1.2 Action Plan for Rainwater Collection from Ground Surfaces

1.2.1 Description of the Technology

The technology of the Rainwater Collection from Ground Surfaces covers collection, storage and use of rainfall that lands on the ground as opposed to collection from roofs with the intention for multi-purpose use in the communities. In many water-poor areas, small-scale runoff collection infrastructure can contribute greatly to the volume of freshwater available for human use and other multi-purpose uses. This is especially true in arid and semi-arid regions, where the little rainfall received is usually very intense and often seasonal (Elliot et. al, 2011). Because of this, runoff and river flows can be abundant for brief periods and non-existent throughout the rest of the year, as is the case in Northern Ghana.

Rainwater collection from ground surfaces is typically used in areas with seasonal rainfall to ensure that adequate water is available during the dry season. It is major adaptation intervention to make water available to communities in the dry season, particularly in the drier northern regions of Ghana. Several such systems exist in the country for domestic water supply, dry season agriculture and livestock watering but these are woefully inadequate at present. The technology has been recommended in the NCCAS and is very high on the governmentôs development policy and agenda. The water stored in these surface reservoirs is available in the dry period for irrigation, livestock watering and domestic needs. Experience in Ghana and elsewhere has shown that properly managed community dams are a big relief to communities vulnerable to water shortage in the dry season. Major environmental benefits of such reservoirs include the replenishment of nearby groundwater reserves and wells and the nourishment of neighbouring ecosystems

The technology consists essentially of collecting flows from a river, stream or other natural watercourse (sometimes called floodwater harvesting). This technique often includes an earthen or other structure to dam the watercourse and form ñsmall reservoirs.ò Rainwater collection from ground surfaces contributes to climate change adaptation at the community level by providing a convenient and reliable water supply during seasonal dry periods and droughts.

1.2.2 Target for Transfer and Diffusion

It is intended that the transfer and diffusion of the technology will be done within ten years phased into two five-year terms beginning from 2013. The target populations are the communities living mostly in the Savannah regions of Ghana where there is great need to ensure reliable water sources during the long crisis periods. Thus the three northern regions and some parts of Brong-Ahafo, Volta and Greater Accra Regions will form the target populations for the transfer and diffusion of the Rainwater Collection from Ground Surfaces technology. Specifically, it is envisaged that the project will provide 100 run-off storage facilities each of 1 million m^3 maximum storage capacity for 100 rural communities for multiple use of water.

1.2.3 Barriers to the Technology Diffusion

Fundamentally, the critical problem the technology addresses is the insufficiency of water to support livelihoods of rural communities resulting in poor community health and poor school attendance, particularly for the girl-child. The diffusion of this technology comes against certain economic and financial barriers as well as non-financial barriers.

Economic and financial barriers were mainly the high construction and maintenance cost and high cost of feasibility studies. The important root causes are few technical experts and artisans at the local level to undertake construction of the water system in a cost effective manner. In addition, high import tariffs (up to 20% depending on the item imported), high interest rates (above 20%) and unstable exchange rate (from cedi/dollar rate of about 1.64/1 in January 2012 to about 1.90/1 in December, 2012) result in high cost of production and imports of construction materials and equipment. Also there is not enough support from government (such as tax reduction incentives) to suppliers of these materials and equipment, particularly at the local level, resulting in inadequate supplies and high prices.

The non-financial barriers relate to institutional and technical barriers. Institutional barriers identified were lack of community ownership of the water system, conflicting sectoral policies on the promotion of the technology and inadequate integration of the technology in policy plans. This results in the weakening of the driving mechanisms from government agencies in pushing for the widespread adoption of the technology. In particular, conflicting or unharmonized sectoral policies on the technology result in an uncoordinated effort in the promotion of the technology. Root causes of the institutional barriers are inadequate community development specialists and logistics to design and implement appropriate community educational and awareness-raising programs in beneficiary communities and incoherent government policy on climate change to drive the adoption of the technology. Lack of awareness raising in beneficiary communities means they are not animated enough to accept the technologies as their own ï a prerequisite to successful diffusion of the technology. In addition, the implementation of the national climate change policy needs to strengthen the strategies for diffusing adaptation technologies in the water sector.

Water systems provided for single use only (e.g. for domestic only and not also for agriculture) and inadequate capacity of users to manage the technology were some of the technical barriers to the technology. Provision of systems for single water use only means there is no flexibility in such systems to support other water uses that might contribute to the incomes of beneficiary communities later. In other words, the technology that supports multipurpose use by beneficiaries would be more likely to be readily accepted and maintained than that supporting single purpose use only. Sustainability of the technology would not be easily achieved if the communities do not have the necessary capacity both in terms of know-how and material resources to adequately manage it.

The poor environmental conditions resulting in poor quality of collected water, lack of cultural acceptance of change and bias against women and other vulnerable groups in the management and use of the water systems, are some of the socio-cultural barriers. Women are major stakeholders in water resources use and management. Socio-cultural biases against them in decision making and implementation in rural communities could result in the technology not benefiting them and other vulnerable groups in the communities. There is also the lack of cultural acceptance of change on the part of beneficiary communities which implies that these communities could resist the adoption of the technology for no technical reason. However, the root causes of the socio-cultural barriers are largely inadequate technical expertise and logistics at the local level to properly animate communities and raise their awareness.

1.2.4 Measures for the Rainwater Collection Technology

An important measure to address the barriers is the development and operationalization of a coherent project on climate change adaptation to diffuse the technology as a mechanism to increase the resilience of vulnerable communities to the impacts of climate change on water availability especially in the water-stressed Savannah regions of Ghana. The project needs to be holistically implemented across the various levels of governance and stakeholder institutions. TAP envisages the construction of multi-purpose dugouts where the emphasis is on domestic water use, watering of livestock and crop agriculture. The actual cost of the dugouts will depend on various factors such as the total population expected to benefit, the targeted irrigable area for crop agriculture and the type and population of livestock in the catchment area. The proposal as outlined in this TAP costs an estimated $100,000 for a dugout capacity of 1 million m^3 for a rural community of about 500 people. It is envisaged that a total of 100 communities will have these technologies built for them at a total cost of US $22.2 million.

One measure to overcome the institutional barriers is the recruitment and training of more community development specialists at the local level to animate and raise the awareness of communities sufficiently to enable them assume ownership of the deployed technology.

For technical measures, it would be necessary to improve the technical capacity of local skilled artisans through appropriate training so they could take into account the need for the technology to satisfy multiple and not just one need. In this regard, the project envisages training, equipping and incentivising maintenance corps (five skilled persons per facility) in the project communities.

Another measure is ensuring that the necessary expertise, specialists and logistics are available at the local level to provide the necessary training that will enable beneficiary communities manage the technology and derive optimum benefit from it.

To overcome the socio-cultural barriers, adequate resources would need to be provided at the respective levels for effective educational programs in the communities to be undertaken. In order to ensure synergistic action, the project activities need to be coordinated at the various levels of governance. The action plan based on the measures is presented in Table 1.2.

Table 1.2 Summary of Action Plan for Rainwater Collection Technology

Action/ Measure	*Why Action*	*Responsible Agent(s)/ Responsibilities*	*Period*	*Cost (USD)*	*Source of Funding*	*Indicator of Success*	*Challenges*
1. Provision of 100 Run-off storage facilities each of 1 million m^3 maximum storage capacity for 100 rural communities to provide water for multiple use	Communities in Northern and coastal Savannah need to ensure reliable water sources during the long crisis periods.	District Assemblies in collaboration with the MWRWH: *MWRWH – coordination and oversight* *District Assemblies – implementation in districts.*	2013 ï 2017	Average cost of $200,000 per facility Total: $20,000,000	Government of Ghana, Development partners, Savannah Accelerated Development Authority (SADA)	80% of the facilities completed within 5 years.	- Availability of feasible sites. -conflicts in ownership of the land for potential sites -Co-operation of beneficiary communities -
2. Ensuring post-construction management system ï sensitization, awareness creation, monitoring and coordination.	Post construction management has been a major weakness in the sustainability of existing facilities.	District Assemblies in collaboration with sector Ministry and Project Coordinating Unit: *PCU and district assemblies – awareness creation, monitoring*	2013 ï 2017	Average cost per facility of $10,000 Total: $1,000,000	Government of Ghana, Development partners, Savannah Accelerated Development Authority (SADA)	90% functional run-off storage facilities in the communities.	-Willingness of communities to manage the systems
3. Training, equipping and incentivising maintenance corps (5 skilled persons per	There is need for skilled manpower for the maintenance of	District Assemblies ï *training and implementation in the districts*	2013 ï 2017	Average cost per team is $12,000 Total:	Government of Ghana, Development partners, Savannah	90% functional run-off storage facilities in	- Availability people of minimum education (Junior High

facility)	the facilities.			$1,200,000	Accelerated Development Authority (SADA)	the communities.	School level) in the communities to be trained.
Total				$22,200,000			