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ANALYTICAL REPORT

“Mitigation of Climate Change Risks of Rural Communities through Improved Local Development Planning” UNDP - BCPR / 00075559 Project



on Activities Performed in 2014

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Analytical Report 2014

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Implementing agency	UNDP CO Armenia	
UNDP CC Programme Coordinator	D. Harutyunyan	
Project Task Leader	G. Hovhannisyan	
Project Experts	Z. Petrosyan A. Hovhannisyan C. Tatin-Jaleran	V. Melikyan K. Hovhannisyan
Partner and contractor organizations	“MPG” LLC “ICARE” Foundation “GEORISK” LLC “MELIORATSIA” LLC “Building Department #1” LLC “A. Nersisyan ev enkerer” LLC “ARNAP” Foundation “NESA” Srl	

Address: Government bld. #3, room 533,
Republic Square, Yerevan, Armenia, 0010
Tel: (+374 10) 58 39 32, 58 39 20
E-mail: climate@nature.am
Web-site: www.nature-ic.am

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ABBREVIATIONS

ARS	Armenian Rescue Service
APR	Annual Progress Report
AWP	Annual Work Plan
BCPR	Bureau for Crisis Prevention and Recovery
CBO	Community Based Organization
CC	Climate Change
CJSC	Closed Joint Stock Company
CO	Country Office
COP	Community of Practice
CPAP	Country Program Action Plan
CRM-TASP	Climate Risk Management Technical Assistance Support Project
CRM	Climate Risk Management
CSMT	Country Support Management Team
DIM	Direct Implementation Modality
DRR	Disaster Risk Reduction
DRRRT	Disaster Risk Reduction Regional Team
EC	European Commission
EEG	Energy Environment Governance Portfolio
FAO	Food and Agriculture Organization
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GDP	Gross Domestic Product
GoA	Government of Armenia
HFA	Hugo Framework for Action
IPCC	Intergovernmental Panel on Climate Change
Ltd	Limited
MDGs	Millennium Development Goals
MoNP	Ministry of Nature Protection of Republic of Armenia
MoES	Ministry of Emergency Situations of Republic of Armenia
MoTA	Ministry of Territorial Administration
MoA	Ministry of Agriculture
NAP	National Adaptation Program
NC	National Communication
NGO	Non-governmental Organization
NIM	National Implementing Modality
NPD	National Project Director
NSS	National Statistical Service
RA	Republic of Armenia
RDRA	Regional Disaster Reduction Advisor
SNCO	State Non-commercial Organization
UNDAF	United Nations Development Assistance Framework
UNEP	United Nations Environmental Programme
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	United States Dollar
V&A	Vulnerability and Adaptation
WB	World Bank
WFP	World Food Program
WMO	World Meteorological Organization

Introduction

With the increasing scale of climate-induced disasters projected for the 21st century, particular emphasis must be placed on the mitigation of disaster and climate risks since they are closely linked to the ability of communities and a country in whole to function appropriately, for the guarantee of economic growth and the potential of a country to develop and prosper. Disaster and climate risk reduction should continuously be a major priority in national and regional development strategies.

Armenia is one of the countries at risk of climate change impact and seriously suffers from different natural disasters. Various scientific researches show that climate change affects the frequency and the severity of natural hazards that lead to increased social vulnerability and enhanced losses. That's why it becomes urgent to promote sustainable development by reducing the vulnerability associated with climate risk. The recognition of the climate change risks and considering the importance of strategies aimed at minimizing negative impacts on communities and economies fields, particularly in agriculture is of great interest for Armenia.

The “Mitigation of Climate Change Risks of Rural Communities through Improved Local Development Planning” UNDP-BCPR Project (hereafter: “the Project”) is aimed to enhance the climate resilience of Armenia in the highest risk sectors and ensure national ownership through enhanced institutional knowledge and responsibility. The specific objectives of the Project are to mitigate the climate change risks of rural communities through mainstreaming climate risk management in the rural development planning process, applying/testing risk mitigation measures in agricultural practice, increasing stakeholders' awareness on the threat to climate change on the agricultural sector, and strengthening the risk management and adaptive capacities of vulnerable communities. This is expected to be carried out by promoting information gathering and networking, improving planning process on local level, enhancing the capacities of the hydro-meteorological department and agricultural extension services, and implementing pilot climate risk management approaches and measures at community level.

Local Project Advisory Committee (LPAC) meeting was taken place on 23 September, 2013 with the purpose of provision of recommendations on the formulation and project approval. Based on the results of discussions and positive feedback from the Project partners and stakeholders, considering the importance of the Project outcomes for addressing the risks for rural development as a part of national DRR policy, LPAC recommended Project document for further approval by UNDP CO.

On 3 October, 2013 the Project Document and revised AWP has been signed. Within the reporting period, the Project's activities were performed according to the work-plan. The present report reflects the following main achievements in 2014:

- Identification of the criteria for selection of vulnerable communities in 2 selected marzes (regions);
- Selection of targeted regions and communities;
- Consultation with marz and community administrations;
- Conduction of surveys;
- Conduction of trainings;
- Performing of the pilots project;
- Organization of a number of seminars/trainings with participation of the Project's local and international experts/consultants;
- Creation of the network of the Project's partner organizations and strengthening of cooperation with local and regional projects on climate change risks.

1. Targeted communities for implementation of climate risk mitigation activities

1.1. Assessment tool for selection of targeted rural communities

Based on the conducted consultations and meetings in communities the indicative criteria for selection of vulnerable rural communities for implementation of CRM activities have been discussed and the assessment tool has been updated and finalized. The selected criteria include such vulnerability criteria as climate zones and landscapes (altitude, dependence on natural ecosystem services, mountain steppe and forest shelter belt), the severity of community's exposure to climate change risks, agricultural activity and the poverty of the community and such impact criteria as the number of people that would benefit from CRM activities and cooperation opportunities with other organizations to mainstream CRM in their planned activities.

Based on the developed and agreed tool total of 43 rural communities in Tavush and Vayots Dzor regions to implement CRM activities have been selected (Table 1).

Table 1. Selected rural communities in targeted regions to implement CRM activities

N	Selected rural communities in	
	Tavush region	Vayots Dzor region
1.	Barekamavan	Agarakadzor
2.	Bagratashen	Azatek
3.	Berdavan	Areni
4.	Haghartsin	Bardzruni
5.	Tavush	Gnishik
6.	Koti	Gomq
7.	Koghb	Elphin
8.	Movses	Eghegis
9.	Nerqin Karmir Aghbyur	Zaritap
10.	Chinari	Taratumb
11.	Choratan	Khndzorut
12.	Paravaqar	Herher
13.	Ptghavan	Horbategh
14.	Aknaghbyur	Hors
15.	Lusahovit	Martiros
16.	Artchis	Shatin
17.	Ltchkadzor	Chiva
18.	Sevqar	Rind
19.	Gosh	Sers
20.	Achadjur	Vernashen
21.	Aygedzor	Qaraglukh
22.	Artsvaberd	

	Tavush region	Vayots Dzor region
Selected rural communities	21	20
Population of targeted communities	41,000	27,000
Population (% from total rural pop.)	50%	74%

1.2. Conduction of surveys

In the reporting period within the framework of the Project, the sub-contractor company has developed the methodology for gender-sensitive survey of communities on climate change risks on agricultural activity with the main objective to measure the impacts on households and the perception of climate change related risks by farmers. The methodology of survey and questionnaire was pre-tested in couple of communities to get preliminary overview of how it works and how it is understandable by the rural people.

Lately, the developed questionnaire has been reviewed and adapted to reflect the differences of selected target groups, and in May 2014 the surveys and community baseline studies to measure the household impacts and the perception of climate change related risks for selected rural communities in Tavush and Vayots Dzor regions have been conducted. Thus, around 400 rural household representatives from 19 rural communities in Tavush region and around 315 household representatives from 15 rural communities in Vayots Dzor region have been interviewed to establish the level of understanding, awareness and attitude to climate change, the impacts of risks and expressions of interest in implementing climate risk mitigation measures. Despite social and environmental differences between the communities, many of the results were similar.

Based on the survey results, the reports for each community include the brief information about the community, social profile, analysis of the surveys, community weakness, strength, and capacity, and conclusions and identified main climate change and weather induced factors hindering the community development.



Figure 1. Farmers and community administration interviews.

	Tavush region	Vayots Dzor region
Surveys conducted in rural communities	19	15
# of interviewed people in targeted communities	400	315

The set of replies provided during the survey allows drawing clear conclusions about the level of awareness and adaptation initiatives in rural communities of Tavush and Vayots Dzor regions. Responses reveal that rural people have a good understanding and range of knowledge of climate change issues in general and there is willingness to try risk mitigation measures. Most communities realize that community support is important to tackle climate change, however, an outside source support is needed that will enable communities to mitigate climate change risks on a local scale.

2. Strengthening the national institutions capacity for evidence-based climate risk management at national and community levels.

2.1. Hydromet service needs assessment

The main responsibilities of the “Armenian State Hydro-meteorological and Monitoring Service” State Non-Commercial Organization under the Ministry of Emergency Situations are (i) provision of hydro-meteorological services aimed at obtaining information on hydro-meteorological phenomena, (ii) provision of forecasts and observations data to the areas of national economy greatly dependent on weather events, (iii) preparation of operative information on hydro-meteorological phenomena and potential dangers for population, national economy, environment etc. The Hydromet service has a good database of historical data and network of observation stations. However, the need for better local capabilities for hydro-meteorological data, particularly for short-term temperature and precipitation forecasts has become acute. Those capabilities are urgently needed in the short-term to support better farm-level decision-making.

The national expert has conducted the assessment of (i) hydro-meteorological background information of extreme climate events, (ii) current situation with operative, short-term and seasonal forecasts, and warning system, as well as (iii) needs, gaps and required external support on capacity building and technical assistance.

The conducted activities include: (i) establishment of procedure for providing relevant information addressing agricultural needs on hydrometeorology data for farmers, (ii) revised and updated webpage of the Hydromet service, and (iii) updated Agro-meteorology bulletin incorporating climate change relevant information.

2.2. Installations of automatic weather stations

Based on the conducted needs assessment, consultations with the National Hydromet Service Director and key department heads the detailed technical specifications of the meteorological observations network equipment has been developed and arranged the works for establishment of two new automatic weather stations in target regions.

Automatic weather stations equipped with sensors and datalogger have been procured and installed in Ptghavan community of Tavush region and Aghavnadzor community of Vayots Dzor region. An agreement on transfer of 2 automated weather stations from the UNDP to Hydromet Service of the MES of RA as the assistance of the Project aimed at strengthening the capacities for early warning and mitigation of climate change posed risks in rural communities has been signed in October 21, 2014. By the Project assistance the written agreements regarding the provision of land for installation of the stations in exchange for the provision of detailed weather related information has been signed between the Hydromet Service and the local farmers. Moreover, the decision to share the weather data on the daily basis by e-mailing to community heads has been agreed, which lately will be passed to all farmers in the community.

Besides, 3-day training course on automated weather stations proper installation and use has been delivered to Hydromet service representatives (see chapter 4.1).

A partnership between the State Agrarian University, State Meteorological Service and UNDP CRM Project on exploitation of automatic meteorological station installed in Artsvaberd community of Tavush region is set up.



Figure 2. Hydromet Service specialists during the installation process.

	Tavush region	Vayots Dzor region
Installed automated weather stations	Ptghavan community	Aghavnadzor community
Registering	Air and soil temperature, precipitation, relative humidity, soil moisture, leaf wetness, atmospheric pressure, wind speed and direction, global solar radiation.	
<p><i>The improved capabilities urgently needed in the short-term to support better farm-level decision-making.</i></p> <p><i>Enhancing capacities of Hydromet Service and regional agricultural extension services will provide tailored information for rural beneficiaries and will strengthen early warning system.</i></p>		

2.3. Needs assessment for introduction of agricultural insurance in Armenia

Based on identified need emerged from community surveys and consultations with key donor community and Ministry of Agriculture the international consultant on assessment of needs for introduction of agricultural insurance in Armenia in the context of climate risk mitigation has been contracted. The International Consultant conducted series of meetings with different ministry representatives, national and international organization representatives, farmers and other key stakeholders, which supported the development of the comprehensive situational report and recommendations covering the following main points:

- i) presents the identified challenges and opportunities in delivering crop insurance in Armenia as one of the main mechanisms of climate risk management;
- ii) based on the best available international practice the report proposes road map for public and private stakeholders involvement for introduction of insurance mechanism in the context of Armenia;
- iii) based on consultations and meetings conducted with stakeholders, the report gives recommendations and conclusions on further development of the agricultural index based insurance scheme in Armenia; and
- iv) the report provides proposal for UNDP for implementation of pilot project, by describing two case studies for different options of weather-based insurance schemes for 2 types of risks: frost and hail.



Figure 3. International Consultant involved in the “Assessment of Needs for Introduction of Agricultural Insurance in Armenia in the Context of Climate Risk Mitigation”.

3. Demonstration projects to mitigate negative impact of climate change

With the increasing scale of climate-induced disasters projected for the 21st century, particular emphasis must be placed on the mitigation of disaster and climate risks since they are closely linked to the ability of communities and a country in whole to function appropriately, for the guarantee of economic growth and the potential of a country to develop and prosper.

In the frames of the Project, it is envisaged to demonstrate the climate change risk mitigation potential via application to selected communities.

It pursues a number of practical goals: awareness raising, mitigation of climate change impact, climate resilience etc. The major criteria for the selection of pilot projects are:

- Project replication potential;
- Social importance; and
- Community participation.

Subsequently, 5 major types of pilot projects have been selected per the listed criteria:

- Provision of anti-hail nets to rural beneficiaries of Tavush and Vayots Dzor regions;
- Construction of passive solar greenhouse with drip irrigation system in Horbategh community of Vayots Dzor region;
- Yeghegis River bank segments enforcement in Shatin community of Vayots Dzor region;
- Indigenous mountainous terrace orchard planting in Koghb community of Tavush region; and
- Reduction of water shortage risk through provision of drip irrigation system to family greenhouses.

3.1. Mitigation of negative hail impact

Hail is considered as one of the most agriculture-related acute hydro-meteorological event by farmers and community leadership. Although in most cases it does not happen in the same location every year, it is more frequent than freezing and droughts and in many cases the negative impact of hail on agriculture is far more significant.

Tavush region and especially its border communities are famous for their vineyards and fruit orchards. The grape produced in Berd sub-region is considered one of the best for production of brandy and Ararat brandy factory has its branch in Berd. Noyemberyan and Ijevan sub-regions are known as centres of pomegranate, peach, persimmon, and fig production.

In the past anti-hail rockets have been used to protect the vineyards and fruit orchards from the hail. This is an effective but expensive solution, which required presence of complex system with radars. Besides it



Figure 4. Anti-hail nets installed on vineyards.

is an active interference into atmosphere, which is not acceptable from environmental standpoint. On the other hand the use of rockets in border regions may become a reason for unrest on the border.

Hail-protection nets are relatively new alternative to rockets. Though nets can't be used for all type of crops, they are considered as preferential anti-hail measures for vineyards and orchards, as well as wind, sunburn, ungulates and birds. The nets provide more addressed protection and can be used by individual farmers, as well as large cooperatives, whereas rockets require regional or even national effort. Once installed, the nets do not require any operational expenses, except for minor repair. These may be used for 10-15 years and even more. There are few cases of *using of*

hail protection nets in Armenia, including one in vineyards of Tierras de Armenia in Armavir region, but

since this is a private business smaller farmers may find difficult to learn more details about the method. UNDP Armenia Disaster Risk Reduction Project has also successfully piloted the nets in Tavush region and the results have been very promising, thus it is important to build on this experience and further promote the use of hail-protection nets in Armenia.

The limitation of nets is that those are not economically feasible if installed in old orchards, thus the Project proposes installing nets either on newly planted dwarf-tree orchards or vineyards. Since dwarf tree orchards are not common in Tavush region, it was proposed focusing on vineyards, while simultaneously presenting the information on hail-protection nets and UNDP experience to farmers and companies interested in establishing dwarf tree orchards, or supplementing the effort with establishment of a dwarf tree orchard. The pilot logic of the project may require installation of nets in different parts of the region in order to inform more farmers about the method, as well as assess its effectiveness under different conditions.

Currently the production of Italian RETIFICIO PADANO is presented in Armenia, and also Technofit Group has announced in 2013 about their intention to start production of nets in Armenia. As a result of cooperation with UNDP DRR Project, ARNAP Foundation has already started production of metallic fittings necessary for installation of nets in Armenia, thanks to which the price of fittings has decreased significantly.

Financial assessment of the anti-hail nets:

Initial investments for hail-protection nets may seem unbearable for small farms, but calculations show that in long-term these investments are economically justified and provide a very high level guarantee of income for the whole life-cycle of the nets. According to discussions with the owners of vineyards in Tavush Region, the average harvest of grapes is about 20 tons per ha, which makes an income of AMD 2.7 million (about USD 6,700 at the time of installation and USD 5,600 at current exchange rate). If the owner does not use hired labour, then the profit makes about 70% of this amount. The cost of installation of nets for one hectare is about USD 10,000 and the service period is 10-15 years. Considering the current frequency of hail damages and projected aggravation under climate change if the vineyards are affected by hail 2-3 times during the net service period and each time at least 70% of production is damaged, the investment becomes profitable, since hail not only damages the crop of current year, but also reduces the production of subsequent 1-2 years. Based on above numbers if there are two cases of damaging of crops by hail during ten years (and the distribution is even) and we assume that each time 70% of crops are lost immediately after the hail and next year the productivity is 30% less than usually the payback period for the nets is about 7.5 for the initial exchange rate and 9 years for current exchange rate, while if there are three cases of hail it is about 5 and 6 years, respectively. Note that calculations are made for Tavush Region, where grape prices are relatively low. In case of Vayots dzor Region where wine producers pay up to AMD 200 per kg the payback period will be about 5 and 6 years for two cases of hail and about 3 and 4 years for three cases of hail.

	Tavush region	Vayots Dzor region
Target community	Tavush and Artsvaberd communities	Areni community
# of rural beneficiaries	13 farmers	1 farmer
Total amount of distributed nets: 30,000 linear meters		
Cost-sharing and cooperation: While the nets have been provided by the Project, the metallic structures necessary for their installation have been co-funded by the beneficiaries.		
<i>Given relatively high upfront price of hail protection net installation many farmers may need to take credits either from banks or brandy/wine producers.</i>		

The results of monitoring and evaluation of the project may be provided to lending organizations as a basis for their risk assessment and provision of credits to farmers for procurement of nets.

Another possible source of financing for the procurement of hail-protection nets can be wine and brandy producers as they will reduce their supply risk. Grape produced in Berd sub-region is considered one of the best for brandy production, while grape from Noyemberyan sub-region is used for production of sparkling wine, thus Ararat brandy factory and Yerevan champagne wines factory – main buyers of grape from these sub-regions – may be interested in providing non- or low-interest credits to farmers for procurement of the nets, thus also establishing long-term partnerships.

Brandy and wine producers are interested in reliable and stable supply of high quality grapes. Support to local farmers will not only be an investment into the social capital of the companies, but also will result in higher incomes in the future.

Spreading of this technology may also support the development of crop insurance market. Currently insurance companies are not that interested in this business due to high and almost unpredictable risks. With installation of hail protection nets the crop production risk management will become more predictable, thus making crop insurance more attractive for private insurance companies. Farmers who will invest into nets may also potentially benefit from lower insurance premiums in comparison with the others.

3.2. Passive solar greenhouse with drip irrigation system in Horbategh community

The Passive Solar Greenhouse (PSG) Project is a multi-component project that incorporates energy efficiency, renewable energy, knowledge-transfer of technical skills, organic crop cultivation methods for agricultural/agribusiness development, and rural market development and is specifically designed for high elevation, mountainous regions. Through the PSG model the Project aims to showcase the latest technological advancements in the field of Passive Architecture, Energy Efficiency, Renewable Energy, and the advantage in combining these technologies to receive optimal enhancement of the overall system capacity. Moreover, these technologies are illustrated in an agricultural production environment that support energy, food, and job security in a vulnerable, mountainous, border rural community.

The PSG design is based on a Chinese model with earliest written records found in the Book of Han (Han Dynasty: 206-23 BCE). It has been tested and successfully adopted in the Hindu Kush-Himalayan region, Japan, Korea, and Russia.



Figure 5. Passive Solar Greenhouse, construction process.

The PSG specific design increases solar heat collection and assures supply-side energy efficiency by decreasing energy losses in the system, while the alternative systems and operational technologies in the PSG provide demand-side energy efficiency by consuming less energy for the same level of service.

The proper positioning of the PSG - the longer axes positioned east-west and oriented toward true south, - is a critical component that maximizing solar exposure, collection of heat radiation, and overall efficiency of the greenhouse. The unique design of the PSG in combination with its optimal positioning has a

significant effect on decreasing energy losses and increasing energy preservation. The design’s uniqueness is in the thermal mass of the greenhouse. The thermal mass is the insulated walls in the eastern, western and northern part of the greenhouse. The optimized exposure of these walls allow for an efficient collection and release of heat. The construction materials of the thermal mass play an essential role in the collection, storage and retention of heat in the greenhouse. Heavy insulation, especially on the northern side of the greenhouse, ensures reduction of heat loss. The dense materials such as bricks, stones and cement, are often used for the construction of the walls. Low density materials on the other hand, including straw, dry glass and Styrofoam, are used for insulation and are placed in between the dense materials. The PSG thermal mass is built with local materials such as straw bales and cement. The inflated double layer cover functions as an insulation blanket, protecting the greenhouse from the outside air and trapping the greenhouse air inside. This increases temperature stability in the PSG and positively affects energy efficiency. The double layer also assures high wind resistance that is often present in high elevation areas. The operational technologies found in the PSG such as the ventilation, drip-irrigation and lighting systems are also selected with energy efficiency in mind.

	Vayots Dzor region
Target community	Horbategh community
# of rural beneficiaries	4 rural households
Size	260 square meters

Cost-sharing and cooperation: A collaboration agreement, in the form of the Statement of Intent (SoI) between UNDP and Project partners (Horbategh village administration and “Researchers for Bio Heating Solutions” NGO) is developed and signed in October 2014 with a common aim to support the implementation of a development project in a rural area of the RA through the construction of a Passive Solar Greenhouse in Vayots Dzor Region. While the Project provides financial support for the greenhouse construction, the RBHS NGO has assisted in greenhouse design development and author supervision.

Besides of obvious energy efficiency benefits, the PSG allows for crop cultivation and access to fresh vegetables year-round, a rare phenomenon for high elevation, mountainous regions where vegetables are scarce and expensive, especially during the winter period. Production of less common vegetables and herbs demanded by high-end restaurants and hotels in Yerevan and Vayots dzor marz will create significant additional income for the beneficiaries. It is also important to mention that the greenhouse will create opportunities for women. In mountainous areas women have limited employment opportunities, since such communities are usually specialized in cattle breeding, and the latter traditionally requires more male workers. Also it is important that the greenhouse provides employment all year round, keeping beneficiaries busy even during winter, when in most of the rural communities of Armenia majority of people is underemployed.

In addition to taking steps to improve agricultural practices in the community, the PSG provides the option for quality and high productivity job-creation through self-employment within the village.

3.3. Mitigation of erosion and flooding in Shatin community

Many of the communities in Vayots Dzor Region face the problem of flooding and river bank erosion leading to landslides. Such problems have smaller direct impact on agriculture and many people do not prioritize these, but communities which have already faced catastrophic events like flooding and landslides realize how important it is to invest into proper riparian zone management of rivers and protection of banks.



Figure 6. Yeghegis River banks sections that need strengthening.

Vayots dzor region is home to one of the biggest rivers of Armenia – Arpa, tributary to Arax. Yeghegis is the one of the main tributaries of Arpa River. It is 47 km long and its basin is 516 km². The river passes through several villages, including Goghtanik, Hermon, Yeghegis, Shatin, and Getap. In Shatin community the river has become a reason for several cases of bank erosion and major landslides. In 2007 the landslide caused by the river destroyed the road connecting the

village to the neighboring communities of Yeghegis, Artabunyk, etc. Funds from state budget were used to restore the slope via construction of a concrete wall and installation of gabions.

To control further bank erosion the community budgets funds for installation of gabions in most urgent location on annual basis. Gabions are purchased by the municipality and distributed among households whose land and houses are most endangered and need urgent protection. Few hundred gabions are installed every year, but no design or holistic assessment of the situation is done so far. On the other hand most of the investments go into engineering solutions, while bio-engineering methods are virtually not used. In many places, where gabions were installed, planting of trees and shrubs typical for riparian zone may be very useful for further enforcement of engineering structures. The issue has been discussed with Shatin village leadership and they have expressed initial agreement to organize planting of willows along the banks during 2015 as a pilot.

In order to ensure that river bank protection measures are implemented properly there is need for professional assessment of the situation and development of a design for construction works. Most of previously installed gabions are of extremely poor quality, including use of low quality wire, over- or under-sized rocks, etc. Thus there is need for proper quality control measures to ensure longevity of investments. Development of the design will help the community during the implementation of works in the future, while use of proper quality gabions will set quality standard for future construction activities in Shatin.

It has also been noticed that most of bank erosion is occurring on the right bank of the river. The left bank is protected by irrigation and Hydro Power Plant (HPP) pipelines, which add to natural pressure on the right bank. There have also been several locations where water has been discharged into river potentially causing erosion in those places, thus this issue also needs addressing. The design for installation of gabions prepared under the project has taken this into consideration and during the construction activities the problem of discharged water will also be taken into consideration.

	Vayots Dzor region
Target community	Shatin community
# of rural beneficiaries	562 rural households
Strengthening design	official design documentation with passed expertise for 7 segments
Protected river bank size	2 segments strengthened - 96 meters

Currently the community spends few thousand dollars every year to buy gabions and provide those to households. The price of gabions made in Vayots Dzor region is about 6,000 drams, but since those are of low quality, the procurement of proper ones may be more expensive. Final budget and the list of necessary measures to strengthen all segments of river bank that becomes clear after the developed design is transferred to the community administration.

3.4. Indigenous mountainous terrace orchard planting in Koghb community

There are several major negative consequences for Armenian agricultural sector related with the climate change. These include reduction of available irrigation water during the vegetation season, especially during July and August, intensification of soil degradation due to more intensive one time weather events, such as rains, winds, etc. On the other hand these changes are also leading to rising of the frequency of disaster events, such as landslides, floods and mudflows. It is important to address these as early as possible to ensure economic growth and realization of the potential of a country to develop and provide better environment for human development.

Surveys conducted in communities of Tavush region have shown that many of the communities face the problem of droughts, flooding, mudflow and land degradation, directly impacting local agriculture productivity and profitability.

Tavush region of Armenia is famous for its fruits, including pomegranate, fig, peach, persimmon, etc. Due to changing climate, farmers specialized on production of these fruits are increasingly more affected by negative weather events, such as droughts, early spring and winter freezing, floods, hails, and other. Local farmers address these issues through diversification of fruit species they produce. Though this is one of the most acceptable and easy solutions for these issues, there are other available solutions, which can be applied.



Figure 7. Terrace for orchard planting in Koghb community.

In 1960-70s Koghb collective farm has invested into construction of terraces on one of the adjacent hills, in order to plant an orchard. At that time, the water has been provided from Debed River through five-level pumping. In the beginning of 1990s the orchard has been abandoned due to lack of means for irrigation. As a result the orchard has been destroyed and currently there is more pressure on other agricultural lands, especially those located closer to Koghb River. This causes problems with flooding of orchards in spring, while in summer the river becomes completely dry.

To address these issues together with Koghb community and local farmers it has been decided to rehabilitate one hectare of the large terrace orchard destroyed in the beginning of 1990s. This will ensure effective and more productive use of irrigation water, while at the same time controlling land degradation. The orchard will be planted using dwarf trees which provide profit earlier than regular trees, thus reducing the financial impact of negative impacts of droughts, freezing and hail. Different species with different growth characteristics will be used in order to safeguard the orchard from weather impacts emerging during different seasons. The irrigation of the orchard will be organized through drip system, thus decreasing demand for water, reducing the pressure on Koghb River, and making application of necessary fertilizers more accurate.

	Tavush region
Target community	Koghb community
# of rural beneficiaries	10 rural households
Size	1.5 ha
Cost-sharing and cooperation: Orchard planting will be co-financed by a group of local farmers who join their efforts in a cooperative, while the land will be provided by Koghb community under a long-term leasing contract.	
<p><i>It is expected that the orchard will become productive in 3-4 years after the planting. The maintenance expenses will be covered out of membership fees to be paid by local cooperative. Establishment of a cooperative will also contribute to the national agricultural priority of promoting more cooperation between farmers in order to increase the productivity of agricultural sector.</i></p>	

3.5. Other supported mitigation measures

Besides main pilot projects selected to be implemented during the Project reporting period, several projects have been conducted in cooperation and co-financed with other organizations.

In order to mitigate water shortage and crop cultivation risks, in collaboration with UNDP Community Development Program 10 and 16 drip irrigation systems for newly constructed greenhouses are provided respectively in Koti and Chinari communities of Tavush region.

The Project has also supported the “Lchkadzor” cooperative in Ayrum community of Lori region in supply and installation of infrared heating system for their fruit and vegetable dry processing facility, which has been constructed within the framework of “Support to Enterprises” Project conducted by OXFAM.

Within the framework of the Project implementation, the sub-contractor company has developed land-use zonation mapping for 4 vulnerable from climate risks rural communities in Vayots Dzor region. The detailed vulnerability assessment and land zonation maps are developed and will be provided to rural communities for inclusion in their further local development planning process.

	Tavush region		Vayots Dzor region
Project name	Installation of drip irrigation system for greenhouses	Supply and installation of infrared heating system for fruit and vegetable dry processing facility	Land-use zonation and mapping
Target community	Chinari and Koti communities	Ayrum community	Martiros, Chiva, Rind and Shatin communities
# of rural beneficiaries	26 rural households	16 farmers	1691 rural households (5382 persons)
Cost-sharing and cooperation:	The financing of the Project is co-shared with the UNDP Community Development Program, which supports the construction of greenhouses.	The Project has supported “Lchkadzor” cooperative in installation of infrared heating system for dry-fruit facility, which has been constructed within the framework of “Support to Enterprises” Project conducted by OXFAM.	The Project has completely financed the initiative.

4. Awareness raising, trainings and organization of educational programs

4.1. Awareness raising, education, professional training

- ✚ The company has been selected and hired in April 2014 to conduct trainings on climate change risks and mitigation activities for rural communities in Tavush and Vayots Dzor regions. Tailor-made training courses has been designed and delivered with the aim to strengthen the capacity of beneficiaries to identify and manage climate change related risks for sustainable development, with main emphasis on agriculture activities. The trainings covered the representatives of marz administration, agriculture extension service and farmers from 43 rural communities from targeted regions. Total of 69 people from Tavush region and 62 from Vayots Dzor region have attended the trainings, from which 18% women farmers’ participation.



Figure 8. Farmers during the training sessions.

- ✚ Provision of training courses on the use of automated weather station has been conducted on October 28-30, 2014 at “ArmStateHydromet” SNCO by the corresponding representatives of NESA Srl., the supplying company. The efficient and proper use of the automated weather station,



presentation of its composed equipment, release of full set of training documents as well as Certificate of Attendance granting has been performed during the training sessions.



Figure 9. Training session and Certificate granting for Hydromet Service.

- ✚ The national expert of agricultural/horticultural activities has provided continuous technical consultancies on agronomy, particularly on horticulture to the farmers in rural communities to improve the local livelihoods. Particularly, the consultations and trainings have been done to the beneficiaries of Passive Solar Greenhouse in Horbategh community and the terrace orchard planting in Koghb community.

4.2. Seminars and professional workshops

- On 4 February, 2014 the Consultation Seminar has been organized by UNDP CRM Project and the Armenian Disaster Risk Reduction National Platform Foundation with participation of **70** participants. The seminar was intended to present the Armenia country report “Climate Risk Management in Armenia” (TASP Project) and UNDP-BCPR “Mitigation of Climate Change Risks of Rural Communities through Local Development Planning” Project objectives, and to discuss with key national counterparts and specialists the main national challenges connected with climate change risks, as well as agree on future cooperation and synergy between projects and implementation of adaptation measures. 
- On 12 March, 2014 the meeting in Ijevan with Tavush Marz Administration has been conducted by UNDP and the Armenian Disaster Risk Reduction National Platform Foundation to discuss the Disaster Risk Reduction and Climate Risk Management issues in the region, present the conducted, on-going and planned activities in regard to risk reduction and to finalize the list of preliminary selected most vulnerable rural communities for implementation of CRM activities. The meeting has been attended by **20** participants. 
- On March 26, 2014, UNDP CRM jointly with other organizations (RA Ministry of Emergency Situations, UNDP DRR, UNICEF, OXFAM, SDC, “Emergency Channel”) participated in organization of the “Development of HFA-2 recommendations” Conference to formulate a package of recommendations to be presented in “HFA-2 of Central Asia and South Caucasus Regional Advisory Meeting” on April 1-3, 2014 in Alma-Ata.

- On July 1-4, 2014, UNDP CRM jointly with other organizations (RA Ministry of Emergency Situations, UNDP DRR, UNISDR ONEA/GETI) participated in organization of the “Developing Capacities on Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) in the Central Asia and the South Caucasus” Workshop to draft Strategy paper on how to scale up “Mainstreaming DRR and CCA for Sustainable Development” Training Course modules in the participating countries.

- On July 22, 2014 the “Climate Index Insurance” Workshop has been organized by UNDP CRM Project to discuss agricultural climate-index insurance possibilities in Armenia and present possible road-map and potential pilot. The workshop has been conducted by the Project’s international consultant and has been attended by 18 participants.



- On November 21, 2014 the workshop has been organized by UNDP CRM Project to present the prepared by the international consultant “Assessment of Needs for Introduction of Agricultural Insurance in Armenia in the Context of Climate Risk Mitigation” Report, to present the potential pilot and to discuss the proposed agricultural climate-index insurance in Armenia. The workshop has been attended by 39 participants.



- On December 3-4, 2014, UNDP CRM jointly with other organizations (RA Ministry of Emergency Situations, UNDP DRR, UNICEF, ARCS, OXFAM, Emergency Channel, UNISDR, UNOCHA and OSCE) participated in organization of the “Information and Communication for Effective Disaster Risk Reduction” Regional Conference with the objective to propose main elements for a Road Map for information generation and communication for effective disaster management in the CASC region.

- On September 8-9, 2014, the Project Task Leader and Deputy Director of the RA Disaster Risk Reduction National Platform have participated in Climate Risk Management Expert Working Group Regional Meeting organized by UNDP-BCPR Disaster Risk Reduction Team in Kathmandu, Nepal to bring relevant government actors and DRR and CCA experts and practitioners to identify practical strategies to further the integration of DRR and CCA beyond collaboration and into fully integrated Climate Risk Management at the global, regional and national levels. Around 30 participants representing the six governments, projects, officials of UNDP and experts have attended the meeting.



5. Conclusions and Lessons learned

Some of the common barriers in CRM that have been met during the Project implementation:

- Limited funds, expertise, and other resources, especially at the local level;
- Low level of research on climate change mitigation in Armenia and lack of development support for implementation of mitigation measures;
- Lack of information on climate change related issues in rural communities, such as the financial impact of these, partly due to poor or improper documentation and absence of baseline information;

- Lack of public awareness on climate change, related negative consequences, as well as potential mitigation measures;
- Lack of cooperation at the community level due to negative experience with collective farms of Soviet period, as well as lack of real incentives related with cooperation in agriculture. Cultural issues are also an important factor from this perspective, as Armenians are traditionally more individualists.
- Even if farmers are aware of climatic changes, only few seem to take steps to adjust their farming activities.
- Poor recognition of the significance of local weather data in farming and limited sources of such data.







The main lessons learned during the Project implementation period:

- CRM requires behavioural and attitudinal changes among individuals and institutions. Organization of workshops and regular visits to project beneficiaries is essential from this perspective.
- CRM measures can be done with low-cost technologies.
- Traditional farming can benefit well from the use of emerging technologies for CRM, such as, early warning and nets.
- A strong sense of ownership of program stakeholders is essential in order to ensure long-term effectiveness of investments. From this perspective cooperation with other organizations and individuals working in the same field may be beneficial, since these may continue capacity building and support of beneficiaries after the end of UNDP projects up to the moment of complete readiness beneficiaries to act independently.
- Private-public partnership facilitates CRM works, especially in case of need for implementation of expensive projects with relatively long-term payback period, such as installation of anti-hail nets.
- Communication and supportive systems must be accessible to local communities.
- Risk perception is important in risk communication.
- The manner in which farmers update their expectations of the climate in response to unusual weather patterns is important issue in CRM.
- Weather-index-based crop insurance might encourage farmers to invest in their crops.

List of the Reports Produced per the Works Performed in the Framework of the Project Implementation during the Reporting Period

1. “MPG” LLC - “Climate change risks analysis and assessment on agricultural activity”, December 2013. (<http://www.nature-ic.am/climate-risk-management-publications-and-reports/>)
2. Zarmandukht Petrosyan – “National Hydro-meteorological Service’s Needs Assessment”, December 2013.
3. “MPG” LLC - “Surveys and community baseline studies to measure the household impacts and perception of climate related risks for selected rural communities in Tavush and Vayots Dzor marzes”, June 2014.
4. “ICARE” Foundation – “Trainings on Climate Change Risks and Mitigation Activities for Rural Communities in Tavush and Vayots Dzor marzes”, June 2014.
5. Clemence Tatin-Jaleran – “A Needs Assessment for Introducing Agricultural Insurance in Armenia in the Context of Climate Risk Mitigation”, September 2014. (<http://www.nature-ic.am/wp-content/uploads/2013/11/Insurance-Report-.pdf>)
6. “GEORISK” LLC – “Land-use zonation (mapping) and climate risk assessment of selected rural communities in Vayots Dzor region”, December 2014.
7. Zarmandukht Petrosyan – “Hydro-meteorological Risk Assessment”, December 2014.
8. Kristine Hovhannisyan – “Legal and Business Consultancy on Establishment of Greenhouses in Rural Communities”, December 2014.
9. Ara Hovhannisyan – “Recommendations on Agricultural and Horticultural Activities”, December 2014.

The Projects' Partners and Contractors

	“Hydrometeorology and Monitoring State Service of Armenia” SNCO
	“MPG” LLC
	“ICARE” Foundation
	“MELIORATSIA” LLC
	“GEORISK” Scientific Research CJSC
	“Building Department #1” LLC
	“A.Nersisyan ev enkerner” LLC
	“ARNAP” Foundation
	“NESA” Srl

United Nations Development Programme

Empowered lives.
Resilient nations.

**TRANSFER OF TITLE OF EQUIPMENT
FROM THE UNITED NATIONS DEVELOPMENT PROGRAMME
TO HYDROMET SERVICE OF THE MINISTRY OF
EMERGENCY SITUATIONS OF THE REPUBLIC OF ARMENIA**

THIS AGREEMENT made on October 21, 2014, by and between the **United Nations Development Programme** (hereinafter referred to as “**UNDP**”), for the transfer to, and **Hydromet Service** (hereinafter referred to as **Hydromet**) for the acceptance of full title and ownership of two Automated Weather Stations as specified in the attached equipment list, hereto as Annex I at a total cost of **21,764.93 USD (8,845,267.55 AMD)**.

These automated weather stations represent assistance of “Mitigation of Climate Change Risk of Rural Communities through Improved Local Development Planning” UNDP-BCPR/00075559 Project (hereinafter referred to as “**Project**”) to Hydromet aimed at strengthening the capacities for early warning and mitigation of climate change posed risks in rural communities of Tavush and Vayots Dzor Marzes.

The transfer of such assets must be affected in compliance with the UNDP Financial Rules and Regulations, the Procurement Manual and the Asset Management Guidelines.

IN WITNESS WHEREOF, UNDP and Hydromet, through their duly authorized representatives, have signed this Agreement:

ACCEPTOR:

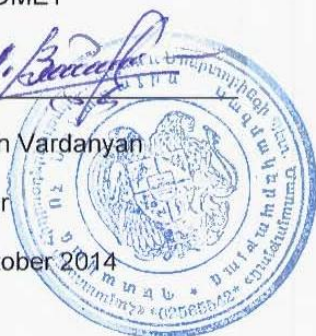
FOR HYDROMET

By: 

Name: Levon Vardanyan

Title: Director

Date: 21 October 2014

**TRANSFEROR:**

FOR UNDP

By: 

Name: Bradley Busetto

Title: Resident Representative

Date: 21 October 2014



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ANNEX
WEATHER STATION EQUIPMENT TO BE TRANSFERRED
(according to the list set below)

No	Label	Contents	Quantity
1.	TMF-ALPS	Box IP66 for outdoor application with electrical connection, TMF500 Datalogger, C116 expansion module, GRPS terminal and n.5 protection modules	2
2.	Battery	Dry battery 12V/38 Ah with cable connection to datalogger	2
3.	Ph Panel	60W Photovoltaic panel with support and cable	2
4.	CS05	Cables for sensor connection, L=5mt	14
5.	TA	Air Temperature sensor	2
6.	UR	Relative Humidity sensor	2
7.	BAR	Athmospheric Pressure sensor	2
8.	PL400	Rain Gauge with 400cmq sensor	2
9.	DV	Wind direction sensor	2
10.	VV1	Wind speed sensor	2
11.	RSG1	Global Solar Radiation sensor	2
12.	BF	Leaf Wetness sensor	2
13.	TT	Ground Temperature sensor	4
14.	SUT	Soil Moisture sensor	16
15.	--	Base pole 20x20cm with screws	2
16.	--	Section pole, L=2mt with screws	2
17.	--	Sensors support, L=150cm	4
18.	--	Sensors support, L=90cm	4
19.	--	Cables for ground protection	2
20.	Documents	Document folder	

Verified by: Mr. Artashes Darbinyan
UNDP Operations Manager



Verified by: Mr. Armen Darbinyan
Deputy Director of Hydromet Service



- If necessary, support the development and implementation of Organic Crop Cultivation Trainings through involvement of the agricultural expert.

The Village Administration has expressed its commitments to:

- Ensure access of the Signatories, in a timely manner, to all technical documentation and other relevant data as required for implementation of the PSG Project;
- Provide selected plot of land in the village to beneficiary farmers of the PSG Project for the implementation of the construction, for a period of 10 years, based on a ten-year free lease agreement and with possibility of extension;
- Ensure availability of relevant documents and permissions, in a timely manner, necessary for the PSG construction;
- Reconstruct the road required to access the PSG area;
- Ensure access to water resources and electricity necessary for the PSG construction and further operations;
- Ensure and provide free of charge necessary machinery and equipment (to be attached) for the construction of the PSG. Provide natural fertilizer and other natural agricultural resources (e.g. cow manure, crop cultivation soil etc.) for the optimization of the PSG, if necessary;
- Ensure monitoring and security of the PSG materials during the construction, integrity of the structure after the construction and during the operations;
- In case of damage (including but not limited to burglary) intentionally caused by the third party on the PSG integrity, undertake the responsibility to initiate an investigation and ensure the recovery of the damage and follow

- Անհրաժեշտության դեպքում, աջակցել մշակաբույսերի օրգանական անոթային վերաբերյալ դասընթացների մշակմանը և գյուղատնտեսի միջոցով դասընթացների իրականացմանը:

Համայնքը Օրացի շրջանակներում պատասխանատու է իրականացնել:

- **Օտարազգույնների** ինքամիտ ժամկետով արտադրել տեխնիկական բոլոր փաստաթղթերը և համապատասխան այլ տվյալներ, ինչպես նաև և ՊԼՁ Օրացին իրականացնելու համար:
- ՊԼՁ Օրացի շահառու գյուղացիներին 10 տարի հաշի անհատույց օգտագործման պայմանագրի հիմունքով և երկարամյակ հնարավորություններով, արտադրել քանակական հարստացման շինարարություն իրականացնելու համար:
- Եկամտի ժամկետով ապահովել համապատասխան փաստաթղթերով և թույլտվություններով ՊԼՁ-ը կառուցելու համար:
- Վերականգնել ՊԼՁ-ի տարածք մուտք գործելու մասնավորապես:
- Արտադրել ջրային ռեսուրսների և էլեկտրականության հասանելիությունը ՊԼՁ-ը կառուցելու և ՊԼՁ-ի հետագա շահագործման համար:
- ՊԼՁ-ի կառուցման համար անհատույց ապահովել և արտադրել անհրաժեշտ տեխնիկա և սարքավորումներ (կցվում է) անհրաժեշտության դեպքում արտադրել օրգանական պարարտանյութեր և այլ գյուղատնտեսական ռեսուրսներ (օր. գոմար, բուսածո և այլն):
- ՊԼՁ-ի կառուցման, ավարտի և շահագործման ընթացքում ապահովել և իրականացնել շինարարական նյութերի և շինության ամբողջականության հսկողությունն և անվտանգությունը:
- ՊԼՁ-ի շինությանը երրորդ անձի կողմից զիջակողությամբ վնաս հասցնելու դեպքում (հերքայտ, սակայն չսանձամբախցվելով կորստի) պատասխանատու է հետաքննություն սկսել և

up on the fair retribution towards the Project;

- Facilitate community meetings, surveys and dissemination of the information on PSG project;

- Participate in the selection process of the PSG Project beneficiaries within the village;
- Support the registration process as the individual subscriber to use the necessary electricity for the PSG operation.
- Follow up constantly on the Project developments and share legitimate information on the Project.

ապահովել վնասի փոխհատուցումը և հետևել հետաքննության արդարացի լուծմանը:

- Աջակցել հյուպանոցային հասարակական հարցումներին և հարցումներին և հարցումներին իրականացնելու համար:
- Մասնակցել ՊԼՁ Օրացի շահառուների ընտրության գործընթացին:
- ՊԼՁ-ի շահագործման համար անհրաժեշտ էլեկտրականության օգտագործման նպատակով ապահովել առանձին բաժանորդ գրանցելու գործընթացին:
- Արտադրել և Օրացի վերաբերյալ տրամադրել համապատասխան տեղեկատվություն:

4. Termination

1. The Sol shall remain valid until the complete fulfillment of obligations under this SOI or unless any of the Signatories decides to terminate it earlier by giving a written notice to the other Signatory.
2. The Sol shall cease to be in force 30 (thirty) days after any of the Signatories have notified in writing the other Signatory of its decision to terminate the Sol.

4. Դադարեցում

1. Հուշագիրը հասարակության մասին կարող է դադարեցվել կամ ավելի վաղ, եթե կողմերից մեկը կտրուկորեն որոշվի դադարեցնելու մասին գրավոր ծանուցում ուղարկելով:
2. Հուշագիրը կորցնում է վավերականությունը 30 (երեսուցուց) օրվա ընթացքում, եթե կողմերից մեկը հայտնի է անում իր որոշումը դադարեցնելու մասին:

5. Management and Coordination of Works

Each of the Signatories will be responsible for the management and coordination of works according to this Sol.

The Signatories agree on the following:

The PSG ownership transfers to the beneficiary

5. Մշակման և կոորդինացիայի համակարգում

Օտարազգույնները յուրաքանչյուրը պատասխանատու է կրում աշխատանքների կառավարման և համակարգման համար համապատասխան այս շուշագրի:

Օտարազգույնները համապատասխան են հետևյալ մասին:

ՊԼՁ-ի սեփականությունը անցնում է օգտագործողին:

farmers upon the completion of construction.

During at least five years after the Project's end, UNDP will have the right to monitor the proper operation and maintenance of the PSG, subject of the present Sol.

6. Legal Scope of Implementation of Responsibilities

Each Signatory shall be responsible for management of its acts and omissions in connection with this Sol and its implementation.

The Signatories recognize that this Sol is strictly limited to the scope described here above and does not entail any further commitments on either Signatories.

The Signatories agree that PSG Project implementation schedule, technical specifications and guidelines presented to the providers, Term of References and conditions will be developed after the Sol signature and will form an integral part of it.

7. Public Relations and use of UNDP name and emblem

None of the Signatories can use the name, logo or abbreviation of the other Signatory for its own business interests.

Signatories acknowledge that they are familiar with UNDP's ideals and objectives and recognize that their name or logo may not be associated with any political or sectarian cause or used in a manner

օգտագործումն անցնում է շահառու գյուղացիներին կառուցման աշխատանքներն ավարտվելու պես:

Օրացի ավարտից հետո առնվազն հինգ տարվա ընթացքում ՄԱԿԸ-ի իրականում է հսկել Հուշագրի շրջանակներում իրականացված ՊԼՁ Օրացի համար պատշաճ շահագործումը և պահպանումը:

6. Գործառնականության իրականացման հարկածային սահման

Օտարազգույնները յուրաքանչյուրը պատասխանատու է սույն Հուշագրի և դրա իրագործման հետ կապված իր գործողություններին և բացառություններ հասցնել:

Օտարազգույնները ընդունում են գիտակցում են սույն Հուշագրի սահմանափակ լինելը և իրենք ընդունելով սույն Համապայմանագրում վերոհիշյալ պարտավորությունները, և սույն իր Հուշագրի շրջանակներում համար հետագա կապուցել պարտավորություն չի ստացան:

Օտարազգույնները համապայման են, որ ՊԼՁ Օրացի իրականացման ժամանակաշրջանը, մասնավորապես ներկայացվող տեխնիկական սահմանափակումները և պայմանների ուղեգրային մշակվելու են սույն Հուշագրի ստորագրելուց հետո և կազմվել են սույն Հուշագրի անբաժան մասը:

7. Հանրային կապեր և ՄԱԿԸ անվանումն ու խորհրդանիշը կիրառելը

Օտարազգույններից ոչ մեկը չի կարող իր անձնական շահերից դուրս օգտագործել մյուս Օտարազգույնի անվանումը, տարբերանիշը կամ հասցանիշը:

Օտարազգույնները գիտակցում են, որ նրանք ծանուց են ՄԱԿԸ-ի արժեքներին և նպատակներին և գիտեն, որ իրենց անվանումը կամ տարբերանիշը չի կարող

inconsistent with the status, reputation and neutrality of UNDP.

Three hard copies of the current Sol are prepared. In case of discrepancies between the texts, the English version should prevail.

Signed in Yerevan, October 10, 2014

For the UNDP: Bradley Bassetto, UN Resident Coordinator/ UNDP Resident Representative in Armenia

անարժեք էրի և քայքայված կամ անարժեքության շարժման հետ կամ օգտագործել ՄԱԿԸ-ի խորհրդանշանը, անդրազգայնությունն ու կարգավիճակն անհամապատասխան:

Սույն Հուշագիրը կազմված է երեք օրինակից: Տեքստերի տարապատասխանների դեպքում ուղղորդվել անդրազգայնություն:

Ստորագրված է Երևանում 2014 թ. Օկտեմբերի 10-ին

ՄԱԿ-ի Նախագահի Օրացի կողմից: Բրեյդլի Բասետո, ՄԱԿ-ի Հայաստանի Հանրապետության ՄԱԿԸ Կոորդինատոր/ՄԱԿԸ Կոորդինատորի ներկայացուցիչ Հայաստանում:



For the Horbategh Village Administration: Gagik Sandrosyan, Head of Horbategh Village Administration

Հորբատեղի համայնքի կողմից: Գագիկ Սանդրոսյան, Հորբատեղի համայնքի գլխավոր



For "Researchers for Bio Heating Solutions" NGO: Gagik Shahinyan, Head of Administration

«Բիոցուսնային լուծումների հետազոտողներ» ՊՈԱԿ: Գագիկ Շահինյան, Գլխավոր



Pilot Projects Fact Sheets

"Mitigation of Climate Change Risks of Rural Communities through Improved Local Development Planning" UNDP - BCP/0075559 Project



PASSIVE SOLAR GREENHOUSE WITH IRRIGATION SYSTEM IN HORBATEGH COMMUNITY

Main information

- ✓ **Target community:** Խորբաթեցի, Վայոց ձոր region
- ✓ **Beneficiaries:** 4 rural households
- ✓ **Size:** 260 square meters



Picture 1. Passive solar greenhouse under construction in Kut, Gegharkunik region, Armenia. © RBHS



Pictures 2. Passive solar greenhouse in Kut, Gegharkunik region, Armenia. © RBHS



Picture 3. Passive solar greenhouse in Kut, Gegharkunik region, Armenia. © RBHS

Overview: Within the context of climate change one of the most vulnerable sectors of the economy is the agricultural, especially its sectors heavily depending on natural landscapes like the cattle breeding. Most of the mountainous communities of Armenia are specialized in cattle breeding and often do not have any serious economic alternatives to it. This means that in case of negative climate impacts on pastures and grasslands those communities may incur serious economic losses leading to emigration and loss of social capital as well. To address this it is important to create additional sources of income for such communities, which will diversify their economic base, thus reducing the vulnerability to climate change.

The surveys conducted in 15 communities of Վայոց ձոր region in 2014 have shown that Խորբաթեցի is one of the communities that heavily depend on cattle breeding. Currently the community faces serious demographic problems, as more and more farmers find difficult to subsist on cattle breeding only and decide to leave the village. Based on these findings and taking into consideration that Խորբաթեցի enjoys relatively long sunshine duration the community has been selected for the implementation of passive solar greenhouse (PSG) project implementation.

The PSG Project is a multi-component project that incorporates energy efficiency, renewable energy, knowledge-transfer of technical skills, organic crop cultivation methods for agricultural/agribusiness development, and rural market development and is specifically designed for high elevation, mountainous regions.

Through the PSG model the Project aims to showcase the latest technological advancements in the field of Passive Architecture, Energy Efficiency, Renewable Energy, and the advantage in combining these technologies to receive optimal enhancement of the overall system capacity. Moreover, these technologies are illustrated in an

"Mitigation of Climate Change Risks of Rural Communities through Improved Local Development Planning" UNDP - BCP/0075559 Project



Picture 4. Project presentation in Horbategh.



Picture 5. Construction preparatory work.



Picture 6. PSG construction site in November, 2014.

agricultural production environment that support energy, food, and job security in a vulnerable, mountainous, border rural community.]

Cost-sharing and cooperation: A collaboration agreement, in the form of the Statement of Intent (SoI) between UNDP and Project partners (Խորբաթեցի village administration and "Researchers for Bio Heating Solutions" NGO) is developed and signed in October 2014 with a common aim to support the implementation of a development project in a rural area of the RA through the construction of a Passive Solar Greenhouse in Վայոց ձոր Region. While the Project provides financial support for the greenhouse construction, the RBHS NGO has assisted in greenhouse design development and author supervision. Besides modelling energy efficiency, the PSG allows for crop cultivation and access to fresh vegetables year-round, a rare phenomenon for high elevation, mountainous regions where vegetables are scarce and expensive, especially during the winter period.

Further outcomes: In addition to taking steps to improve agricultural practices in the community, the PSG provides the option for quality and high productivity job-creation through self-employment within the village.

The main objective of the "Mitigation of Climate Change Risks of Rural Communities through Improved Local Development Planning" UNDP-BCP/0075559 project is to enhance the climate resilience of Armenia in the highest risk sectors and areas and ensure national ownership through enhanced institutional knowledge and responsibility. Specific objectives are to mitigate the climate change risks of rural communities through mainstreaming climate risk management in the rural development planning process, applying/testing risk mitigation measures in agricultural practice, increasing stakeholders' awareness on the threat to climate change on the agricultural sector, and strengthening the risk management and adaptive capacities of vulnerable communities.

The outcome of the project is: "Armenia is better able to address key environmental challenges, including climate change and natural resource management".

Governmental bld #3, room 533, Yerevan, RA. Tel: (37410) 569920, 569992 Fax: (37410) 569993, E-mail: climate@nature.am, Web-site: www.nature.am

"Mitigation of Climate Change Risks of Rural Communities through Improved Local Development Planning" UNDP - BCP/0075559 Project



INSTALLATION OF HAIL-PROTECTION NETS

Main information

- ✓ **Target community:** Խալսի and ԱՇԽԱԲԵՇԻ communities of Խալսի region, ԱՇԽԱԲԵՇԻ community of Վայոց ձոր region
- ✓ **Beneficiaries:** 13 farmers in Խալսի region, 1 farmer in Վայոց ձոր region
- ✓ **Total amount of distributed nets:** 30,000 square meters



Picture 1. Project presentation in community.



Picture 2. Distribution of anti-hail net supporting metallic structures.



Picture 3. Distribution of anti-hail net supporting metallic structures.

Overview: The surveys conducted in 19 communities of Խալսի region and 15 communities of Վայոց ձոր region in 2014 have shown that hail is considered as one of the most acute impact for agriculture activity by farmers and community leadership. Although in most cases it does not happen in the same location every year, it happened frequently than freezing and droughts and in many cases the negative impact of hail on the crops is much more significant.

Վայոց ձոր and Խալսի regions and especially the border communities of the latter are famous for their vineyards and fruits orchards.

In the past anti-hail rockets have been used to protect the vineyards and fruits orchards from the hail. This is an effective but expensive solution, which required presence of complex system with radars. Besides, the rockets have a number of weaknesses (expensive, have an active interference into atmosphere, as well as their use in border regions may become a reason for unrest on the border).

Hail-protection nets are relatively new alternative to rockets. These are installed directly on vineyards and orchards providing protection from hail, as well as wind, sunburn, ungulates and birds. The nets provide more addressed protection and can be used by individual farmers, as well as large cooperatives, whereas rockets require regional or even national effort. Once installed, the nets do not require any operational expenses, except for minor repair. These may be used for 10-15 years and even more.

The limitation of nets is that those are not economically and technically feasible to apply for if installed in old orchards, thus the Project proposes installing nets either on newly planted dwarf-tree orchards or vineyards. Since dwarf tree orchards are not common in Վայոց ձոր and Խալսի regions, it was proposed focusing on vineyards, while simultaneously presenting the information on

"Mitigation of Climate Change Risks of Rural Communities through Improved Local Development Planning" UNDP - BCP/0075559 Project



metallic structures.

hail-protection nets and UNDP experience to farmers and companies interested in establishing dwarf tree orchards, or supplementing the effort with establishment of a dwarf tree orchard.



Picture 4. Installed hail protection nets.



Picture 5. Installed hail protection nets.

Financial assessment of the anti-hail nets: Calculations show that in long-term the investments are economically justified and provide a very high level guarantee of income for the whole life-cycle of the nets. The cost of installation of nets is about USD 10,000 per hectare and the service period is 10-15 years. Considering the current frequency of hail damages and projected aggravation under climate change if the vineyards are affected by hail 2-3 times during the service period and each time at least 70% of production is damaged, the investment becomes profitable, since hail not only damages the crop of current year, but also reduces the production of subsequent 1-2 years.

Further outcomes: Spreading of this technology may also support the development of crop insurance market. Currently insurance companies are not that interested in this business due to high and almost unpredictable risks. With installation of hail protection nets the crop production risk management will become more predictable, thus making crop insurance more attractive for private insurance companies. Farmers who will invest into nets may also potentially benefit from lower insurance premiums in comparison with the others.

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MITIGATION OF EROSION AND FLOODING IN SHATIN COMMUNITY

Main information

- ✓ **Target community:** Shatin community, Yeghgis Dzor region
- ✓ **Beneficiaries:** 562 rural households
- ✓ **Protected river bank size:** 140 meters



Picture 1. Eroded bank of Yeghgis River in Shatin community.



Pictures 2. Eroded bank of Yeghgis River in Shatin community.



Picture 3. Eroded bank of Yeghgis River in Shatin community.

Overview: With the rise of climate-induced disasters projected for the 21st century, there has to be placed particular emphasis on mitigation of disaster and climate risks as these have serious impact on the ability of communities and economies in whole to function properly, for the guarantee of economic growth and the potential of a country to develop and provide better environment for human development.

The surveys conducted in 15 communities of Yeghgis Dzor region in 2014 have shown that many of the communities face the problem of flooding and river bank erosion leading to landslides. Such problems have smaller direct impact on agriculture and many people do not prioritize these, but communities which have already faced catastrophic events like flooding and landslides realize how important it is to invest into proper riparian zone management of rivers and protection of banks.

The surveys conducted in 15 communities of Yeghgis Dzor region is home to one of the biggest rivers of Armenia – Arpa, tributary to Agha Yeghgis, is one of the main tributaries of Arpa river. It is 47 km long and its basin is 516 km². The river passes through several villages, including Goghtanik, Hermon, Yeghgis, Shatin, and Getap. In Shatin the river has become a reason for several cases of bank erosion and major landslides. In 2007 a landslide caused by the river destroyed the road connecting the village to neighboring communities of Yeghgis, Artabounk, etc. Funds from state budget were used to restore the slope via construction of a concrete wall and installation of gabions.

To control further bank erosion the community budgets funds for installation of gabions in most urgent location on annual basis. Gabions are purchased by the municipality and distributed among households whose land and houses are most endangered and need urgent protection. Few hundred gabions are installed every year, but no design or holistic assessment of the situation is done so far. On the other hand most of the investments go into engineering



MITIGATION OF EROSION AND FLOODING IN SHATIN COMMUNITY



Picture 4. Construction of gabions on Yeghgis River, Shatin community.



Picture 5. Construction of gabions on Yeghgis River, Shatin community.



Picture 6. Newly constructed gabions on Yeghgis River, Shatin community.

solutions, while bio-engineering methods are virtually not used. In many places, where gabions were installed, planting of trees and shrubs typical for riparian zone may be very useful for further enforcement of engineering structures.

In order to ensure that river bank protection measures are implemented properly there is need for professional assessment of the situation and development of a design for construction works. Most of previously installed gabions are of extremely poor quality, including use of low quality wire, over- or under-sized rocks, etc. Thus there is need for proper quality control measures to ensure longevity of investments. Development of the design will help the community during the implementation of works in the future, while use of proper quality gabions will set quality standard for future construction activities in Shatin.

It has also been noticed that most of bank erosion is occurring on the right bank of the river. The left bank is protected by irrigation and HPP pipelines, which add to natural pressure on the right bank. There have also been several locations where water has been discharged into river potentially causing erosion in those places, thus this issue also need addressing.

The main objective of the "Mitigation of Climate Change Risks of Rural Communities through Improved Local Development Planning" UNDP-BCP/00075559 project is to enhance the climate resilience of Armenia in the highest risk sectors and areas and ensure national ownership through enhanced institutional knowledge and responsibility. Specific objectives are to mitigate the climate change risks of rural communities through mainstreaming climate risk management in the rural development planning process, assessing existing risk mitigation measures in agricultural practice, increasing stakeholders awareness on the threat to climate change on the agricultural sector, and strengthening the risk management and adaptive capacities of vulnerable communities.

The outcome of the project is: "Armenia is better able to address key environmental challenges, including climate change and natural resource management".
Governmental bld #6, room 503, Yerevan, RA, Tel: (374 10) 583000, 583002 Fax: (374 10) 583003
E-mail: climate@nature.am Web-site: www.nature.am

«Տեղական զարգացման բարելավված պլանավորման միջոցով կլիմայի փոփոխության ռիսկերի մեղմումը գյուղատնտեսական համայնքներում» ՄԱՏՄ-ՃԿԿԲ/00075559 Մրցագիր



Հիդրոօրհրտաբանական ավտոմատ կայանների տեղադրում և օգտագործում

Միակողմանի ազդերի կազմակերպության զարգացման ծրագրի (ՄԱՏՄ) և ճգնաժամների կառավարման վերականգնման բրաժիի (ՃԿԿԲ) կողմից համատեղ իրականացվող «Տեղական զարգացման բարելավված պլանավորման միջոցով կլիմայի փոփոխության ռիսկերի մեղմումը գյուղատնտեսական համայնքներում» Մրցագրի նպատակն է բարձրացնել կլիմայի սեզոնային ռիսկերի մեղմումը գյուղատնտեսական համայնքներում՝ Մրցագրի նպատակն է բարձրացնել կլիմայի սեզոնային ռիսկերի մեղմումը գյուղատնտեսական համայնքներում կլիմայի փոփոխության ռիսկերը հասնողներին՝ զարգացման ընդհանուր պլանավորման գործընթացում կլիմայական ռիսկերի ընդգրկման, գյուղատնտեսական պլանավորման ռիսկերի մեղմման միջոցառումների կիրառման փորձարկման, գյուղատնտեսության ոլորտում կլիմայի փոփոխության սպառնալիքների մասին շահառուների իրազեկվածության բարձրացման և խոցելի համայնքներում ռիսկերի կառավարման և հարմարվողականության կարողությունների ձեռնարկման միջոցով:

Մրցագրի նպատակն է կատարելագործել հիդրոօրհրտաբանական ավտոմատ կայանների տեղադրումը և գործարկելը՝ նպատակով վաղ անազնագնման համակարգը և փորձարկելու համայնքային մակարդակով կլիմայական ռիսկերի կառավարման մոտեցումները և միջոցառումները:

Կլիմայի սեզոնային կանխատեսումները կարող են շատ օգտակար լինել գյուղատնտեսական աշխատանքների պլանավորման և վաղ անազնագնման և արձագանքման պլանավորման համար: Դրանք կարող են օգնել գյուղատնտեսական ոլորտի որոշում կայացումներին կատարելագործելու կլիմայական ռիսկերի կառավարման:

Հայաստանում աղետների ռիսկի կառավարման գործում ներգրավված էինական առաջնային մարմինները և 22 արտակարգ իրավիճակների նախարարության, Հայաստանի պետական հիդրոօրհրտաբանության և մոնիթորինգի (Հիդրոմետ) ՊՈԱԿ-ը:

Հիդրոօրհրտաբանական ավտոմատ կայաններ (NESA SRL)

Նպատակն է կատարելագործել տվյալների հավաքագրման և վերլուծության գործընթացները: Օդերևութաբանական վտանգների կարճաժամկետ և երկարաժամկետ կանխատեսման համար Մրցագրի կողմից ձեռք է բերվել բնապահպանական մոնիթորինգի համակարգերի և հեռակառավարման իտալական առաջատար «NESA Srl» ընկերության արտադրության երկու հիդրոօրհրտաբանական ավտոմատ կայան:

Կայանները համապատասխանում են Համաշխարհային օդերևութաբանական կազմակերպության տնտեսաբանական Ավտոմատ կայանները տեղադրվել են Տափաշի մարզի Դաղավան և Կաթո ձորի մարզի Արվանակար համայնքներում:

«Տեղական զարգացման բարելավված պլանավորման միջոցով կլիմայի փոփոխության ռիսկերի մեղմումը գյուղատնտեսական համայնքներում» ՄԱՏՄ-ՃԿԿԲ/00075559 Մրցագիր



Կայանները գրանցում են օդի և գրունտի ջերմաստիճանները, տեղումների քանակը, հարաբերական օդի և գրունտի խոնավությունը, բույսի խոնավապահովվածությունը, մթնոլորտային մշտնը, քամու ուղղությունն և արագությունը, ընդհանուր արևային ճառագայթումը:



Կայանները տեղադրվել են ֆիդուրների հարապարակներում իրենց այգիներին անբաժանելիս եղանակային տվյալներով սպասվելու պայմանով: Ավտոմատ կայանները համար կայանների տարածքը ցանկապատվել է:

Կայանները տեղադրվել են ֆիդուրների հարապարակներում իրենց այգիներին անբաժանելիս եղանակային տվյալներով սպասվելու պայմանով: Ավտոմատ կայանները համար կայանների տարածքը ցանկապատվել է:

Հիդրոօրհրտաբանական ավտոմատ կայանների տեղադրում և օգտագործումը նվիրված դասընթաց



Կայանները տեղադրվել և գործարկելու նպատակով «NESA Srl» ընկերության ներկայացուցիչները 2014թ. հոկտեմբերի 28-30 Հիդրոմետ ծառայության և այլ կազմակերպությունների մասնագետների համար կազմակերպել էին ուսուցողական դասընթացներ:



Դասընթացը կազմված էր երկու բաժնից՝ հիդրոօրհրտաբանական ավտոմատ կայաններում ներառված սարքավորումների կառուցվածքի նկարագրություն և կայանների տեղադրում և գործարկում: Դասընթացի ավարտին մասնակիցներին տրվեցին վկայականներ: Դասընթացի զեկուցումները տեղադրված են ծրագրի կայքում www.nature-ic.am:

Project Overall Impact

	Pilots and Other Projects Implemented								
	Surveys	Trainings	Early Warning / AWS	Hail Protection	Passive Solar Green-house	Drip Irrigation	Land-use Zonation	Yeghegis bed strengthening	Infrared heating system
Tavush/ community	19	22	Ptghavan	Tavush, Artsvaberd		Koti, Chinary			Ayrum
Vayots Dzor/ community	15	22	Aghavnadzor	Areni	Horbategh		Martiros, Chiva, Rind, Shatin	Shatin	
Direct beneficiaries	-	134 8 (Horbategh) 23(Hydromet)	2 farmers + Hydromet Service	14 farmers	4 house- holds	26 households	1691 households	562 households	16 farmers
Amount/size/...	715 households interviewed	-	2 stations installed	30000 meters	260sq.m.	Each for 120sq.m	-	7 segments design + 2 segments strengthened 96 meters	-
Temporary jobs created	8	8	8	3	10	5	8	13	2
Full-time jobs created	-	-	-	14	4	26	-	-	-