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Integrated Natural Resource Management Plan, Lower Alazani/Ioni Pilot Watershed Area Republic of Georgia

Integrated Natural Resource Management Plan Series



UNESCO-IHE
Institute for Water Education



Integrated Natural Resources Management in the Republic of Georgia Program

Integrated Natural Resource Management Plan, Lower Alazani/Ioni Pilot Watershed Area

Republic of Georgia

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Global Water for Sustainability Program

Florida International University

Biscayne Bay Campus 3000 NE 151 St. ACI-267

North Miami, FL 33181 USA

Email: glows@fiu.edu

Website: www.globalwaters.net

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LIST OF ACRONYMS AND ABBREVIATIONS

ADB – Asian Development Bank
CARE International - Cooperative for Assistance and Relief Everywhere International
CBO – Community-based Organization
CENN – Caucasus Environmental NGO Network
EBRD – European Bank for Reconstruction and Development
EU – European Union
GLOWS – Global Waters for Sustainability
GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit, the German Society for International Cooperation
GNERC - Georgian National Energy and Water Supply Regulation Commission
INRMW – Integrated Natural Resources Management in Watershed
IWMP – Integrated Watershed Management Plan
KfW – Kreditanstalt für Wiederaufbau, German Development Bank
km² – square kilometer
Ltd – Limited Liability Company
MDF – Municipal Development Fund
MIA – Ministry of Internal Affairs of Georgia
MoA – Ministry of Agriculture of Georgia
MoENRP – Ministry of Environment and Natural Resources Protection of Georgia
MES – Ministry of Education and Science of Georgia
MESD – Ministry of Economy and Sustainable Development of Georgia
MoF – Ministry of Finance of Georgia
MoH – Ministry of Health of Georgia
MRDI – Ministry of Regional Development and Infrastructure
NEA – National Environment Agency, MoE
NGO – Non-governmental Organization
PAs – Protected Areas
Sida – Swedish International Development Cooperation Agency
WEAP – Water Evaluation and Planning System
UNDP – United Nations Development Program
UNESCO-IHE – UNESCO Institute for Water Education
USAID – US Agency for International Development
UWSCG- United Water Supply Company of Georgia
WB – World Bank
DEMO – demonstration projects

1. BACKGROUND

The Alazani and Iori Rivers are the major watercourses in the Kakheti region, traditionally the agricultural region of Georgia. Viticulture, the leading field, is supplemented by fruit-growing, cultivation of cereals and intensive stock farming in the Alazani River Valley.

The total catchment area of the Alazani River is 11,800 km², with 6,962 km² of the area located in Georgia. The catchment area of the Iori River is 5,260 km², of which 4,650 km² is located in Georgia. The Lower Alazani-Iori pilot watershed area, for which the given Integrated Natural Resources Management Plan (hereafter Integrated Watershed Management Plan-IWMP) is developed, fully encompasses the Dedoplistskaro municipality with more than 2,532 km² of catchment area.

The waters and associated resources of the Alazani and Iori river basins, including land and biological resources, have various essential and economic functions involving but not limited to: provision of drinking water, nutritional base, energy and clean environment to the population; provision of water for agriculture, industries, fisheries; provision of local resources for subsistence economies; maintaining ecosystem integrity, richness and healthiness (water, soil and climate regulation, etc.); disaster risk reduction (prevention/control of floods, landslides, mudflows and avalanches); and provision of recreational resources to the population.

The lower Alazani-Iori pilot watershed area is less densely populated than middle to lower reaches of the Alazani and Iori river basins due to harsh local oro-climatic conditions. The natural landscapes occupy wider areas here than in the middle reaches, though they are mostly represented by semi-arid and arid ecosystems and to a lesser extent by floodplain forests. Ecosystems of the downstream areas have higher health protection, ecological and livelihood support values than commercial, aesthetic and recreational values.

More specifically, water resources of the lower Alazani-Iori watershed area is very poor compare to upper part of Alazani-Iori watershed area. One of the major assets/functions of the region is provision of natural basis for both subsistence and large-scale agricultural development. Sizeable areas of the municipality are used as winter pastures, though the productivity of these lands is reduced due to land degradation caused by unsustainable pasture management. In addition, cereal and sunflower production contribute significantly to the total agricultural output. However, the application of unsustainable agricultural practices and insufficient/absence of irrigation systems have led to the decline of agricultural productivity. In addition, almost complete clearing of the windbreaks in this area has resulted in severe wind erosion of agricultural lands.

The arid and semi-arid areas shared by the lower Alazani and Iori river watersheds are very significant ecosystems and yet very fragile due to the oro-climatic and biological peculiarities. They are habitats for many endemic, rare and endangered species. More specifically, there are around 500 vascular plants in these arid and semi-arid ecosystems. In addition, there are 66 animal species, including 17 species listed in the "Red Book", and around 250 species of birds. Many of these endemic and rare species have limited population sizes and habitats. Alazani and Iori floodplain forests have water regulation and purification functions and represent the riparian corridors. There are a number of PAs of various IUCN categories in the municipality, including

Vashlovani PAs, Chachuna Sanctuary, several natural monuments and protected landscapes. They represent the boundaries of the ranges that are home for many endangered and rare species that are impacted by the harsh climatic conditions. Meanwhile, anthropogenic pressures on these resources are high, including poaching, grazing, illegal tree felling, killing of predators, mining operations, and oil and gas extraction that overweigh the carrying capacity of the ecosystems. In addition, construction of the Dali irrigation reservoir without consideration of ecological and hydro-morphological peculiarities of the region significantly changed the river regime and prevented the downstream floodplain forests from recovering waters that prevent degradation of these forests and further aridization of the downstream areas.

Due to the limited timber resources, commercial logging does not occur in the forests of the lower Alazani-lori pilot watershed area, while social wood cutting is allowed at low volumes. The local population still cuts trees in order to meet their heating and cooking needs that results in the deterioration of the overall quality of forest ecosystems in terms of species composition and density. Another major factor in forest degradation is livestock grazing. Forest degradation enhances the stresses of climate change and reduces the adaptive/coping capacities of the local ecosystems and populations.

The pilot area does not have hydropower potential, though solar and wind energy potential is significant. It also has high biogas potential due to the presence of a large number of livestock. All the renewable energy resources are untapped owing to the poor knowledge and low rate of technology diffusion.

The lower Alazani-lori pilot watershed area is very poor in water resources, both surface and ground waters, and therefore there is a significant shortage of drinking and irrigation water. Inefficient use of water resources and poor/underdeveloped water infrastructures contribute significantly to the water shortage. In addition, the quality of source water is bad due to high salt content. Water shortage coupled with desertification, a huge problem of the downstream areas, is further accelerated by the climate change. Droughts here have become more frequent, longer and intensive. According to "Evaluation of the vulnerability of lower Alazani pilot watershed area river runoff to climate change"¹, within the next 50 year horizon, the streamflow of the Alazani River in its lower course will be reduced by 9-14% and that of the lori River by 5-9%. This will cause serious water shortage, taking into consideration the expected increase in irrigation water abstraction from both the Alazani and lori Rivers in the medium to long-term perspective.

In accordance with CENN climate change and disaster vulnerability and risk assessment² conducted under the INRMW-Georgia program, climate change will have an impact on the seasonal and annual regime of average maximum air temperature. More specifically, it is expected that the temperature will increase in all seasons, and, accordingly, annually. Average maximum temperature in summers and winters may increase by 3⁰ C, while in other seasons and annually by 2-2.5⁰C. The amount of precipitation will increase in winter (21%) and in summer (6-8%); in spring and fall, decrease in precipitation is expected. The total annual precipitation will be almost the

¹ The study - Detailed Assessment of Natural Resources of the lower Alazani-lori pilot watershed area was developed under INRMW project. <http://www.globalwaters.net/wp-content/uploads/2012/12/Lower-Alazani-lori-detailedAssesment04-08-13.pdf>

² Lower Alazani-lori pilot watershed area -Assessment of the Vulnerability to Natural Disasters and Climate Change. Plan of Mitigation and Adaptation Measures. May 2013

same as in the baseline period. The number of days with a daily precipitation of more than 10, 20 and 50 mm will decrease annually. The duration of continued precipitation periods and continued dry periods will increase. The number of days with the risk of debris flows, with more than 50 mm sediments, will remain almost the same as in the second period of observation. Thus, there is a possibility of the risk of debris flows to rise in the Dedoplistskaro municipality, while the risk of landslide processes is less possible.

The rural population has very limited access to safe drinking water due to both resource scarcity and poor technical conditions of the existing centralized water supply systems. Moreover, water quality is not adequately controlled owing to the absence of mechanical treatment at source, and unprotected sanitary zones around water sources; chlorination is not carried out in the system. Chlorination is only carried out for the centralized water supply system of Dedoplistskaro City.

Pollution caused by municipal wastewater is also problem for the pilot area. There is no exists municipal wastewater treatment plant for Dedoplistskaro city, none of the villages have sewerage systems and treatment facilities; untreated wastewater is directly discharged on the earth's surface or into seasonally dry rivers/dry ravines. Ground waters are also polluted from the seepage of pollutants from pit latrines.

Waste management is also very poor in the pilot area. The legal and illegal waste disposal sites do not meet any sanitary requirements and they represent one of the major sources of pollution for the waters and the overall ambient environment.

Ambient water quality monitoring is completely absent in the targeted watershed. There is no ground and surface water monitoring. Therefore, it is very difficult to judge the exact state of the surface and ground waters.

It should be mentioned that the pilot area has high potential for tourism, including cultural, agri and nature based tourism. There are several historical and cultural monuments in the municipality that may attract tourists. These attractions coupled with tours to traditional farms, vineyards and PAs may attract a significant number of tourists. There are several hunting farms in the pilot watershed area that may become a good basis for sport-hunting and wildlife-tracking based tourism. The existing PAs are also attractive to eco-tourists and scientists.

Thus, the resources in the lower courses of the Alazani and Iori river basins are not used in an integrated way and environmental considerations are paid no/little attention while utilizing these resources for both meeting essential needs and generating profits continue.

In order to address the issues mentioned above, the Integrated Natural Resources Management Plan for the lower Alazani pilot watershed area was developed under the USAID/GLOWS program INRMW- Georgia.

2. METHODOLOGY AND LIMITATIONS

The integrated watershed management planning process included the following stages: 1. Identification of priority problems by the target communities; 2. Identification of priority problems by local experts hired under the INRMW program; 3. Synthesis of the problems identified by experts and local stakeholders and their validation at the community and local authority level; 4. Identification of priority interventions by the INRMW program experts, local communities and authorities; and 5. Compilation of watershed issues, needs, opportunities and interventions into one document – IWMP by the INRMW program team.

In order to identify the priority watershed issues, needs and opportunities as well as to define the priority interventions at the community and/or watershed level, a holistic approach was utilized to incorporate the specific problems recognized in the larger context of the watershed and to achieve a cooperative, integrated watershed resource planning and management. Another conceptual idea in the designing of the planning process was a participatory approach to ensure the engagement of all interested parties in the course of action. The specific steps designed to employ these methods into the process of developing the watershed plans are described below.

Based on the two major principles described above, the planning activity was conducted by means of: 1. Intensive consultations with and engagement of the local stakeholders (members of 14 target communities selected through an application of multiple criteria³, well-representing the rural population of the lower Alazani pilot watershed area and representatives of local authorities) achieved through conducting community questionnaires and a series of stakeholder meetings and workshops; and 2. The work of the expert team, composed of local experts, tasked to characterize and assess the overall condition of the watershed and its resources, including various geographic, geologic, hydrologic, socio-economic, ecological and other considerations. Land and forest use, as well as water body conditions were also assessed, including pollutant sources and monitoring data, although very limited due to the weakness/absence of the monitoring system. Next, based on the expert analysis and recommendations, as well as the stakeholder input ensured by the participatory meetings conducted in Dedoplistskaro, the priority problems were identified and the recommendations for the solution were developed.

Along with a number of meetings with local authorities, several workshops hosting the representatives of the local target communities were conducted. The goal of the first workshop was to identify the priority issues of the targeted villages and communities. The priority issues revealed through this collaborative and participatory process were based on the extent of their impact on key ecosystem functions and the services as well as on their economic and health impacts (see Annexes 2 and 3). More specifically, the watershed issues were listed with maximum attainable scores assigned to them as per specially elaborated environmental and socio-economic criteria: 1. Negative impact on the health status of villagers; 2. Negative impacts on the environment of the targeted villages and their surroundings; and 3. Negative socio-economic impacts on the local population. Based on those criteria, target community members and INRMW

³ Detailed description of the entire process, methodology and outcomes of the selection of target communities is included in the following documents: i) Technical Report 4. Selection of Target Communities in Pilot Watersheds (Ambrolauri, Oni, Telavi and Akhmeta Municipalities), October, 2011. <http://www.globalwaters.net/wp-content/uploads/2012/12/Technical-Report-4-Selection-of-Target-Communities-in-Pilot-Watersheds-October-2011.pdf> and ii) Technical Report 5. Selection of Target Communities in Pilot Watersheds (Khobi, Senaki, Dedoplistskaro Municipalities), October 2012. <http://www.globalwaters.net/wp-content/uploads/2012/12/INRMW-Lower-Pilot-Watersheds-Community-Selection-Report.pdf>

experts assessed watershed issues to meet the following objectives : Protection of human health; Improvement of environmental quality/natural ecosystem integrity; Promotion of sustainable and effective utilization of natural resources; Disaster risk reduction; Maintaining existing reserve of water resources storage; Maintaining biodiversity; Promotion of organic agriculture and reduction of land degradation; and Development of tourism potential. In accordance with the issues prioritization exercise, at least three major issues were identified as top priorities for each community. On the following workshop, the final list of issues was presented to local stakeholders in order to build a common understanding and secure the agreement of the interested parties on the priority issues. The next step was the synthesizing of the prioritized issues, identified by local communities and experts, by the INRMW program team and its final assessment; during this process, among various evaluation criteria, ecosystems values, functions and services impacted by the issues were analysed (Please see Annex 4).

Issues identification and prioritization exercises were followed by the development of recommendations on potential interventions to tackle watershed issues and manage its resources more sustainably. These suggestions were made by the INRMW experts. Based on these recommendations, the INRMW program team elaborated a menu of potential structural and non-structural measures to present to target communities and authorities and prioritize these interventions through active participation of the local stakeholders. Potential interventions were prioritized based on the expected impact of the recommended measures on the environment, local economy and people's health. In the workshop that was conducted, the participants filled in the pre-prepared questionnaire (Annex 5), grading the suggested measures by points (maximum possible points of 5 were given to public health; maximum points of 3 were given to the impact on the environment; and maximum points of 3 were given to socio-economic impacts). The list derived out of this exercise was finally merged with the recommendations made by the local experts. The combined list of potential interventions was presented to the local stakeholders, who confirmed the validity of the presented measures (see Annex 6 for the workshop agenda and the list of participants).

Based on the priority issues, needs, opportunities and interventions identified through the stakeholder participation and the experts' assessments, the IWMP for the lower Alazani pilot watershed area was developed. Geographically, the plan covers the area located in the south-east of Georgia and encompasses the Dedoplistskaro municipality under the Kakheti regional administration. More specifically, the focus is directed on 14 pilot communities, which include all communities of the municipality (please refer to Annex 1), as well as the urban areas of the pilot watershed area.

The plan consists of feasible and time-bound structural and non-structural measures that address priority watershed issues at the community, municipality and/or watershed level. Their prioritisation is based on the number and quality of the ecological functions/services that they support, critical importance assigned to the measures by local stakeholders and experts, and the cost of the activity.

During the detailed assessment conducted for developing the IWMP, certain limitations were noted with reference to many historical and current socio-economic and environmental data. It should be mentioned a very limited network for water quality monitoring and nonexistence

comprehensive database on environmental quality in the country. Furthermore, various studies differ in terms of completeness of data and inconsistencies between reports are common, which can be considered as limitations of the conducted assessment. Thus, in many cases, expert analysis and extrapolations of the accessible information were employed to fill the existing gaps in the data.

3. INTEGRATED WATERSHED MANAGEMENT PLAN

3.1 Goals and Objectives

The long-term development goal of the IWMP for the lower Alazani pilot watershed area is the sustainable development of the pilot watershed through the protection and integrated management of its ecosystems and resources. The development goal of the plan will be attained by achieving the following specific objectives: 1. Reduction of environmental pollution and improvement of environmental quality; 2. Protection of human health through provision of safe drinking water; 3. Maintaining the existing reserves of water resources through sustainable and efficient utilization; 4. Disaster risk reduction; 5. Conservation, recovery and sustainable use of natural ecosystems, including maintaining biodiversity within and outside the PAs; 6. Sustainable utilization of renewable energy resources; 7. Reduction of land degradation through application of sustainable land management practices; 8. Promotion of organic/traditional agriculture; and 9. Development of eco, agro and cultural tourism potential.

3.2 Planned Actions

3.2.1 Priority Measures

Findings of the watershed assessments as well as the priority setting exercises indicate that for Dedoplistskaro municipality in the lower Alazani pilot watershed, the measures dealing with the water supply and sewerage systems, improvement of municipal waste collection and condition of the landfills, as well as the measures dealing with the restoration of windbreaks, reforestation and reclamation of pastures and grasslands, energy efficiency, the development of local renewable energy resources and the application of clean energy technologies, establishment of organic farms, and ecotourism development supportive activities are the most important.

The focus made by the community representatives was reflected in the IWMP. The synergic effect of multiple practices was also considered when determining the measures directed towards attaining each objective. The specific activities suggested for solving the prioritized issues include:

a) Structural measures: These measures are those intended for intervention at the village/community/ municipal/watershed level to address and solve the problems especially acute for the lower Alazani pilot watershed area, e.g., improvement of waste management system, urban/rural water supply systems, waste collection system, restoration of windbreaks for agricultural lands, renovation of irrigation systems, reclamation of pastures and grasslands, renovation of storm water drainage systems, reforestation of severely damaged forests, implementation of energy efficient measures, ecotourism development supportive activities, etc.

The structural measures also include public awareness activities, which include the selected demo-projects planned to be implemented under the small grants component of the INRMW program or through grass root initiatives other than the INRMW program, to solve the issues that require immediate intervention and can be implemented in shorter time period with relatively low cost requirements, and tangible and easily replicable impacts on the lives of the locals, e.g.: renovation/construction of rural water supply systems, fencing of sanitary zones at the water intakes, installation of water treatment/ chlorination facilities/devices, renovation/arrangement of

small-scale rural irrigation systems, introduction of alternative irrigation practices such as drip irrigation schemes at the community/individual farm level, construction of small-scale (rural) sewerage systems, arrangement of drainage system and wastewater treatment facilities on existing landfill, arrangement of dry toilets for public buildings that do not have relevant water treatment plants, reclamation of pastures and grasslands, establishment of traditional organic farms, implementation of energy efficient measures, installation of solar systems, and others (see Table 1 for details).

b) Non-structural measures: These are the higher scale measures that do not involve physical intervention but aim to reduce the identified risks and impacts through improving policies and laws in corresponding spheres, as well as through raising public awareness, trainings and education. The examples of the most vital non-structural measures suggested for the lower Alazani pilot watershed area include: development of a strategy , including an organizational model for the introduction of integrated watershed management; development of regional waste management strategy for the Kakheti region; establishing effective tariffs and their implementation systems in water use and waste management; strengthening law enforcement systems; strengthening the national monitoring network for surface and ground water resources; and development of overall forest policies, corresponding legal basis, including regulations on forest use, GIS compatible comprehensive forest database, etc.

Furthermore, the suggested measures were categorized as: i) Long-term; ii) Medium term; and iii) Short-term, considering the existing capacity for their implementation. Short-term activities are those that require immediate intervention and can be implemented in a time period up to one year (including the demo-projects planned under the INRMW project); Medium term activities are those that require about one- five years for realization; and Long-term activities are those that will need more than five years to be carried out.

The cost ranges for the suggested measures/activities were categorized as: i) L - low-cost (up to \$20,000); ii) M - medium-cost (\$20,000-\$100,000); and iii) H - high-cost (more than \$100,000). Likewise, the time-scale of suggested measures was broken down into: i) S - "Short-term" implying the period of time up to one year; ii) M - "medium-term" – one to five years and; and iii) L - "long-term"> five years.

For the list of the measures suggested see Table 1 below.

Table 1. Matrix of Watershed Management Plan of the Lower Alazani Pilot Watershed Area

Goal	Objectives	Measures	Scale of the measure	Ecosystem Functions/values influenced	Cost Range \$	Timeline	Responsible Agent	Potential Source of Funding
1. Sustainable development of the pilot watershed area through protection and integrated management of its ecosystems and resources	Objective 1: <i>Reduction of the environmental pollution/improvement of environmental quality</i>	Structural Measures						
		1. Setting up of waste collection system; procurement of waste containers and closed trucks for transportation of waste (2 closed trucks and ~150 pieces of 1m ³ containers)	Municipal center – Dedoplistskaro and Communities	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism	H >100,000- (~100 000 – 250 000)	M	Regional and municipal governments	Central and local budgets; development agencies (Sida, USAID, EU etc.); development banks (ADB, EBRD, WB, KfW).
		2. Improving management of existing landfill; implementation of low-cost protection measures for controlled existing waste disposal site /landfill: fencing and locking; arranging diversion channels, placing warning signs; constructing drainage and water retention and purification ponds, preparing access roads to landfills, etc.	Existing landfill of Dedoplistskaro	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism	M: 20 000 – 100, 000 (initial activities) (~1 project - ~25 000)	M	Central government: MRDI and MoENRP; Municipal government; LTD “Company of Solid Wastes”.	Central and local budgets
		3. Construction of a new EU-standard municipal solid waste landfill	Municipal, Dedoplistskaro	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production	H:>1, 000, 000	L	Central government: MRDI and MoENRP; Municipal	Development Banks (ADB, EBRD, KfW, WB, etc.); Multi-lateral

			6. Aesthetic/recreational value 7. Cultural value 8. Tourism			government; LTD “Company of Solid Wastes”.	development agencies (EU, USAID, etc); development banks (ADB, EBRD, WB, KfW).	
		4. Arranging waste segregation and processing facility	Regional or municipal (1 project – Dedoplistskaro)	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism	H: >100, 000	L	Central government: MRDI and MoENRP; Municipal government; LTD “Company of Solid Wastes” or private sector.	Central and local budgets; development agencies (Sida, USAID, EU etc.); development banks (ADB, EBRD, WB, KfW).
		5. Conservation of the existing solid waste landfills (after construction of new landfill)	Dedoplistskaro landfill	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism	H: 100,000 (~200. 000)	L	Central government: MRDI and MoENRP; Municipal government; LTD “Company of Solid Wastes”.	Central and/or local government; Development agencies (USAID, Sida, EU, etc.); development banks (ADB, EBRD, WB, KfW).
		6. Construction of municipal/ medical waste incinerator	Municipal, Dedoplistskaro	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism	H: 100, 000-1, 000, 000	L	Central government: MRDI and MoENRP; LTD “Company of Solid Wastes” or private sector.	Private sector; Development agencies (USAID, Sida, EU, etc.).
		7. Construction of a waste transfer station in Dedoplistskaro municipality (This is relevant for the option when	Urban-scale: Dedoplistskaro	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value	H: >100, 000	M	Central government: MRDI and MoENRP; LTD “Company of Solid Wastes”.	Central government; Development agencies (USAID, Sida, EU, etc.); development

		there will be a central EU standard solid waste landfill in the region)		8. Tourism				banks (ADB, EBRD, WB, KfW).
		8. Renovation of the urban sewerage system	Urban-scale: Dedoplistskaro	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism 	H: >1, 000, 000	M-L	Central government:(MRDI and MoENRP; LTD “UWSCG”;Regi onal and municipal government.	Central budgets; development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); development banks (ADB, EBRD, WB, KfW).
		9. Construction of urban wastewater treatment plants	Urban-scale: Dedoplistskaro	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism 	H: 100, 000-1,000,000	M-L	Central government: MRDI and MoENRP; LTD “UWSCG” Regional and municipal government.	Central and local budgets; development banks (ADB, EBRD, WB, KfW).
		10. Construction of small-scale (rural) sewerage systems with treatment plants	Village level (at least 4 villages ⁴)	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism 	H: >100 000 (~400 000 total, ~20 000-100 000 per each project)	M-L	Central government: MRDI and MoENRP; LTD “UWSCG”; Water companies of villages; Municipal governments; CBOs.	Central and local budgets; development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); NGOs.
Non-structural measures								
		1. Development of regional waste management	Regional and Municipal	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 	M: 20,000-100,000	S	Central government: MoENRP and	Central and local authorities

⁴These are the pilot villages of INRMW-Georgia program which identified the issue as priority (villages: Arkhiloskalo, Khornabuji, Zemo Qedi, Kasristskali)

		strategy for Kakheti region, and municipal waste management plans for Dedoplistskaro municipalities		<ol style="list-style-type: none"> 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism 			MRDI; Regional authorities - Kakheti governor's office; local municipal government.	Bilateral and/or multilateral development agencies (USAID, Sida, EU, bilateral donors, etc.).
		2. Improvement of fee system for waste management and enforcement of tariff payments	National; Regional.	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism 	M: 20,000-100,000	M	Central government: MoENRP, MRDI and MoF; regional government.	Central and local authorities; Bilateral and/or multilateral development agencies (USAID, Sida, EU, bilateral donors, etc.).
		3. Strengthening of law enforcement system	National	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism 	M: 20,000-100,000	M	Central government: MoENRP and MoF.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
		4. Strengthening of national network for surface and ground water quality monitoring	National	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism 	H: 100,000-1,000,000	M-L	Central government: MoENRP, MoENRP and NEA.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
		5. Improvement of existing regulations on wastewater discharge in harmonization with EU directives	National	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism 	M: 20,000-100,000	S-L	Central government: MoENRP.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
Awareness raising and DEMO projects								

	1. Awareness raising and capacity building of local population and municipal authorities in waste management	Municipal	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism	M: 20,000 - 100,000	S-M	Central government: MoENRP, MRDI and MESD; NGOs; Eco-clubs; Development Agencies; NGOs.	Bi-lateral and/or multilateral development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); NGOs.
	2. Construction of on-site waste water treatment facilities for small industries, hotels and public buildings	Community-level	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism	M: >20,000 (~2 demo-projects, ~40,000)	M	CBOs/NGOs; Private sector.	Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); NGOs; private sector.
	3. Arrangement of dry toilets for public buildings, households and hotels with no relevant wastewater treatment plants	Communities (~5 buildings,)	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Drinking water quality 5. Agricultural production 6. Aesthetic/recreational value 7. Cultural value 8. Tourism	M: 20,000-100,000 (7,000per project)	S	NGOs/CBOs, Private sector.	Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Private Sector, NGOs private sector.
	Objective 2:	Structural Measures					
	<i>Protection of human health through provision of safe drinking water</i>						
	1. Renovation of urban water supply systems for Dedoplistskaro ⁵	Urban scale: Dedoplistskaro	1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Cultural value 6. Tourism	H: >1,000,000	M-L	Central government: MRDI; LTD UWSCG.	Central budgets; Development banks (ADB, KfW, WB, etc.); development banks (ADB, EBRD, WB, KfW).
	2. Renovation of	Village-level	1. Human health	M: 20,000 -	M	Central	Local budgets;

⁵See for more detailed list of measures under the Water Safety Plan for Pilot Cities of GLOWS/INRMW program. at <http://www.globalwaters.net/projects/current-projects/inrmw/>

	rural water supply systems	(~5 ⁶ villages,)	<ol style="list-style-type: none"> Drinking water supply Ecosystem integrity/conservation value Economic/commercial value Cultural value Tourism 	100,000 (each project ~20,000)		government: MRDI; LTD UWSCG; regional and municipal governments; CBOs.	development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.) .
	3. Construction of rural water supply systems	Village-level	<ol style="list-style-type: none"> Human health Drinking water supply Ecosystem integrity/conservation value Economic/commercial value Cultural value Tourism 	H: 100,000 – 1,000,000	M-L	Central government: MRDI; Regional and Municipal government; CBOs/NGOs.	Central and local budgets; development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); development banks (ADB, EBRD, WB, KfW) .
	4. Fencing of sanitary zones at the water intakes ⁷	Village-level (at least 13 villages)	<ol style="list-style-type: none"> Human health Drinking water supply Ecosystem integrity/conservation value Economic/commercial value Cultural value Tourism 	M: 20,000 - 100,000 (~5,000 for each intake)	S-M	Central government: MRDI; LTD UWSCG; CBOs/NGOs.	Central and local budgets; development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); development banks (ADB, EBRD, WB, KfW) .
	5. Installation of water treatment/chlorination facilities/devices in the pilot villages	Community-level	<ol style="list-style-type: none"> Human health Drinking water supply Ecosystem integrity/conservation value Economic/commercial value Cultural value Tourism 	M: 20,000 – 100,000 (~7,000 for each project)	S	Central government: MRDI; MDF; Regional and Municipal governments; CBOs/NGOs.	Central and local budgets; development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); NGOs.

⁶ Pilot villages of INRMW program <http://www.globalwaters.net/projects/current-projects/inrmw/>

⁷ Pilot villages of INRMW program <http://www.globalwaters.net/projects/current-projects/inrmw/>

Non-structural measures							
1. Strengthening of state inspection system of drinking water	National	1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Cultural value 6. Tourism	M: 20,000-100,000	S-M	Central government: MoENRP, MoA and MoH.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).	
2. Establishing effective tariffs and their implementation mechanisms for drinking water supply system	National	1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Cultural value 6. Tourism	L: 20,000	M	Central Government: MoF and MRDI; GNERC; Municipal government.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).	
Public Awareness raising and DEMO projects							
1. Awareness raising and capacity building of local population, local water companies and municipal authorities on rational use of drinking water resources	Municipal	1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Cultural value 6. Tourism	M: 20,000 – 100,000	S-M	Central government: MoENRP, MRDI and MoH; Municipal government; CBOs/NGOs.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).	
2. Renovation of small scale water supply system	Villages	1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Cultural value 6. Tourism	M: 20,000-100,000 (5 villages: - ~100,000) ~20,000 for each project	S-M	Municipal government; CBOs/NGOs.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).	
Objective 3:	Structural Measures						

<p><i>Maintaining existing reserves of water resources through sustainable and efficient utilization</i></p>	<p>1. Renovation of irrigation systems (main - Lower Alazani irrigation channel and secondary canals: Zilich, Telettskali, Mtsaretskali and Kushiskhevi canals)</p>	<p>Regional; Municipality.</p>	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Drinking water supply 5. Irrigation 6. Livelihood value 7. Agricultural production 8. Cultural value 9. Tourism 10. Recreation 	<p>H: > 1, 000,000</p>	<p>L</p>	<p>Central government: MRDI, MoF and MoA.</p>	<p>Central budgets; development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); development banks (ADB, EBRD, WB, KfW); Private sector; NGOs.</p>
	<p>2. Renovation of small scale rural irrigation systems</p>	<p>Villages at least 5 villages⁸ in Dedoplistskaro municipality</p>	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Drinking water supply 5. Irrigation 6. Livelihood value 7. Agricultural production 8. Cultural value 9. Tourism 10. Recreation 	<p>M: 20,000-100,000 ~20,000 for each project</p>	<p>S-L</p>	<p>Municipal governments; Local LTDs of rural water companies; CBOs/NGOs.</p>	<p>Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Development banks (ADB, EBRD, WB, KfW).</p>
	<p>3. Construction of new small scale irrigation systems for the villages (that lack such systems)</p>	<p>Villages</p>	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Drinking water supply 5. Irrigation 6. Livelihood value 7. Agricultural production 8. Cultural value 9. Tourism 10. Recreation 	<p>H: 100,000 – 1,000,000</p>	<p>M-L</p>	<p>Municipal governments; Local LTDs of rural water companies; CBOs/NGOs.</p>	<p>Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Development banks (ADB, EBRD, WB, KfW).</p>

⁸ Pilot villages of INRMW program: Sabatlo, Ozaani, Tavtskaro, Pirosmeni, Samreklo

	4. construction of drip irrigation systems	Communities/individual farms	<ol style="list-style-type: none"> Human health Ecosystem integrity/conservation value Economic/commercial value Drinking water supply Irrigation Livelihood value Agricultural production Cultural value Tourism Recreation 	M: 20,000-100,000	M	Regional and municipal governments; Local LTDs of rural water companies; CBOs/NGOs	Development agencies (USAID, UNDP, EU, Dutch government, GIZ, Sida, etc.); Development banks (ADB, EBRD, WB, KfW); Private sector .
	5. Renovation of water supply system ⁹	Cities and Villages	<ol style="list-style-type: none"> Human health Drinking water supply Ecosystem integrity/conservation value Economic/commercial value Cultural value Tourism 	H> 1,000,000	L	Government: MRDI, MoF and MDF; CBOs/NGOs; municipal governments; Local LTDs of rural water companies CBOs/NGOs.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	Non-structural Measures						
	1. Elaboration of new law and relevant sub-laws on water in harmonization with EU directives – Setting up of a River Basin Management approach	National	<ol style="list-style-type: none"> Human health Ecosystem integrity/conservation value Economic/commercial value Drinking water supply Irrigation Livelihood value Agricultural production Cultural value Tourism Recreation 	M: 20,000-100,000	S-M	Central government : MoENRP; International and/local NGOs.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).

⁹ Please see for more details, under objective 2 of this table

	2. Development of national regulation on ecological flow of surface waters	National	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Drinking water supply 5. Irrigation 6. Livelihood value 7. Agricultural production 8. Cultural value 9. Tourism 10. Recreation 	L: 20,000	S	Central government: MoENRP.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	3. Strengthening of law enforcement and inspection system	National	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Drinking water supply 5. Irrigation 6. Livelihood value 7. Agricultural production 8. Cultural value 9. Tourism 10. Recreation 	H: >100,000	M	Central government: MoENRP.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	4. Strengthening of national hydrological monitoring network	National Municipal	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Drinking water supply 5. Irrigation 6. Livelihood value 7. Agricultural production 8. Cultural value 9. Tourism 10. Recreation 	H: >100,000	M-L	Central government: MoENRP and NEA.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	5. Establishing effective tariffs and their implementations systems of water use	Watershed pilot area	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Drinking water supply 5. Irrigation 6. Livelihood value 	M: 20,000-100,000	S	Central government: MRDI, MoF and MoA; International and/local NGOs.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).

			7. Agricultural production 8. Cultural value 9. Tourism 10. Recreation				
Public awareness raising and DEMO projects							
1. Awareness raising and capacity building of local population and municipal authorities on sustainable and rational use of water resources	Municipal	1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Drinking water 5. Irrigation 6. Livelihood value 7. Agricultural production 8. Cultural value 9. Tourism 10. Recreation	L: 20,000-	S-M	Central government: MoENRP, MRDI and MESD; Municipal government; CBOs/ NGOs.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).	
2. Renovation of small scale rural irrigation systems	Villages	1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Drinking water supply 5. Irrigation 6. Livelihood value 7. Agricultural production 8. Cultural value 9. Tourism 10. Recreation	M: 20,000-100,000 (20,000 for each pilot project)	S	Municipal governments; Local LTDs of rural water companies; CBOs/NGOs.	Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Development banks (ADB, EBRD, WB, KfW).	
3. Introduction of drip irrigation systems at community/ individual farm level	Communities/individual farms	1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Drinking water supply 5. Irrigation 6. Livelihood value 7. Agricultural production 8. Cultural value	M: 20,000-100,000 (20,000 for each pilot project)	S	Municipal governments; Local LTDs of rural water companies; CBOs/NGOs.	Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Development banks (ADB, EBRD, WB,	

				9. Tourism 10. Recreation				KfW).
	Objective 4: <i>Disaster risk reduction</i> ¹⁰	Structural measures						
		1. Cleaning of river beds	Municipal level: River beds of : Alazani and Iori rivers	1. Human health 2. Ecosystem integrity/conservation value 3. Disaster Risk Reduction 4. Cultural value 5. Tourism 6. Recreation	H: >1,000,000 ~ 700,000 for each project	M-L	Central government: MoENRP and MRDI; Regional and municipal governments.	Central and regional budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Development banks (ADB, EBRD, WB, KfW).
		2. Construction of gabions along the river beds	River banks: Alazani, Iori, and Gedeqiskhevi	1. Human health 2. Ecosystem integrity/conservation value 3. Disaster Risk Reduction 4. Cultural value 5. Tourism 6. Recreation	H: 100, 000-1,000,000	M-L	Central government: MoENRP and MRDI; Regional and municipal governments.	Central and regional budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Development banks (ADB, EBRD, WB, KfW).

¹⁰ For detailed information regarding this objective please see “Assessment of the Vulnerability to Natural Disaster and Climate Change and Plan of Mitigation and Adaptation Measures of the Upper Alazani Pilot Watershed Area” developed under the INRMW-Georgia project

	3. Construction of new storm water drainage systems	Village scale	<ol style="list-style-type: none"> Human health Ecosystem integrity/conservation value Disaster Risk Reduction Cultural value Tourism Recreation 	M: 20,000 – 100,000 ~ 40,000 for each project	S-M	Regional and municipal governments; CBOs.	Regional budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
Non-structural measures							
	1. Strengthening of natural disaster early warning information systems	National	<ol style="list-style-type: none"> Human health Ecosystem integrity/conservation value Disaster Risk Reduction Cultural value Tourism Recreation 	H: > 100,000	M-L	Central government: MoENRP and MIA.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Development banks (ADB, EBRD, WB, KfW).
Public awareness and DEMO projects							
	1. Awareness raising and capacity building of local population and municipal authorities on DRR	Municipal	<ol style="list-style-type: none"> Human health Ecosystem integrity/conservation value Disaster Risk Reduction Cultural value Tourism Recreation 	M: 20,000 – 100,000	S-M	Central government: MoENRP, MIA and MRDI; Municipal government; CBOs/ NGOs.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	2. Renovation of eroded lands/river banks by bioengineering methods	Village	<ol style="list-style-type: none"> Human health Ecosystem integrity/conservation value Disaster Risk Reduction Cultural value Tourism Recreation 	M: 20,000-100,000; ~20,000 at list one project	M-L	Regional and municipal governments; CBOs/ NGOs.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Private sector.

	3. Renovation of existing small scale storm water drainage systems	Villages	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Disaster Risk Reduction 4. Cultural value 5. Tourism 6. Recreation 	M: 20,000-100,000; ~20,000 at list one project	M-L	Regional and municipal governments; CBOs/ NGOs.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Private sector.	
Objective 5: <i>Conservation, recovery and sustainable use of natural ecosystems, including maintaining biodiversity within and outside the PAs</i>	Structural measures							
	1. Afforestation/reforestation activities in the pilot areas with severely damaged forests	Municipality	<ol style="list-style-type: none"> 1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Disaster Risk Reduction 6. Irrigation 7. Livelihood support value 8. Cultural value 9. Tourism 10. Recreation 	H: >100,000	M-L	Central government: (MoENRP and National Agency of Forest; Regional and municipal governments.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).	
	2. Restoration of wind breaks	Communities	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Livelihood support value agricultural production 5. Cultural value 6. Tourism 	H: >100,000 (~ 10 projects, ~500,000)	M	Regional and municipal governments; CBOs.	Central and local budgets; Development agencies (USAID, UNDP, EU, Dutch government, GIZ, Sida, etc.).	
	3. Restoration of floodplain forests	Watershed pilot area	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Livelihood support value 5. Aesthetic/recreational value 6. Cultural value 7. Tourism 	H: 100,000 – 1,000,000 (~2 demo-projects, ~500,000)	S-M	Central government: MoENRP and National Agency of Forest; Regional and municipal governments.	Central budget; Development agencies (USAID, UNDP, EU, Dutch government, GIZ, Sida, etc.).	

	4. Establishment of open/closed tree nurseries	Communities	<ol style="list-style-type: none"> 1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Disaster Risk Reduction 6. Livelihood support value 7. Cultural value 8. Tourism 9. Recreation 	M: 20,000 – 100,000	M	Central government: MoENRP and National Agency of Forest; municipal governments; CBOs/NGOs; Private sector.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	5. Improvement of the infrastructure of PAs (Waste management, water supply, wastewater treatment, etc.)	PAs: Vashlovani, Chachuna and Alazani floodplain	<ol style="list-style-type: none"> 1. Ecological value 2. Economic/commercial value 3. Livelihood support value 4. Aesthetic/recreational value 5. Cultural value 6. Tourism 	H: > 100,000	M-L	Municipal government: MoENRP, APA, MESD, and Tourism Agency; CBOs/NGOs; Private sector.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
Non-Structural Measures							
	1. Development of overall forest policies, corresponding legal bases, laws and sub-laws including enhancing law enforcement mechanisms on regulations of forest use	National	<ol style="list-style-type: none"> 1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Disaster Risk Reduction 6. Irrigation 7. Livelihood support value 8. Cultural value 9. Tourism 10. Recreation 	M: 20,000-100,000	M	Central government: MoENRP and National Agency of Forest.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	2. Development of forests management plans for a watershed/ municipality that should include measures for using, maintaining, protection and restoration of forests	Watershed pilot area/municipalities	<ol style="list-style-type: none"> 1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Disaster Risk Reduction 6. Irrigation 7. Livelihood support value 8. Cultural value 9. Tourism 10. Recreation 	M: 20,000 – 100,000	M	Central government: MoENRP and National Agency of Forest.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).

		3. Inventory of forests and elaboration of forest cadastre	National; Municipalities.	<ol style="list-style-type: none"> 1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Disaster Risk Reduction 6. Irrigation 7. Livelihood support value 8. Cultural value 9. Tourism 10. Recreation 	H: >100,000	M-L	Central government: MoENRP and National Agency of Forest; International and/local NGOs; Private sector.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
		4. Setting up of forest monitoring systems	National; Municipalities.	<ol style="list-style-type: none"> 1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Disaster Risk Reduction 6. Irrigation 7. Livelihood support value 8. Cultural value 9. Tourism 10. Recreation 	M: 20,000-100,000	M	Central government: MoENRP and National Agency of Forest.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
		5. Determining the annual demand for fuel wood at the municipality level	Municipalities; villages.	<ol style="list-style-type: none"> 1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Disaster Risk Reduction 6. Irrigation 7. Livelihood support value 8. Cultural value 9. Tourism 10. Recreation 	L: 20,000	S	Central government: MoENRP and National Agency of Forest; Municipal governments.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).

	6. Improvement of biodiversity related legislation policy and planning	National	<ol style="list-style-type: none"> 1. Ecosystem integrity/conservation value 2. Economic/commercial value 3. Cultural value 4. Tourism 	M: 20,000 100,000	M	Central government: MoENRP.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	7. Establishment of comprehensive and efficient system of biodiversity monitoring and implementation of respective activities	National	<ol style="list-style-type: none"> 1. Ecosystem integrity/conservation value 2. Economic/commercial value 3. Cultural value 4. Tourism 	H: >100,000	M-L	Central government: MoENRP.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	8. Strengthening law enforcement system on biodiversity and forest management laws and regulations	National	<ol style="list-style-type: none"> 1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Disaster Risk Reduction 6. Irrigation 7. Livelihood support value 8. Cultural value 9. Tourism 10. Recreation 	H: >100,000	M	Central government: MoENRP.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	9. Capacity building of the protected area management staff	PA-s: Vashlovani, Chachuna and Alazani floodplain	<ol style="list-style-type: none"> 1. Ecological value 2. Economic/commercial value 3. Livelihood support value 4. Aesthetic/recreational value 5. Cultural value 6. Tourism 	M: 20,000-100,000	M	Central and local governments: MOENRP and APA; Academic Institutions e.g. Iliani, TSU, etc.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
Public awareness raising – DEMO projects							
	1. Awareness raising and capacity building of local population and municipal authorities on ecosystem functions and protection	Municipal	<ol style="list-style-type: none"> 1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Disaster Risk Reduction 6. Irrigation 	M: 20,000 – 100,000	S-M	Central government: MoENRP, MESD and MES; Municipal governments; CBOs/NGOs.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).

			7. Livelihood support value 8. Cultural value 9. Tourism 10. Recreation				
	2. Promotion of using alternative energy sources through implementation of demo project and awareness raising campaigns <i>(Please see for more details under objective 6)</i>	Municipalities; villages; households.	1. Human health 2. Drinking water supply 3. Ecosystem integrity/conservation value 4. Economic/commercial value 5. Disaster Risk Reduction 6. Livelihood support value 7. Cultural value 8. Tourism 9. Recreation	M: 20,000-100,00	S-M	Central government: MoENRP, Agency of Natural Resources and Ministry of Energy of Georgia; Municipal governments; NGOs/CBOs.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	3. Inclusion of local communities, especially youth and children, in the activities related to PAs	Watershed pilot area	1. Ecological value 2. Economic/commercial value 3. Livelihood support value 4. Aesthetic/recreational value 5. Cultural value 6. Tourism	M: 20,000-100,00	S-M	Central and local government - MoENRP and APA; academic institutions; CBOs/NGOs; Eco-clubs.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	4. Installation of information and prohibition/demarcation signs to reduce illegal grazing in the locations where such violations are especially frequent	PAs: Vashlovani, Chachuna and Alazani floodplain	1. Ecological value 2. Economic/commercial value 3. Livelihood support value 4. Aesthetic/recreational value 5. Cultural value 6. Tourism	L: <20.000	S	Municipal government: MoENRP and APA; Eco-clubs; CBOs/NGOs.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	5. Establishment of fish farms or cooperative farms, including hatcheries, nurseries and grow-out facilities	Communities and farmers	1. Ecological value 2. Economic/commercial value 3. Livelihood support value 4. Aesthetic/recreational value 5. Cultural value 6. Tourism	H: > 100,000; (~4 demo-projects, ~20,000 for each project)	S-M	Municipal governments; CBOs/NGOs; Private sector.	Local budgets; Private sector; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	6. Establishment of	Communities	1. Ecological value	H:	S-M	Municipal	Local budgets;

		hunting farms		<ol style="list-style-type: none"> Economic/commercial value Livelihood support value Aesthetic/recreational value Cultural value Tourism 	> 100,000; (~2 demo-projects, ~200,000)		governments; CBOs/NGOs; Private sector.	Private sector; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Private sector.
Objective 6: <i>Sustainable utilization of renewable energy resources</i>	Structural measures							
	1. Implementation of energy efficient measures	Public buildings; Individual households.	<ol style="list-style-type: none"> Human health Ecosystem integrity/conservation value Economic/commercial value Livelihood support value Tourism 	M: 100, 000; (~10 projects, ~20,000 for each project)	S-M	Municipal governments; CBOs/NGOs; Private sector.	Central and local budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Private sector.	
	Public awareness raising – DEMO projects							
	1. Promotion of using alternative energy sources through implementation of demo project and awareness raising campaigns	Municipalities; Villages; Households.	<ol style="list-style-type: none"> Human health Drinking water supply Ecosystem integrity/conservation value Economic/commercial value Disaster Risk Reduction Irrigation Energy source Livelihood support value Cultural value Tourism Recreation 	M: 20,000-100,000	S-M	Central government: MoENRP-Agency of Natural Resources and Ministry of Energy of Georgia; Municipal governments; NGOs/CBOs; Private sector.	Central and local budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Private sector.	

	2. Installation of solar systems	Public buildings; Individual households	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction 5. Livelihood support value 6. Tourism 	M: 20,000-100,000; (~10 projects, ~40,000 – 100,000)	S	Municipal governments; CBOs/NGOs; Private sector.	Central and local budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Private sector.	
	3. Construction of biogas digesters	Households; Communities	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction 5. Livelihood support value 6. Tourism 	M: 20,000-100,000; (~6 projects, ~100,000)	M	Municipal governments; CBOs/NGOs; Private sector.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Private sector.	
	Objective 7: <i>Reduction of land degradation through application of sustainable land management practices</i>	structural measures						
	1. Reclamation of pastures and grasslands	Watershed pilot area – Municipalities Communities	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction 5. Livelihood support value 6. Agricultural Productivity 	H: >1,000,000	M-L	Central government: MoENRP, MoA; Municipal governments; CBOs/NGOs; Private sector.	Central and local budgets; Development agencies (USAID, UNDP, EU, bi-lateral donors, GIZ, Sida, etc.); Private sector.	
	2. Reclamation of degraded agricultural lands by using efficient irrigation practices and etc.	Communities	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction 5. Livelihood support value 6. Agricultural Productivity 	H: < 1,000,000	L	Central government: MoENRP and MoA; Municipal governments; CBOs/NGOs; Private sector.	Central and local budgets; Development agencies (USAID, UNDP, EU, bi-lateral donors, GIZ, Sida, etc.); Private sector.	
3. Carry out activities against land erosion - terracing, using no-tillage technologies,	Communities	<ol style="list-style-type: none"> 1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 	H: > 100,000 (~2 projects,	L	Central government: MoENRP and MoA;	Central and local budgets; Development agencies		

		planting trees, grasses, etc.		4. Disaster Risk Reduction 5. Livelihood support value 6. Agricultural Productivity	~200,000)		Municipal governments; CBOs/NGOs; Private sector.	(USAID, UNDP, EU, bi-lateral donors, GIZ, Sida, etc.); Private sector.	
		Non-structural measures							
		1. Introduction of effective land/agricultural land management policy and its implementation mechanisms (land use zoning, land inventory and monitoring, land use fees, land allocation, etc.)	National	1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction 5. Livelihood support value 6. Agricultural Productivity	M: 20,000 – 100,000	M	Central government: MoENRP and MoA; NGOs/CBOs.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).	
		2. Conducting an inventory of eroded and degraded agricultural lands	National Municipal	1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction 5. Livelihood support value 6. Agricultural Productivity	M: 20,000 – 100,000	M	Central government: MoENRP and MoA; NGOs/CBOs.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).	
		3. Setting up of regular state monitoring network for soil quality	National Municipal	1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction 5. Livelihood support value 6. Agricultural Productivity	H: >100,000	M-H	Central government: MoENRP and MoA; Local authorities; NGOs/CBOs.	Central and/or budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).	
4. Establishing proper zoning or other regulatory or economic mechanisms for sustainable pasture management		1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Livelihood support value 5. Aesthetic/recreational value 6. Cultural value	M: 20,000 – 100,000	M	Central and regional government: MoENRP and MoA.	Central and local budgets; Development agencies (USAID, UNDP, EU, Dutch			

							government, GIZ, Sida, etc.).
Public Awareness raising – DEMO projects							
	1. Awareness raising and capacity building of local population and municipal authorities on ecosystem functions and protection, sustainable land management and traditional agricultural practice	Municipal	1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction 5. Livelihood support value 6. Agricultural Productivity	M: >20,000	S-M	Central government: MoENRP, MES and MoF; Municipal government; CBOs/NGOs.	Central and/or budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	2. Reclamation of pastures and grasslands	Watershed pilot area – Municipalities, Communities	1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction 5. Livelihood support value 6. Agricultural Productivity	M: 20,000-100,000 ≈20 000-50 000 for each project	S-M	Central government: MoF, MoENRP and MoA; municipal governments; CBOs/NGOs; Private sector.	Central and local budgets; Development agencies (USAID, UNDP, EU, bi-lateral donors, GIZ, Sida, etc.); Private sector.
	3. Implementation of land reclamation measures of eroded agricultural lands (through the use of bio fertilizers, irrigation etc.)	Communities	1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction 5. Livelihood support value 6. Agricultural Productivity	M: 20,000-100,000 ≈20 000-50 000 for each project	S-M	Central government: MoF, MoENRP and MoA; municipal governments; CBOs/NGOs; Private sector.	Central and local budgets; Development agencies (USAID, UNDP, EU, bi-lateral donors, GIZ, Sida, etc.); Private sector.
	4. Restoration of windbreaks for agricultural lands	Communities	1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction	M: 20,000 – 100,000 (~ 2 demo-projects, ~100 000)	S-M	Central government: MoF, MoENRP and MoA; municipal	Central and local budgets; Development agencies (USAID, UNDP,

			5. Livelihood support value 6. Agricultural Productivity			governments; CBOs/NGOs; Private sector.	EU, bi-lateral donors, GIZ, Sida, etc.); Private sector.
	5. Carry out activities against land erosion - terracing, using no-tillage technologies, planting trees, grasses, etc.	Communities	1. Human health 2. Ecosystem integrity/conservation value 3. Economic/commercial value 4. Disaster Risk Reduction 5. Livelihood support value 6. Agricultural Productivity	H: 100,000 (~2 demo- projects, ~200,000)	L	Central government: MoF, MoENRP and MoA; municipal governments; CBOs/NGOs; Private sector.	Central and local budgets; Development agencies (USAID, UNDP, EU, bi-lateral donors, GIZ, Sida, etc.); Private sector.
	Non-structural measures						
Objective 8: Promotion of organic/traditional agriculture	1. Development of Central policy and its implementation mechanisms on Georgian agrobiodiversity and regulating GMO materials and products	Watershed pilot area	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Livelihood support value 5. Agricultural Productivity 6. Cultural value 7. Tourism	H: >100,000	M-L	Central government; local government; International and/local NGOs.	Central budget; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	Public Awareness raising – DEMO projects						
	1. Establishment of traditional organic farms	Communities – farmer's level	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Livelihood support value 5. Agricultural Productivity 6. Cultural value 7. Tourism	H: >100,000 20,000 – 100,000 (~10 demo- projects, ~200,000)	M	Municipal governments; CBOs/NGOs; Private sector.	Local budgets; Private sector; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	2. Introduction of seed materials to re-establish production of traditional endemic species	Watershed pilot area	1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Livelihood support value 5. Agricultural Productivity 6. Cultural value 7. Tourism	H: >100,000; (~10 demo- projects, ~100,000)	M	Municipal governments; CBOs; Private sector.	Local budgets; Private sector; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).
	3. Establishment of	Communities –	1. Health protection value	M: 20,000 –	S-M	Municipal	Local budgets;

	herbal farms	farmer's level	<ol style="list-style-type: none"> 2. Ecological value 3. Economic/commercial value 4. Livelihood support value 5. Agricultural Productivity 6. Cultural value 7. Tourism 	100,000 (~3 demo-projects, ~100,000)		governments; CBOs; Private sector.	Private sector; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).	
	Public awareness – Demo projects							
Objective 9: <i>Development of eco, agro and cultural tourism potential</i>	1. Ecotourism development and supportive activities - arranging tourist trails, shelters, picnic and camping areas, panoramic views, wildlife tracking spots, placing sign boards and banners, etc.	PA-s: Vashlovani, Chachuna and Alazani floodplain	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Livelihood support value 5. Cultural value 6. Tourism 7. Recreation 	L: <20,000 (3 projects, ~60,000)	S	Central and regional governments; Private sector.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Private sector.	
	2. Establishment of environmentally friendly technologies for hotels and guest houses near the protected areas and buffer zones	PA-s: Vashlovani, Chachuna and Alazani floodplain	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Livelihood support value 5. Cultural value 6. Tourism 7. Recreation 	M: 20,000-100,000 (~5 projects, ~100,000)	S	Central and regional governments; Private sector.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.); Private sector.	
	3. Setting up of waste collection system at the protected areas	PA-s: Vashlovani, Chachuna and Alazani floodplain	<ol style="list-style-type: none"> 1. Health protection value 2. Ecological value 3. Economic/commercial value 4. Livelihood support value 5. Cultural value 6. Tourism 7. Recreation 	M: 20,000-100,000 (~3 projects, ~150,000)	S	Central and regional governments; Private sector.	Central and local budgets; Development agencies (USAID, UNDP, EU, bilateral donors, GIZ, Sida, etc.).	

3.2.2 Management and Funding Mechanisms

This IWMP (Table 1) includes the responsible agents for each suggested measure. They are categorized as: a) those practiced by governmental structures such as central, regional and municipal governments (e.g. MoENRP, MRDI, Kakheti Governor's office, United Water Supply Company of Georgia (UWSCG), etc.); and b) those practiced by the private sector: businesses, CBOs, international and local NGOs, eco-clubs and others. For each measure, a number of stakeholders will be involved in the implementation process, with a responsible party identified according to the specifics of its implementation needs and the accepted management practices of the structures listed above.

Potential funding sources are also recommended in the plan. Again, accepted funding practices were considered and the selection of the funding sources for specific measures was made based on the particulars of the type of activity: e.g., for nonstructural measures the potential funding sources are mostly central budget, bilateral and/or multilateral development agencies such as USAID, Sida, EU, the Dutch Government, etc. In some cases, the funds can be supplemented from the local budgets too for these measures. As for the structural measures, the possible funding sources may include but are not limited to: central and local budgets; development agencies (Sida, USAID, EU, etc.); development banks (ADB, EBRD, WB and KfW); multi-lateral development agencies (EU, USAID, etc); private sector – businesses, NGOs, etc.

It should be noted that the current legal and institutional setting does not allow for the management of natural resources within the boundaries of watersheds. Management responsibilities over local natural resource bases are divided between the state government and local municipalities. Therefore, at this stage, the most feasible measure is to create a watershed council with two units in the municipal government covered by this IWMP. It will be an advisory and consultative body for the effective monitoring and update of the IWMP. The council will be composed of local government, community and NGO representatives but will be open to other stakeholders including private businesses and donors. The council will be hosted by the local government.

ANNEXES

**Annex 1: INRMW Project List of Target Communities of the Lower Alazani_Iori
Pilot Watershed Area**

Table 1: Target Communities and their Respective Villages in Dedoplistskaro Municipality

#	Community	Village	Population
1	Zemo Machkhaani	Machkhaani	2,860
2	Gamarjveba	Gamarjveba	1,640
3	Khornabuji	Khornabuji	2,700
4	Sabatloi	Sabatlo	496
5	Ozaani	Ozaani	1,110
		Tavtskaro	115
6	Arboshiki	Arboshiki	2,500
7	Samreklo	Samreklo	1,400
8	Pirosmani	Pirosmani	800
9	Arkhiloskalo	Arkhiloskalo	1,685
10	Zemo Kedi	Zemo Kedi	2,916
11	Kvemo Kedi	Kvemo Kedi	1,482
12	Mirzaani	Mirzaani	690
13	Samtatskaro	Samtatskaro	1,400
14	Karistskali	Karistskali	425

Map 1. Lower Alazani-Iori Pilot Watershed Area



Annex 2: Priority Environmental Problems Identified by Selected Communities

Table 1: Priority Problems Identified by Selected Communities of Dedoplistskaro Municipality

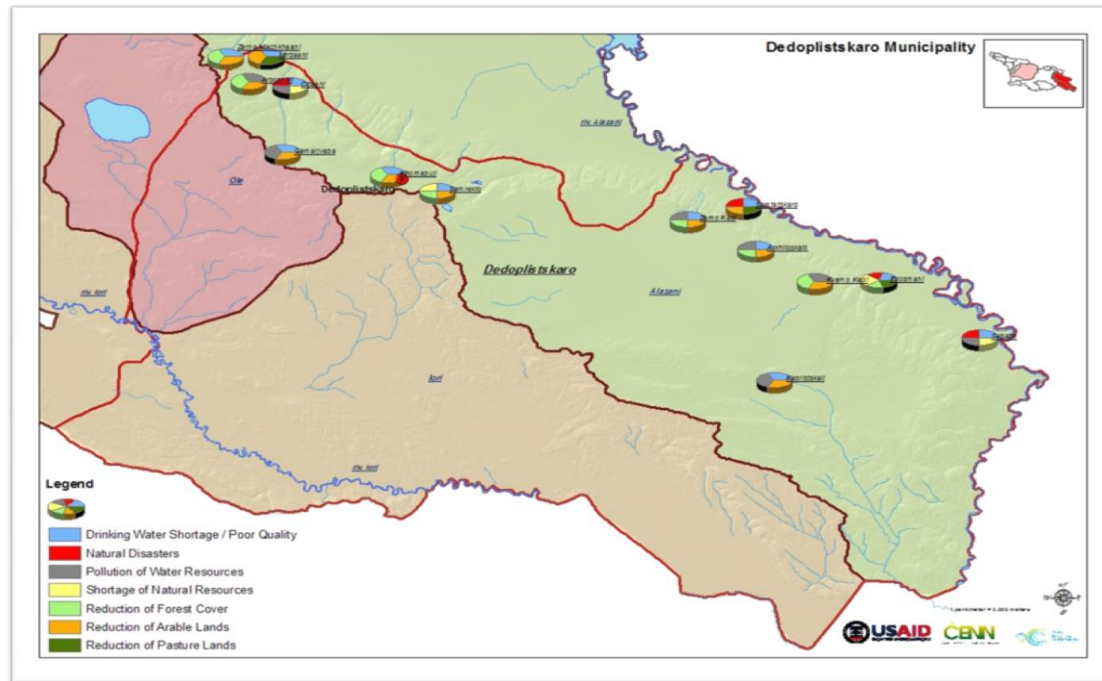
Community	Village	Priority Issue	Causes
1. Zemo Machkhaani	Zemo Machkhaani	Shortage of safe drinking water.	Obsolete and damaged water supply system; poor condition of headworks; use of drinking water for irrigation.
		Deforestation.	Illegal wood cutting to meet heating needs; gas is supplied to the village, but households cannot afford it.
		Degradation of agricultural lands.	Absence of irrigation systems; droughts; hail.
2. Gamarjveba	Gamarjveba	Shortage of drinking water.	Headwork capacity is insufficient to supply four villages, including Gamarjveba.
		Soil and water pollution from municipal solid wastes.	Uncontrolled dumping of wastes; rare (once a week) collection of wastes.
		Degradation of agricultural lands (erosion).	Wind impact; destruction of wind breaks.
3. Khornabuji	Khornabuji and Tchoeti	Poor drinking water quality.	Village does not have centralized water supply system, and as a result, water is abstracted from individual wells; water is naturally salty.
		Deforestation.	Wood cutting to meet heating and cooking needs; absence of other energy sources.
		Soil and water pollution.	Absence of waste collection and disposal system; uncontrolled waste dumping.
4. Sabatlo	Sabatlo	Shortage of safe drinking water.	Centralized drinking water supply system is out of commission; headwork is out of order.
		Soil and water pollution.	Absence of waste collection and disposal system; uncontrolled waste dumping.
		Seasonal floods, flashfloods and mudflows; around 40% of agricultural lands is flooded by Alazani River.	River bank erosion; absence of flood protection/embankments.
		Lack of irrigation water.	Existing irrigation system is out of order.
5. Ozaani	Ozaani	Pollution of rivers and lakes.	Gedekhiskhevi River is polluted from wastes of upstream villages of Zemo Machkhaani and Arboshiki; illegal dumping of wastes in river beds and banks and on the territory of the Patara Tba (Little Lake).

	Tavtskaro	Flashfloods and mudflows.	Absence of river bank reinforcement structures on Gedekhiskhevi River; inadequate storm water drainage.
		Lack of irrigation water.	Existing irrigation systems supplying water from Alazani and Iori rivers are inoperative
		Poor drinking water quality.	Absence of water chlorination in the reservoirs and system.
		Soil and water pollution.	Absence of centralized waste collection and disposal system; absence of legal landfill; uncontrolled waste dumping in river beds and banks
		Lack of irrigation water.	Only 5% of farm land is irrigated from Alazani irrigation canal, and the remaining 95% are not covered, because the existing Iori irrigation system and Taribana irrigation canals are nonfunctional currently.
6. Arboshiki	Arboshiki		
		Degradation of agricultural lands (wind-induced erosion).	Droughts; absence of irrigation; absence of wind breakers.
		Deforestation.	Uncontrolled/illegal cutting of trees for fire wood; the village is supplied with gas, but households cannot afford it.
		Soil and water pollution.	Absence of centralized waste collection and disposal system; absence of legal landfill; uncontrolled waste dumping in river beds and banks.
7. Samreklo	Samreklo		
		Poor drinking water quality.	Source water has high salt content.
		Deforestation.	Forests were cut intensively in 1990s due to high energy crisis.
		Degradation of agricultural lands (wind-induced erosion).	Destruction of wind breaks.
		Lack of irrigation water.	Absence of irrigation systems.
8. Pirosmeni	Pirosmeni		
		Poor drinking water quality.	Source water is salty.
		Flooding of 130 ha agricultural lands during flashfloods.	Absence of river bank reinforcement structures.
		Lack of irrigation water.	Existing irrigation system does not function due to obsolescence and poor condition.
		Deforestation.	Cutting of trees for heating purposes.
		Pasture degradation.	Overgrazing; reduction of pasture productivity due to soil erosion and distribution of weeds.
9. Arkhiloskalo			

	Arkhiloskalo	Shortage and poor quality of drinking water.	Capacity of the headworks (drilled well) is insufficient; water supply system is obsolete and damaged in many places; drinking water is used for irrigation
		Deforestation.	Extensive wood cutting to meet heating and cooking needs; absence of alternative energy sources in the village.
		Soil and water pollution.	Absence of centralized waste collection and disposal system; absence of legal landfill; uncontrolled waste dumping in river beds and banks.
		Degradation of agricultural lands (erosion).	Wind impact; destruction of wind breaks.
10. Zemo Kedi	Zemo Kedi		
		Shortage and poor quality of drinking water.	Capacity of the headworks (drilled well) is insufficient; water supply system is obsolete and damaged in many places; drinking water is used for irrigation
		Deforestation.	Extensive wood cutting occurs to meet heating and cooking needs: absence of alternative energy sources in the village.
		Soil and water pollution.	Absence of centralized waste collection and disposal system; absence of legal landfill; uncontrolled waste dumping in river beds and banks.
	Degradation of agricultural lands (erosion).	Wind impact; destruction of wind breaks.	
11. Kvemo Kedi	Kvemo Kedi		
		Deforestation.	Extensive wood cutting to meet heating and cooking needs; absence of alternative energy sources in the village.
		Soil and water pollution.	Absence of centralized waste collection and disposal system; absence of legal landfill; uncontrolled waste dumping in river beds and banks.
		Degradation of agricultural lands (erosion).	Wind impact; destruction of wind breaks.
12. Mirzaani	Mirzaani		
		Shortage and poor quality of drinking water.	Headworks is damaged significantly; water main and distribution network is damaged, partial rehabilitation works are ongoing.
		Pasture degradation.	Overgrazing; reduction of pasture productivity due to soil erosion and distribution of weeds.
		Degradation of agricultural lands (erosion).	Wind impact; destruction of wind breaks
13. Samtatskaro	Samtatskaro		
		Flooding and loss of floodplain forests during seasonal floods and flash floods.	River bank and bed erosion; absence of river bank protection structures.

		Pasture degradation.	Overgrazing; reduction of pasture productivity due to soil erosion and distribution of weeds.
		Shortage and poor quality of drinking water.	Out of 5 intakes, water quality at 3 intakes is very poor, intakes have insufficient capacity, and there is a need for additional bore wells.
		Degradation of agricultural lands (erosion).	Wind impact; destruction of wind breaks.
14. Kastrisksali	Kastristsali		
		Shortage and poor quality of drinking water.	Water is collected through drainage of groundwaters; headworks is damaged and needs rehabilitation; water discharge rate is insufficient; groundwater is excessively salty.
		Streams and soil pollution.	Dumping of household solid wastes in dry ravines, streams and river banks; runoff from livestock farms; absence of sanitary landfills; absence of waste collection system.
		Degradation of agricultural lands (erosion).	Wind impact; destruction of wind breaks.

Map 1. Priority Environmental and Natural Resources Management Issues of Pilot Communities



Annex 3: Matrix of Priority Watershed Issues of the Lower Alazani-Iori Pilot Watershed Area Identified by INRMW Experts

Topic: Forest Resources

#	Priority Issue	Criteria: Negative Impact	Maximum Attainable Score	Scoring Result	Causal-Chain Analysis		
					Causes	Negative Impacts/Impacts on Other Resources	Scale of the Impact
1.	Deterioration in general condition of a high conservation value forest area (Total score:17)	On the health of population.	10	6	Absence of proper legal-regulatory, policy and institutional framework for sustainable forest management; absence of data on the current state of the forests and volumes of timber harvesting; underutilization of alternative (renewable) energy resources such as solar energy, wind energy and biogas; lack of technical, financial and human resources for sustainable forest management.	Deterioration of water balance and shortening of water resources Degradation of ecosystems; Degradation of soil cover; Decreased biodiversity and extinction of rare species; Degradation on natural habitats within the protected areas and its buffer zones.	Floodplain forests and former collective farm forests.
		Watershed ecology.	8	7			
		Social-economic conditions: housing, infrastructure and agriculture.	5	4			
3.	Reduction of timber resources (Total score: 18)	On the health of population.	10	6	Unsustainable use of timber resources; Uncontrolled cutting of trees for firewood; Failure to implementation of a monitoring system; underutilization of alternative (renewable) energy resources such as solar energy, wind energy and biogas; There is no set up optimal quota for timber use, that does not exceed the annual increment of timber; Absence of forest maintenance and restoration measures;	Degradation of forests and soil of adjacent territories; sharp decrease of climate and water regulatory functions; Deterioration of water balance and shortening of water resources; Decreasing of biodiversity and extinction of rare species; Ecosystem degradation.	Floodplain forests and former collective farm forests.
		Watershed ecology.	8	8			
		Social-economic conditions: housing, infrastructure and agriculture.	5	4			

Topic: Land Resources

#	Priority Issue	Criteria: Negative Impact	Maximum Attainable Score	Scoring Result	Causal-Chain Analysis		
					Causes	Negative Impacts/Impacts on Various Resources	Scale of the Impact
1.	Soil degradation and Loss of high productivity agricultural lands (Total score: 16)	On the health of population.	10	7	Flood forest degradation and reduction of its cover; Geodynamic processes; Bad agricultural practices; Improper land cultivation; Destruction of wind breakers; Lack/absence of irrigation system; Absence of land reclamation measures; Use of valuable agricultural land for non-agricultural purposes.	Loss of agricultural land productivity and total area of productive lands; Generation of eroded sections; Reduction of soil stability (thickness of the soil); Stream/lake sedimentation.	Entire lower Alazani-lori pilot watershed area.
		Watershed ecology.	8	6			
		Social-economic conditions: housing, infrastructure and agriculture.	5	3			
2.	Pasture degradation. (Total score: 17)	On the health of population.	10	8	Overgrazing and uncontrolled grazing; Grazing large herds of cattle for a long period of time or on land that is not appropriate for grazing; Unsustainable management of pasture lands; Active geo-dynamic processes; Change from traditional zoning and rotation of pasture lands.	Loss of agricultural land productivity and total area of productive lands; Generation of eroded sections; Reduction of soil stability (thickness of the soil); Stream/lake sedimentation. degradation of ecosystems within the PAs and its buffer zones.	Entire lower Alazani-lori pilot watershed area.
		Watershed ecology.	8	6			
		Social-economic conditions: housing, infrastructure and agriculture.	5	3			

3	Soil Pollution (Total score: 18)	On the health of population.	10	8	Pollutants leaching from waste dumps, open-pit mines, and pit latrines; Urban storm water and agriculture runoff; Untreated wastewater discharge; Absence of regulatory and law enforcement mechanisms for soil quality; Absence of effective waste and wastewater control regulatory and/or economic mechanisms; Absence of soil quality monitoring system; Absence of financial and technical resources for implementing effective waste management and water sanitation policies.	Loss of land productivity; Pollution of underground and surface waters; Decreased biodiversity.	pilot watershed
		On the ecological condition of the whole water catchment area.	8	6			
		On socio-economic conditions: dwellings, infrastructure, agriculture.	5	4			

Topic: Waste Management

#	Priority Issue	Criteria: Negative Impact	Maximum Attainable Score	Scoring Result	Causal-Chain Analysis		
					Causes	Negative Impacts/Impacts on Other Resources	Scale of the Impact
1	Unsanitary (which are not in compliance with environmental norms) legal and illegal landfills in the pilot municipalities (Total score: 13)	On the health of population.	10	7	Landfills constructed during the Soviet period without any projection of environmental protection measures; Absence of waste collecting and transportation services in the villages; Low level of awareness in the local population; Limited financial and personnel capabilities in the	Polluted water, soil, and air in recreational and other territories; Impedes development of tourism.	Regional
		Watershed ecology.	8	2			
		Social-economic conditions: housing, infrastructure and agriculture.	5	4			

					municipalities; Lack of technical equipment (e.g., containers, garbage trucks, etc.); Weak legislation on waste management.		
2.	Absence of waste recycling and processing systems in the pilot regions. (Total score: 11)	On the health of population.	10	4	Absence of relevant infrastructure to process waste, including collection stations for recyclable materials; Low level of awareness in the local population; Weak legislation on waste management.	Large quantity of waste, including nondegradable waste in landfills; Loss of land resources for landfills.	Regional
		Watershed ecology.	8	4			
		Social-economic conditions: housing, infrastructure and agriculture.	5	3			

Topic: Water resources

#	Priority Issue	Criteria: Negative Impact	Maximum Attainable Score	Scoring Result	Causal-Chain Analysis		
					Causes	Negative Impacts/Impacts on Other Resources	Scale of the Impact
1.	Lack/unavailability of irrigation water.	On the health of population.	10	6	Scarce water resources due to hydro-geological and climate peculiarities; poor/nonfunctional irrigation systems; absence of	Decreased output; decreased land productivity; decreased revenues.	Entire lower Alazani-Iori pilot watershed area.
		Watershed ecology.	8	2			

	(Total score: 13)	Social-economic conditions: housing, infrastructure and agriculture.	5	5	irrigation system; lack of technical and financial means to rehabilitate/build irrigation systems.		
2.	Shortage of source water (especially in the villages located at the North-East side of the Shiraki plane) (Total score: 18)	Community health	10	10	Logging of looplane forests;	-	Watershed level (villages of Zemo and Kedi, Arkhiloskalo).
		Watershed ecology.	8	4	Change of hufrological regime of the Alazani river (increase of the stream flow);		
		Social-economic conditions: housing, infrastructure and agriculture	5	4	Natural hydro-geological and climate factors determining water shortage;		
3.	Reduction of flood capacity of rivers and development of catastrophic events (Total score: 16)	On the health of population.	10	5	River bed and bank erosion due to geodynamic processes; change in stream flow.	Change in river hydromorphology; soil drying; loss of agricultural lands; forest degradation; loss of border land. Flooding of agricultural lands and floodplain forests.	Entire lower Alazani-lori pilot watershed area.
		Watershed ecology.	8	6			
		Social-economic conditions: housing, infrastructure and agriculture.	5	5			
3.	Water pollution (surface and grounwaters). (Total score: 18)	On the health of population.	10	7	Poor infrastructure of legal and illegal landfills; Amortized centralized sewage systems in the cities and absence of waste water treatment plants; Absence of sewage networks in villages; Oil drilling activites; Agriculture and urban runoff Insufficiently treated/untreated industrial wastewater; Poor monitoring systems for	Deterioration of the water ecosystem.	Entire lower Alazani-lori pilot watershed area.
		Watershed ecology.	8	6			
		Social-economic conditions: housing, infrastructure and agriculture .	5	5			

					ambient water quality (underground and surface); Absence of effective regulations, including standards for wastewater discharges; Absence of a common effective policy on waste management; Poor law enforcement.		
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Area: Water Supply Systems

#	Priority Issue	Criteria: Negative Impact	Maximum Attainable Score	Scoring Result	Causal-Chain Analysis		
					Causes	Negative Impacts/ Impacts on Other Resources	Scale of the Impact
1.	Poor drinking water quality (Total score: 10)	On the health of population.	10	7	Poor quality of drinking water sources: salty content; Unprotected water source; Dilapidated water main and distribution network; Absence of mechanical water treatment and disinfection; Absence of drinking water quality monitoring system.	-	Majority of villages.
		Watershed ecology.	8	1			
		Social-economic conditions: housing, infrastructure and agriculture.	5	2			
2.	Poor access/unavailability of drinking water (Total	On the health of population.	10	6	Absence of centralized water supply systems in a number of villages; Shortage of source water;	-	Majority of villages.
		Watershed ecology.	8	1			

	score: 8)	Social-economic conditions: housing, infrastructure and agriculture.	5	1	Inadequate capacities of intakes; Poor condition of collectors; Damages on water mains and distribution networks and high losses in the systems; Poor condition of storage or regulating reservoirs or absence of such facilities; Inefficient water usage/consumption; Lack of financial and technical means for improving water supply infrastructure/developing new ones and its proper maintenance.		
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Topic: Biodiversity

#	Priority Issue	Criteria: Negative Impact	Maximum Attainable Score	Scoring Result	Causal-Chain Analysis		
					Causes	Negative Impacts/ Impacts on Other Resources	Scale of the Impact
1.	Degradation (destruction, modification and/or transformation) of natural ecosystems and biomes ;	On the health of population.	10	4	Overgrazing, intensive forest cutting, invasive species, poaching, and unsustainable tourism;	Degradation of ecosystems.	Pilot watershed area.
		Watershed ecology	8	8			

	Destruction of habitats; Species loss. (Total scores: 17)	Social-economic conditions: housing, infrastructure and agriculture.	5	5	Poor biodiversity-related legislation, policy, and planning; weak enforcement of biodiversity and forest management laws and regulations; Poor economic conditions of rural communities heavily dependent on local resources for their subsistence; Low public awareness of environmental protection.		
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Topic: agriculture

#	Priority problems	Criteria of Negative impact	Max score	Evaluati on	Causal relation		
					Reasons causing problems	Negative results (impact on other resources)	Problem scale
1	Loss of traditional, endemic agricultural species (e.g., lentil, chickpea, flax, wheat) and wide use of GMOs. (Total score: 16)	On the health of population.	10	8	Lack of control of gene-manipulated materials and products; Wide use of mass-production crops; Loss of local knowledge of traditional agriculture.	Agricultural genetic erosion.	National
		On the ecological condition of the whole water catchment area.	8	5			
		On socio-economic conditions: dwellings, infrastructure, agriculture.	5	3			

Annex 4. Summary of priority problems of the Lower Alazani pilot Watershed Area

#	Area	Priority Issue	Watershed/Ecosystem Value/Function/Service Impacted	Max. Score	Scoring
1.	Forest Resources	<p>1. Deterioration of overall quality of high conservation value forests; 2. Reduction of timber resources.</p> <p>Immediate/underlying causes – problem 1 and 2: unsustainable use of timber resources, including uncontrolled cutting of trees for firewood; overgrazing in forest ecosystems; absence of forest maintenance and restoration measures; logging for pasture or arable land development;</p> <p>Root causes – problem 1 and 2: unsustainable silviculture methods, e.g. clearcutting; lack of financial and technical resources to carry out afforestation/reforestation measures; underutilization of alternative energy sources; low socioeconomic level of local population with limited access to secure energy sources (e.g. gas, electricity); local population’s limited awareness of energy saving and efficiency measures; absence of a common forest management policy, effective legislation and regulations; absence of forest inventory and monitoring systems; absence of an effective law-enforcement system.</p>	Human health	40	30
			Drinking water supply	40	20
			Ecosystem integrity/conservation value	40	40
			Disaster risk reduction.	40	30
			Irrigation	30	20
			Energy resources	30	0
			Forest resources used as fuel	30	30
			Agricultural produce.	30	0
			Provision of reserves of mineral resources.	30	0
			Cultural value.	20	15
			Ecotourism.	20	20
			Recreation.	20	20
Total score					225

#	Area	Priority Issue	Watershed/Ecosystem Value/Function/Service Impacted	Max. Score	Scoring
2.	Water Quantity	<p>1. Poor availability of drinking and irrigation water; 2. Flooding of Alazani floodforests and agricultural lands.</p> <p>Immediate/underlying causes - problem 1: shortage of source water; inefficient and outdated centralized water supply systems; absence of centralized rural water systems in many villages; inefficient, outdated and crumbling irrigation infrastructure..</p> <p>Root causes – problem 1: oro-climatic and hydrological peculiarities: dry climate, scarce hydrological network and ground water reserves; deforestation; climate change impacts; lack of fundstechnical and human resources for rehabilitating existing systems and/or building new efficient systems; absence of effective water usage tariffs and implementation systems (appropriate institutions, billing and bill collection systems and penalties).</p> <p>Immediate/underlying causes – problem 2: river bank and bed erosion and change in river hydromorphology; absence of flood control devices/river bank protection structures; specific hydrological regime of Alazani.</p> <p>Root causes – problem 2: lack of data on water hydrology and hydromorphology, shortage of technical, human and financial resources to properly design, construct, operate and maintain flood control structures; forest degradation/worsening climate change.</p>	Human health	40	30
			Drinking water supply	40	40
			Ecosystem integrity/conservation value	40	30
			Disaster risk reduction.	40	40
			Irrigation	30	30
			Energy resources	30	0
			Forest resources used as fuel	30	0
			Agricultural produce.	30	30
			Provision of reserves of mineral resources.	30	0
			Cultural value.	20	20
			Ecotourism.	20	20
			Recreation.	20	20
Total score					260

#	Area	Priority Issue	Watershed/Ecosystem Value/Function/Service Impacted	Max. Score	Scoring
3.	Water Quality	<p>1. Pollution of surface and ground waters;</p> <p>2. Pollution of tap water.</p> <p>Immediate/underlying causes – problem 1: discharge of untreated wastewaters from point sources of pollution (e.g., sewerage system of Dedoplistskaro City) into surface waters; agriculture and urban runoff; drainage of storm waters and seepage of leachates from controlled and uncontrolled waste disposal sites, open pit mines and dry pit latrines.</p> <p>Root causes – problem 1: deteriorated or absent of sewerage systems; absence of wastewater treatment facilities; absence of standards-based sanitary landfills and poor condition of existing landfills; lack of state finances to rehabilitate/build centralized sewerage systems, WWTPs and standard-based landfills; poor ambient water quality and soil monitoring; absence of effective regulations, including standards for wastewater discharges; absence of a common effective policy on waste and water management; poor law enforcement; low environmental consciousness of local communities.</p> <p>Immediate/underlying causes - problem 2: high salt content of groundwater; crumbling drinking water supply infrastructure or no infrastructure in the majority of villages; absence of sanitary zones/lack of protection for existing zones surrounding water sources; absence of tap water treatment in virtually all communities with centralized water supply systems.</p> <p>Root causes – problem 2: shortage of funds to rehabilitate existing centralized systems or to build new systems; absence of effective regulations, law enforcement, monitoring mechanisms and local capacity for tap water quality monitoring and control, as well as for environmental pollution control; low environmental awareness in local communities.</p>	Human health	40	40
			Drinking water supply	40	40
			Ecosystem integrity/conservation value	40	40
			Disaster risk reduction.	40	0
			Irrigation	30	0
			Energy resources	30	0
			Forest resources used as fuel	30	0
			Agricultural produce.	30	30
			Provision of reserves of mineral resources.	30	0
			Cultural value.	20	20
			Ecotourism.	20	20
			Recreation.	20	20
Total score					210

#	Area	Priority Issue	Watershed/Ecosystem Value/Function/Service Impacted	Max. Score	Scoring
4.	Waste Management	<p>1. Poor sanitary-hygienic conditions in urban and rural settlements;</p> <p>2. Pollution of streams, rivers, groundwater and soil.</p> <p>Immediate/underlying causes - problem 1: substandard waste collection, transportation and disposal systems in urban areas and nonexistence of similar systems in the vast majority of villages.</p> <p>Root causes – problem 1: lack of financial, technical and human resources/capacity to organize effective waste collection, transportation and disposal systems; absence of effective waste collection and disposal tariffs; poor enforcement of tariff collections.</p> <p>Immediate/underlying causes - problem 2: unsanitary and poor ecological conditions of existing legal landfills, proximity of waste disposal sites to streams and settlements; improper operation and maintenance of existing waste disposal sites.</p> <p>Root causes problem 2: lack of financial, technical and human resources to build standard-based sanitary landfills and/or properly operate and maintain existing facilities; absence of waste recycling and processing practices ; absence of common standard-based legal,regulatory, policy and institutional frameworks in the area of waste management; poor environmental monitoring and law enforcement; low environmental consciousness in local communities.</p>	Human health	40	40
			Drinking water supply	40	30
			Ecosystem integrity/conservation value	40	40
			Disaster risk reduction.	40	0
			Irrigation	30	10
			Energy resources	30	0
			Forest resources used as fuel	30	0
			Agricultural produce.	30	20
			Provision of reserves of mineral resources.	30	0
			Cultural value.	20	20
			Ecotourism.	20	20
			Recreation.	20	20
Total score					200

#	Area	Priority Issue	Watershed/Ecosystem Value/Function/Service Impacted	Max. Score	Scoring
5.	Land Resources	<p>1. Soil erosion; 2. Loss of productive agricultural lands and high conservation value ecosystems, including floodplain forests; 3. Soil pollution</p> <p>Immediate/underlying causes - problem 1: absence of erosion control and land reclamation measures; unsustainable agricultural techniques and practices (e.g. extensive land cultivation, no crop rotation, no pasture zoning and rotation); overgrazing; destruction of windbreaks. Root causes – problem 1: lack of financial, technical and human resources to implement erosion control/land reclamation measures; absence of policy/plan for sustainable land management; absence of effective land and water usage tariffs and implementation mechanisms; absence of proper zoning or other regulatory or economic mechanisms for sustainable pasture management; absence of sustainable forest management laws, policies and effective mechanisms for law enforcement; local farmers’ low awareness of sustainable water, land use, and agriculture practices; lack of scientific knowledge on human and climate change impacts on land erosion, etc.</p> <p>Immediate/underlying causes - problem 2: unsustainable agricultural practices; destruction/elimination of windbreaks; overgrazing; uncontrolled timber harvesting; land use change. Root causes – problem 2: absence of effective agricultural land management policy, including land use planning and implementation mechanisms (e.g., land use zoning, land inventory and monitoring, land usage fees, land allocation); lack of local knowledge of proper agricultural practices; absence of common effective policy and its implementation mechanisms for forest management; climate change.</p> <p>Immediate/underlying causes - problem 3: leaching of pollutants from waste dumps and burial sites, open-pit mines and pit latrines; urban and agriculture runoff; discharge of untreated wastewaters onto the earth's surface. Root causes – problem 3: improper use of agrochemicals; poor knowledge on the optimal agrochemical inputs; absence of regulatory and law enforcement mechanisms for soil quality; absence of effective environmental pollution control regulatory and/or economic mechanisms; absence of financial, technical and human resources for implementing effective environmental control policies, including</p>	Human health	40	30
			Drinking water supply	40	20
			Ecosystem integrity/conservation value	40	40
			Disaster risk reduction.	40	40
			Irrigation	30	0
			Energy resources	30	0
			Forest resources used as fuel	30	0
			Agricultural produce.	30	30
			Provision of reserves of mineral resources.	30	0
			Cultural value.	20	15
			Ecotourism.	20	15
			Recreation.	20	15

		policies for waste and wastewater management.		
Total score				205

#	Area	Priority Issue	Watershed/Ecosystem Value/Function/Service Impacted	Max. Score	Scoring
6.	Biodiversity	<p>1. Degradation (destruction, modification and transformation) of natural ecosystems and biomes; 2. Species loss and decrease in wildlife populations; 3. Loss of traditional and endemic species (e.g. lentils, chickpeas, flax, wheat,); 4. Widespread use of GMOs.</p> <p>Immediate/underlying causes - problem 1: overgrazing; intensive logging; distribution of invasive species; poaching and unsustainable tourism; man-made fires; clearing for agricultural development. Immediate/underlying causes - problem 2: poaching; overfishing; distribution of invasive species; infrastructure projects, in areas rich in biodiversity, without conducting environmental impact assessment and mitigation measures; unsustainable tourism. Root causes – problem 1 and 2: inadequate legal-regulatory, policy and institutional frameworks for biodiversity conservation and sustainable utilization; poor biodiversity monitoring and law enforcement capacity, including lack of technical and financial resources and qualified staff; high poverty level and low environmental awareness in the local population. Underlying causes - problem 3: widespread use of mass-production crops. Root causes – problem 3: absence of state policy on agrobiodiversity and corresponding implementation mechanisms; dwindling local knowledge of traditional agriculture. Underlying causes - problem 4: wide availability and low cost of GMO seeds and products compared to ecological seeds and</p>	Human health	40	30
			Drinking water supply	40	30
			Ecosystem integrity/conservation value	40	40
			Disaster risk reduction.	40	30
			Irrigation	30	20
			Energy resources	30	0
			Forest resources used as fuel	30	0
			Agricultural produce.	30	30
			Provision of reserves of mineral resources.	30	0
			Cultural value.	20	20
			Ecotourism.	20	20
			Recreation.	20	20

		products. Root causes – problem 4: low public awareness and absence of legal, policy and institutional frameworks for regulating the use of GMO raw materials and products.			
<i>Total score</i>					240

Annex 5. Identification of Priority Measures for Lower Alazani Watershed Management Plans - Matrix



Integrated Natural Resources Management in Watersheds (INRMW) of Georgia Program

Identification of Priority Measures for Lower Alazani Watershed Management Plans

Group				
#	Measures	Criteria - Positive Impact on	Maximum possible	Given points
1	Construction/rehabilitation of small-scale sewerage systems for municipal waste waters	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
2	Construction of on-site waste water treatment facilities for municipal center	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		

3	Construction of small scale on-site waste water treatment facilities	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
4	Rehabilitation/construction of rural water supply systems	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
5	Rehabilitation/construction of urban water supply systems	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	

		Total		
6	Land erosion protection measures (wind breaks, etc.)	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
7	Cleaning of river beds/catastrophe risk reduction measures	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
8	Construction of major irrigation	Population health	5	

	systems	Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
9	Installation of small-scale sprinkle/drip irrigation systems	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
10	Improvement of waste collection system	Population health	Population health	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	

		Total		
11	Existing waste disposal site/landfill improvement measures	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
12	Conservation of the existing landfills/waste disposal sites	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
13	Construction of new municipal solid waste landfill	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	

		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
14	Arranging waste segregation and processing facility in existing/new landfill site	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
15	Construction of municipal/medical waste incinerator	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		

16	Afforestation/reforestation activities (floodplain forests)	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
17	Reclamation of pastures	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
18	Establishment of tree nurseries	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	

		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
19	Establishment of farms for utilizing forest non-timber resources	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
20	Establishment of traditional/organic farm(s)	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
21	Establishment of hunting farm(s)	Population health	5	

		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
22	Establishment of fish farm(s)	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
23	Implementation of low-cost energy efficiency measures (thermo insulation, furnaces of complete burning)	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	

		Total		
24	Rehabilitation/construction of micro to small hydropower plants	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
25	Installation of solar systems	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
26	Construction of biogas digesters	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	

		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
27	Production of woodwaste pellets/briquettes (construction of pellet/briquette mill or installation of pellet/briquette production line)	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	
		Total		
28	Eco-tourism development supportive measures (setting up tourist trails, shelters, picnic and camping areas, panorama views, wildlife viewing spots, placing signboards and banners, etc.)	Population health	5	
		Environment (ecosystems like forests, plains, floodplains, animal species and their habitats)	3	
		Social-economic conditions: (homes, infrastructure, agriculture lands, etc.)	3	

		Total	
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List of participants

Names:

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- 2.
- 3.
- 4.
- ...

Annex 6: List of Participants and Agenda of the Workshop on Identification of INRMW Priority Actions, Lower Alazani Pilot Watershed Area



Integrated Natural Resources Management in Watersheds (INRMW) of Georgia Program

**Workshop on Identification of INRMP Priority Actions
Pilot Territory of the Downstream Areas of the River Alazani-Iori Watershed
20 September, 2012,
Venue: Dedoplistskaro**

The workshop is organized by GLOWS consortium members - *Representative Office of Florida International University in Georgia* (ROFIU-GE) and *CARE International in Caucasus* (CARE) with content wise contribution from all INRMW partners

Purpose of INRMP Priority Actions Identification Workshop is to discuss with local stakeholders the INRMP potential interventions and prioritize them through stakeholder participation

Agenda

Participants - Local authorities, Trustees of Selected Communities and CIG representatives of Dedoplistskaro Municipalities, GLOWS/INRMW program team, USAID

- 12.00-12.30 Registration
- 12.30-13.15 Welcoming & introduction by ROFIU-GE and Care
- 13.15-13.45 Presentation of watershed interventions, ROFIU-GE team
- 13.45-14.00 Q&A, discussion
- 14.00-15.00 Break
- 15.00-15.30 Presentation of INRMP actions prioritization methodology, including criteria, FIU-GE
- 15.30-16.00 Q&A
- 16.00-17.00 INRMP actions prioritization exercise (work in 2 break-up groups)
- 17.00-17.45 Five minute Presentations by breakup groups, Q&A
- 18.00 Wrap-up and closing remarks

List of Invitees

Name/Title
Mariam Shotadze, USAID/GLOWS INRMW Program Country Director, ROFIU-GE
Eliso Barnovi, USAID/GLOWS INRMW Program Country Deputy Director, ROFIU-GE
Ekaterina Shalutashvili, USAID/GLOWS INRMW, Communications Officer/Translator. ROFIU-GE
Neli Javakhishvili, USAID/GLOWS INRMW, Assistant, ROFIU-GE
Malkhaz Adeishvili, USAID/GLOWS INRMW Program Community Engagement Component, Grants Manager, Care International
Nana Kvrivishvili, USAID/GLOWS INRMW Program Community Engagement Component, Governance Officer, Care International
Mariam Bakhtadze, USAID/GLOWS INRMW Program Energy Analysis Component, Team Leader, Winrock International
Irakli Kobulia, USAID/GLOWS INRMW Program DRR and CC component, Manager, CENN

Global Water for Sustainability Program



Florida International University

Biscayne Bay Campus

3000 NE 151St. ACI-267

North Miami, FL 33181 USA

Phone: (+1-305) 919-4112

