

Report on the CRiSTAL Training Workshop

10–12th March 2009: Same, Pangani Basin, Tanzania



A Global Water Initiative (GWI) or Running Dry Programme

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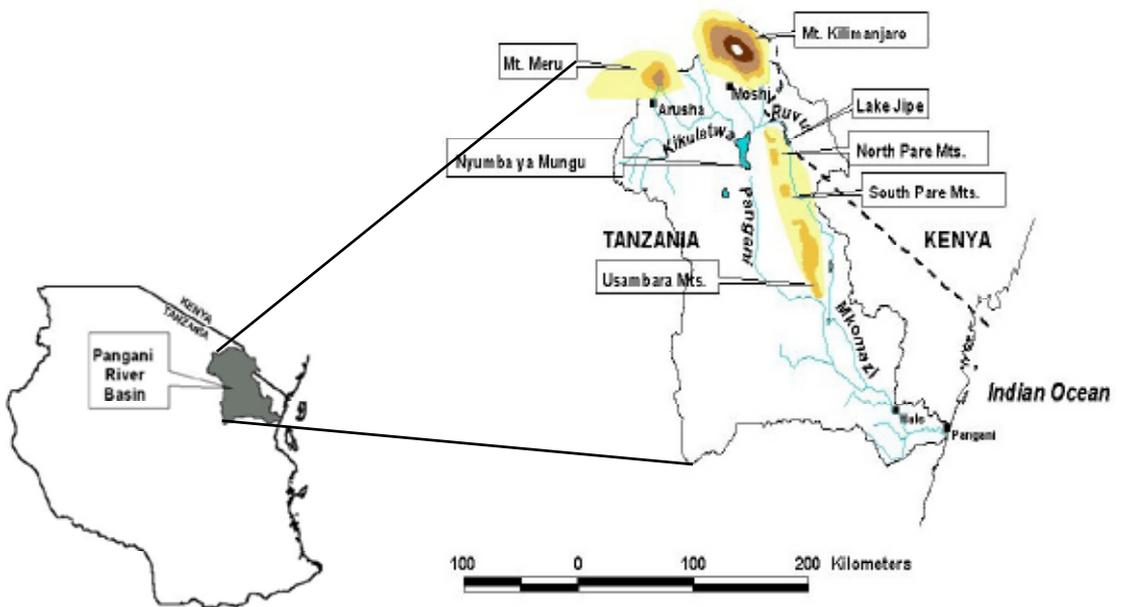
1. Background and Context

The Howard G. Buffet Foundation Global Water Initiative was developed in September 2006 with the aim of ‘ensuring that vulnerable populations world-wide have reliable access to clean water in such a way that their dignity, rights, culture and natural environment are not negatively impacted’. The strategic objectives of the initiative are to support integrated water management programs in identified countries, to develop a water constituency in those countries and regions, and to influence beyond this initiative for wider scale-up.

The initiative focuses on developing partnership amongst key organizations in three geographic clusters: Eastern Africa (Ethiopia, Kenya, Tanzania, and Uganda), Western Africa (Burkina Faso, Ghana, Mali, Niger, and Senegal) and Central America (El Salvador, Guatemala, Honduras and Nicaragua). Organizations currently involved in the initiative are Action against Hunger, CARE, Catholic Relief Services, IIED, IUCN, Oxfam America and SOS-Sahel.

In Eastern Africa and in Tanzania in particular, CARE, Catholic Relief Services (CRS) and IUCN are working together in partnership to implement the GWI activities. These three partners met in February, June and November 2007 to develop the GWI Tanzanian Programme – fitting it within the East Africa programme. The activities of the GWI in Tanzania are concentrated in the Pangani River Basin (Fig. 1), below Nyumba ya Mungu dam.

The Pangani River Basin (PRB) is located along Tanzania’s northern border covering an area of 43,650 km², about 5 percent of which is within Kenya. The basin which contains Mount Kilimanjaro, Mount Meru and the Pare and Usambara mountains drains east into the Indian Ocean at the city of Pangani – south of Tanga where the flow of the Pangani is 39 m³/s. The basin is divided into four administrative regions of Arusha, Manyara, Kilimanjaro and Tanga. Some 3.7 million people live in the basin, 80 percent of whom rely directly and indirectly on agriculture for their livelihoods. The PRB is also an area of significant concentration of pastoral communities, who are nomadic and depend on livestock for





their livelihoods. Increasing competition for land and water resources means that the pastoralists are forced to move constantly in search of water and pasture. The population of the PRB includes some of the poorest; most excluded and marginalized people in Tanzania. The total population however is growing faster than the population of urban and industrial areas, with more people relying on agriculture for survival every year.

The PRB contributes significantly to the Tanzanian economy through agricultural production and hydropower generation with some 17 percent of the country's electricity being generated by hydropower in the PRB. Irrigated agriculture covers some 30,000-40,000 ha.

Consequently water-stress in the basin can result in both increased latent and overt conflicts amongst water users. Almost 90 percent of the surface flows in the PRB are already used for irrigation and hydropower generation. The basin has also been adversely affected by changing climatic conditions in the past decade and the situation will likely worsen as climate variability is expected to reduce annual flow in the basin by 6-9 percent. Sharing the basin's water to meet and balance

future demands is a significant challenge which must accommodate water use for agriculture, hydropower generation, environmental goods and services and the conservation of natural resources and nature reserves.

The Basin however contains a wide diversity of ecological zones, the montane forests of Kilimanjaro, contrast sharply with the arid and semi-arid savannah found in the mountains rainfall shadow and also with the diverse ecology of the river's estuary to the east. It is generally the case however that the poorest communities are found in the arid and semi arid zones which cover some 50 percent of area of the basin.

The population of the arid and semi arid zones of the PRB is more vulnerable than those in the other zones; as a consequence their present capacity to adapt and reduce the impact of water shocks is limited. The level of provision of basic water and sanitation facilities is below 50 percent, and schools are particularly under served. Because water supplies are far from users a particular burden falls upon women and children, and consequently this has an impact on universal primary education, health, gender equity and the empowerment of women. Environmental degradation has profound

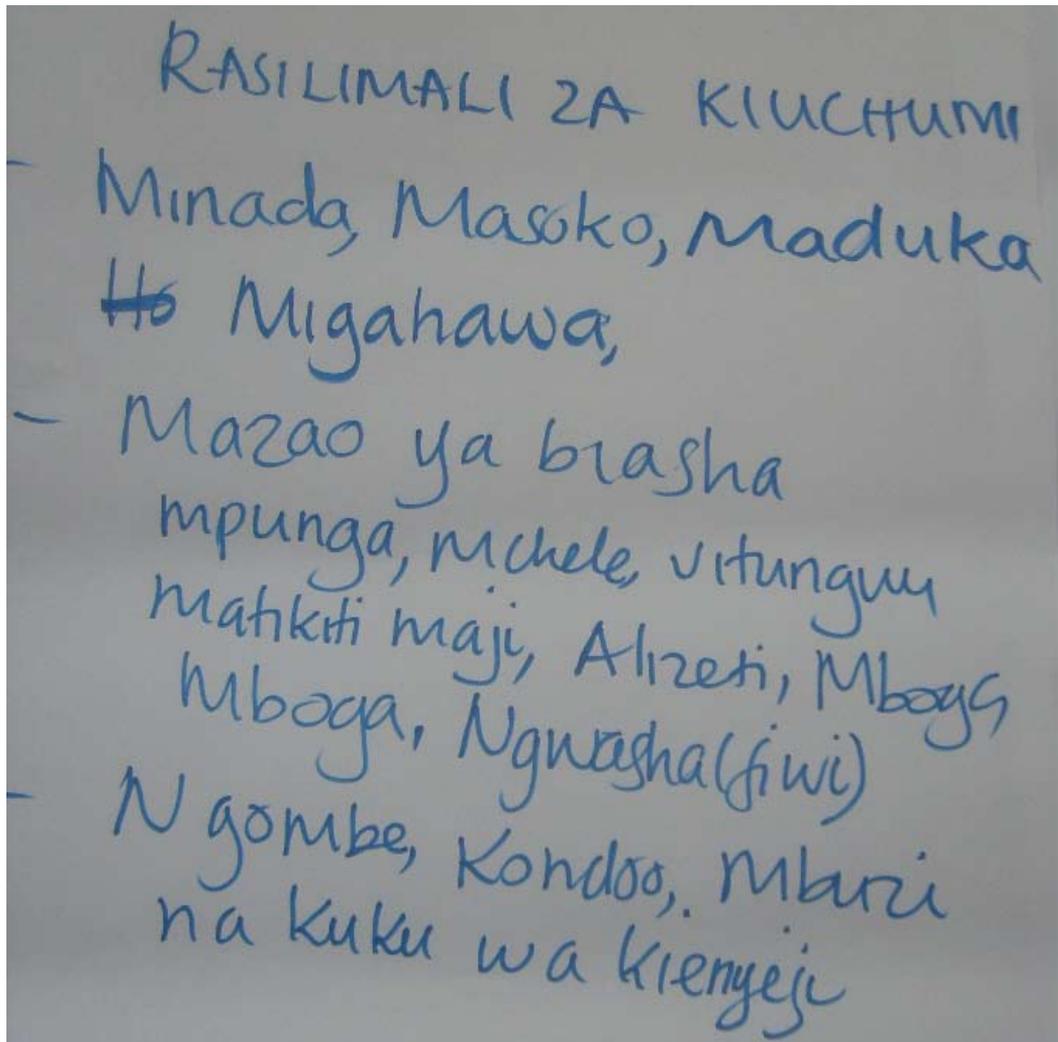
effects in these arid areas. It is unfortunately the case that much of the basin outside of urban areas has very limited basic services. As a consequence there is an elevated occurrence of water related disease and a poor knowledge of hygiene behaviors in the arid zones.

Pangani River Basin represents a high priority location for assistance because of its aridity, socio-economic status and increasing vulnerability to water related shocks. The overall institutional organization for the river basin is provided for under the Tanzanian National Water Policy, whereby water resource management and development in Pangani Basin is being coordinated by the Pangani Basin Water Office.

The partners undertook an initial situation analysis of the Pangani Basin (through literature, field visits and interviews) and generated an overview of Integrated Water Resource Management within the basin, as well as the status of rural water supply and sanitation infrastructure. Subsequent assessments determined the focal locations and activities which could be undertaken in the Basin.

The GWI programme in East Africa has three strategic objectives (SO):

- SO1: Good Governance: Improved local and community governance and the enabling policy framework;



- SO2: Sustainable Multiple Uses of Water: Efficient, effective and equitable domestic and productive uses of water, sanitation, hygiene, and watershed management; and
- SO3: Risk Management: Vulnerable rural communities and their environments have increased resilience to water-related shocks
- Vulnerability to increased competition over water use – with is coupled with a need for improved knowledge and representation of user’s interests.
- Vulnerability to environmental degradation and pollution, since this contributes directly to water stress.
- Vulnerability to other resource exploitation in the basin, since this contributes indirectly to water stress

In Tanzania, IUCN is providing a lead role in the implementation of SO3, while CARE and CRS are providing a lead role in the implementation of SO1 and SO2. In addition, CARE is providing overall program coordination. The purpose of the partnership is to gain greater benefits for communities than would be possible through the partners acting independently.

The specific results (objectives) under SO3 include:

- Community and local stakeholders’ capacity to plan, organize, manage and adapt to water related shocks and conflict over scarce water resources improved;
- Risk management initiatives are in place at regional & national levels to address water-related shocks in the context of global climate change.

The present understanding of water related vulnerability at the community level in the basin can be summarized as:-

- Economic Vulnerability as a result of the nature of present livelihoods, a lack of credit and savings mechanisms as well as inadequate coping strategies for decreases in market prices for produce.
- Vulnerability to Health Risks, in which water is linked to both the cause and remedy of the major causes of morbidity and mortality.
- Social Vulnerability as a result of marginalization or the lack of associations to represent community interests.
- Vulnerability to inadequate management and operation of existing water supply and sanitation infrastructure

The overall effect of the program will be measured in terms of reduced vulnerability and the ability to adapt to changes at the community level.

Cooperation to reduce human vulnerability at the community level in the context of river basin management means that poor rural communities increase their awareness, voice and capacity in the face of critical changes which presently appear beyond their influence. These changes concern both the benefits arising from basin level planning, and also the threats arising from environmental degradation, competition and climate change. The knowledge of how this can be achieved would have far reaching consequences – not only within the Pangani Basin and Tanzania but beyond. Consequently, the potential exists to scale up to other sub-catchments within the basin and beyond.

It is within this context that IUCN conducted training on Community-based Risk Screening Tool - Adaptation & Livelihoods (CRiSTAL) between 10-12th March 2009 in Same, Pangani Basin, Tanzania. CRiSTAL is a decision support tool that helps users to better understand the links between climate-related risks and people’s livelihoods. The tool assists communities and project implementers to climate-proof planned or on-going development interventions/ activities, by so doing, provides for adjustments that improve the project’s impact on livelihood resources. CRiSTAL was jointly developed by IUCN, IISD, SEI-US and is designed to provide a basis for community and project-based decision-making so that adaptation opportunities can be maximised, and mal-adaptation minimized.



2. CRiSTAL Training Workshop in Same, Pangani Basin, Tanzania

The workshop was facilitated by IUCN's Regional Climate Change Coordinator Mr. Excellent Hachileka and drew 18 participants from Tanzania's central and local government agencies and NGOs, more so those participating in the implementation of the GWI activities in the Pangani Basin. The full list of the participants is attached as annex 1. The objectives of the workshop were:

1. To develop skills for subsequent undertaking of the vulnerability assessment of water related shock in the project area and beyond;
2. To ensure that the current project activities maximizes climate change adaptation opportunities; and
3. To create awareness among the project implementers on climate change issues including understanding the linkages between climate-related risks, people's livelihoods and the project activities.

The expected output of the CRiSTAL training was to contribute towards enhancing the local adaptive capacity as the community and project implementers were to have a better understanding of the following:

1. How current climate hazards and climate change affect the project area and local livelihoods;
2. How people cope, looking specifically at the resources needed to cope with climate stress in Same;
3. How project activities affects livelihood resources that are vulnerable to climate risk and or important to local coping strategies in pastoralism and farming and;
4. How the Running Dry project activities can be adjusted to enhance their adaptive capacity.

Sessions during the three days workshop included theory and practical, the latter involved visiting community members in Ruvu, one of Pangani Basin's Project areas, and discussing how climate change had affected them, the coping mechanisms they had adapted and how they thought the situation could be addressed.

On the first day, the facilitator took the participants through a session on the predicted climatic changes, hazards and risks for the eastern and southern Africa region. He then took them through the basic concepts in climate change science with a view to enhancing their understanding of the various terminologies used in relation to climate change, impacts, adaptation, mitigation etc. He used different scenarios and illustrations to reinforce the participants' understanding of the phenomenon. The Pangani Basin Project coordinator, Mr. Sylvand Kamugisha, made a presentation to the participants on the implications of climate change on the Pangani Basin.

A session on communicating climate change issues was facilitated by Ms. Grace Chepkwony, IUCN ESARO Communication Officer. During this session, participants discussed the need to communicate climate change-related issues with a view to influencing decisions and actions

towards addressing it, since in most cases it is as a result of human behaviour, hence the solution would be to change people's behaviour. Communication is a key factor in making this change to happen. The participants discussed how they could use communications to disseminate evidenced-based messages with a view to galvanizing support and stimulating action aimed at addressing climate change and the attendant socio-economic problems. Participants discussed various ways communication channel of creating awareness e.g. working with the media, production of publications and use of other in-house communication channels etc.

On the second day, the participants visited communities in Ruvu where they met and discussed with various groups: farmers, fishermen, women, pastoralists including local elders and leaders. Each group provided information on how climate change had affected them, their coping strategies and how they thought the situation could be improved. Using the groups, the climate change and livelihood contexts for the community were discussed and recorded through facilitated discussions as presented in Section 3. On the third day, the data were then analyzed and entered into excel – a format for the CRISTAL – to produce a final report.





3. Climate change and Livelihood context for Ruvu Community, Pangani Basin

3.1 Pastoralists

Defining the climate context for pastoralists

Historical context of Climate change

In the 1940s to 1950s the on-set of the Rainfall season was on time and there was adequate rain fall to grow most crops which ensured good harvests for the community, good pastures for livestock though the population was relatively smaller.

In the 1950s to 1970s changes in rainfall patterns emerged marked by more variable

and less rainfall resulting in low harvests, disease outbreaks, loss of forests and pasture as the human population increased.

In the 1970s to 2000, changes in seasonal calendars have occurred coupled with change in food and life system characterized by reduced food production and a generally increased uncertainty in livelihood systems as a result of climate change.

Climate hazards

The main climate hazards recorded are: Drought, Floods, Change of seasonal calendar and increased Bush fires.

Table 1. Coping strategies for each hazard

Drought	Floods	Change of seasonal calendar	Increased bush fires
Migration to greener pastures and access to water	Early harvesting	Food storage	Environmental Protection
Dialogue between livestock keepers and farmers	Migration to up-land areas	Spiritual guidance (praying)	Fetching water for bees so that they do not go far searching for water
Growing of drought resistant crops	Construction of Temporary settlements	Environmental protection	Clearing of bushes around the trees with bees

Defining the livelihood context: Livelihood Resources for Pastoralists

The following were registered as the key livelihood resources for pastoralists:

- **Natural Resources:** Land, Water, Forest, Minerals and Fish
- **Human resources:** Experts/ Professionals (teachers, agricultural and livestock extension officers and health officers), Religious leaders, Indigenous farming skills and Weaving skills
- **Financial Resources:** Livestock, Agriculture, SACCOS, Fisheries and Bee keeping

- **Social Resources:** School, USHAMIRU SACCOS, Church and mosque (Religious leaders), Health center, Market place

- **Physical Resources:** Irrigation furrows, Roads, Energy and communication network, Fishing boats, Wind mill for running the bore hole

Main livelihood activities

The livelihood activities in Same are Pastoralism, Agriculture, Trading, Bee keeping and Fishing.

Table 2. Impacts of hazards on livelihoods

Drought	Floods	Change of seasonal calendar	Increased bush fires
Conflicts within communities	Famine	Famine	Loss of pastures/trees
Loss of livestock	Human and livestock disease outbreak	Declining per capital	Loss of bees
Loss of crops-resulting into famine	Destruction of infrastructures	Uncertainty in livelihood system	Loss of food crops

Table 3. Coping strategies with impacts of hazards on livelihoods

Drought	Floods	Change of seasonal calendar	Increased bush fires
<p><i>Conflicts within communities:</i></p> <ul style="list-style-type: none"> • Dialogue between pastoralists and farmers • Dialogue between family members and traditional/religions leaders <p><i>Loss of livestock:</i></p> <ul style="list-style-type: none"> • Migration in search of green pastures/water • Use of veterinary drugs • Grouping of livestock <p><i>Famine:</i></p> <ul style="list-style-type: none"> • Food storage • Stopping ceremonies/efficient use of food stock 	<p><i>Famine</i></p> <ul style="list-style-type: none"> • Food storage • Efficient use of food stock <p><i>Disease outbreak</i></p> <ul style="list-style-type: none"> • Use of human and animal drugs • Sanitary measures/boiling of drinking water <p><i>Destruction of infrastructures</i></p> <ul style="list-style-type: none"> • Construction of temporary settlements • Migrating to the up land • Repairing of damaged infrastructures 	<p><i>Declining of per capital income</i></p> <ul style="list-style-type: none"> • Change of livelihood system • Access loans from USHAMIRU – SACCOS 	

Coping strategies which are not applied:

- Allocation of pasture land for planting fodder.
- Need to have irrigation canals/furrows. This is expensive to them.
- Lining of irrigation canals to reduce water loss
- Need financial support for the lining furrows.
- Construction of cattle trough and small dams to store water for dry season consumption
- Planting drought resistant grass for pasture
- Drilling of bore holes to support surface water for irrigation/ domestic and livestock use.
- More awareness creation on environmental protection
- Improve communication between water managers and water users(early warning system)
- Provision of infrastructure and social services to upland areas so that people can shift to those areas.

3.2 Farmers

Defining the climate context for farmers

Table 4. Hazards and impacts

Floods	Strong wind	Drought
Famine	Human diseases	Famine
Low food production	Destructions of human settlement	Low production
Destructions of human settlement	Destruction of infrastructure	Human and animal diseases
Lose of farm produce		Water sources drying
Lose of belongings		Conflict between farmers and pastoralist
Demolition of infrastructure		Death of animals
Low income		
Conflict among the community		
Human and animal diseases		



Livelihood resources for the farmers

Human resources: Teachers, Doctors, Extension officers

Natural resources: Water, Land, Forest

Social resources: Schools, Dispensary, Income generating group, Market/auction places for Livestock

Physical resources: Irrigation canals, Pipeline/Boreholes, Roads

Financial resources: Cash crops, Access to market, Selling of Livestock

Table 5. Coping strategies

Floods	Strong wind	Drought
Water treatment	Use of local /modern medicine for treatment	Rehabilitation of irrigation system in order to increase efficiency and productivity
Health check up	Tree planting	Food supply in market
Food security	Roofing rehabilitation	Setting special area for grazing at low land
Rehabilitation of human settlement		Rainfall harvesting
		Dialogue between farmers and livestock keepers

3.2 Complimentary group: Elders and Religious leaders

Historical climate change context

- The historical background of this village started during the colonial era; this area were occupied by Masai and few fishermen.
- Agricultural activities were started by immigrant from Same and started irrigation system in the village.
- In 1937 there was floods which caused a lot of losses; people were rescued by local boats, and all infrastructures were totally destroyed and those people who were rescued, transferred to another area known as Bwagamoyo.
- After few years they came back to start irrigation system; furrows were modified and extension officers were posted to the village by the government for the purpose of helping agricultural and administration issues.
- New furrow was introduced at Nyahururu; this furrow is still in use by people of

Hedaru, Makanya, Mwembe and other neighbor villages.

- In 1959, “Ndigana” decease erupted in the area and become hazards, many animals died, this made most of animal keepers stated to eat ugali (stiff porridge) in 1960, it was a shame to livestock keepers families.
- 1964, the village was named as Muungano and many people came in from various place to start economic activities such as agricultural, fishing and livestock.
- In 1965, after the drought people returned back to the lowland for survival until 1979 where they requested to have permanent residential in higher locations.
- In 1974 there was a hunger in the village coursed by drought, in general the whole country suffered with this hazard.
- In 1975 the village was officially registered and Nyahururu furrow rehabilitated but presently there is no enough water to sustain agricultural activities in the area.
- In 1976-National Villagezation program started and the villagers requested to

- have permanent resident.
- Residents of this village are farmers, livestock keepers and fishermen who are very small in number.
- All pastoralist who were living in this area stayed together with their livestock in their houses.
- In 1979, the villagers moved from the lower areas to higher areas for permanent residence, and started to build a school, rehabilitation of road and health service (first aid box) were also in place. No deforestation in the village because most of livestock keepers are forest friend.

- After immigration to higher areas a lot of wild animals like lion, zebras, elephants disappeared

Climate context - hazards

- Drought
- Strong wind
- Flash floods
- Change in calendar year
- Change in weather
- Little rainfall
- Increase in poverty

Table 6. Impacts of hazards

Drought	Floods	Change in weather	Strong winds
Death of livestock	Destruction of infrastructure	Increases in human and animal deceases	Increase in human diseases
Low Agricultural produce	Produce are harvest	Water source become dry flooded	Destruction of infrastructure
Inadequate water for human and animal use	Fertile land are transferred to another place	Drying for wild grasses, trees etc	Soil erosion
Conflict within the community	Famine	Financial loss	
Increase in hunger			Famine
Limited area for farming			

Livelihood resources

Natural resources: Land, Water, Forest

Physical Resources: Water, Road, Dispensary

Economic and financial: Livestock, Agricultural, Fishing

Social Resources: Local government, Community leaders, Young groups

Human resources: Teachers, Doctor, Religious leaders

Coping strategies

Drought

- Rehabilitation of water system
- Cultivation of season crops
- Special praying
- Food storage
- Rehabilitation of furrows
- Furrows to pastoralists farm
- Tree planting
- Cattle trough building
- Rain water harvesting

3.4 Complimentary group: Women

Table 7. Climate context: hazards and impacts

Floods	Strong wind	Drought
Food shortage	Destruction of human settlement	Low water supply
Farm demolition	Infrastructures destruction	Livestock died
Absence of livestock feeding area	Human and animal disease	Low Agricultural produce harvest
Human and animal diseases	Bush fire	Migration
Destructions of human settlement		Food shortage
Lose of farm produce		Human and animal disease
Lose of belongings		Water source drying
Demolition of infrastructure		Low income earnings/high cost living
Low income		Conflict within the society
Conflict among the community		
Closing of schools		
Migration		

Livelihood resources

Natural resources: Land, Water, Forest, Fish, Stones, Sand, Wild animal

Physical Resources: Water, Road, Dispensary, Furrows, Religious building, Boreholes, Milling machine, Means of transport

Social Resources: Cooperative society e.g. RUBAFA, RUFAIKO, USHAMIRI, Religion, Women group, Youth group, Street Children group Village government, Village council, Street leader

Financial Resources: Saving and Credit Society(SACCOS)

Human resources: Teachers, Doctor, Religious leaders, Technician e.g. masons, Elders leaders

Coping strategies

Coping strategies include: Water allocation, Rehabilitation of furrows, looking for temporary employment, Livestock selling and Food storage

Environmental conservation

Conservation efforts are: Discouraging deforestation, Tree planting, Bylaws, Rain water harvesting and Land use rotation.



Table 8. Pastoralist coping and alternative strategies

Strategy	Is it working	Is it sustainable?	Alternative strategy	Notes
DROUGHT Dialogue	Yes	Yes	-	Livestock keepers and farmers seat together and discuss on prevailing issues
Dialogue between family members	Yes	Yes	-	Village and Religious leaders offer counselling and guidance to the family members
LOSS OF LIVESTOCK Migration	Yes	No	Improve the pasture land by planting drought resistant fodder Construction of furrows toward to the pasture land located.	Provisional of extension services on how to plant the fodders
Veterinary drugs	Yes	No	Training community animal health workers. Improving indigenous knowledge on animal disease control.	Need financial support for the construction of furrows Identification of potential trainers/community based animal health providers Design and implement awareness raising strategies
Livestock grouping	Yes	No	-	Calves/milked/sick -- old livestock's are left behind during migration
Famine food storage	Yes	No	Improved food storage skills and facilities	Provide post harvest trainings Provide skills to farmers and
Efficient use of food stock	Yes	No	Seeds varieties improvement and conservation farming	Provision of improved seeds Provide post harvest trainings
Floods Famine Food storage	Yes	No	Improve food storage skills and facilities	Provision with improved seeds varieties
Efficient use of food stock	Yes	No	Seeds varieties improvement and conservation farming	Provide skills to farmers
Disease Drugs	Yes	No	Improving the indigenous medicinal plants Introduce medicinal plants	Awareness creation on the use of the indigenous medicinal plants Training/provisions of medicinal plants
Sanitation and Hygiene	Yes	No	Improving water supply system and treatment	-
Destruction of Infrastructure Construction of temporary settlement	Yes	No	Introducing permanent settlement upland	Awareness of environment destruction impact
Repairing of damaged infrastructure	Yes	No	To improve the infrastructure design and maintenance	Construction of infrastructures which can withstand the floods
Decline of per capital income Change of livelihood system to farming/beekeeping	Yes	No	Change of live to conservation farming and agro forestry	Inclusion of conservation farming and agro forestry due to antiapartheid climate change
Access loan from USHAMIRI - SACCOS	Yes	No	Investment small business entrepreneurs from SACCOS	Provision of training on entrepreneurship

Table 9. Sustainability of coping strategies

Coping strategies	Is it working	Is it sustainable	Alternative strategy	Notes
FLOODS - Low yield - Food storage	Yes	Not	Improve storage facilities and techniques	Community grain storage
- Early warning and preparedness	Not	Not	Efficient early warning information and coordination	-Efficient operation at the water dam -Efficient communication to community
- Shifting to higher grounds	Yes	Not	Proper land use and management and education, low enforcement	Observe land tenure
Diseases - Water treatment	Yes	Not	Construction of new efficient water supply system and community empowerment	Boiling water is expensive
- Treatment	Yes	Yes	Awareness creation on health education prevention strategies	Need to have a public health facility
- Mosquito nets	Yes	Not	- Promotion of health education - prevention - Control of mosquito - Breeding grounds	Emphasizes on effective use of mosquito nets for preventing malaria
Damage of infrastructure - Rehabilitation and renovation of roads and houses	Yes	Yes	- Resettlement to higher grounds	Construction of permanent houses for people living in low grounds
- Relocation of homesteads to higher grounds	Yes	Yes		Construction of permanent houses for people living in low grounds of higher grounds - Enforcement of existing by laws land use - lobby
DROUGHT Drought - Plant drought registered crops	Yes	Yes	Introduction of conservation farming – water harvesting, etc	Raise awareness and emphasizes on crops
- Reduce irrigated land	Not	Not	Cementing/lining irrigation canals to reduce water losses	Proper irrigation schedule and proper/efficient irrigation technologies
- Casual labour	Yes	Not	Provide/Introduce entrepreneurship skills and IGAS	Capacity building on entrepreneurship like cottage industries – small scale
- Selling house hold assets	Yes	Not	II	II
Conflicts. - Negotiation (meetings) fair land use and management and other resources	Yes	Yes	Conflict prevention and mitigation through fair land use and water resources management	Community participation machinery with capacity to manage conflict
Use of existing by laws	Not	Yes	Improving the enforcement of by laws , by raising the community awareness on by laws and strengthening the local governance structures	Community participatory by laws formulation and review.
Conflict mediations	Yes	Yes	Predication based on legal instruments	

DISEASE							
- Treat of human and livestock diseases	Yes	Yes	Yes	Use of tradition medicine for human and animals	Capacity building on negotiation skills - Cop. Building or livestock disease at HH. Level. - Improve skills		
- Selling of livestock	Yes	Not	Not	- Improved livestock management	- Education on livestock - Entrepreneurship		
- Vaccination	Yes	Yes	Yes		- Improve facilitate infrastructure (eg. Cattle dips) - Drags availabilities - Proper Schedule - Awareness on tree planting, spices		
STRONG WIND							
Destruction of infrastructure tree planting	Not	Not	Yes	Improving tree planting and conservation and protection of Natural forests/trees	- Raising community ownership		
Rehabilitation/Renovation	Not	Not	Yes	Construction of stable infrastructures	- Work with experts to establish efficacy and dosage		
Diseases							
Use of tradition medicine/herbs	Yes	Yes	Yes	- Use of modern and tradition medicines	- Health education		
Go to hospital	Yes	Yes	Yes	Herbal medicine and modern	- Awareness raising on - Early warning system - Empowerment fire fighting (techniques) - Strengthening the capacity of village land board		
Bush fire use of by laws	Not	Not	Yes	Fire break use			
Land use management and plans	Not	Not	Yes	- Review the existing - Use of land, use plans which takes into account physical measures for the control of bush fire in participatory manner			
Trees planting	Not	Not	Yes	Planting tree and conservation and protection	- Appropriate tree spices be introduced Awareness-raising		

4. Way forward and recommendations

The vulnerability assessment carried out in Ruvu identified the following possible climate change adaptation activities that could address the main identified hazards - drought, floods and strong winds:

1. Construction of water storage facilities;
2. Involvement of upstream and downstream communities in addressing water use conflict, regulating water flow and conservation programs;
3. Formation of water user associations with representations from all stakeholders, including other natural resource groups (e.g. forest) and raising awareness among them;
4. Drilling of boreholes and wells to provide water for domestic and multiple uses;
5. Promotion of conservation farming;
6. Planting appropriate trees species around farms;
7. Acquisition of entrepreneurial skill among farmers and pastoralists and facilitation of access to capital through saving and credit cooperative societies (SACCOS) so as to promote adoption of alternate livelihood practices which are environmentally friendly; provision of cattle troughs and lining of canals to reduce water loss etc.

This information is useful for district planners to determine what may be effective approaches to aid the community reduce its vulnerability to climate related hazards. This list will be reviewed and prioritized with the communities to determine the feasibility of activities and what the project (GWI) could support.

Information from the community consultations was entered into CRiSTAL to analyse the sensitivity of current project activities to climate change hazards and impacts. The outputs of the analysis using CRiSTAL as a decision support tool can be found in Annex 3a-d. Annex 3d provides a summary of revised project activities with notes on synergies and barriers. The activities were first revised by looking at the influence of current activities on resources that were important for coping with hazards as well as resources influenced by hazards (see Annex 3c). Next, the activities were assessed for their sustainability considering the future climate context in the area. According to INC (2003), the Pangani basin was projected to have seasonal variation, some months with increase and decrease of runoff; annual basin runoff is estimated to decrease by 6%. The decreased could have serious impacts on social well being and economic development of the area. However, detailed modelling is needed that will be based on new generation of global climate models (GCMs).

According to the CRS project officer Eng. Harold Msanya, the following adjustment of project activities will be made to address some of the impacts of climate change in the project:

1. In the design of Naururu Irrigation Canal, the measuring device of water being abstracted will be incorporated. This will improve the allocation of water along the Pangani River and the amount of water being used by the canal users will be known and allocated accordingly.
2. Proper fill along the pipe line is required to avoid soil erosion in the area. During floods, the soils are washed away.

3. Protect against soil erosion around the tanks to be constructed by the project
4. To plant appropriate tree species to deter degradation along the pipeline and within vital installations

These project activity adjustments will reduce the vulnerability of the community to climate change hazards and improve the sustainability of the project.

Revised project activity	Is this revised activity sustainable with CC?	Why or why not?	Further revised activity
A 2.1.1 Investigate and identify feasible locations and designs for new water source developments	YES		
A 2.1.2 Identify and undertake the rehabilitation water supplies and address effects of CC .	NO	Because it does not mention clearly the issues of climate change like floods, drought and strong winds	A 2.1.2 Identify and undertake the rehabilitation of water supply systems including adaptation of predominant climate change issues like floods, strong wind and drought
A2.1.5 Design sanitation and hygiene promotion interventions, including the use of PHAST and hand washing with soap.	YES		
A2.1.7 Establish, strengthen school hygiene clubs and carryout school hygiene promotion activities, improve school sanitation	YES		
A2.2.2 Provide appropriate technology skills at the community level to enhance productive use of water, including watershed management and waste water re-use and Ecosan	YES		
A2.2.3 Support household level kitchen gardens and small-scale enterprises. Including improved use of agricultural inputs, credit facilities and access to markets; include land management.	YES		
A2.2.5 Support increased use of run-off for productive uses	YES		

Annex 1: List of Participants

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Annex 2: Workshop programme

TIME	ACTIVITY	WHO
Afternoon	DAY 1 (9th March 2009) Participants arrives at Same	
08:30- 09:00	DAY 2 (10th March 2009) Registration	All Participants
09:00 -09:30	Opening and Introduction	Pangani Project Coordinator All Participants
09:30- 10:30	Presentation on Climate Change Predicted climatic changes, hazards and risks for the region Responses to Climate change Mitigation Adaptation Questions and discussions	IUCN Facilitator
10:30 – 11:00	TEA BREAK	
11:00 – 12:00	Tools for climate change adaptation Questions and discussions	IUCN Facilitator
12:00 – 01:00	Implications for Pangani Basin and the GWI Project Questions and discussions	Pangani Project Coordinator
01:00 – 02:00	LUNCH	
02:00 – 04:00	CRiSTAL Tool – Theory Questions and discussions	IUCN Facilitator
04:00 – 04:15	TEA BREAK	All
04:15 – 05:00	CRiSTAL Tool – Theory Questions and discussions	IUCN Facilitator
08:30 – 09:15 09:15 – 01:00	DAY 3 (11th March 2009) Leave for Ruvu (Community) Village Practical data collection	All CRS, Same Diocese, Pangani Project Manager/Coordinator
01:00 – 02:00	Light bites and soft drinks at Ruvu Muungano Village	All
02:00 – 03:00	Leave for Same	All
03:00 – 04:00	Practical data summarization for entry by trainees in Same	All, IUCN Facilitator
04:00 – 04:15	TEA	All
04:15:	Practical data summarization for entry by trainees cont.	All, IUCN Facilitator
8:30 – 10:30	DAY 4 (12th March 2009) Practical data entry, analysis and report generation	All, IUCN Facilitator
10:30 – 11:00	TEA BREAK	All
11:00 – 01.00	Practical Project review for climate change proofing with project staff / trainees	All, IUCN Facilitator
01:00 – 02:00	LUNCH	All
02:00 – 03:30	Practical project review for climate change proofing with project staff / trainees cont.	All, IUCN Facilitator
03:30 – 03:45	TEA BREAK	ALL
03:45 – 04:30	Tools for Negotiation for Prioritization of adaptation measures with communities	IUCN Facilitator
04:30 – 04:45	Evaluation	All
04:45 – 05:00	Way forward and Closing	All

Annex 3: Climate Context Report

What are the synergies and/or barriers to implementing revised project activities?

Now that you have revised project activities, you are asked to identify the synergies and barriers to their implementation -- i.e. what issues, or developments might enable or inhibit the implementation of the adjusted project activity? Examples include local needs, local capacities, as well as financial, political and institutional support.

Original Project Activities	Revised Project Activities	Issues
A2.1.1 Investigate and identify feasible locations and designs for new water source developments	A 2.1.1 Investigate and identify feasible locations and designs for new water source developments	
A2.1.2 Identify and undertake the rehabilitation of existing water supplies	A 2.1.2 Identify and undertake the rehabilitation of water supply systems including adaptation of predominant climate change issues like floods, strong wind and drought	Funding for purchase of rehabilitating material, skills and land
A2.1.5 Design sanitation and hygiene promotion interventions, including the use of PHAST and hand washing with soap.	A2.1.5 Design sanitation and hygiene promotion interventions, including the use of PHAST and hand washing with soap.	Funds, human resources, and skills
A2.1.7 Establish, strengthen school hygiene clubs and carryout school hygiene promotion activities, improve school sanitation	A2.1.7 Establish, strengthens school hygiene clubs and carryout school hygiene promotion activities, improve school sanitation	Funds and human resources
A2.2.2 Provide appropriate technology skills at the community level to enhance productive use of water. Including waste water re-use and Ecosan	A2.2.2 Provide appropriate technology skills at the community level to enhance productive use of water, including watershed management and waste water re-use and Ecosan	Funds and human resources
A2.2.3 Support household level kitchen gardens and small-scale enterprises. Including improved use of agricultural inputs, credit facilities and access to markets.	A2.2.3 Support household level kitchen gardens and small-scale enterprises. Including improved use of agricultural inputs, credit facilities and access to markets; include land management.	Funds, human resources, skills and monitoring
A2.2.5 Support increased use of run-off for productive uses	A2.2.5 Support increased use of run-off for productive uses	Funds, human resource, land and willingness of community to participate

Climate Context Report

Name:

Global Water Initiative - Running Dry Project

Location:

Same District, Kilimanjaro Region

Implementing Agency:

Implementing agency

Brief Description of the Project:

GWI programme was developed in September 2006 with three strategic objectives (1) good governance (2) multiple use of water and (3) risk management. To ensure reliable access to clean water, and natural environment are not negatively impacted.

Brief Description of Project Context

The area is a semi arid lying along left bank of Pangani river. Water resource in the area is used for domestic, irrigated agriculture, livestock, fisheries and ecosystem services.

Hazard	Impact	Coping Strategy	Notes
Floods	Low yield	Improved storage facility and techniques	
	Diseases	construction of efficient water supply system and community empowerment	
	Damage to Infrastructure	construction of permanent houses for people living in low lands	
Drought	Low yield	Introduction of conservation farming and water harvesting	
	Conflict among farmers and livestock keepers	Conflict prevention and mitigation through fair land use and water resource management	
	Disease(both animal and human)	Combine modern and traditional medicine	
Strong wind	Destruction of infrastructure	Construction of permanent and stable infrastructure	
	Bushfire	Use of fire breaks	
	Disease(both human and animal)	Construct efficient water supply and community empowerment	

Livelihood Context Report

Name:

Global Water Initiative - Running Dry Project

Location:

Same District, Kilimanjaro Region

Implementing Agency:

CARE, IUCN, CRS and Local partners Diocese of SAME, PBWO and SAIPRO

Brief description of the project:

GWl programme was developed in September 2006 with three strategic objectives (1) good governance (2) multiple use of water and (3) risk management. To ensure reliable access to clean water, and natural environment are not negatively impacted.

Brief Description of project context:

The area is a semi arid lying along left bank of Pangani river. Water resource in the area is used for domestic, irrigated agriculture, livestock, fisheries and ecosystem services.

Extent to which livelihood resources are influenced by climate hazards identified in the climate context
(0 = no influence, 5 = very strong influence):

Hazards:		Floods					Drought					Strong wind								
		0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	
Natural resources	Resources																			
	Water					X						X						X		
	Land					X												X		
	Forest			X							X							X		
Physical Resources	Roads						X		X									X		
	Irrigation canals						X								X					
	Boreholes		X															X		
Financial Resources	Crops						X					X						X		
	Livestock				X							X					X			
	Honey/Fish	X										X								X
Human Resources	Agricultural skills		X							X					X					
	Local artisans (carpentry, masons)	X							X			X					X			
	Livestock skills		X							X							X			
Social Resources	Women's groups					X											X			
	Churches				X						X						X			
	Cooperative societies				X						X						X			

Hazard 1

Extent to which livelihood resources influence (positively or negatively) the coping strategies identified
(0 = no influence, 5 = very strong influence):

Floods	Impacts Coping strategies	Low yields					Disease					Damage to infrastructure							
		Improved storage facility and techniques					construction of efficient water supply system and community empowerment					construction of permanent houses for people living in low lands							
	Resources	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
Natural resources	Water			X									X				X		
	Land				X						X							X	
	Forest				X							X					X		
Physical Resources	Roads				X					X					X				
	Irrigation canals			X							X						X		
	Boreholes		X								X				X				
Financial Resources	Crops					X						X							X
	Livestock					X						X							X
	Honey/Fish					X					X								X
Human Resources	Agricultural skills						X					X					X		
	Local artisans (carpentry, masons)					X						X							X
	Livestock skills				X							X							X
Social Resources	Women's groups				X							X							X
	Churches				X					X					X				
	Cooperative societies						X					X							X

Hazard 2

Extent to which livelihood resources influence (positively or negatively) the coping strategies identified
(0 = no influence, 5 = very strong influence):

Drought	Impacts Coping strategies	Low yields					Conflict among farmers and livestock keepers					Disease (both animal and human)							
		Introduction of conservation farming and water harvesting					Conflict prevention and mitigation through fair land use and water resource management					Combine modern and traditional medicine							
	Resources	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
Natural resources	Water					X							X				X		
	Land						X					X						X	
	Forest				X					X									X
Physical Resources	Roads		X								X							X	
	Irrigation canals						X					X			X				
	Boreholes			X								X			X				
Financial Resources	Crops					X						X							X
	Livestock					X						X							X
	Honey/Fish				X						X								X
Human Resources	Agricultural skills						X				X						X		
	Local artisans (carpentry, masons)		X							X					X				
	Livestock skills					X					X								X
Social Resources	Women's groups		X								X				X				
	Churches				X						X								X
	Cooperative societies																		

Hazard 3

Extent to which livelihood resources influence (positively or negatively) the coping strategies identified
(0 = no influence, 5 = very strong influence):

Strong wind	Impacts Coping strategies	Destruction of infrastructure Construction of permanent and stable infrastructure					Bushfire Use of fire breaks					Disease(both animal and human) Contract efficient water supply and community empowerment								
		0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	
Natural resources	Resources																			
	Water					X			X											X
	Land						X			X									X	
Physical Resources	Forest				X				X							X				
	Roads					X			X								X			
	Irrigation canals				X			X											X	
Financial Resources	Boreholes				X			X											X	
	Crops						X			X									X	
	Livestock						X			X									X	
Human Resources	Honey/Fish				X			X										X		
	Agricultural skills			X					X									X		
	Local artisans (carpentry, masons)						X		X											X
Social Resources	Livestock skills			X					X									X		
	Women's groups					X				X									X	
	Churches				X				X									X		
	Cooperative societies				X				X										X	

Project Screening Report

Name:

Global Water Initiative - Running Dry Project

Location:

Implementing Agency:

Brief Description of the Project:

GWl programme was developed in September 2006 with three strategic objectives (1) good governance (2) multiple use of water and (3) risk management. To ensure reliable access to clean water, and natural environment are not negatively impacted.

Brief Description of Project Context:

The area is a semi arid lying along left bank of Pangani river. Water resource in the area is used for domestic, irrigated agriculture, livestock, fisheries and ecosystem services.

Activities	Resources strongly affected by hazards	Impact on resources most affected by hazards			Resources most important to coping	Impact of activity on resources most important to coping		
		Pos	Neg	Neu		Pos	Neg	Neu
Activity 1 A 2.1.1 Investigate and identify feasible locations and designs for new water source developments	Water	Pos			Water			Neu
	Land	Pos			Land			Neu
	Roads				Forest			Neu
	Irrigation canals			Neu	Roads			Neu
	Boreholes				Irrigation canals			Neu
			Pos		Boreholes			Neu

	Women's groups	Pos	Neg	Neu	Women's groups	Pos	Neg	Neu
Activity 3 A2.1.5 Design sanitation and hygiene promotion interventions, including the use of PHAST and hand washing with soap.					Churches	Pos		
					Cooperative societies	Pos		
		Pos	Neg	Neu		Pos	Neg	Neu
	Water	Pos			Water	Pos		
	Land			Neu	Land			Neu
					Forest			Neu
	Roads			Neu	Roads			Neu
	Irrigation canals			Neu	Irrigation canals			Neu
	Boreholes			Neu	Boreholes			Neu
	Crops			Neu	Crops			Neu
	Livestock	Pos			Livestock	Pos		
	Honey/Fish			Neu	Honey/Fish			Neu
					Agricultural skills			Neu
				Local artisans (carpentry, masons)	Pos			
				Livestock skills			Neu	
	Women's groups	Pos		Women's groups	Pos			
				Churches	Pos			
				Cooperative societies	Pos			
		Pos	Neg	Neu		Pos	Neg	Neu
Activity 4 A2.1.7 Establish, strengthen school hygiene clubs and carryout school hygiene promotion activities, improve school sanitation	Water	Pos			Water	Pos		
	Land			Neu	Land			Neu
					Forest			Neu

A2.2.5 Support increased use of run-off for productive uses

Water	Pos					
Land	Pos				Land	Pos
					Forest	Pos
Roads	Pos				Roads	Pos
Irrigation canals	Pos				Irrigation canals	Pos
Boreholes	Pos				Boreholes	Pos
Crops	Pos				Crops	Pos
Livestock	Pos				Livestock	Pos
Honey/Fish	Pos				Honey/Fish	Pos
					Agricultural skills	Pos
					Local artisans (carpentry, masons)	Neu
					Livestock skills	Neu
Women's groups	Pos				Women's groups	Pos
					Churches	Pos
					Cooperative societies	Pos

This Annex summarizes the revised project activities (after assessing their sensitivity to climate change impacts) and provides additional information on synergies and barriers.

Screening Process Summary Report

Name:

Global Water Initiative - Running Dry Project

Location:

Same District, Kilimanjaro Region

Implementing Agency:

CARE, IUCN, CRS and Local partners Dioocese of SAME, PBWO and SAIPRO

Brief Description of the Project:

GWl programme was developed in September 2006 with three strategic objectives (1) good governance (2) multiple use of water and (3) risk management. To ensure reliable access to clean water, and natural environment are not negatively impacted.

Brief Description of Project Context:

The area is a semi arid lying along left bank of Pangani river. Water resource in the area is used for domestic, irrigated agriculture, livestock, fisheries and ecosystem services.

Synergies and Barriers

Political Synergies & Barriers		
Original Project Activities	Revised Project Activities	Issues
A 2.1.1 Investigate and identify feasible locations and designs for new water source developments	A 2.1.1 Investigate and identify feasible locations and designs for new water source developments	
A 2.1.2 Identify and undertake the rehabilitation of existing water supplies	A 2.1.2 Identify and undertake the rehabilitation of water supply systems including adaptation of predominant climate change issues like floods, strong wind and drought	Funding for purchase of rehabilitating material, skills and land

A2.1.5 Design sanitation and hygiene promotion interventions, including the use of PHAST and hand washing with soap.	A2.1.5 Design sanitation and hygiene promotion interventions, including the use of PHAST and hand washing with soap.	Funds, human resources, and skills
A2.1.7 Establish, strengthen school hygiene clubs and carryout school hygiene promotion activities, improve school sanitation	A2.1.7 Establish, strengthen school hygiene clubs and carryout school hygiene promotion activities, improve school sanitation	Funds and human resources
A2.2.2 Provide appropriate technology skills at the community level to enhance productive use of water. Including waste water re-use and Ecosan	A2.2.2 Provide appropriate technology skills at the community level to enhance productive use of water, including watershed management and waste water re-use and Ecosan	Funds and human resources
A2.2.3 Support household level kitchen gardens and small-scale enterprises. Including improved use of agricultural inputs, credit facilities and access to markets.	A2.2.3 Support household level kitchen gardens and small-scale enterprises. Including improved use of agricultural inputs, credit facilities and access to markets; include land management.	Funds, human resources, skills and monitoring
A2.2.5 Support increased use of run-off for productive uses	A2.2.5 Support increased use of run-off for productive uses	Funds, human resource, land and willingness of community to participate

INTERNATIONAL UNION FOR THE CONSERVATION OF NATURE (IUCN)

Founded in 1948, IUCN is a membership organization or a Union that brings together States, government agencies and a diverse range of non-governmental organizations in a unique world partnership: Over 980 members in all, spread across some 140 countries. As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. IUCN builds on the strengths of its members, networks and partners to enhance their capacity and to support global alliances to safeguard natural resources at local, regional and global levels.



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The Global Water Initiative
A Partnership Funded by the Howard G. Buffett Foundation

