meadow 2;
D. Establishment of test pads to monitor and compare impacts of different ECM;
E. Construction of a tree nursery to support afforestation.

The implementation phase consisted of several workshops and trainings provided by IBiS and external consultants.

At first a GIZ consultant conducted field training for an implementing company as well as community members in fence construction and maintenance. Trainees were also informed about the advantages of hay residues application and it was demonstrated how to collect hay residues (seeds) and store them. Furthermore, participants agreed on the species of trees/bushes to be planted on the pile walls.

During the construction of permanent fences and pile walls progress was monitored and workers were constantly advised on the correct implementation. CMG members and the head of the local executive committee were actively involved in the fence construction process.

Moreover, trainings on the proper maintenance of fences and the application of hay residues and seeds were provided. During the trainings the local community was advised to close some entrance ways to eroded target areas and adjust the constructed terraces. It was also noticed that some pile walls were wrongly positioned and they were changed accordingly.

Under the supervision of the consultant a small tree nursery was constructed for seed planting

and seedling production. It is planned to use those seedlings for afforestation measures in the upcoming years. Furthermore, 9 experimental test pads were established in the steep slope above the village in order to compare different methods of controlling soil erosion and bioresto-ration of vegetation cover in the implementation sites.

In December 2016 land users of neighboring villages were invited to an exchange visit to gain insights on the implementation of control measures against in Ehen village. All participants appreciated the ECMs and integrated biodiversity management activities done in Ehen municipality and were interested to implement best practice examples in their villages. The methods against erosion control applied in Ehen municipality can be used as lessons learned for neighboring municipalities and only have to be adapted slightly to fit their local conditions.

Afterwards a lessons learnt workshop was conducted involving the rayon level working group, which was established in September 2016. IBiS gave a presentation on lessons learned (successes and problems) while implementing ECM in Ehen. During a lively discussion the participants raised questions on the situation in Ehen and follow ups and offered ideas to improve current ECM in the future.

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GIZ	German International Cooperation
IBiS	Integrated Biodiversity Management, South Caucasus
CMG	Community Management Group
ECM	Erosion Control Measures
MENR	Ministry of Environment and Natural Resources
IEC	Integrated Erosion Control in Mountainous Regions, South Caucasus
SMBP	Sustainable Management of Biodiversity, South Caucasus

1. Introduction

The biodiversity of the South Caucasus is of global importance, but the huge variety of species and the proper functioning of the ecosystems are under threat. There is considerable pressure from the exploitation of natural resources by the local population, private industry and governments.

Within the framework of the Caucasus Initiative of the German government, the GIZ Programme “Integrated Biodiversity Management, South Caucasus (IBiS)” cooperates primarily with the environment ministries of the three different countries of the South Caucasus. The programme follows a multi-level approach. At national level, it promotes the development or revision of biodiversity strategies and regulations, particularly in forest and pasture management, and in erosion control. The experience gained from the pilot measures at district, municipal and local levels are incorporated into this process. As part of these pilot measures, relevant actors are provided with the skills needed to implement integrated approaches for sustainable management of biodiversity and ecosystem services.

Integrated Biodiversity Management, South Caucasus (IBiS) Programme follows up on the achievements of the programmes “Sustainable Management of Biodiversity, South Caucasus” (SMBP) and “Integrated Erosion Control in Mountainous Regions, South Caucasus” (IEC), and is due to last four years (from December 2015 to November 2019). It was agreed that all erosion control measures identified by IEC will be implemented under the IBiS programme.

In Azerbaijan it was decided to implement and test potential erosion control measures (ECM) in a pilot region. The selection of the pilot region goes back to former negotiations between the Ministry of Environment and Natural Resources (MENR) and IEC. From several regions discussed as potential project regions MENR selected Ehen village in Ismayilli district. Previous assessment studies (implemented within the framework of IEC) depict severe erosion problems for some areas of Ismayilli district, resulting in a server threat for local communities.

Ehen municipality is located approximately 25 km north east of Ismayilli town. The relatively soft, erodible units of the southern Caucasus, namely sandstone, silt, and clay, are exposed to strong erosional processes. Consequently, the draining rivers of Ismayilli district carry high sediment loads. While reaching Ehen by road from the south, clear evidences of considerable erosion processes can be observed, e.g. gullying, splash erosion, landslides. Also considerable earth flows have been observed.

Nearly 1200 ha of land is leased out by municipality, while 100 ha of land is used as the “public pastures” by municipality members. The rest of the area is comprised of scrublands, settlements and orchards. The pastures that are in use by the community are heavily degraded and urgent measures must be taken to stop further degradation and erosion.

Preparatory missions to identify and propose concrete Erosion Control Measures (ECM) in Ehen village were carried out in 2014 (Jonathan Etzold) and 2015 (Rainier Arndt). Dr. Hanns Kirchmeir (E.C.O. Institute for Ecology), has developed a draft plan for implementation in 2015, which includes recommendations for technical implementation of afforestation, erosion control and pasture management in the selected area. The latest concept (Version

10/05/2016) provides concrete planning steps towards the implementation of the recommended measures. Through the whole process the inclusion of the community members was of high concern, not only for the acceptance of the measures and the programme, but also to generate ownership and achieve sustainable outcomes.

The planned ECMs were agreed on with Ehen community during community meetings and also the meetings of the Community Management Group (CMG) that was established by IEC. It was decided to implement stabilization measures (fencing, terrace construction and tree planting), different Hay-Meadows, monitoring plots and test pads and a tree nursery.

The objective of IBiS in Ehen village is to coordinate the implementation of selected erosion control measures with different stakeholders involved, assure quality of results and to facilitate community participation as well as practical learning processes.

The report will give insights on the implementation process that took place between July and November 2016, starting with the involvement of the community, capacity development on the construction of ECM, monitoring of the implementation process, trainings on maintenance of ECM and exchange of knowledge between villages and further sharing of lessons learned with stakeholders and partners of IBiS.

2. Involvement and participation of community in the implementation of erosion control measures

Before implementation of ECM in Ehen village the selected measures were discussed together with the community. The purpose was to involve the local community in the process of decision making, because in the further phases it will create responsibility and ownership senses in the community. IBiS hired a local consultant (Vugar Bashirov) to establish working groups and trainings for participatory implementation of the selected ECM in Ehen/Ismayilli. Below is the overview of the visits that Vugar Bashirov made to Ehen village.

Table 1: Visits of GIZ consultant to Ehen village to involve the community for implementation of ECM

Date	Activities
02/08/2016	Meeting with Ehen community and formation of CMG for participation and involvement of community in the implementation of erosion control measures
03/08/2016	Prepare a written agreement for the cooperation between GIZ-IBiS and the Ehen village community
7/09/2016	Field training in fence construction and maintenance
17/09/2016	Field training in collection of hay residuals
21/09/2016	Field training in constructing pile walls
11/10/2016	Field training on fence maintenance and applying hay mulch
12/10/2016	Field training on constructing pile walls based on the local condition (relief, contours, etc.)

2.1 Preparing a written agreement for the cooperation between GIZ-IBiS and Ehen community

The consultant Vugar Bashirov made his first visit to Ehen village on 02. August 2016. The purpose was to facilitate participation of Ehen community in the implementation of erosion control measures. The two-day visit was technically supported by the GIZ. The first day consisted of two meetings with the municipality and local executive committee. During the meetings the ecological problems of Ehen municipality lands and the mitigation measures against them were discussed. GIZ-IBiS Programme explained the concept on erosion control measures in Ehen and the community members expressed their readiness to work with the Programme and support its activities. During the meeting of Ehen municipality the community members reselected the Community Management Group (CMG) consisting of 14 people from different groups in order to ensure active participation of Ehen community in the implementation process of erosion control measures. The CMG consists of leaders of local executive committee and municipality, community activists, school teachers, farmers, veterinarians, etc. in order to cover all interests. CMG meeting can be easily called and the decision of this group will be accepted as the decision of the whole community. The composition of the CMG was the following:

Table 2: Members of the Community Management Group

No	Name	Position
1.	Ahmed Khanjanov	(chair) – farmer, activist villager
2.	Zahid Mammadov	(deputy chair) – teacher, beekeeper, activist villager
3.	Gulkhiz Sharifova	pensioner, activist villager
4.	Sevinj Jabiyeva	municipality head
5.	Vugar Bashirov	local executive committee head
6.	Agasef Babayev	farmer, veterinarian
7.	Mirzagha Gardashov	veterinarian

8.	Aladdin Khanjanov	school librarian
9.	Ulfat Mammadova	teacher
10.	Azad Khanjanov	farmer, wild fruit collection
11.	Ingilab Khanjanov	pensioner
12.	Jafar Gardashov	teacher
13.	Javid Maharramov	welder
14.	Vagif Mammadov	villager

The next day consultant Bashirov met with the CMG members, Ehen municipality, local executive committee and they agreed to sign a Cooperation Memorandum (Appendix 1) in order to officially support each other in implementation of erosion control measures in Ehen village. Representing the interests of Ehen community the municipality head Sevinj Jabiyeva agreed to sign the memorandum. Ehen community agreed to contribute with collection of hay residues, work power, municipality lands for protection (long term and short term) purpose, seedlings stocking and more (Appendix 2).

Figure 1: Meeting with Ehen community

2.2 Field training in fence construction and collection of hay residuals

The consultant conducted a field training to coach the implementing company and community members on fence construction and maintenance. The areas above the village and near the road from Lahic to Ehen were eroded because of overgrazing by village livestock. Fencing is a selected method to limit animal access to those steep slopes and enhance rehabilitation of vegetation cover and stop erosion processes.

The representative of the implementing company was Mr. Rasib Zeynalov. The list of training participants was given in table 3. The general agenda is attached (Appendix 3) to the report.

Table 3: Participants of the field training in fence construction and collection of hay residuals

No	Name	Position
1.	Ahmed Khanjanov	chair of CMG, farmer
2.	Zahid Mammadov	deputy chair of CMG, teacher
3.	Gulkhiz Sharifova	pensioner, activist villager
4.	Vugar Bashirov	local executive committee head
5.	Gorkhmaz Jabiyev	director of secondary school
6.	Jafar Gardashov	teacher
7.	Mammadagha Umudov	teacher

8.	Valeh Soltanov	school security guard
9.	Javid Maharramov	welder

The field training was supported by Elmaddin Namazov, advisor for GIZ. The training participants were invited to the project target area (Site 1 – the steep slope above the village) and the peculiarities (height, length, design, place of gates) of fence construction were explained in the field. Local participants commented that the height of the fence (100 cm) will not be enough, and they proposed to add 15 cm height and install two lines barbed wire on it. This additional measure was intended to control cattle's access to the fenced area, because the area is close to the village and located next to road to the pastures. By this barbed protection wires the risk of cattle intervention to the erosion control measures can be reduced. But taken into account harmful effects (injuries) of barbed wires to cattle, wild animals and local people it was decided to use an ordinary fence (100 cm height) in Site 1 and Site 3 and 4 (near the road from Lahic to Ehen, west from the village Ehen) as a trial. If there is a need to raise the height of permanent fence additional measures should be considered in the future.

Figure 2: Field training in fence construction

The consultant conducted field training together with the representative of the implementing company explaining how to collect hay residues and seeds. In the beginning the community members were informed about the advantages of hay residues application. Then the participants were taken to one of the villagers houses to show practically how to collect hay residues (seeds) and store them. Furthermore, participants agreed on the species of trees/bushes to be planted on the pile walls. The community members indicated that the following indigenous trees/bushes are best suited for the project target area (Site 1).

Table 4: The recommended list of species of trees/bushes for planting in Site 1

No	Common Name	Latin name
1.	Walnut	Juglans regia
2.	Hazelnut	Corylus maxima
3.	Plum	Prunus domestica
4.	Cherry plum	Prunus cerasifera
5.	Berberis	Berberis vulgaris
6.	Blackthorn	Prunus spinosa
7.	Wild Apples	Malus sylvestris
8.	Wild Pear	Pyrus caucasica
9.	Sour cherry	Prunus cerasus
10.	Willow	Salix sp.
11.	Caucasian ash	Fraxinus angustifolia ssp. oxycarpa

2.3 Field training in fence maintenance and applying hay mulch

Following up, the consultant gave practical insights on proper fence maintenance. The training participants were CMG members and village activists, as well as staff of the implementing company. The field training was supported by GIZ expert Mr. Elmaddin Namazov. The participants were invited to the project target area (Site 1) and mistakes on fence construction (the large distances between earth and fence bottom, improper connecting two fences etc.) were illustrated in the field. The local people explained that the large distance (holes) between earth and the fence bottom line emerged because of uneven relief of the area. In Site 3 and 4 there wasn't this type of problem (Site 3 and 4 are slopes but the relief is even).

The field training also covered the correct appliance of hay residues and seeds. In the beginning the community members were informed about the advantages of hay residues application (immediate effect for restoration of vegetation cover in eroded soils, safe seed source, biodiversity enrichment, high aesthetic value of multicolored flowering in different time, etc). Then the participants were taken to the project target area Site 1 and trained on hay application rate per square meter and applying techniques. The hay application rate for the degraded pastures of steep slopes should be 0,2 kg per square meter and the hay should be applied starting from the top of the hill. The rule is that maximum 70 percent of the area can be covered with the hay mulch, otherwise it will stop germination of natural vegetation because of lacking sunshine and heat. Hay mulching can be combined with spreading seeds of natural vegetation (sainfoin, etc.) and application of livestock manure or other organic fertilizers.

Figure 3: Hay and manure applied during the field training

2.4 Field training in construction of a small scale tree nursery

Another training course on the construction of the planned small tree nursery was conducted by the consultant. The trainees were informed that firstly the nursery should be fenced by permanent wire net. Two concrete basements for the rain tanks should be constructed. The edge of the nursery close to the rain rill should be cleaned and filled with gravel and stones to allow for maintenance works. After completing fencing and other nursery construction works, the site should be manured and plowed (spaded) manually to prepare for seed planting and seedling production.

Figure 4: The edge of the nursery needs to be cleaned and maintained

3. Monitoring and advice on construction and maintenance of permanent fences, pile walls, tree nursery and tree/bush planting

Implementation of ECM in Ehen village was monitored by the local consultant Vugar Bashirov and some advices were given if needed. Below is the overview of the local consultant visits for the purpose of monitoring and advice.

Table 5: Visits of GIZ consultant to Ehen village to monitor and advice in ECM implementation

Date	Activities
08/09/2016	Monitor on fence construction process
18/09/2016	Monitor on collection of hay residuals
19/09/2016	Advice to implementing company and community members on fence construction and maintenance
22/09/2016	Advice to implementing company and community members on constructing pile walls
23/09/2016	Advice to implementing company and community members on constructing fences and pile walls
24/09/2016	Monitor on construction process of fences and pile walls
25/09/2016	Advice to implementing company and community members on constructing pile walls
26/09/2016	Monitor on pile walls construction
07/10/2016	Monitor on implementation process
15/10/2016	Advise on fencing of a small tree nursery
16/10/2016	Advise on construction of a small tree nursery
19/10/2016	Advice to implementing company and community members on fence construction and maintenance
20/10/2016	Advice to implementing company and community members on pile walls construction
25/10/2016	Monitor on tree nursery and pile walls construction
29/10/2016	Advice to implementing company and community members on pile walls reconstruction
30/10/2016	Advice in preparation of pile walls for tree/bush planting
04/11/2016	Advise on reconstruction of pile walls and preparation of pile walls for tree/shrub planting
06/11/2016	Monitor tree/shrub planting process
07/11/2016	Advise on seed, hay and manure application to the test pads
09/11/2016	Monitor on implementation process and taking GPS coordinates of the sites, pile walls and test pads

3.1 Monitor and advice on fence construction

During a visit of the consultant and the GIZ advisor the exact borders of the permanent fence in the area of Site 1 were identified. Here “permanent” means to last a minimum of 8-10 years, limiting livestock access to the area. The fence border should be laid between two monitoring points (A and B) marked before by the international consultant Jonathan Etzold. Point A will be outside the fenced area and point B marks the fenced area where different ECM will be implemented (just fenced, fenced + hay residues, fenced + manure, etc.). The aim is to compare the erosion process differences of the conventional grazed area A and the sustainable managed area B. Conclusions will be shared with the local community and recommendations will be given to control erosion process in steep slopes.

Based on the available maps and GPS coordinates the borders were marked and community members were instructed on how to install the permanent fence and use the soil driller motor driven machine for piles. The construction company was engaged in preparation works for the fence construction, such as cutting metal piles, fixing upper and down edges of the fence, etc. During the 18/09/2016 and 19/09/2016 the community installed permanent fence around Site 1. Because of rocky ground of the area they mainly used traditional metal crowbars rather than motor driven soil driller.

Figure 5: Active involvement of Ehen community in fence construction

The height of poles was 115 cm; they drilled holes into the ground (35-40 cm depth) and the holes for the poles were filled with concrete and stone mixture. The distance between two poles is two meters. It should be emphasized that the local community including CMG members, head of local executive committee were actively involved in the fence construction process. CMG members and head of local executive committee organized and guided fence construction process and appointed local community members with appropriate practices in construction work.

Figure 6: In rocky ground community members used traditional metal crowbars to dig holes

Figure 7: Poles were fixed with concrete and fence is installing

3.2 Monitor and advice on fence maintenance

During several visits of the consultant and GIZ experts the fence construction was monitored and advice on fence maintenance works was given to the community. As a result the construction company and the local community fixed some parts of the fence, but still there were some entrance ways to the area from the bottom of the fences. The local community was advised to eliminate this problem (to close those entrances) with the help of locally available materials such as stones, twigs of horny bushes etc. Besides that the bottom line (open entrance) of the gate located close to the main village spring should be closed with a movable extension for allowing flood pass but prohibiting animal access.

Figure 8: The bottom line of the permanent wire net needs to be closed

3.3 Monitor and advice on constructing pile walls and fence

In order to prevent stones and rocks from falling to village and to stabilise the slope, to create shade and decrease drought and wind, it was decided to establish lines of trees and shrubs by means of pile walls. For the construction of pile walls the logs were used.
The local consultant visited Ehen village to conduct field training on constructing pile walls. First the positions of pile walls were decided with the community and the places of pile walls (two lines on the main slope and the shorter at the south part) were marked. The pile walls had a path below for maintenance and irrigation purposes. The process of pile walls construction was monitored by the consultant and some additional advices were given. It was recommended that the bottom of pile walls shouldn't be empty (because of terrain difficulties sometimes the edges of piles touch the earth but the central part remains in the air) and it should be filled with stones, earth and other available materials. Besides that, two lines of pile walls should be laid in staggered order, otherwise they will have not any advantage in controlling the water flow away but will conversely contribute to this process. The next day borders of permanent fence in Site 3 and Site 4 were marked by the local consultant. Then in the field the consultant explained the installation process and the place for the access gate, monitored and advised fence construction in Site 3 and Site 4 and also pile walls construction in Site 1. The pile walls were constructed in two lines with 15 m distance between.

Figure 9: The height of the timbers is low and bottom line of the pile walls is empty

Figure 10: Advice and monitor on constructing pile walls

3.4 Monitor and advice on reconstructing pile walls

After the training the local consultant visited Ehen village to monitor the construction of pile walls. First the positions of the pile walls were examined.

Figure 11: The timbers are raised and the positions of the pile walls are changed

There was a malposition at the central part of the main slope. The pile walls weren't positioned perpendicular to the slopes. And in some places they didn't laid in staggered order. It was recommended to change the position and order of the pile walls to control water run by the rills. During the monitoring it was revealed that the height of the pile walls was not enough to construct terraces. The construction company and the local community were advised to raise the timbers up to the double height (diameter) of them and filled the gaps with stones and earth materials. The local community offered long bunches of willow to be used in pile wall construction as well (Fig. 14).

Figure 12: The wrong positions (red lines) of the pile walls changed into perpendicular to slopes

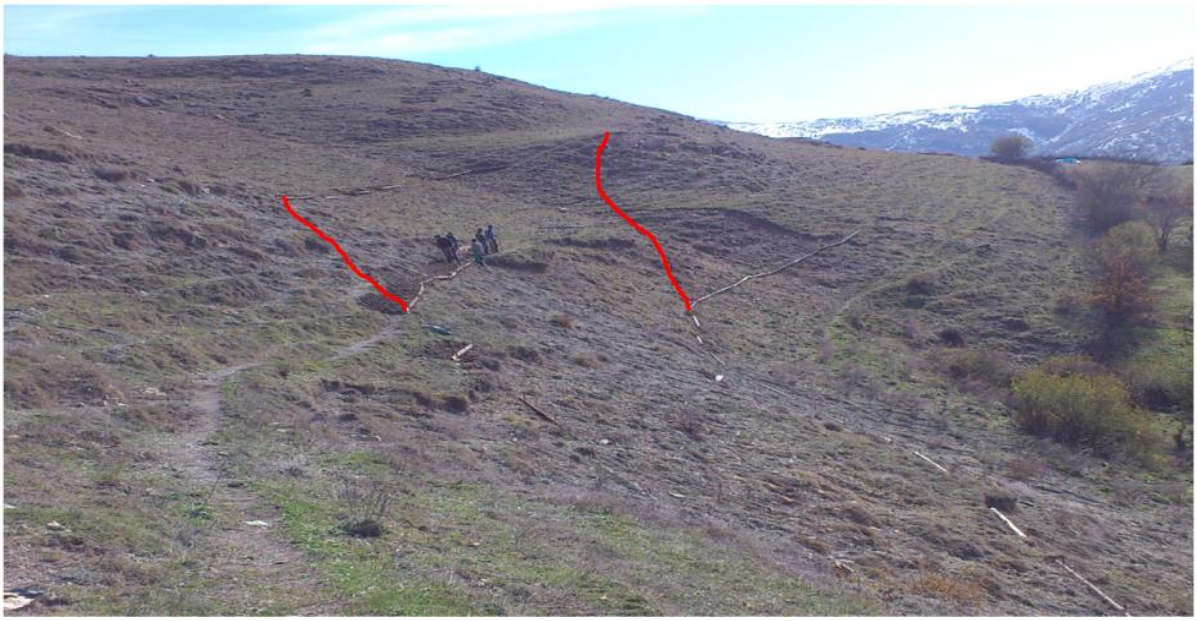


Figure 13: The bottom line (open entrance) of the gate was closed with a movable extension

During the reported period all the above mentioned mistakes on fence maintenance and pile wall reconstruction were corrected by the construction company and the local community. The local consultant took GPS coordinates (Appendix 9) of the sites, pile walls and test pads and they will be used for future monitoring of intervention sites.

Figure 14: The bunches of long twigs can be used in constructing pile walls

3.5 Establishment of experiments in the test pads

9 test pads were established in the implementation sites (Site 1 and 3). The size of the experiment site was 3.24 ha (2.72 ha+0.53 ha), so the experiments also were established on a smaller scale. The purpose was to study different methods for soil erosion control and bio-restoration of vegetation cover. The size of the each test pad was 100 m2 (10 m x 10 m). There were 4 treatments (Manure 60 kg + 25 kg hay residue, hay uncut - 100 kg, hay uncut 100 kg + 60 kg manure and hay residue 25 kg) replicated twice on 8 test pads and 1 treatment (sainfoin with mixed local grass seeds, 35 kg).

Table 6: Experimental test pads in Site 1 and Site 3

N	Project area	Test pads	Applied methods	Initial monitoring results	
				Vegetated area	Non-vegetated area
1	Az-Ehen	TP- 001	Manure (60 kg) + 25 kg hay residue	10 %	90%
2	Az-Ehen	TP- 002	Hay uncut - 100 kg	10 %	90%

3	Az-Ehen	TP- 003	Hay (uncut, 100 kg) + 60 kg manure	5 %	95%
4	Az-Ehen	TP- 004	Hay residue (25 kg)	8 %	92%
5	Az-Ehen	TP- 005	Sainfoin with mixed local grass seeds, 35 kg	40 %	60%
6	Az-Ehen	TP- 006	Hay (uncut, 100 kg) + 60 kg manure	15 %	85%
7	Az-Ehen	TP- 007	Manure (60 kg) + 25 kg hay residue	45%	55%
8	Az-Ehen	TP- 008	Hay (uncut, 100kg)	40%	60%
9	Az-Ehen	TP- 009	Hay residue (25 kg)	60%	40%

Figure 15: Experiments in the test pads

The above mentioned methods will be compared to each other and to the conditions on the unfenced areas. The best method will be selected according to the soil erosion, vegetation restoration and also economic costs of the treatments. The idea is that the selected method might be applied in the implementation sites of Ehen and other surrounding villages. Once in every spring a monitoring of soil erosion and vegetation bio-restoration will be conducted. The method for monitoring was taken from the Monitoring Manual for Summer Pastures in the Greater Caucasus in Azerbaijan (J.Etzold, R.Neudert 2013). The monitoring will last a minimum of 2 years.

3.6 Monitor and advice on construction of a small tree nursery

The local consultant visited Ehen community for two days in order to monitor and give advice on the construction of a small tree nursery. The size of the tree nursery is 0.02 ha located in the yard of Ehen village school. The goal of this nursery is to provide Ehen community with necessary amount of tree/bush seedlings for afforestation measures in the upcoming years.

Under the supervision of the consultant the top and bottom edges of the metal wire were fixed and mounted to the piles strengthened to the ground with the concrete beforehand. Besides those two basements for the rain collecting tanks were constructed, the edges were cleaned from weeds and stones. The rain collecting tanks were installed but weren't joined to the rain gutters because there was a risk of frost damage, it was planned to join the whole system (rain gutters, tanks, drip irrigation system) in spring after frost period. The land plot of the nursery was manured and plowed manually.

Figure 16: Construction works in the tree nursery

After the construction of tree nursery the seeds of the following trees were planted in November:

- Oak, 7 plots (110 seeds)
- Blackthorn, 5 plots (80 seeds)

- Cornel, 2 plots (41 seeds)
- Quince, 2 plots (50 seeds)
- Apple, 5 plots (250 seeds)
- Medlar, 1 plot (5-10 seeds)
- Persimmon, 2 plots (50 seeds)

The size of seeding plots is 2m^2 and the average planting density is 10 plants/m^2. The seedlings will be grown minimum 2 years in the nursery and then be used for afforestation measures.

3.7 Tree/bush planting on the pile walls

After construction of pile walls the next step was to plant trees/bushes on the terraces. The goal of this activity was to reinforce steep slopes against soil erosion, earth flow and flooding. For that purpose Ehen community supplied 53 oak tree, 43 Caucasian ash tree, 20 sour cherry, 4 plum, 5 blackthorn and 9 willow saplings. Besides that 300 walnut, 100 oak and 100 pieces of elm tree saplings were purchased by the project. These tree species were previously agreed by the local population and also recommended by the international expert Dr. Hanns Kirchmeir in his latest concept (Version 10/05/2016).

37 men, 2 women, 10 school children were participating in the community work day to plant trees/bushes at the terraces.

Figure 17: Tree/bush saplings were planted on the community work day

Under the supervision of the consultant they planted 4 trees/bushes on each terrace. The order of the trees/bushes was “Walnut-elm-bushes-Walnut” or “Oak-elm-bushes-Oak”. Caucasian ash was planted especially to the degraded rocky places because of its high tolerance to unfavorable environmental conditions.

Trees/bushes were planted maximum close to the base of the terraces rather than terrace wall in order to catch the water accumulated from upper slopes. In-between the tree/bush planting live stakes of willow were planted horizontally in order to reinforce terrace walls.

After planting each tree sapling was watered. In spring it was planned to install a drip irrigation system to protect the trees from drought during the dry summer period.

Figure 18: Tree planting and live stakes of willow on the pile walls

4. Exchange of lessons learnt practices

4.1 Experience exchange visit to implementation sites

Land users of neighboring villages were invited to Ehen to share the experiences in implementing control measures against soil erosion. For that purpose the local expert prepared a power point presentation illustrating implementation processes and results of erosion control measures. The agenda of the experience visit is attached to the report (Appendix 4). The total number of exchange visit participants was 39 from neighboring communities Lahij, Tazakand, Zernava, Goydan, Burovdal and Baskal. The participant list is attached to the report (Appendix 5).

First the participants were informed about the participatory approach to solve the environmental problems and integrated biodiversity management. Then the implementation process of erosion control measures was demonstrated via multimedia projector and those methods and measures were discussed by the participants. After discussions the participants were taken to Site 1 and erosion control measures were demonstrated practically in place.

Nariman Taghiyev from Goydan village spoke about sensitive places prone to landslide in Goydan municipality and stated that Goydan is willing to adapt measures against landslide in their village voluntarily. He emphasized that the measures applied in Ehen will ensure a safe future and should count as a case study, but that Goydan doesn't have the necessary financial and technical resources to implement the measures on their own. If IBiS can support Goydan, the local population will actively participate and help to implement those measures.

Figure 19: Discussions during the experience exchange visit

Mutallim Mutallimov from Ehen municipality offered to build a recreation place in the upper side of the village to attract tourists. His co-villager Aladdin Khanjanov offered to continue

tree planting measures along the road to Ehen village and protect them with wire nets. Tree planting along the road will protect the road from destruction and sliding.

Figure 20: Erosion control measures were demonstrated in the field to the participants of exchange visit

The participants also recommended installing double lines of pile walls instead of single in the south part of Site 1. Collection of forest litter and mixing it with manure and then spread in the degraded areas of the implementation sites were also offered. Planting of bushes like dog-rose, berberis and sea buckthorn on the terraces was suggested, but the local community was against to this recommendation, because those bushes can be a shelter for predator animals like fox and jackal. All participants agreed that the ECM implemented in Ehen municipality and the involvement of the local community in the implementation processes helped farmers to perceive environmental problems and think about solutions.

Generally all participants appreciated the erosion control measures and integrated biodiversity management activities done in Ehen municipality and are in favor of using best practice methods in their villages. The methods against erosion control applied in Ehen municipality within the pilot project are already lessons learned for neighboring municipalities and they can select effective ones and suitable for their local conditions.

4.2 Lessons learnt workshop with involved stakeholders

The lessons learnt workshop was conducted through involving the rayon level working group. The group was established by support of IBiS in summer of 2016. Main function of the working group is to take responsibility for the feasibility and the achievement of local level interventions of IBiS. The working group monitors and reviews the project implementation status as well. All relevant stakeholders in the field of natural resource management were participating in this group. The agenda, participant list of the lessons learnt workshop and PowerPoint presentation are attached to the report (Appendix 6, 7 and 8).

After the presentation of the lessons learned practices in Ehen (successes and problems) a discussion started on the implemented ECM. The participants raised some questions regarding the understanding of the situation and offered ideas for future improvements of current ECM.

Figure 21: Discussions during the lessons learnt workshop about the implemented ECM

Recommendations to further implementation of ECM:

1. Using concrete posts to make terraces more sustainable;
2. Planting thorny tree species like acacia, dog rose etc. in terraces in order to create natural permanent defense (live hedge);
3. Using thorny wires for better protection of sites;
4. For long term management of erosion control sites it would be advisable to involve farmers to the management through compensation of his works with collection of hay and fruits of sites and the project could give him a horse;
5. The most important action towards to sustainable management of natural resources is changing human behavior and in this regard the results of ECM may contribute this process a lot;
6. By 2020 it is planned to develop and use of digital soil erosion map which could support for better management of soil erosion;
7. All negative intervention to the ECM sites should be controlled by municipality and even possible penalty mechanism system can be applied; in this regard municipalities may negotiate with local representatives of MENR in order to find out better penalty or management system referring existing rules and regulations;
8. Tree nursery should be given to the management of local municipality;

9. Sharing of best experiences on community based (participatory) erosion control or natural resource management would be good.

Islam Garayev, senior adviser of Ismayilli Property Committee office recommended involving Mudri municipality in the ECM implementation. Because of its similar environmental problems it could benefit from the experiences gained in Ehen municipality.

5. Assessment and findings of consultant

Community involvement and interest or motivation process is typical in rural areas. Local communities are aware of certain issues and problems but are not able to develop the initiative to engage in the solution. Maybe this attitude was derived from Soviet period, because that time everything was planned by the central government and no initiatives were accepted. Knowing this situation a CMG (a group of community activists) was reestablished by IBiS and the community was motivated through offering of technical support and trainings (permanent fences, pile walls, road rehabilitation, forest plantings, international and national expertise, etc.). In the future key persons (in local language it is called as “ağsaqqal”) should be identified to foster the community involvement process, raise awareness and activate the community. Besides that the community members should be informed about the problems and ways of solutions through workshops, trainings, field days, etc. Some incentives (technical supports) should be given to the community for better motivation.

During the discussions about implementation of erosion control measures in Ehen municipality the CMG was concerned with the possible danger of the electric fence to the village children and they proposed that villagers should be trained how to maintain the electric fences. Besides that the species of bushes for planting on the pile walls should be selected carefully, otherwise they can be a potential shelter for predator animals.

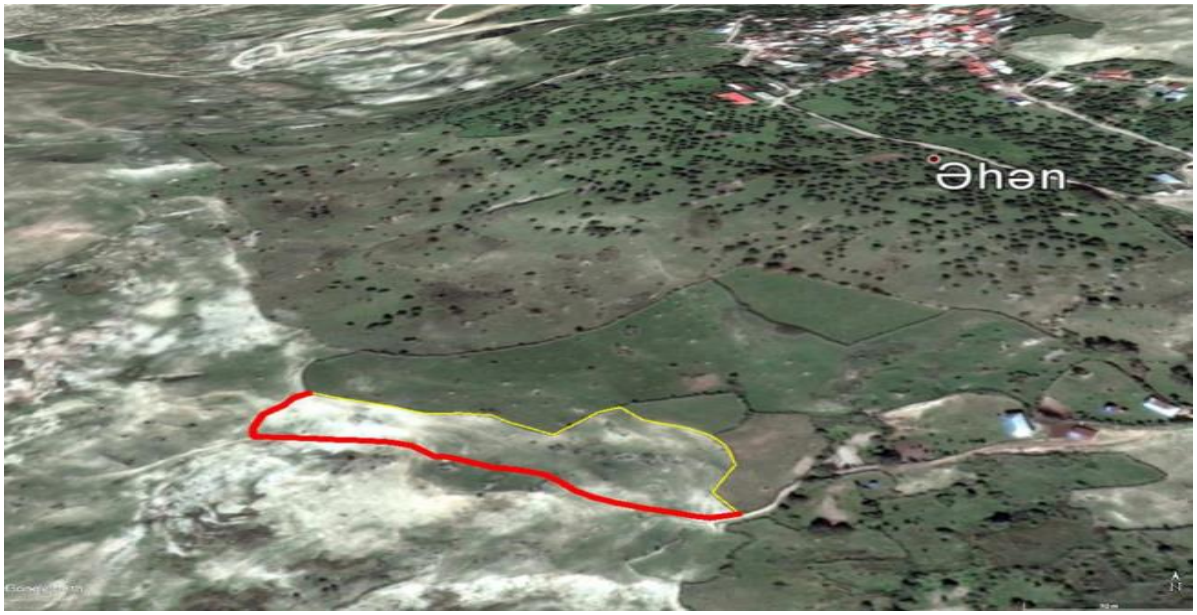
During monitoring of the works on pile wall construction it was revealed that the height of the pile walls were not enough for making small terraces. Thus, it was advised to raise the timbers and fill the gaps on the bottom with the stones and earth materials.

The position of the pile walls was firstly laid according to the sketch agreed on the concept document. But during the monitoring it was learned that the positions should be changed according to the concrete relief situation (direction of slopes, rills, gullies etc.).

Due to erosion control purpose some areas are kept under protection (permanent and temporary fencing), but to increase the productivity of livestock additional fodder can be added. Especially plants from the Legume family have a high share of proteins and give valuable fodder. At the given altitude Sainfoins (*Onobrychis spp.*) can be grown in the hay meadows and pastures. To increase the proportion of Sainfoins in the vegetation, seed can be collected in summer and distributed to suitable meadows and pastures. For this purpose the village leader Mr. Vugar Bashirov (head of local executive committee) offered to protect the nearby area of his hayfield with permanent fence and to produce sainfoin seed. The area to be fenced is approximately 1,5 hectares and belongs to the municipality. If IBiS could contribute him with fencing material (~370m length) and also sainfoin seed he can organize (because the area is close to his hayfield) sainfoin seed production and provide the Ehen municipality with certain amount sainfoin seed. Through this approach other hayfield areas of Ehen community can be seeded with sainfoin and productivity of other hayfields will be raised.

In general the protected areas will be greener in the future and it is expected that the interests of tourists in visiting Ehen will be raised. Lahij settlement has many tourists every year and the protected area (Site 1) can be seen from Lahij.

Figure 22: Pasture land can be used for sainfoin seed production



It is recommended to install an infrastructure (chairs, table, roof, a branch of natural spring, cooking facilities etc.) in a flat place approximately 150 m far from Ehen village. As a result tourism could become a good alternative income source for the community.

Figure 23: A nice place where tourists can go for sightseeing and resting

6. Conclusions

During the implementation of ECM in Ehen, IBiS and a local consultant were able to raise awareness on erosion risk, capacitate the local population on a sustainable way of managing biodiversity and foster the exchange on community level as well as between villages. Thereby IBiS followed a community based approach, involving local people in the whole process from planning to implementation of a feasible ECM concept.

At first the members of Ehen community reselected the Community Management Group (CMG) consisting of 14 people in order to ensure active participation of Ehen community in the implementation process of ECM. Moreover Ehen municipality, CMG and local executive committee agreed to sign a Cooperation Memorandum in order to officially support each other in the implementation of ECM in Ehen village.

The local community was trained how to maintenance permanent fences and apply hay residues and seeds to the degraded slopes.

The local community was advised to close some entrance ways to the target area from the bottom of the fences with the help of locally available materials such as stones, twigs of horny bushes etc. Besides that the bottom line (open entrance) of the gate located close to the main village spring should be closed with a movable extension allowing flood pass but prohibiting animal access.

During the monitoring it was revealed that the height of the pile walls were not enough for constructing terraces. The construction company and the local community were advised to raise the timbers up to the double height (diameter) of them and filled the gaps with stones and earth materials. During the reported period the wrong position of some pile walls were changed to be perpendicular to the slopes and laid in staggered order to control the water flow. The local community offered to integrate locally available long bunches of willow into the pile wall construction.

There were established 9 test pads in the implementation sites (Site 1 and 3). The purpose was to study different methods for soil erosion control and biorestoration of vegetation cover. There were 4 treatments (Manure 60 kg + 25 kg hay residue, Hay uncut - 100 kg, Hay uncut 100 kg + 60 kg manure and Hay residue 25 kg) replicated twice and 1 treatment of sainfoin with mixed local grass seeds (35 kg). These methods will be compared to each other. The best method will be selected and applied in the implementation sites of Ehen and other surrounding villages.

Under the supervision of the consultant the borders of the tree nursery were fenced with permanent wire net. Besides that two basements for the rain collecting tanks were constructed, the edges were cleaned from weeds and stones and prepared as a road for making management techniques in the nursery. In the end the land plot of the nursery was manured and plowed manually.

To increase the productivity of livestock additional fodder can be added to the feed stock. For this purpose the pasture land next to the hayfield area of the farmer and also the village leader (head of local executive committee) Mr. Vugar Bashirov can be protected with permanent fence to enable sainfoin (*Onobrychis spp.*) seed production. The area to be fenced is

approximately 1,5 hectares and belongs to the municipality. By this way other hayfield areas of Ehen community can be seeded with sainfoin and the productivity of the hayfields will be raised.

In general the protected areas will be greener in the future and it is expected that the interests of tourists in visiting Ehen will be raised. Lahij settlement has many tourists every year and the protected area (Site 1) can be seen from Lahij. It is recommended to install an infrastructure (chairs, table, roof, a branch of natural spring, cooking facilities etc.) in a flat place approximately 150 m far from Ehen village. As a result tourism could become a good alternative income source for the community.

Land users of neighboring villages were invited to an experience exchange visit to share the experience in control measures against soil erosion in Ehen village.

A lessons learnt workshop was conducted through involving the rayon level working group. The working group discussed successes and problems of the implemented ECM and raised some questions (about total area of Project intervention, next activities of IBiS Program in terms of expansion of implementation area towards neighboring communities, etc.) regarding the understanding of the situation and offered ideas for future improvements of current ECM.

7. References

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8. Appendices

Appendix 1. Cooperation Memorandum between GIZ IBiS Program and Ehen community

COOPERATION MEMORANDUM

This Cooperation Memorandum was agreed between Integrated Biodiversity Management, South Caucasus Programme (hereinafter will be referred as GIZ Programme) and Ehen village community of Ismayilli district (hereinafter will be referred as Ehen community) in Ehen village of Ismayilli district on the 3rd of the August, 2016.

The main objective of this agreement is to support the implementation process of the following activities in the pilot area:

A. Ehen community agrees to cooperate with GIZ Programme for implementation of the erosion control measures in Ehen village.
B. GIZ Programme plans to implement the following bioengineering and erosion control measures in Ehen municipality:
    - Stabilization of erosion in the rocky slope located directly above the village near to the water house;
    - Fencing for rehabilitation of vegetation cover;
    - Rehabilitation of vegetation cover and shifting pasture land into hay meadow through application of hay residues, seeds and coconut net in South-West part of the village Ehen that are very sensitive on grazing;
    - Establishment of tree and shrub rows to stabilize the horizontal trench for protection from flooding and rockfall from steep hillsides;
    - Reforestation of steep hillsides located directly above the village;
    - Stabilization of Lahij-Ehen road through establishing tree/shrub row in the west side;
    - Application of bioengineering measures for stabilization of the gully erosion along Lahij-Ehen road;
    - Implementation of engineering measures (gabion boxes) to avoid slow-down of water speed and erosive energy.
C. Ehen community will support the above mentioned activities and contribute GIZ Programme with hay seed, working power, land plot, tree seedlings etc.
D. Ehen community is responsible for protection of the equipment used for the project activities in Ehen village.
E. Ehen community will support to solve the conflicts may be arisen during implementation of erosion control measures in Ehen village.
F. Ehen municipality and local representative of district administration will support implementation of the project.

By signing this Cooperation Memorandum the parties agree with the clauses above mentioned:

Ehen community, on behalf of the community

_____

Sevinj Jabiyeva,

Chair of Ehen municipality

_____

Integrated Biodiversity Management,
South Caucasus Programme

Appendix 2. Contribution of Ehen community to IBiS Program

Activities	IBiS Program	Ehen community	Remarks
Measure 1. Stabilization of erosion on steep slope above the village			
Fencing the 2,72 ha area	✓ Materials and toolkit for construction; ✓ Supervisor expert and construction company; ✓ 100 man/day.	✓ Support for construction; ✓ 2,72 ha municipality land for protection, ✓ 40 man/day.	Ehen community including CMG members, local representative of district administration was actively participated in fencing process.
Construction of pile walls	✓ Materials and toolkit for construction; ✓ Supervisor expert and construction company; ✓ 20 man/day.	✓ Support for construction; ✓ 5 man/day.	Ehen community was actively participated in pile wall construction.
Tree/bush planting on the terraces	✓ Materials and toolkit for construction; ✓ Supervisor expert; ✓ 500 Seedlings etc.	✓ Support for planting; ✓ 134 seedlings; ✓ 49 man/day.	Women, men, teachers and schoolchildren were actively participated in planting process of seedlings on terraces.
Measure 2. Setup of 0,52 ha Hay-Meadow 1			
Fencing the 0,52 ha area	✓ Materials and toolkit for construction; ✓ Supervisor expert and construction company; ✓ 20 man/day.	✓ 0,52 ha municipality land for protection ✓ 10 man/day.	Ehen community was actively participated in fencing process.
Measure 3. Setup of 0,32 ha Hay-Meadow 2			
Fencing the 0,32 ha area	✓ Materials and toolkit for construction; ✓ Supervisor expert and construction company; ✓ 20 man/day.	✓ 0,32 ha municipality land for protection; ✓ 10 man/day.	Ehen community was actively participated in fencing process.

Measure 4. Establishment of test pads			
Marking and designing of the test pads	✓ Materials and toolkit for establishment; ✓ Supervisor expert.	✓ Support for transportation of materials; ✓ 4 man/day	Ehen community was actively participated in test pad establishment processes.
Collection of Hay residues, kg	-	100	Residues were collected from the place of hay storage and stables
Provision with Hay uncut, kg	300	-	Natural hay stored for feeding animals in winter
Provision with Manure, kg	-240		Well-rotted manure
Collection of Sainfoin seed, kg	-35		Collected from sainfoin hay meadows
Measure 5. Construction of tree nursery			
Construction of 0,02 ha small tree nursery	✓ Materials and toolkit for construction; ✓ Supervisor expert and construction company; ✓ 24 man/day	✓ 0,02 ha land given by the village school ✓ 12 man/day	Ehen community was actively participated in tree nursery establishment processes.

Appendix 3. General agenda for the practical field training in Ehen community

Date	Activities
7/09/2016	09:30-11:00 – Meeting with the community members and representative of the construction company. 11:00-13:00 – Discussions about fence construction and its maintenance. 14:00-18:00 – Visit to the project target area (Site 1) and practical explanation of the peculiarities (height, length, design, place of gates) of fence construction in the field.
8/09/2016	09:00-10:00 – Meeting with the community members and representative of the construction company. Discussions about erosion control measures in Ehen community. 10:00-13:00 – Interactive training about advantages of hay residues application and collection of hay residues. 14:00-18:00 – Visit to villager's house to show practically how to collect hay residues (seeds) and store them.
20/09/2016	09:00-10:00 – Meeting with the community members and representative of the construction company. Discussions about erosion control measures in Ehen community. 10:00-13:00 – Interactive training about constructing pile walls, different construction materials, coconut application, locally available shrub bunches. 14:00-18:00 – Visit to the project target area (Site 1) and practical explanation of the pile wall construction in the field.

Appendix 4. General agenda for exchange visit to implementation sites

Date	Activities
03/12/2016	- Greetings - Presentation about the project - Presentation about the erosion control measures implemented in Ehen municipality - How does local community assess the ECM - Tea/coffee break - Visit to the Site 1 - What did we learn? - Proposals - Questions

Appendix 5. List of participants of exchange visit

Programme: IBiS
Event: Exchange visit among farmers on Erosion control measures
Date: 03.12.2016.
Place: Ehen village, Ismayilli rayon

	Name & Surname	Organization	Position	Status (AMA, IMA, NP, STE, Partner)	Email (optional)	Telephone (optional)
1	Səlimov Zaur	Tazakand municipality	Member	Partner		+99455 233 49 98
2	Səlimov Məharət	Tazakand municipality	Member	Partner		+99451 913 14 91
3	Əzimov Simran	Tazakand municipality	Member	Partner		+99451 336 38 35
4	Bağıyev Azər	Tazakand municipality	Leader	Partner		+99450 395 64 15
5	Adgözəlov Zeynal	Tazakand municipality	Member (Zarnava)	Partner		+99455 694 57 03
6	Bayramov Asiman	Lahij municipality	Member	Partner		+99455 248 99 08
7	Hüseynov Xəyal	Lahij municipality	Member	Partner		+99451 571 32 35
8	Əliyev Kamal	Lahij municipality	Member	Partner		
9	Rzayev Rafiq	Lahij municipality	Member	Partner		+99451 537 22 57
10	Nağıyev Rəşad	Baskal municipality	Leader	Partner		+99450 625 02 52
11	Ağayev Samir	Baskal municipality	Member	Partner		+99455 760 66 99
12	Ağayev Vüqar	Baskal municipality	Member	Partner		
13	Mirzəyev Çingiz	Ehen municipality	Goydan village	Partner		+99450 487 37 16
14	Tağıyev Fərman	Ehen municipality	Goydan village	Partner		+99450 308 86 02
15	Musayev Nuru	Ehen municipality	Goydan village	Partner		+99450 441 43 87
16	Tağıyev Nəriman	Ehen municipality	Goydan village	Partner		+99450 415 08 63
17	Mirzəyev Nadir	Ehen municipality	Goydan village	Partner		+99450 755 72 84
18	Məhərrəmov Vahid	Ehen municipality	Member	Partner		+99450 569 92 68
19	Məhərrəmov Cəlal	Ehen municipality	Member	Partner		+99455 480 30 53
20	Məhərrəmov Cəmil	Ehen municipality	Member	Partner		
21	Xancanov Ələddin	Ehen municipality	Member	Partner		+99450 717 52 12
22	Xancanov Əhməd	Ehen municipality	Member	Partner		+99451 674 68 68
23	Bəşirov Vüqar	Ehen municipality	Member	Partner		+99450 643 88 37

	Name & Surname	Organization	Position	Status (AMA, IMA, NP, STE, Partner)	Email (optional)	Telephone (optional)
24	Quliyev Ədalət	Ehen municipality	Member	Partner		+99451 844 01 17
25	Soltanov Vasif	Ehen municipality	Member	Partner		
26	Əmirov Vəzir	Ehen municipality	Member	Partner		+99451 892 70 20
27	Babayev Oqtay	Ehen municipality	Member	Partner		
28	Mehdiyev Vüsal	Ehen municipality	Member	Partner		
29	Məsimov Vidadi	Ehen municipality	Member	Partner		
30	Əkbərov Fazil	Ehen municipality	Member	Partner		+99450 899 49 91
31	Mütəllimov Mütəllim	Ehen municipality	Member	Partner		+99451 538 53 22
32	Cəbiyev Tural	Ehen municipality	Member	Partner		+99455 581 04 08
33	Əliyev Elxan	Ehen municipality	Member	Partner		
34	Cəlilov Tural	Ehen municipality	Member	Partner		
35	Cəlilov Əkrəm	Ehen municipality	Member	Partner		
36	Aslanov Allahverdi	Ehen municipality	Leader	Partner		
37	Şərifova Gulxiz	Ehen municipality	Member	Partner		
38	Agayev Agami	Brovdal municipality	Leader	Partner		
39	Nabiyev Bedel	Brovdal municipality	Member	Partner		
40	Vugar Bashirov	ADAU, soil scientist	Expert	STE	vugar.bashirov@gmail.com	+99450 644 11 66
41	Abdurzaqov Yusif	GIZ	IBIS, Field Officer	NP	yusif.abdurzagov@giz.d	+99450 287 70 37
42	Huseynli Mahir	GIZ	IBIS, Field Officer	NP	mahir.huseynli@giz.de	+99450 287 70 38
43	Elmaddin Namazov	GIZ	Adviser	NP	elmeddin.namazov@giz.d	+99450 283 49 61

List is prepared by: _____ (Project staff)

List is approved by: _____(AV / DV)

Appendix 6. General agenda for lessons learnt workshop

Date	Activities
03/12/2016	- Greetings - Acquaintance - Presentation about the project - Presentation about lessons learned on ECM implemented in Ehen municipality - Questions / Proposals - Tea/coffee break - Contentment questionnaire - Proposals - Lunch break - Free time (discussions can be continued)

Appendix 7. List of participants of lessons learnt workshop

Programme: IBiS
Event: Lesson learnt workshop on implementation of ECM
Date: 05.12.2016.
Place: Talıstan Forest park Hotel, Ismayilly, Azerbaijan

	Name & Surname	Organization	Position	Status (AMA, IMA, NP, STE, Part-	Email (optional)	Telephone (optional)
1	Shahin Ismayilov	Ismayilli district admin-istration	Senior ad-viser	Partner		+99450 582 74 47
2	Vugar Bashirov	Ismayilli district admin-istration	Local repre-sentative in Ehen	Partner		+99450 643 88 37
3	Xancanov Ahmad	Leader	Ehen CMG	Partner		+99451 674 18 68
4	Cabiyev Akram	Ehen municipality	Member	Partner		+99450 671 00 34
5	Garayev İslam	Property committe	Senior ad-viser	Partner		+99450 571 51 62
6	Asadov Akif	MoAgr, Ismayilli brunch	Head of sector	Partner		+99450 366 13 74
7	Ismayılov Elshan	MoAgr, Ismayilli branch	Head of sector	Partner		+99455 395 29 92
8	Chiriyev Nariman	MENR, regional ecolog-ical department	Senior in-spector	Partner		+99450 385 74 16
9	Mammadov Kamil	MENR, Ismaylli forest enterprise	Senior ad-viser	Partner		+99470 388 12 12
10	Garibov Afqan	Shahdag National Park	Deputy	Partner		+99450 347 42 35
11	Babayev Ruhid	Shahdag National Park	Guardian	Partner		+99455 735 55 73
12	Musayev Rafael	Shahdag National Park	Guardian	Partner		+99450 422 10 17
13	Suleymanov Sabuhi	Ismayilli turism infam-tion centre	Director	Partner		+99455 756 27 99
14	Aslanov Allahverdi	Ehen municipality	Leader	Partner		+99450 361 74 90
15	Maharramov Shaig	Talistan municpality	Leader	Partner		+99450 542 50 90
16	Abdurzaqov Yusif	GIZ	Field Coor-dinator	NP	yu-sif.abdurzagov@giz.de	+99450 287 70 37
17	Huseynli Mahir	GIZ	Field Coor-dinator	NP	8usey.huseynli@giz.de	+99450 287 70 38
18	Vugar Bashirov	ASAU	Soil scien-tist, free-lance expert	STE	vugar.bashirov@gmail.com	+99450 644 11 66
19	Elmaddin Namazov	GIZ	Adviser	NP	Elmeddin.nama-	+99450 283 49 61

Appendix 8. PowerPoint presentation for the Lessons Learnt Workshop

The ppt was enclosed to the report.

Appendix 9. GPS coordinates of the sites, pile walls and test pads

The kmz files were enclosed to the report.

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Integrated Management of Biodiversity, South Caucasus IBiS

Programme Office Baku, Azerbaijan

22, Nizami Street / 4th Floor
1001 Baku, Azerbaijan
Tel: +99412 4978068
www.giz.de
www.biodivers-southcaucasus.org

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH