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Workshop Proceedings
**Tanzania Coastal Climate Change National Adaptation
Planning Workshop**

March 7-8, 2013

Stella Maris Hotel, Bagamoyo



COASTAL RESOURCES CENTER
University of Rhode Island



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Disclaimer: This report was made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents of this publication do not necessarily reflect the views of USAID or the United States Government.

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Acknowledgments

The University of Rhode Island would like to thank the Vice President's Office, Division of Environment and Pwani Project/Tanzania Coastal Management Partnership (TCMP) for their efforts in organizing this workshop, and the United States Agency for International Development (USAID) for its support. The organizers further would like to thank workshop participants who prepared presentations. These contributions provided participants with the introductions needed to understand coastal management, development, and climate change in Tanzania and the considerable work that has been done to date to understand and mainstream climate change adaptation into development planning. These presenters include:

Ladislaus Kyaruzi, Vice President's Office: "The NAPA and NAP process in Perspective"

Lewis Nzali, National Environment Management Council: "National Integrated Coastal Environment Management Strategy and Climate Change Mainstreaming"

Jennifer Frankel-Reed, USAID Global Climate Change Office: "Lessons Learned from NAP Processes"

Freddy K. Manyika, Vice President's Office, Division of Environment: "Tanzania's Efforts to Address the Impacts of Climate Change"

Yohana Shaghude, Institute of Marine Science, University of Dar es Salaam: "Climate Change Impacts in Coastal Tanzania"

A special appreciation is given to the principal workshop facilitator, Yoon Kim, supporting facilitators Charlotte Mack, Jim Tobey, Karen Kent and Joyce-Lynn Njinga, Senior Advisor Magnus Ngoile, Master of Ceremonies, Jeremiah Daffa, and photographer and special assistant Ashley Charleson.

Finally, the workshop's success would not be possible without the creativity, commitment, and participation of the many talented professionals who attended the workshop and contributed in plenary and breakout group discussions.

Executive Summary

A national workshop on *Tanzania Coastal Climate Change National Adaptation Planning* was hosted by the Division of Environment, Vice-President's Office (VPO) in Bagamoyo, Tanzania on March 7-8, 2013. Its objective was to build momentum and provide experience in the National Adaptation Plan (NAP) process that the Government of Tanzania is committed to under the United Nations Framework Convention on Climate Change (UNFCCC). A Roadmap and Technical Guide to the NAP process was finalized by the VPO shortly after the Workshop, so this was the first NAP activity prior to its release and prior to the public release of the National Climate Change Strategy at the end of March.

The Workshop focused on the cross-sectoral nature of climate change impacts specifically on the coastal and marine environment, and actions and institutions that could help society adapt. United Nations guidance on the NAP process states that the planning should be based on nationally identified priorities, and coordinated with national development objectives, plans, policies and programs. Therefore, the workshop used a methodology that starts with sectors and their development objectives and identifies adaptation actions to support those objectives, taking into account the larger context of other anthropogenic stressors and threats.

On the first morning, four high-level guests gave opening comments, followed by five speaker presentations that set the stage for the rest of the workshop. They all reinforced the importance of bringing climate change to the forefront of development because climate change is one of the most serious global threats to sustainable development, with adverse impacts already evident on the environment, human health, food security, human settlements, economic activities, natural resources and physical infrastructure. The comments, presentations, and a follow-up round robin of what participants are doing with their organizations in climate change adaptation also showed that Tanzania is not starting from scratch and people in the room already have substantial experience with vulnerability assessment and adaptation implementation.

The rest of the workshop involved active participant interaction in breakout sessions and plenary. The breakout sessions were organized by economic sectors representing the most critical sectors to coastal development. They included Fisheries, Human Settlements, Tourism, Forestry, and Agriculture. Participants in the five groups mapped the critical inputs and enabling conditions that they depend upon. The groups considered climate and non-climate threats to those key inputs as well as strengths and capacities. Key climate related impacts to critical inputs were then defined and the short-term versus the long term nature of the impacts were identified.

Considering the medium to long term impacts (as this is the focus of the NAP process), participants brainstormed actions and policies needed to address them for each sector. Participants toured the other tables, reviewed the ideas generated, and identified potential areas of collaboration or overlap. Finally, actions were prioritized based on criteria developed by each table and then sequenced. A plenary exercise posted priority actions on a typology of likelihood of success and level of benefits with those actions with high likelihood of success and high benefits representing the most promising opportunities.

Key messages that came out of the sessions included the inter-linkages of inputs, threats, adaptation actions and institutions across the sectors. Many sectors rely on the same inputs and enabling conditions. In addition, some of the inputs to one sector are other sectors, highlighting their importance to

development goals. For example, in addition to being its own important economic sector, water resources are a critical input for the fisheries, forestry, tourism, agriculture and human settlement sectors.

It was found that certain threats and constraints are more common than others but most climate change impacts, such as increased drought and flooding have significant consequences across many sectors. Also, both climate and non-climate threats are present in all sectors. Increases in temperature, heat waves, changes in precipitation, flooding, and drought were consistently identified as threats. Land use change, population growth, and pollution were other threats that were pervasive across sectors. Some of the groups noted that governance was a major constraint, pointing to a need for better implementation of existing policies and regulations. Insufficient political will and social capital was also discussed.

Actions to adapt to climate change impacts also led to some interesting cross-sectoral connections – both in terms of the substance of actions, and in terms of participation. For example, participants from the forestry group found that the fisheries group had proposed marine parks and protected coastal wetland areas that could also be a critical action in the forestry sector to protect mangrove ecosystems. Integrating education about climate change into the school curriculum was an action proposed by one group that all of the other groups also found relevant to their sector. A high level of duplication and crossover among sectors on the identification of institutions and programs was also noted.

In developing criteria for prioritizing actions, political will, cost-benefit ratio, multiple benefits and short-term benefits of adaptive actions were mentioned by more than one Group. In attempting to prioritize actions based on criteria it was found that:

- Longer lists of criteria make the task more difficult
- Handling the trade-off between short versus long term results and benefits can be difficult, especially in the context of communities living in poverty
- It is important to provide vulnerable resource user communities with concrete economic benefits and rights so that sustainable management makes economic sense for them

When groups plotted their highest priority actions on a two dimensional graph from low to high benefit and from low to high likelihood of success, almost all activities were placed in the high benefits zone. A discussion followed of what low priority actions would look like, with participants noting that deciding what *not* to do (saying no) is often more difficult than deciding what to do (saying yes).

Other findings and recommendations that emerged from the workshop, included issues related to funding, coordination across sectors, and how to mix science and policy in climate change adaptation planning. In terms of funding, aside from United Nations and other donor support, it was remarked that each of the sectors, such as those represented in the workshop, need to request from the treasury a small budget for climate change and all sectors need to increase the visibility and importance of climate change at the national level. While the need for coordination and an inclusive adaptation planning process was frequently emphasized, how to coordinate was found to be more challenging. A recommendation for a coordination process that also combines both the necessary pieces of science and management seemed to resonate with participants. The recommendation is to form issue-driven science and management panels that are composed of groupings of sectors or ecosystems for adaptation planning. Depending on donor interest and priorities, donors could select which groupings of sectors or ecosystems they want to support and participate in.

1. Introduction

The workshop *Tanzania Coastal Climate Change National Adaptation Planning*, took place in Bagamoyo, Tanzania on March 7 and 8, 2013. The workshop was hosted by the Government of Tanzania's Vice President's Office, Division of Environment (VPO/DOE) in collaboration with the University of Rhode Island's USAID/Pwani Project and the USAID Global Climate Change Office. The event was attended by more than 40 representatives from ministries, agencies, and other entities within the Government of Tanzania; NGOs; academia; the private sector; international development organizations; and the media. Forty-two percent of participants were women.

This report provides a detailed synthesis of the workshop: its design, objectives, information shared, and outcomes. The appendices provide relevant workshop materials, including the agenda, participant list, speakers' PowerPoint presentations, sector posters prepared in advance of the workshop, and outputs of small group exercises.

2. Workshop Objectives

The objectives of the workshop were to:

- Build momentum and lay the groundwork for the National Adaptation Plan (NAP) process that the Government of Tanzania is committed to
- Launch the Tanzania NAP process within the context of coastal priorities
- Propose and model a process for mainstreaming climate change adaptation into development objectives
- Demonstrate the inter-sectoral nature of climate change effects and adaptation actions
- Highlight findings on mainstreaming climate change adaptation into Tanzania's coastal development objectives
- Highlight findings on the process modeled in this workshop, its relevance to the larger NAP process in Tanzania and to NAP processes in general for other developing countries

3. Background

Today, it is widely recognized that climate change adaptation must be mainstreamed into the development agenda, since climate change is seen as one of the most serious threats to sustainable development, with adverse impacts on the environment, human health, food security, economic activity, natural resources and physical infrastructure.

This Workshop, hosted by the Division of Environment in the Vice-President's Office focused on the cross-sectoral nature of climate change impacts on the coastal and marine environment, and actions and institutions that could be used to respond. It was intended to build momentum and lay the groundwork for the National Adaptation Plan (NAP) process that the Government of Tanzania is committed to under the United Nations Framework Convention on Climate Change (UNFCCC). NAPs are continuous, iterative and inclusive processes that map out medium to long term adaptation strategies.

The UNFCCC Decision on National Adaptation Plans states that the planning should be based on nationally identified priorities, and coordinated with national development objectives, plans, policies and programs. Therefore, the workshop used a methodology that starts with development objectives and then identifies the inputs that are required to achieve those objectives. Next, the stressors and threats that affect the inputs and may hinder achievement of the objectives were determined. Based on identified stressors and threats, adaptation actions to support development objectives were generated and prioritized by participants.

4. Workshop Methodology and Structure

The methodology used for the workshop enabled participants to identify key ways in which climate change and other threats could affect Tanzania's long term development goals, as well as to identify and prioritize critical actions and institutional roles necessary to respond to these threats and achieve the country's vision. The methodology helped to raise awareness of the need to mainstream climate change into national development planning, generate support and buy-in for a cross-sectoral approach to climate change adaptation mainstreaming, and improve coordination by involving a wider group of stakeholders.

To ensure that diverse perspectives and areas of expertise were represented at the workshop, invitees included representatives from a diversity of government and non-government organizations. As the master of ceremonies stated,

“Having all the stake holders together, I think that we can come up with something tangible, which we can use to move forward with coastal and marine development.”

This institutional and sectoral diversity was critical to identifying cross-sectoral climate impacts, understanding how solutions in one sector can affect another, and facilitating cooperation between institutions that do not typically work together.

Tanzania uses the Development Vision 2025 framework as its main strategic development guide and the Integrated Coastal Environment Management Strategy (ICEMS) as the coastal strategic development guide within the context of the Development Vision 2025. In addition to mainstreaming climate change considerations into the ICEMS, Tanzania has recently developed a National Climate Change Strategy that was publically launched in the weeks following this workshop.

Following overviews of national development goals, NAPA and NAP processes in Tanzania, and a round robin of what various participating institutions are doing related to coastal development and climate change, each of five tables received an economic sector to consider. Economic sectors that represent the most critical sectors to coastal development issues formed the foundation of the workshop's breakout session exercises. These included Fisheries, Human Settlements, Tourism, Forestry, and Agriculture. Participants selected a sector and worked on that thematic area with other participants throughout the two days.

In the first day, participants mapped the critical inputs and conditions upon which their assigned economic sectors depend. They considered climate and non-climate threats to those key inputs as well as strengths and capacities. Finally, they identified key climate related impacts.

The second day began with a plenary exercise to consolidate all of the impacts and consider the short term versus the long term nature of the impacts identified. Based on the medium to long term impacts (as this is the focus of the NAP process), participants brainstormed actions and policies needed to address the climate change impacts identified for each sector, keeping in mind existing adaptation activities. Participants studied the ideas generated at the other tables, and identified potential areas of collaboration or overlap. Finally, actions were prioritized based on criteria developed by each table and then sequenced. A plenary exercise then appreciated the most promising opportunities by placing priority actions on a typology of likelihood of success and level of benefits with those actions with high likelihood of success and high benefits representing the most promising opportunities.



Figure 1. Participants in breakout session at five coastal sector table stations

5. Workshop Sessions

A. Opening Remarks and Speakers

The workshop opened with remarks from high-level individuals who reinforced the importance of bringing climate change to the forefront of development. Opening remarks were made by:

- Vice President's Office, Division of Environment: Freddy Manyika
- USAID/Pwani Project: Baraka Kalanghe
- USAID/Tanzania: Agathe Sector
- Guest of Honor, Deputy Permanent Secretary, Vice President's Office: Eng. Ngosi Mwihava

The Director of the USAID/Pwani Project, Baraka Kalanghe, stated that:

“Climate change affects almost everything in the coastal ecosystem: biodiversity, water resources, agriculture, fishing, infrastructure, and human settlements, among just a few. So, to mainstream climate change considerations into policies, strategies and plans, we need an integrated vision and we need to see how climate change impacts and how society responds to those impacts involves integration across many sectors.”

The Guest of Honor, the Deputy Permanent Secretary of the Vice President’s Office, Eng. Ngosi Mwihava, stated that:

“The impacts (of climate change) are already vivid and are being felt in many sectors. Adaptation is the over-riding priority to provide opportunities to cope with climate change and the National Republic of Tanzania recognizes the need to embrace adaptation planning in a broader context instead of in a piece meal way.”



Figure 2. Opening Remarks by the Guest of Honor, the Deputy Secretary of the VPO, Eng. Ngosi Mwihava

Five presentations were then delivered, which set the stage for the workshop sessions that followed.

1. Tanzania’s NAPA. Strategy and NAP Process

Mr. Ladislaus Kyaruzi, Vice President’s Office, stated that climate change is already happening and is expected to have complex short term, medium term, and long term consequences to livelihoods, the environment, and economy at various levels. Adaptation is necessary in order to increase the resilience of communities to the impacts of climate change. In 2007, Tanzania adopted a National Adaptation Program of Action (NAPA) after four years of preparation, research, and consultation. The NAPA identifies 14 priority areas, including the coastal sector.



Figure 3. Mr. Kanizio Fredrick Manyika, Division of Environment, Vice President’s Office

Two adaptation projects will be implemented with the United Nations Least Developed Countries Fund (LDCF) (\$3.5 million) and the United Nations Adaptation Fund (\$5.8 million).

The NAP builds on the NAPA, but is a longer term and iterative process with multiple trajectories. Its objective is to facilitate the integration of climate change adaptation in a coherent manner into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels.

A Roadmap and Technical Guidelines for the NAP process is being formulated and is almost finalized. It will guide the sequence of activities and resources needed in the NAP process. The estimated resources needed for the NAP process is \$790,000. How to fund this will be a big challenge. The proposed approach and tasks for the NAP process include:

- Development of criteria for selecting priority NAP projects
- Identification of thematic/sectoral areas that require further assessment
- Assessment and development of appropriate medium and long term adaptation needs and proposal of relevant interventions including institutional and policy measures

2. Integrated Coastal Environment Management Strategy and Climate Change Mainstreaming

Mr. Lewis Nzali, National Environment Management Council, stated that climate change is likely to result in significant alteration of coastal ecosystems, coastal hazards, and lifestyle changes for fishers, other coastal resource users, waterfront property owners and coastal communities. Recognizing the impact of climate change, NEMC formed a group to review the National Integrated Coastal Environment Management Strategy (NICEMS) to incorporate climate change issues into the Strategy.



Figure 4. Mr. Lewis Nzali, National Environment Management Council

Climate change was mainstreamed into Strategy 4 of the NICEMS and reformulated to read:

“Calls for establishing an integrated planning and management mechanism for coastal areas of high economic interest and/or substantial environmental vulnerability to climate change and variability, and natural hazards. Strategy 4 would address inadequate intersectoral coordination for coastal environmental management, and inadequate adaptation measures for coastal climate change and variability. Proposed proactive implementation measures include:

- Assessments of vulnerability
- Selecting courses of action
- Mainstreaming climate change considerations into development plans and strategies
- Implementation of adaptation measures
- Evaluation of adaptive management”

3. Building on NAP Experience in Other Countries

Ms. Jennifer Frankel-Reed, USAID Global Climate Change Office, summarized lessons learned from NAP processes in other countries. Best practices that emerge from other countries’ experience include:

- Start with development priorities, not climate projections, to solve the mainstreaming challenge
- Be strategic and prioritize where climate change matters most
- Look ahead to identify risks that require longer term adjustments
- Think about sectors and across sectors to avoid unintended consequences and identify actions with multiple benefits
- NAP is a process. Workshops establish buy-in on priorities that guide next steps, ownership, and action



Figure 5. Jennifer Frankel-Reed, USAID Global Climate Change Office

4. Tanzania's Efforts to Address the Impacts of Climate Change

Mr. Freddy Manyika, Vice President's Office, like the other speakers, stated that climate change is one of the most serious global threats to sustainable development, with adverse impacts already vivid on the environment, human health, food security, human settlements, economic activities, natural resources and physical infrastructure.

National level actions taken to address climate change vulnerability include:

- An assessment of vulnerability and adaptation to climate change (1994-1996) in the sectors of agriculture, water, coastal resources, and forestry.
- Completion of a National Adaptation Programme of Action (NAPA, 2007)
- Establishment of a National Climate Change Steering Committee (NCCSC, 2008)
- Establishment of a National Climate Change Technical Committee (NCCTC, 2008)
- Preparation of a Technology Needs Assessment (TNA, 2010) that identified technologies to adapt
- Preparation of a National Climate Change Strategy (NCCS, publicly launched in March 2013)

With respect to the coastal sector, the NCCS recommends adaptation strategies that include:

- Mechanisms for coastal erosion control
- Alternative technologies to enhance water availability
- Coastal land use planning
- Protection and conservation of coastal and marine ecosystems
- Decentralization of coastal systems management
- Alternative livelihoods

A current effort led by the VPO is to establish a climate change database and system for information sharing. Three donor-supported projects managed by the VPO include:

- African Adaptation Program on “Mainstreaming Climate Change Adaptation in the National Sectoral Policies of Tanzania”
- Least Developed Country Fund (\$5.8 million) for the project “Development of Core Capacity to Address Adaptation to Climate Change in Productive Coastal Zones of Bagamoyo, Rufiji, Pangani and Zanzibar (2012-2017)”
- Adaptation Fund project in Dar es Salaam: Seawall rehabilitation and construction on Ocean Road and Kigamboni drainage systems, mangroves, and coral reefs (2012-2017)

5. Climate Change Impacts in Coastal Tanzania

Dr. Yohonda Shagude, Institute of Marine Science, summarized scientific data on climate change trends that include increases in ambient air temperature; reduced overall precipitation with increased variability in rainfall patterns and more intense rain events; increased wind speed; and rising sea level from the thermal expansion of the sea due to warmer sea temperatures.

These effects manifest themselves in the coastal and marine environment as bleaching and mortality of coral reefs; farmed seaweed die-offs and reduced levels of natural seagrass in shallow areas; mortality of mangrove trees and landward retreat; increased coastal erosion; flooding damage to roads and infrastructure; and reduced seasonality predictability for fishermen and agriculture.

The historical record for sea level is not long; only Zanzibar extends 30 years. The Zanzibar record shows a trend of falling sea levels. Dr. Shagude noted that there are two physical processes: the global sea level is rising, but land can also rise or sink. The island of Unguja is probably rising faster than the sea is rising. Historical data for Mombasa is long and shows Mombasa sea levels are increasing, but very minimally. This is also likely a case of rising land mass as the geology for the Zanzibar channel area is similar.

B. Other Current Initiatives on Climate Change Adaptation in Coastal and Marine Environments

In plenary, representatives of organizations briefly informed the group of past, on-going and future initiatives in coastal climate change adaptation in Tanzania.

1. WWF is conducting climate change vulnerability assessments on their natural resource management programmes in East Africa, including one in Tanzania. A vulnerability assessment will be completed for the Rufiji-Mafia-Kilwa Seascape. A systematic methodology has been used that was developed by WWF and the World Bank.
2. The World Bank supported Marine and Coastal Environment Project (MACEMP) ended in 2012, but a follow-on project may be developed. Another project with Terms of Reference coming soon is to study the threats and challenges to coastal areas using a GIS spatial vulnerability assessment along the coast. This will help determine where the priorities are for climate change project investments.
3. IMS conducts research into climate change parameters over time. IMS is developing a tool for predicting coral bleaching events using sea surface temperature from satellite data. IMS is also advising property owners and hotel developers on how to protect their property from climate change impacts.

4. TAFIRI (Tanzania Fisheries Research Institute) is formulating a research agenda on six themes, of which climate change is one. Research areas will include climate change economics, climate change vulnerability and adaptation planning, and the resilience of aquatic organisms.
5. The Ministry of Agriculture is reviewing agricultural policy to identify climate change issues. The Ministry is also conducting research and extension on disease and drought tolerance; working on climate change awareness in coastal regions; and is formulating strategic climate change adaptation interventions.
6. Pwani/USAID project has assisted six coastal communities with vulnerability assessment and adaptation planning in Zanzibar (Paji and Jambiani), Bagamoyo District (Mlingotini and Kitonga), and Pangani District (Mwembeni and Sange) and has conducted overall vulnerability assessments for Pangani District coastal villages and Bagamoyo District coastal villages. Actions in communities being carried out are integrated beekeeping for mangrove conservation, mango and other fruit and cash crop planting, drought and pest resistant banana crops, beach grass planting and monitoring, and village to village study tours with District officers.
7. USAID/TNZ is developing a new program that will focus water, agriculture, and the coastal interlinkages. This will involve the various Water Basin Offices, the Ministry of Agriculture, the Ministry of Water, farming communities, and Irrigation Offices. This new initiative will not begin before next year. USAID/TNZ also expects to soon be partnering with the University of Dar es Salaam (UDSM) on the effects of climate change on rice and maize in the Rufiji basin, and climate change impacts on water, crop productivity, and soil and water management.
8. The Zanzibar Department of Environment has developed Integrated Coastal Management Committees and action plans in 10 districts with World Bank support. The impacts of climate change on Pemba Island and the East coast of Unguja have been severe.
9. WIOMSA supports research, extension, conferences and publications, including books, on climate change impacts, climate change adaptation and the coastal and marine environment in the Western Indian Ocean region. Over the last 3 years, climate change adaptation has been a focus. A product is the book “Adapting to a Changing Environment.” Over the next 3-4 years, research will focus on helping communities and institutions to adapt.
10. Fisheries and Livestock Department supports alternative livelihood development in all coastal Districts.
11. Sea sense supports community-based education and awareness on climate change and coastal habitat conservation and sustainable livelihoods.
12. IRA/USDm supports teaching and research on climate change. It has put climate change in the course curriculum. IRA is also involved in several projects, including with the African Climate Change Program.
13. STATOIL, the Norwegian gas and oil company, supports mapping of coastal and marine areas for environmental management and Environmental Impact Assessment.

C. Breakout Sessions

Breakout Session 1: Build a “map” of relationships among coastal economic sectors and the inputs and enabling conditions they depend upon

The objective of breakout session 1 was to produce a “map” of relationships among economic sectors for use in later exercises and analyses. Each table was assigned one economic sector of importance for the

coast, which is also highlighted in Tanzania’s National Climate Change Strategy. Participants answered the question “What *economic* and *environmental inputs* and *enabling conditions* are required for success in this sector?” Economic and environmental inputs include land, labor, capital, infrastructure, water, etc. and enabling conditions are the regulations, laws, capacities, and policies that enable the responsible use of economic and environmental inputs. For each sector, participants wrote the inputs and conditions on post-it notes, linked those to the sectors, and then grouped those inputs and conditions that have similarities and/or interlinkages.

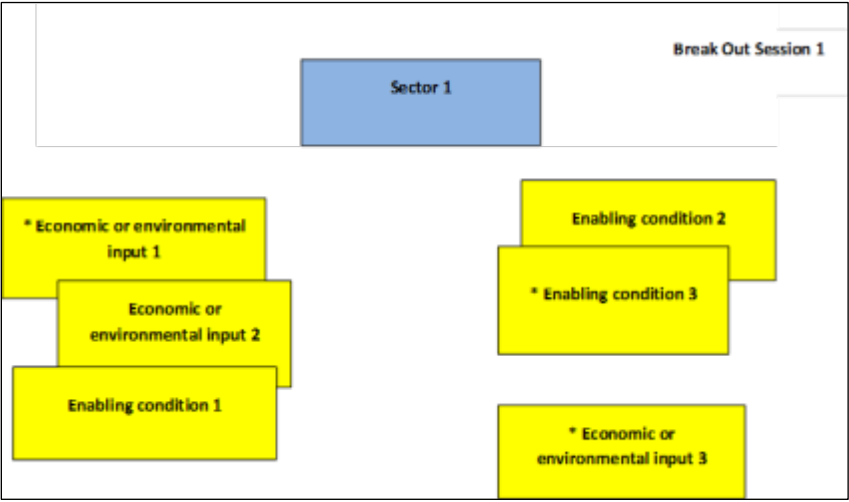


Figure 6. Graphic guidance for session one

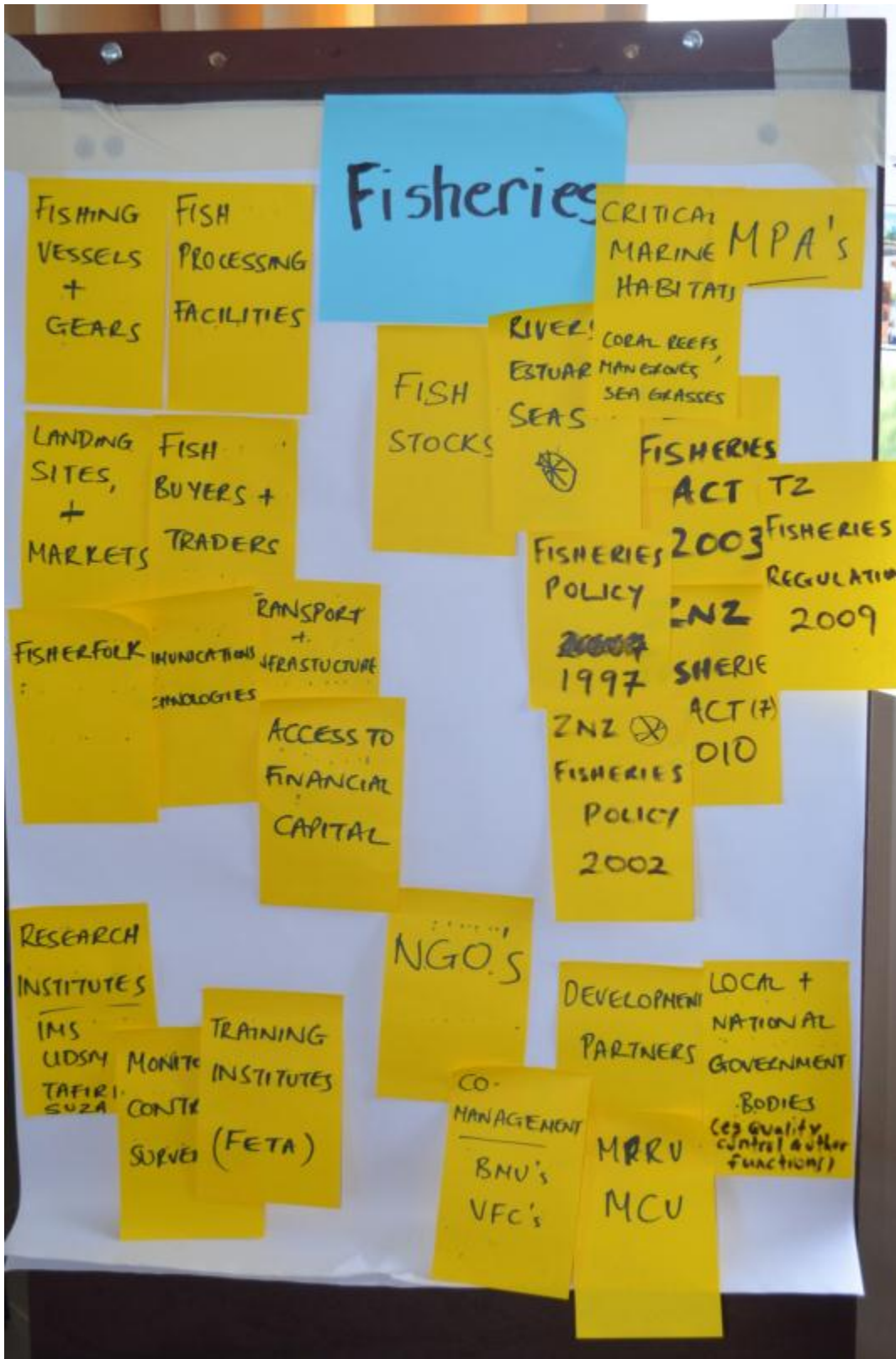


Figure 7. Inputs and enabling conditions in the fisheries sector

One of the key messages that came out of breakout session 1 was that many sectors relied on the same inputs and enabling conditions. The word map in Figure 8 shows the relative frequency with which inputs were mentioned in the different groups; water, roads and other infrastructure and energy were among the most common. In addition, the cross cutting nature of sectors and inputs was noted. For example, in addition to being its own important economic sector, water resources is a critical input for the fisheries, forestry, tourism, agriculture and human settlements sectors that were the focus of this workshop.

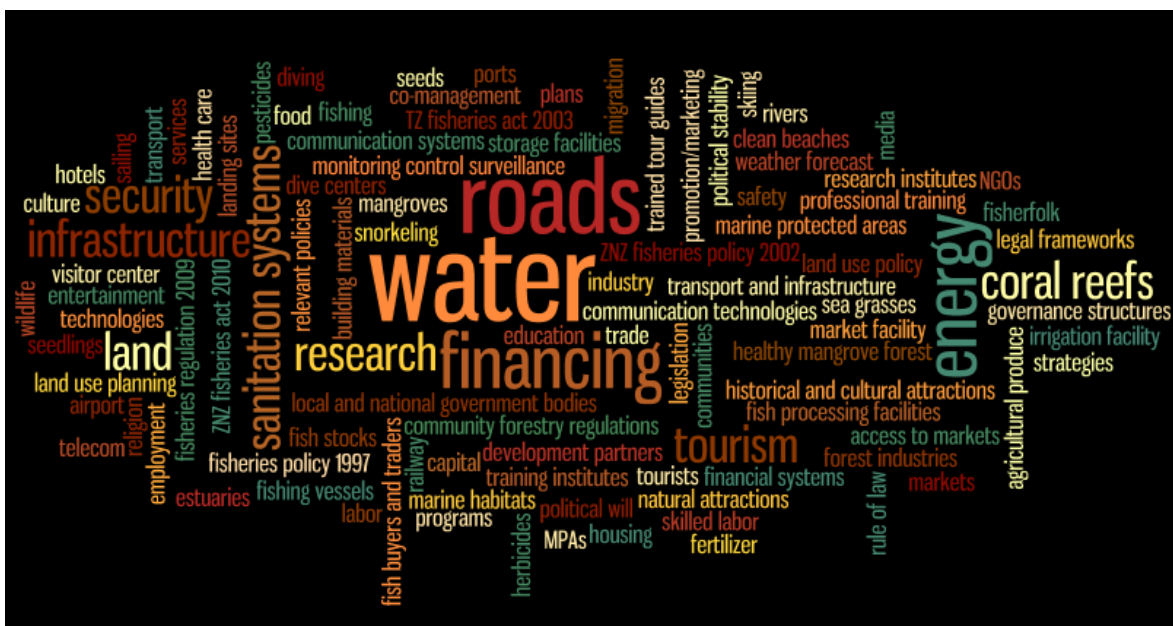


Figure 8. Word map of the relative frequency with which inputs were mentioned in the five sector groups

Breakout Session 2: Add threats and constraints, then strengths and capacities to the “map” of relationships and identify key climate related impacts

The objective of this breakout session was first to identify climate and non-climate threats and constraints that may affect the economic/environmental inputs and enabling conditions identified in Session 1. Examples of climate threats are warmer temperatures, droughts, floods, storms, and sea level rise. Non-climate threats include pollution, overharvesting of resources, high population growth, and rural-urban migration (non-climate threats). Constraints include high energy costs, unenforced regulations, and a shortage of skilled labor. Participants labeled each of the inputs and enabling conditions with the relevant threats and constraints.

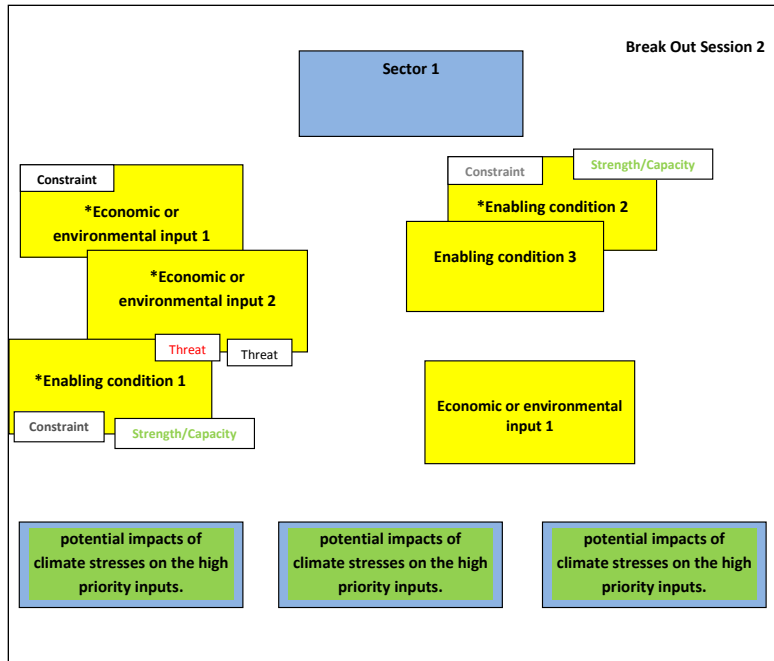


Figure 9. Graphic guidance for session two

Participants found that certain threats and constraints were more common than others. In particular, increases in temperature, heat waves, changes in precipitation, flooding, and drought were consistently identified as potential threats. Land use change, population growth, and pollution were other threats that were pervasive across sectors. Some of the groups noted that governance was a major constraint, pointing to a need for better implementation of existing policies and regulations. Insufficient political will and social capital were also discussed.



Figure 10. Threats and Constraints laid over the Tourism Map of Relationships

In addition to threats and constraints, participants identified strengths and capacities that represent opportunities for safeguarding the economic or environmental inputs identified. Examples of strengths and capacities included credit facilities, Participatory Forestry Management (PFM), District Integrated Coastal Management (ICM) Action Plans, existence of a meteorological system, and research institutions.

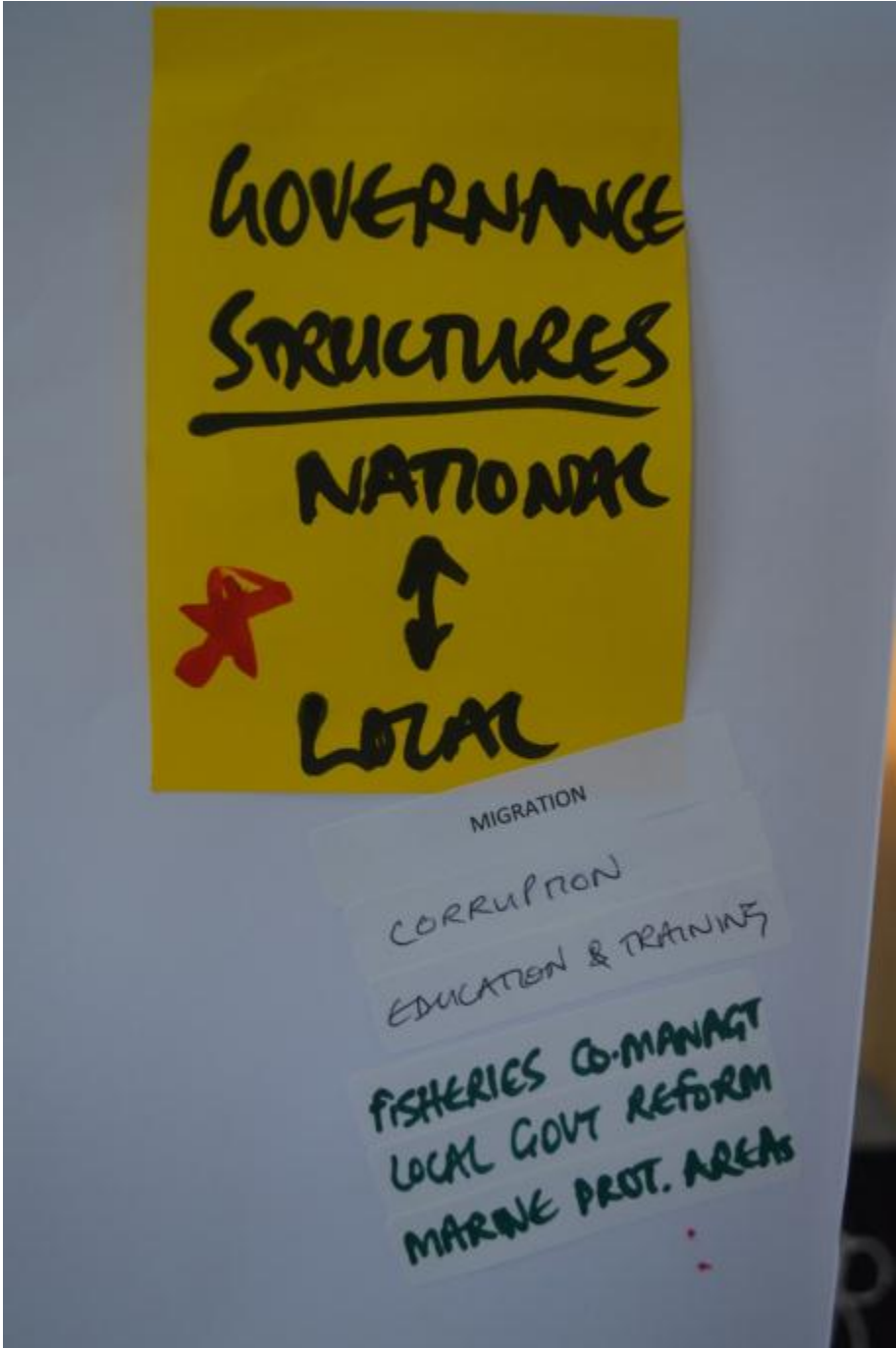


Figure 11. Example of Strengths and Capacities Identified in the Human Settlements Sector

This break out session concluded with the identification of potential impacts for the climate stressors on the high priority inputs. Some common impacts identified were: droughts that increase the scarcity of fresh water resources for household, tourism, agricultural and energy needs and affecting flows into fisheries ecosystems; and, increasing storm surges and weather events that damage infrastructure affecting agriculture, fisheries, forestry, tourism and human settlements. Impacts are listed in the table below and organized on a continuum from near term to long term.

Table 1. Impacts of climate stressors on priority inputs

Fisheries	
Near-Term Impacts	<ul style="list-style-type: none"> • Changes in precipitation will: reduce freshwater flows to estuaries; increase salinity and damage vegetation and species sensitive to salinity; and, increase runoff (sedimentation/pollution)
Longer Term Impacts	<ul style="list-style-type: none"> • Warmer sea temperatures cause coral bleaching and mortality; changes in fish distribution and productivity; seagrass/seaweed die off; stress and disease to marine organisms; increased erosion; and, mangrove loss
Tourism	
Near Term Impacts	<ul style="list-style-type: none"> • Coastal erosion is leading to loss and damage to beaches and infrastructure that support tourism • Drought and floods will cause food, water and energy shortages limiting tourism activities. • Drought and temperatures will reduce water needed by animals causing migration and death of wildlife
Longer Term Impacts	<ul style="list-style-type: none"> • Floods and sea level rise will cause damage to tourism related infrastructure • Sea level rise will cause inundation of natural, historical and cultural resources which will prevent tourism in those areas • Rise of sea temperature causes salinization which results in coral bleaching and decreasing mangroves • Changes in seasons due to climate change will affect the length and timing of tourism seasons
Agriculture	
Near Term Impacts	<ul style="list-style-type: none"> • Flooding can restrict mobility of extension workers • Flooding can close and damage roads, limiting market access • Flooding can impede use of farming equipment • Coastal flooding can affect germination and/or wash seeds away • Drought can lead to reduced germination percentage • Drought can cause food shortage, resulting in illegal harvesting of resources and potentially leading to conflict and destruction of natural resources • Intense rainfall can damage storage facilities and destroy crops • Increased intensity of rainfall can cause floods, affecting soil erosion and decreasing productivity • Higher temperatures may reduce worker productivity
Longer Term Impacts	<ul style="list-style-type: none"> • Sea level rise affects land and water quality through saline intrusion
Forestry	
Near Term Impacts	<ul style="list-style-type: none"> • Coastal and inland flooding affects infrastructure, causing loss of property and life, reducing labor • Coastal and inland flooding causes need for emergency responses potentially diverting of financial resources • Drought affects growth patterns causing loss of forest cover • Drought may cause forest/bush fires resulting in loss of timber/firewood and possibly leading to loss of community livelihoods
Long Term Impacts	<ul style="list-style-type: none"> • Ocean acidification can change the growing environment for mangrove, reducing mangrove area

Human Settlements	
Near Term Impacts	<ul style="list-style-type: none"> • Drought may make water resources more scarce for household use and shambas (small crop gardens) • More unpredictable rainfall and more drought may decrease subsistence agricultural production and reduce food security
Longer Term Impacts	<ul style="list-style-type: none"> • More intense storm surges may cause greater erosion and damage and disruption to housing • Higher sea temperature and increased drought will lower fisheries productivity and reduce food security

Participants noted that the NAP process is focused on medium to long term planning as opposed to the NAPA, which was shorter term. They also noted that some impacts are both short and long term in nature, while sea level rise, ocean acidification, and ocean temperature rise are generally long term impacts. Participants also noted that a single climate change impact, such as increased drought and flooding had significant consequences across many sectors.

Breakout Session 3: Identify actions, policies and institutions to address climate impacts

In their sector table groups participants suggested actions, policies and institutions needed to address the climate impacts identified in their map. Actions are things that people or institutions can do, such as replicating the community based forestry model in the coastal zone to improve mangrove conservation and protection. Policies include laws, regulations, strategies, and plans.

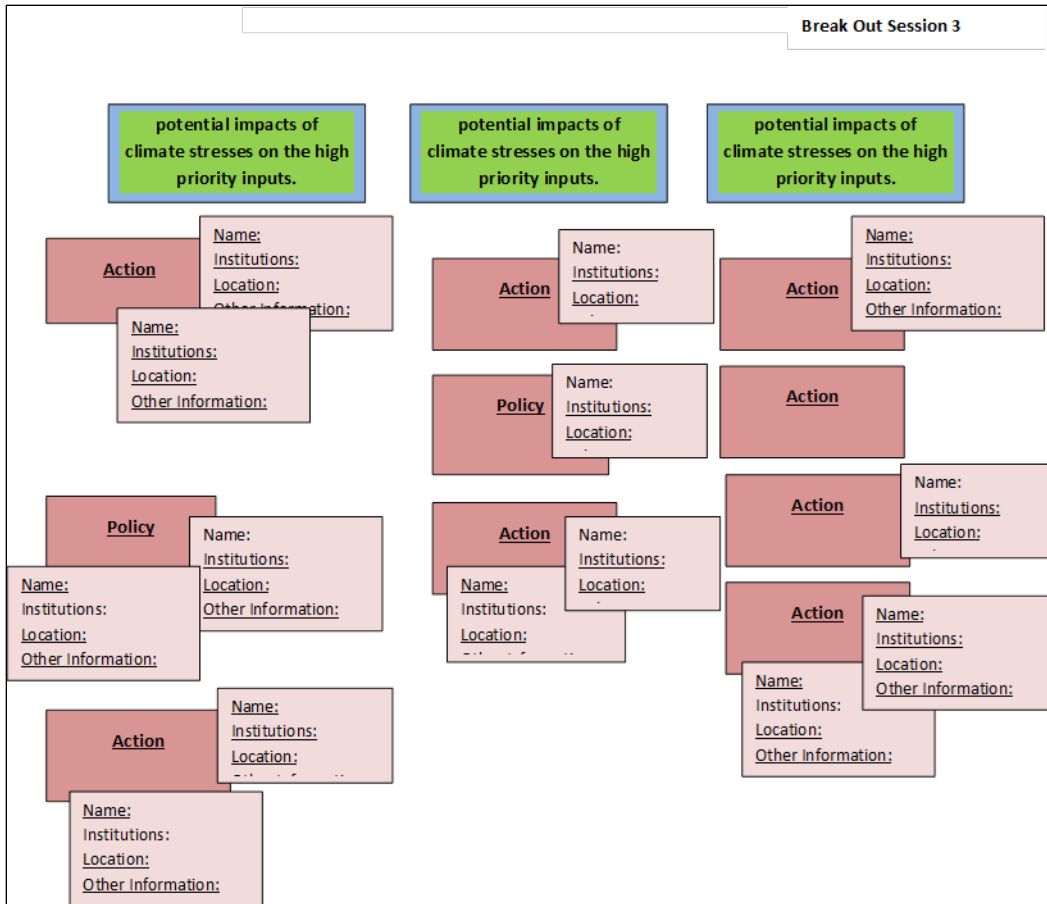


Figure 12. Graphic guide to session three

Actions discussed in multiple groups included diversification of livelihoods, early warning systems, better land use planning and enforcement of existing plans. Groups also highlighted the need for general policies (e.g., a climate policy or land policy), as well as more specific policies (e.g., a mining policy or a seed policy). To encourage cross-sectoral dialogue, during the coffee break, participants moved around the room to observe the work of other tables, identifying actions and institutions relevant to bring back to their own table and adding actions and institutions to the maps of others where they saw gaps.



Figure 13. Master of Ceremonies, Jeremiah Daffa, reviewing human settlement adaptation actions

Table 2. Actions Discussed by the Groups

Fisheries	<ul style="list-style-type: none"> • Replant mangroves • Enforce land use planning regulations • Include environmental education and climate change in primary school curriculum • Mainstream climate change consideration in relevant policies • Strengthen community-based enforcement • Support Beach Management Units (BMU's) and Village Fisherman Committees (VFC's) to take action against illegal fishing • Implement and enforce marine no-take areas
Tourism	<ul style="list-style-type: none"> • Promote coral planting and protection • Develop disaster preparedness plans • Improve drainage systems • Implement seasonal forecasting and early warning systems • Introduce alternative land use planning • Promote alternative sources of income • Encourage water harvesting and storage/sustainable use of water extraction
Agriculture	<ul style="list-style-type: none"> • Promote post-harvest crop processing • Drill well far from the sea • Undertake research on water desalination • Research drought tolerant seed varieties • Enhance irrigation agriculture • Use multiple information communication channels • Strengthen early warning systems • Promote integrated farming systems • Improve drainage systems • Construct dams for rainwater harvesting
Forestry	<ul style="list-style-type: none"> • Implement early warning system

	<ul style="list-style-type: none"> • Diversify income generation activities • Proper land use planning • Construction of seawall • Awareness and education on emergency response and disaster preparedness
Human Settlements	<ul style="list-style-type: none"> • Introduce drought tolerant crops that do not need too much rain to foster food security and short term crops • Strengthen coastal zone land use planning • Introduce resilient building standards • Promote water recycling (for irrigation) • Improve food storage system and alternative livelihood promotion • Introduce early warning system and weather forecasting • Improve infrastructure • Diversify livelihoods

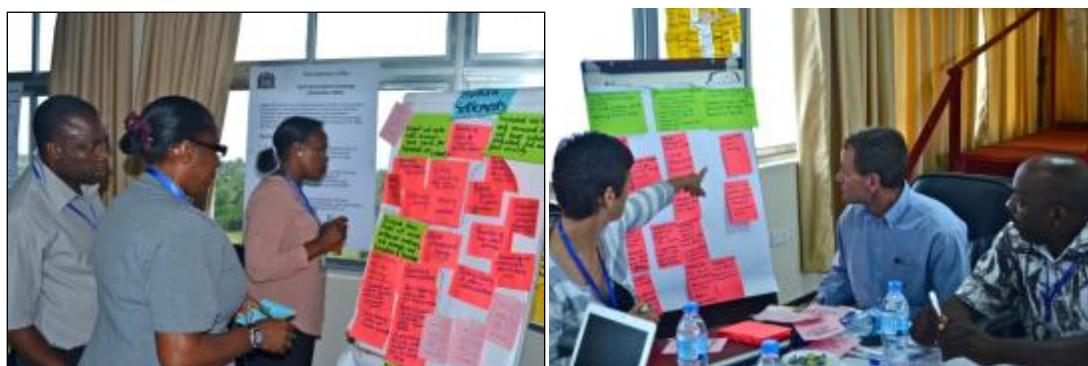


Figure 14. Human settlements map of relationships **Figure 15.** Defining fisheries actions

The walk-about in this session led to some interesting cross-sectoral connections, both in terms of the substance of actions, and in terms of participation. For example, participants from the forestry group found that the fisheries group had proposed marine parks and protecting coastal wetland areas that could also be a critical action in the forestry sector to protect mangrove ecosystems. Integrating education about climate change into the school curriculum was an action proposed by one group that all of the other groups also found relevant to their sectors. A high level of duplication and crossover among sectors on the identification of institutions and programs was noted by the participants. For example, the following institutions were mentioned by at least three of the five groups:

- District Council
- Department of Agriculture
- District Council
- Department of Agriculture
- Marine Parks and Reserves
- National Land Use Planning Commission

Ministry of Land
National Environment Management Council (NEMC)
Sea Sense
Institute of Marine Science (IMS)
Tanzania Fisheries Research Institute (TAFIRI)
Ministry of Natural Resources and Tourism
Vice President's Office (VPO)

Breakout Session 4: Identify Criteria for Prioritizing Actions

The objective of Session 4 was to facilitate participants to reflect on strategic prioritization of the key actions identified and to reflect on whether some actions need to be done before others. A summary of the criteria defined by each group is provided below.

Criteria for prioritizing actions

Mentioned by more than one Group	<ul style="list-style-type: none"> • Acceptability and political will to support activities • Multiple benefits • Cost/benefit ratio • Activities that have near term benefits and that do not sacrifice long term benefits • Effectiveness and feasibility of the action • Availability of financial resources and skills for the action
Other criteria	<ul style="list-style-type: none"> • Socio-economic importance of the benefit • Magnitude of the impact/benefit • Select actions that build on existing initiatives • Activities that engage local communities and can be carried out with local resources • Target ecosystems that are already highly impacted but are restorable • Environmental impact and sustainability of the action

During a plenary discussion of the criteria generated by each group, participants noted that:

- Longer lists of criteria made the task more difficult
- Several groups identified the criteria of multiple benefits stemming from a single action
- Handling the trade-off between short versus long term results and benefits was difficult, especially in the context of communities living in poverty
- Awareness raising and public education on the need to manage resources sustainably for both short and long term to provide sustained benefits were discussed. Also, noted was the need to develop participatory management systems that provide vulnerable resource user communities with concrete economic benefits and rights so that sustainable management makes economic sense for them.

Finally participants were asked to identify the most promising opportunities among the actions they had identified by plotting their highest priority actions on a two dimensional graph from low to high benefit and from low to high likelihood of success. Almost all activities were placed in the high benefits zone. A discussion followed of what low priority actions would look like, with participants noting that deciding what *not* to do (saying no) is often more difficult than deciding what to do (saying yes). Hard anti-erosion infrastructure on the coast was identified as one such action that might not be the highest priority

investment in the Tanzania economic context since they are costly to install and maintain, and can cause problems up or down the coast.

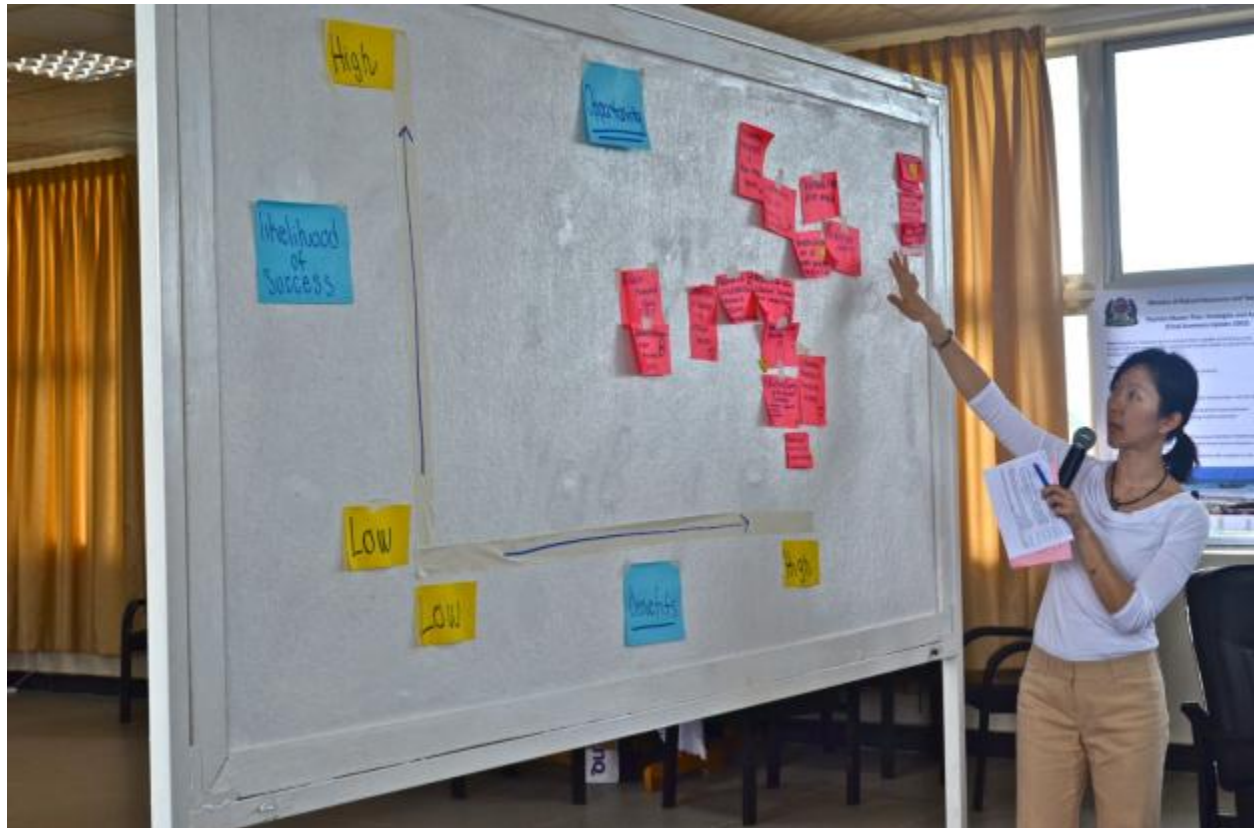


Figure 16. Typology of actions: likelihood of success vs. overall benefits

D. Plenary Session

The speakers from the morning of the previous day (Freddy Manyika, VPO; Lewis Nzali, NEMC; Yohana Shaghude, IMS; and Ladislaus Kyaruzi, VPO) formed a panel, offered summaries of workshop content and took questions from the plenary.

Among the cross-cutting issues discussed were funding, how to coordinate among sectors, and how to mix science and policy in climate change adaptation decision making.

It was noted that the Vice President’s Office, through the Division of Environment holds a monthly Environmental Working Group meeting that is receptive to any sector participating. Another suggestion from Dr. Magnus Ngoile was to organize issue-driven science and management panels composed of groupings of sectors or ecosystems to advise on climate change adaptation. Depending on donor interest and priorities, donors could select which groupings of sectors and/or ecosystems they want to support and participate with in the NAP process.

In terms of budget for climate change mainstreaming and adaptation, it was noted that environment and climate change issues are not priorities in the national budget. VPO should not be the only institution requesting budget for climate change adaptation. In Tanzania, climate change is viewed as an issue that is the sole responsibility of the Division of Environment and its environmental staff. However, climate change is a cross-cutting issue that is likely to affect most sectors directly or indirectly. Thus, each sector, including those represented in the workshop, needs to request from the treasury a small budget for climate change. Further, to increase the priority for climate change issues, it was suggested that reporting on climate change issues be improved. Many climate change activities at the sub-national level are not reported to the VPO and national government. As Jeremiah Daffa commented, without national visibility, “we might end up dancing in the air without clicking our feet on the soil.”



Figure 17. Dr. Magnus Ngoile offering ideas

E. Closing Remarks

In closing, Mr. Freddy Manyika thanked the organizers and participants for making the workshop a success. He reiterated that the workshop was very useful, relevant, and informative. He noted that “*This is the start of the NAP process there is a lot of work and challenges ahead, including technical, financial and policy/institutional aspects. They are all important in the process and we have identified them as challenges.*”



Figure 18. Closing remarks by Mr. Freddy Manyika, Vice President's Office

6. Participant Feed-Back

Participants were asked to provide comments in plenary on the workshop and its methodology. Participants appreciated the hands on and interactive nature of the workshop methodology as opposed to the usual workshop format dominated by presentations.

Participants were also asked to fill out an evaluation form at the end of the workshop. The results of the survey about the effectiveness of the workshop are portrayed in Figures 19-23 below. Seventy-one percent of the twenty-one participants who submitted evaluation forms said that the workshop was very useful and 29 percent somewhat useful in building momentum for Tanzania's work toward National Adaptation Planning.

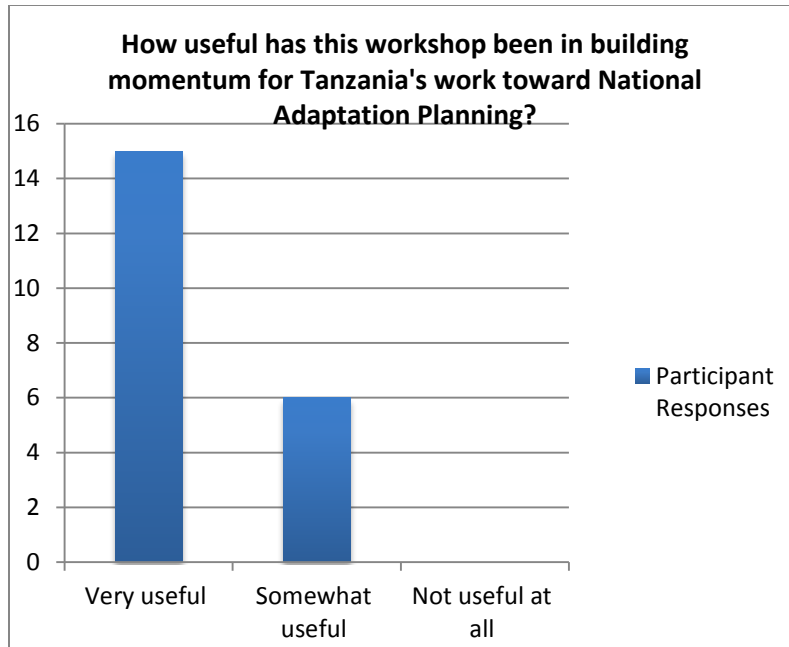


Figure 19. Workshop effectiveness

In terms of what was most useful, the most frequent responses concerned facilitating collaboration across different sectors, prioritizing actions, and development of the NAP process (Figure 20).

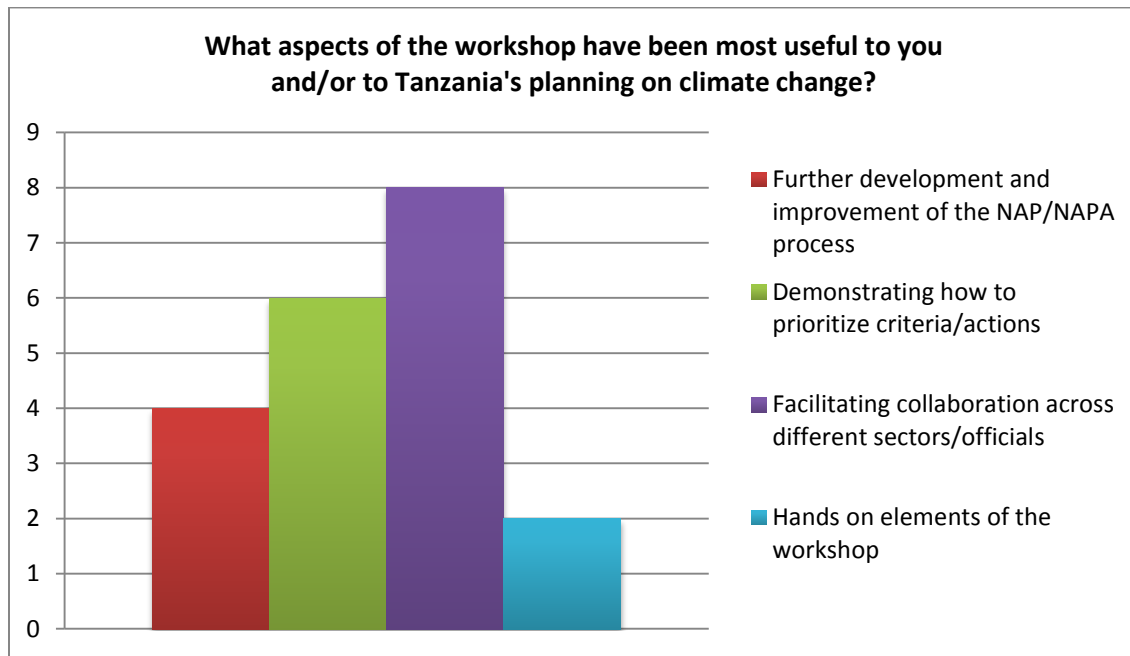


Figure 20. Most useful workshop aspects

With respect to how the workshop built understanding of linkages across sectors in adaptation planning and action, the most frequent response was that it facilitated cross-sectoral interaction and collaboration between stakeholders (Figure 21).

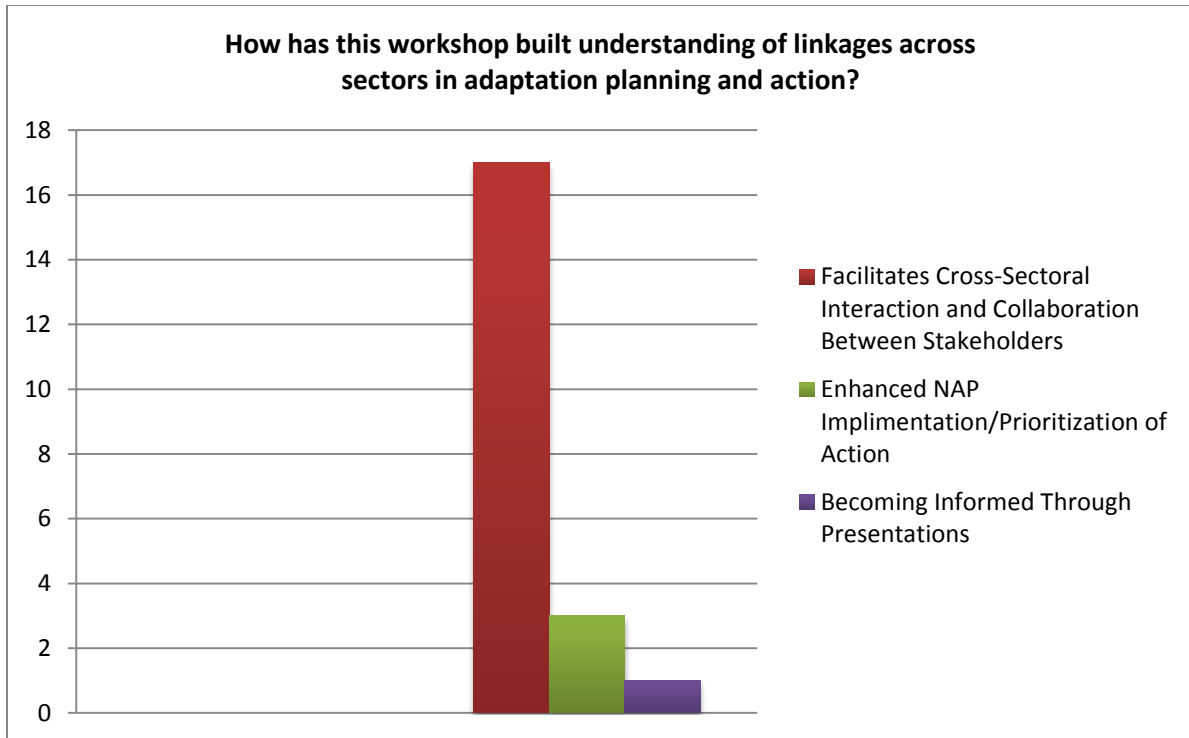


Figure 21. Results for evaluation question on building linkages across sectors

The most frequent responses to the question concerning the most important next steps in advancing Tanzania’s climate change planning were: sharing workshop results and recommendations; additional cross-sectoral collaboration; and mobilizing financial resources (Figure 22).

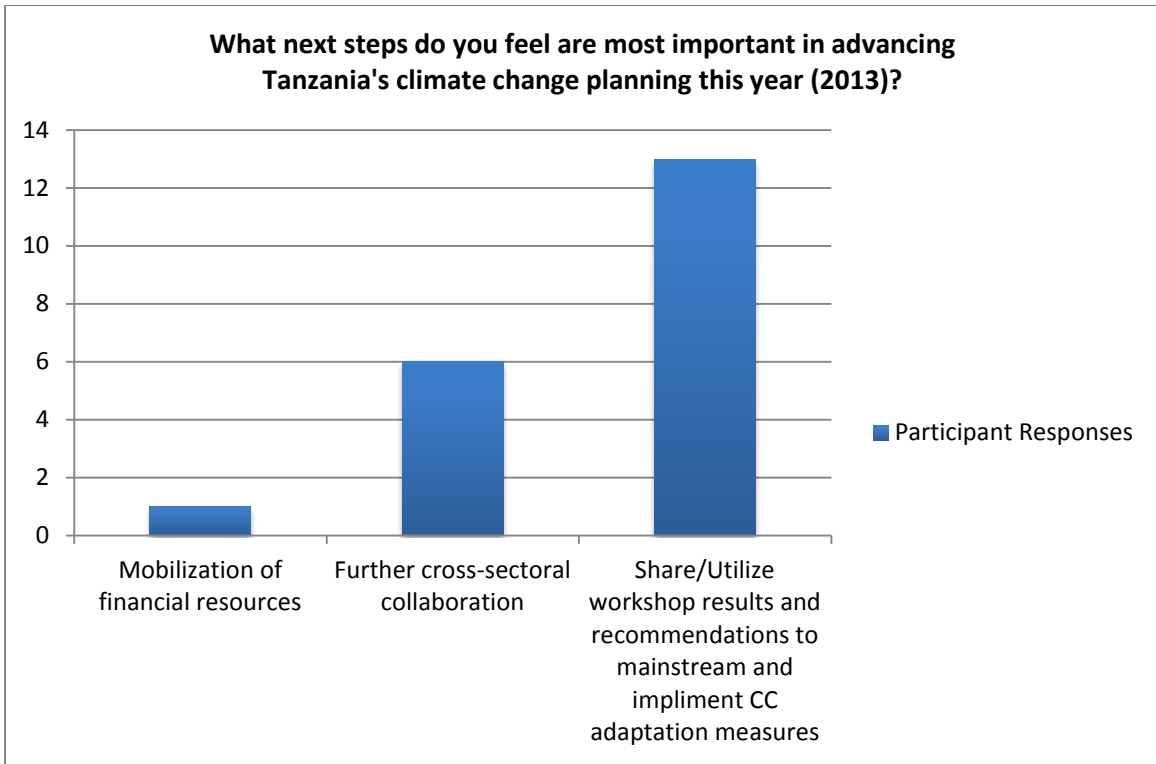


Figure 22. Next step in advancing Tanzania’s climate change planning

Finally, when asked about important next steps to implement adaptation actions in Tanzania, the following responses were given: share workshop results and recommendations; additional cross-sectoral collaboration; mobilize financial resources; and, prioritize actions (Figure 23).

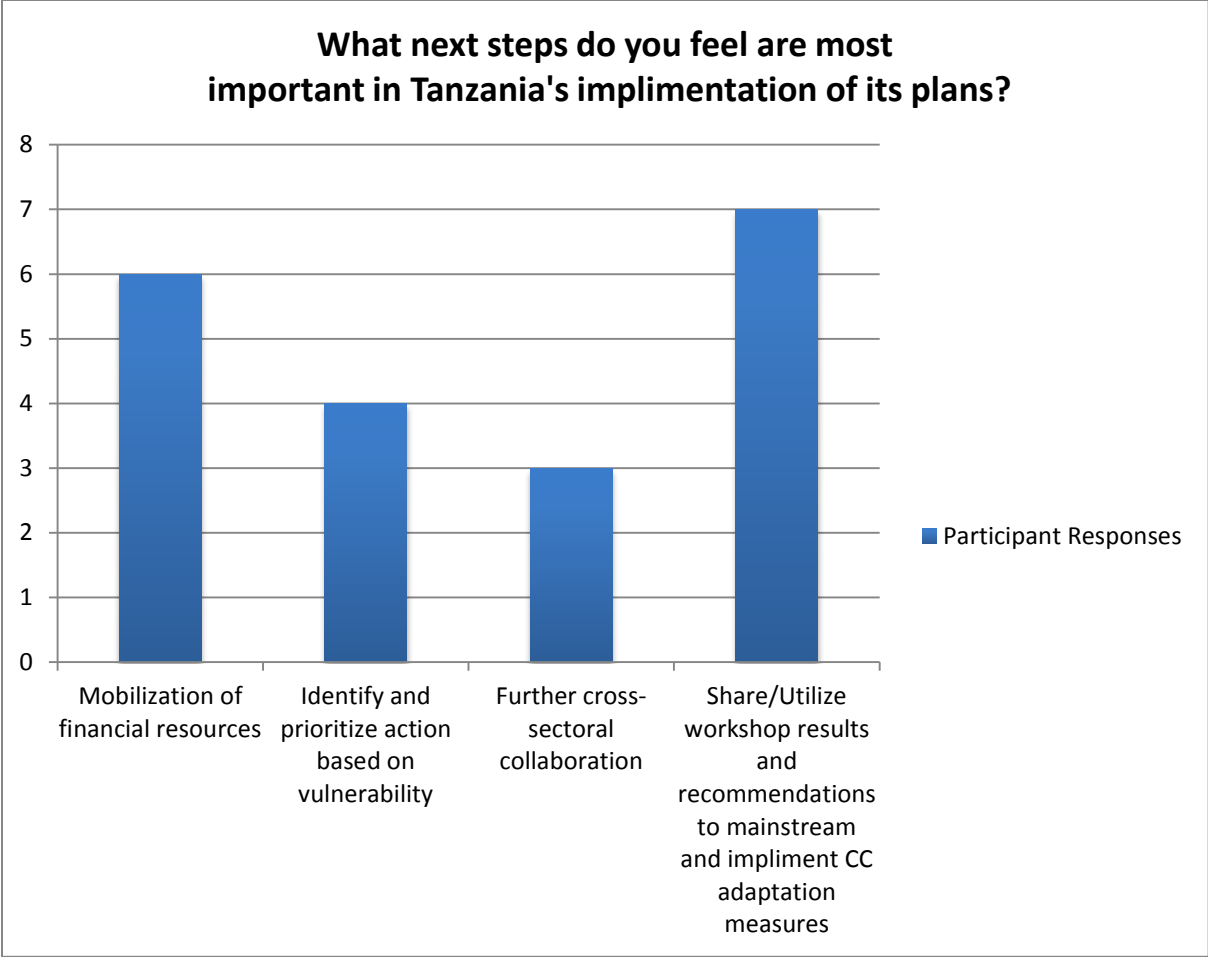


Figure 23. Next steps in implementing climate change adaptation

References

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- Fisheries Sector Development Programme, Ministry of Livestock and Fisheries Development, December, 2010
- Marine Parks and Reserves Unit Strategic Plan (2006-2010), Ministry of Natural Resources and Tourism, 2006
- National Adaptation Program of Action (NAPA), Vice President's Office, January, 2007
- National Integrated Coastal Environment Management Strategy, Vice President's Office, January, 2003
- National Strategy for Growth and Reduction of Poverty II, Ministry of Finance and Economic Affairs, July, 2010
- Rural Development Strategy, Prime Minister's Office, December, 2001
- Seaweed Development Strategic Plan, Ministry of Natural Resources and Tourism, June, 2005
- Tanzania Development Vision 2025
- Tourism Master Plan: Strategies and Actions, Ministry of Natural Resources and Tourism, April, 2002
- Water Sector Development Program (2005-2025), Ministry of Water, July, 2006
- Yanda, P. (2013), "Coastal and Marine Ecosystems in a Changing Climate – the Case of Tanzania," background paper prepared for the University of Rhode Island, 33 pp.

Appendix A: Agenda

Tanzania Coastal Climate Change NAP Workshop

Location: Stella Maris Hotel, Bagamoyo

Date: March 7-8, 2013

Agenda

DAY 1	
8:00-9:00	<i>Registration</i>
9:30-10:30	<ul style="list-style-type: none"> ▪ Master of Ceremonies opening remarks and self-introduction ▪ Department of Environment remarks ▪ USAID/Pwani Project remarks ▪ USAID/TZ remarks ▪ Guest of Honor, Permanent Secretary, Vice President's Office remarks ▪ Group photo
10:30-10:45	<i>Tea and Coffee</i>
10:45-12:30	<ul style="list-style-type: none"> ▪ Workshop Objectives and Overview (Daffa) ▪ Tanzania's NAPA Strategy and NAP process (DOE/VPO) ▪ Integrated Coastal Environment Management Strategy and climate change mainstreaming (NEMC) ▪ Building on NAP experience in other countries (USAID/GCC) ▪ Current efforts to address coastal climate change adaptation in Tanzania (self-reporting by each participant organization led by VPO)
12:30-13:00	<ul style="list-style-type: none"> ▪ Climate change impacts in coastal Tanzania (Dr. Shagude, IMS)
13:00-14:00	<i>Lunch</i>
14:00-15:00	<ul style="list-style-type: none"> ▪ Breakout Session #1: Each table will build a map of relationships among coastal economic sectors and the inputs/conditions they depend upon
15:00-15:15	<i>Tea and Coffee break</i>
15:15-16:45	<ul style="list-style-type: none"> ▪ Breakout Session #2 – Each table will map both climate and non-climate threats and constraints to the key inputs/conditions identified in Breakout Session #1 and identify key impacts of climate stressors.
16:15-16:45	<ul style="list-style-type: none"> ▪ Facilitated discussion of findings, interlinkages, and dependencies among tables (Facilitator: Dr. Ngoile and Dr. Yoon Kim)
16:45-17:00	<ul style="list-style-type: none"> ▪ Day 1 wrap-up and preview of Day 2; invitation to reception (Master of Ceremonies)
18:00-20:00	<i>Reception Cultural Item</i>

DAY 2	
9:00-9:15	<ul style="list-style-type: none"> ▪ Introduction to Day 2 (Facilitator: Daffa)
9:15-9:45	<ul style="list-style-type: none"> ▪ Facilitated discussion of climate impacts on the various sectors and short medium and long term nature of the impacts (Facilitator: Dr. Yoon Kim)
9:45-10:45	<ul style="list-style-type: none"> ▪ Breakout Session #3 – Each table will identify measures, policies and institutions to address climate impacts identified on its map
10:45-11:15	<p><i>Tea and Coffee break</i></p> <p><i>Participants move among tables and indicate ongoing activities/volunteer to fill gaps</i></p>
11:15-12:15	<ul style="list-style-type: none"> ▪ Breakout Session #4: Each table identifies criteria for strategic prioritization of adaptation measures, prioritizes and sequences its priorities
12:15–13:00	<ul style="list-style-type: none"> ▪ Plenary Discussion: Criteria for strategic prioritization of adaptation measures
13:00-14:00	<p><i>Lunch</i></p>
14:00-15:00	<ul style="list-style-type: none"> ▪ Panel Discussion: Wrap up and next steps (Facilitator: VPO, Daffa, Dr. Ngoile)
15:00-15:15	<ul style="list-style-type: none"> ▪ Closing Remarks (VPO)
15:15-15:30	<ul style="list-style-type: none"> ▪ Vote of Thanks - Participant
15:30-16:15	<p><i>Adjourn - Tea and Coffee</i></p>

Appendix B: Participants

Tanzania Coastal Management Partnership
National Adaptation Planning Workshop
March 7, 2013

	Name	Organization
1	Eng. Ngosi Mwihava	Vice President's Office, Deputy Permanent Secretary
2	TDJ Mangazeni	Vice President's Office
3	Zubeda Majiji Z.M. Hepautwa	Vice President's Office
4	Evelyn Mkokoi	Vice President's Office
5	Risper Koyi	Vice President's Office
6	Salome G. Killo	Vice President's Office
7	Freddy K. Manyika	Vice President's Office, Division of Environment
8	Ladislaus Kyaruzi	Vice President's Office, Division of Environment
9	Emelda Teikura Adam	Vice President's Office, Division of Environment
10	Dr. Constantine M. Shayo	Vice President's Office, Division of Environment
11	Jennifer Frankel-Reed	USAID Global Climate Change Office
12	Agathe Sector	USAID/TNZ
13	Lewis Nzali Mtemi	National Environment Management Council
14	Omar Halum Fom	Marine Conservation Unit, Department of Fisheries Development, Zanzibar
15	Saida I. Omar	Department of Environment, Zanzibar
16	Omar H. Fom	Department of Fisheries, Zanzibar
17	Dr. Yohana W. Shaghude	Institute of Marine Sciences, University of Dar es Salaam
18	Anita Julius	Marine Parks and Reserves Unit
19	Alistidia Karaze	Tanzania Tourist Board
20	Winnifrida Mrema	Ministry of Energy and Minerals
21	Innocent Ngao Wanyonyi	Western Indian Ocean Marine Science Association
22	Knut Yngue Davanger	STATOIL
23	Erick Mchome	STATOIL/EXONMOBIL
24	Dr. James G. Lyimo	Institute of Resource Assessment, University of Dar es Salaam
25	Theresia Massoy	Ministry of Agriculture Food Security and Cooperatives, EMV
26	Florian Mkeya	Ministry of Natural Resources and Tourism/Tanzania Forest Service
27	Martin E. Mrema	Ministry of Natural Resources and Tourism
28	Upendo Minja	Tanzania Chamber of Commerce, Industry & Agriculture
29	Mussa Biboze	Tanzania Port Authority
30	Semvua Mzighani	Tanzania Fisheries Research Institute
31	Jason Rubens	WWF
32	Magrett Dominic	Ministry of Livestock and Fisheries Development
33	Frida Urrio	Pangani District Council
34	Lindsey West	Sea Sense
35	Marietha Msembele	Channel Ten, Mwandish
36	Shabani Tolle	ITV
37	Sara de Wit	University of Cologne
38	Tobias von Platen	World Bank

38	Paskalia Bazil	Ministry of Water
39	Modest Zacharia	Ministry of Water/Wami Ruvu Basin Water Office
40	Magnus Ngoile	University of Dar es Salaam
41	Jeremiah Daffa	Pwani Project/TCMP
42	Safarani Msuya	Pwani Project/TCMP
43	Baraka Kalanghe	Pwani Project/TCMP
44	Jairos Mahenge	Pwani Project/TCMP
45	Jim Tobey	University of Rhode Island, Coastal Resources Center
46	Karen Kent	University of Rhode Island, Coastal Resources Center
47	Ashley Charleson	University of Rhode Island
48	Lyly Njinga	IRG
49	Yoon Kim	IRG
50	Charlotte Mack	ICF International

Appendix C: Sectoral Posters



Ministry of Livestock and Fisheries Development


**Fisheries Sector Development Program
(December 2010)**

Goal: *To develop a sustainable, competitive, and more efficient fisheries and aquaculture industry that contributes to the improvement of the livelihoods of stakeholders and the national economy while preserving the environment*

Objectives

- Ensure effective fisheries resources management, protection, and conservation
- Strengthen fisheries and aquaculture products utilization and marketing
- Strengthen and support fisheries and aquaculture research, training extension and information services
- Develop and strengthen appropriate fisheries and aquaculture infrastructure
- Promote aquaculture development, management, and environmental conservation





Ministry of Natural Resources and Tourism

**Marine Parks and Reserves Unit
Strategic Plan
(2006-2010)**


Goal: *To establish and manage Tanzania's marine protected areas for sustainable use*


Objectives

- Marine and coastal resources are conserved for sustainable use
- Communities are involved and fully participate in the management and conservation of marine and coastal resources
- Management of Marine Protected Areas (MPAs) and delivery of high quality services from them is carried out efficiently

Enabling Legislation

- Marine Parks and Reserves Act (1994)
Provides for the establishment, management, and monitoring of marine parks and reserves
- Fisheries Act (2003)
Provides for protection, conservation, and regulation and control of fish, fish products, and aquatic flora and its products





Vice President's Office, Division of Environment

**National Adaptation Programme of Action
(January 2007)**


NAPA Vision

- 1) To identify immediate and urgent Climate Change Adaptation Actions that are robust enough to lead to long-term sustainable development in a changing climate.
- 2) To identify climate change adaptation activities that most effectively reduce the risks that a changing climate poses to sustainable development.

NAPA is linked with other national development policies, goals, objectives, plans, and strategies

Sector	Rank Order
Agriculture and food security	1
Water	2/3
Energy	2/3
Forestry	4
Health	5
Wildlife	6/7
Tourism	6/7
Industry	8
Coastal and marine resources	9
Human settlements	10
Wetlands	11

Sector	Activities	Rank
Coastal and marine resources	Construction of artificial structures, e.g. sea walls	1
	Restoration of degraded habitats, e.g. beach grass planting, mangrove planting, and stimulation of coral reef growth	2
	Reduction or elimination of non-climate stressors e.g. destructive fishing practices and damaging extraction	3
	Relocation due to sea level rise of small island communities	4
	Establishment of protected areas	5
	Desalination of saltwater where possible	6



Vice President's Office

**National Integrated Coastal Environment Management Strategy
(January 2003)**

Vision: *A coast with thriving coastal settlements where people rely on the coast and its abundant resources for their food and livelihood and are actively working to protect and sustain the resource base*

Goal: *Implement National Environment Policy and related policies in conserving, protecting and developing the resources of Tanzania's coast for use by present and future generations, to ensure food security and support economic growth*

Strategies

- Support local level environmental planning and integrated management of coastal resources and activities and provide mechanisms to harmonize national interests with local needs.
- Promote integrated, sustainable and environmentally friendly approaches to development of major economic issues of coastal resources to optimize benefits.
- Conserve and restore critical habitats and areas of high biodiversity while ensuring coastal people continue to benefit from sustainable use of the resources
- Establish an integrated planning and management mechanism for coastal areas of high economic interest and/or with substantial environmental vulnerability to natural hazards.
- Develop and use an effective coastal ecosystem research, monitoring and assessment system that will allow available scientific and technical information to inform decisions.
- Provide meaningful opportunities for stakeholder involvement in the coastal development process and implementation of coastal management policies
- Build both human and institutional capacity for interdisciplinary and inter-sectoral management of coastal environment

Updating the Strategy to mainstream Climate Change considerations is on-going



Ministry of Finance and Economic Affairs

**National Strategy for Growth and
Reduction of Poverty II
(2005/06 – 2009/10)**

Goal: Foster a commitment to accelerating economic growth and fighting poverty

Objectives

- Emphasis on a more focused and sharper prioritization of interventions – projects and programs in key priority growth and poverty reduction sectors
- Strengthen evidence-based planning and resource allocation in the priority interventions
- Align strategic plans of Ministries, Departments and Agencies (MDAs) and local Government Authorities (LGAs) to this strategy
- Strengthen government's and national implementation capacity
- Scale up the role and participation of the private sector in priority areas of growth and poverty reduction
- Improve human resources capacity, in terms of skills, knowledge, and efficient deployment
- Foster changes in mind-set toward hard work, patriotism, and self-reliance
- Mainstream cross cutting issues in MDAs and LGAs processes
- Strengthen the monitoring and reporting systems
- Improve implementation of core reforms, including further improvement of public financial management systems



Prime Minister's Office

**Rural Development Strategy
(December 2001)**

Goal: Stimulate socio-economic growth of the rural economy by building on the gains achieved at macro level, facilitate prioritized action for the development of assessment indicators, as well as create a process for a more systematic involvement of the private sector and civil society in the fight against poverty.

Objectives

- Provide a strategic framework that will facilitate the co-ordinated implementation of sector policies and strategies concerned with the development of rural communities
- Provide support for the implementation of the Poverty Reduction Strategy and create a development environment that will contribute to enabling rural communities and households achieving sustainable livelihoods.
- Identify short and medium term priorities that will support the goal of sustainable livelihoods, and contribute to the long-term goal, outlined in Vision 2025, of sustained economic growth



**Ministry of Natural Resources and
Tourism**

**Seaweed Development Strategic Plan
(June 2005)**

Goal: Promote *cottonii* production as an income generating activity for Tanzania's coastal inhabitants; reduce poverty of coastal communities; and, improve stewardship of marine and coastal resources

Objectives

- Create an investment environment that encourages new investment and maintains confidence of all seaweed industry stakeholders
- Build the capacity of producers to be become self-reliant
- Expand extension and research in the seaweed industry
- Increase farmer productivity by promoting better farm management practices so that it becomes a primary sources of income
- Increase awareness about *cottonii* farming as an attractive income generating business



Ministry of Natural Resources and Tourism

**Tourism Master Plan: Strategies and Actions
(Final Summary Update 2002)**

Goal: Develop an integrated tourism product that is capable of attracting a low volume, high yield segment of the international tourism market to spend their entire holiday in Tanzania

Objectives

- Develop a range of high standard special interest products
- Develop activity and soft adventure products
- Develop a beach resort product
- Develop a cultural/historical tourism product
- Eliminate obstacles due to inadequate access, poor infrastructure, and lack of utilities
- Establish an attractive climate for enterprise development and investment
- Establish a destination campaign to create strong market awareness

Key Activities

- Further enhancement and diversification of the proven Northern Wildlife Area
- Development of the coastal zones involving beach resort tourism along the coast, including Mafia and other offshore islands
- Enhancement of the Dar es Salaam and environments with emphasis on the urban waterfront and the offshore islands





Agricultural Sector Lead Ministries (ASLMs)

Agricultural Sector Development Programme (ASDP)

Goal: Increase growth, reduce food insecurity, and accelerate poverty reduction (particularly in rural areas) by increasing agricultural productivity, higher added value, and improving producer price incentives.

Objectives

- To enable farmers to have better access to and use of agricultural knowledge, technologies, marketing systems and infrastructure, all of which contribute to higher productivity, profitability, and farm incomes
- To promote private investment based on an improved regulatory and policy environment



Ministry of Water

Water Sector Development Program (2005-2025)

Goals: Achieve the Millennium Development Goals for access to safe water, sanitation, and a sustainable environment, while also setting targets for 2010.

Objectives:

- Develop a sound water resources management and development framework in all nine water basins, for optimising the utilization of water resources in a sustainable manner for the various competing uses
- Promote good governance of water resources through empowering water users, encouraging participatory and transparent decision-making, devolving ownership to the user level, and granting secure water rights with responsibilities to the water users, community groups, local government and Basin Boards






Appendix D: PowerPoint Presentations

Ladislaus Kyaruzi, Vice President's Office

<p style="text-align: center;">The NAPA and NAP process in Perspectives</p> <p style="text-align: center;">A presentation prepared for workshop on mainstreaming adaptation into Coastal and Marine Development 7-8 March 2012, Bagamoyo, Coast region</p>	<p style="text-align: center;">Structure of the presentation</p> <ul style="list-style-type: none"> • Introduction • NAPA Context • The NAPA process • The NAPA Process and challenges • The NAP Context and process • Proposed approach to develop NAP in Tanzania • Conclusion and recommendations 	<p style="text-align: center;">Introduction</p> <ul style="list-style-type: none"> • Climate change is already happening and is expected to have complex, short term, med-term and long term consequences to the livelihood, environment and economy at various levels • Developing countries, particularly the Least Developed Countries (LDCs), are already suffering and are expected to continue suffering disproportionately from the adverse effects of climate change • Even if the Ghg emissions stops today, it is difficult to escape from the impending effects of climate change-significant changes in typology, frequency, intensity, duration and distribution of climate induced effects can still be expected
<p style="text-align: center;">Introduction cont'd</p> <ul style="list-style-type: none"> • Therefore, people need to learn how to live and sustain their livelihood in the changing climate by adapting to the impacts • Adaptation is as an adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities. • Adaptation is necessary in order to increase the resilience of the communities to the impacts of climate change. 	<p style="text-align: center;">NAPA Context</p> <ul style="list-style-type: none"> • Strategies to cope with current climate variability and extremes exist at the community level. 	<p style="text-align: center;">NAPA Process in Tanzania</p> <ul style="list-style-type: none"> • Tanzania formulated her NAPA in 2007 • NAPA formulation process was based on consultations with various sectors and literature review. • A NAPA multidisciplinary team was formed • A number of consultations were done at community level in some parts of the country mainly to verify and concretize the information from the sectors.
<p style="text-align: center;">NAPA process cont'd</p> <ul style="list-style-type: none"> • The focus of the current Tanzania NAPA was on adaptation needs in the few sectors: agriculture, water, energy, health and forestry sectors, as a starting point • Tanzania NAPA has identified 14 priority areas • The NAPA document was prepared with the primary objective of identifying and promoting activities that address urgent and immediate needs for adapting to the adverse impacts of climate change. 	<p style="text-align: center;">THE NAPA PROCESS cont'd</p> <ul style="list-style-type: none"> • NAPA forms a basis for support not only from the LDC Fund under the UNFCCC as required, but also from the international community at large • NAPA is already being implemented in Tanzania • Two adaptation projects will be implemented through LDCF (USD 3.5 mill) and AF(USD 5.8 mill) • There is also number of support through both bilateral and multilateral initiatives eg. AAP, EU etc 	<p style="text-align: center;">Challenges on NAPA process</p> <ul style="list-style-type: none"> • Inadequate awareness of stakeholders • Limited finance from the funding sources (LDCF) • Learning by doing exercise • Disbursement of funds taking longer than expected • Difficult in selection of priority projects (evolving adaptation needs) • Coordination of multiple actors
<p style="text-align: center;">The NAP Context and process</p> <ul style="list-style-type: none"> • Since NAPA considers simplified and direct channels of communication for information relating to the urgent and immediate adaptation needs of the LDCs, the international community realised the need to formulate medium and longer-term strategic responses on adaptation. • At its 17th session, the COP to the UNFCCC acknowledged that national adaptation planning can enable all developing and least developed country (LDC) Parties to assess their vulnerabilities, to mainstream climate change risks and to address adaptation. 	<p style="text-align: center;">The NAP Context and process cont'd</p> <ul style="list-style-type: none"> • The COP also acknowledged that, because of their development status, climate change risks magnify development challenges for LDCs, and recognized the need to address adaptation planning in the broader context of sustainable development planning. • With this in mind, the COP established the national adaptation plan (NAP) process as a way to facilitate effective adaptation planning in LDCs and other developing countries. 	<p style="text-align: center;">Objectives of the NAP</p> <ul style="list-style-type: none"> • <i>To reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience;</i> • <i>To facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate.</i>

<p>NAP Context and process cont'd</p> <ul style="list-style-type: none"> • Tanzania decided to establish a process to formulate National Adaptation Plans that will address medium and long-term adaptation needs. • A NAP Road map has been formulated • The roadmap shows a milestone of activities and resources needed in the process • The budget for the NAP preparation is estimated at USD 790,000.0 • It is expected that the NAP will use a comprehensive approach to address adaptation needs in the country, and will provide guidance to all government entities and all partners interested in supported this country in adaptation 	<p>Proposed approach to develop NAP in Tanzania</p> <ul style="list-style-type: none"> • Use of multidisciplinary team • Information collection (primary and secondary sources) • Production of synthesis report based on reviews and technical reports • Comprehensive Assessments of development needs and climate Vulnerabilities; 	<p>Proposed approach and tasks to develop NAP in Tanzania</p> <ul style="list-style-type: none"> • Development of criteria for selecting priority NAP programmes/projects; • Identification of Thematic / Sectoral Areas that require further Assessment; • Assessment and development of appropriate medium- and long-term adaptation needs and propose relevant interventions including institutional and policy measures; • Development of programme profiles
<p>NAP process at global level</p> <ul style="list-style-type: none"> • The LEG has prepared the final technical guidelines that takes on board the latest feedback • The LEG will be closing chapter on the technical guidelines at its next meeting to be held in Lome, Togo 12 -17 March 2013 • The technical guidelines will be used to guide countries on how to aggregate activities according to work streams - e.g. on gap analysis and capacity building, outreach and awareness, versus a section on V&A 	<p>NAP process at global level cont'd</p> <ul style="list-style-type: none"> • Countries will use the technical guideline to select activities and form their own nationally-specific road map. • NAP process is a process, with multiple trajectories ... and not a set of sequential steps towards one output! ... the many plans/many outputs ideas ... 	<p>Challenges during the NAP process</p> <ul style="list-style-type: none"> • Limited funds to finance the NAP process • Coordination of the NAP process at national and international level • Lack of predictable source of financing the process and implementation (unlike the NAPA), there is no specific funding for NAP
<p>Conclusion and recommendations</p> <ul style="list-style-type: none"> • NAP process is crucial for sustainable adaptation strategies in Tanzania • International community should support the national initiatives to prepare and implement NAP 	<ul style="list-style-type: none"> • Asante sana 	

<p>National Environment Management Council</p> <p>National Integrated Coastal Environment Management Strategy and Climate Change mainstreaming</p> <p>March 2013</p> <p>By Mtemi, Lewis Nzali</p>		
<p>National Integrated Coastal Environment Management Strategy</p> 	<p>Vision – of NICEMS</p> <p>The overall vision of this Strategy is having a coast with thriving coastal settlements where people rely on the coast and its abundant resources for their food and livelihood and are actively working to protect and sustain the resource base.</p>	<p>Goal</p> <ul style="list-style-type: none"> • To implement the National Environmental Policy and other related policies in conserving, protecting and developing the resources of Tanzania's coast for use by present and future generations, to ensure food security and to support economic growth.
<p>Integrated Coastal Management Issues</p> <ul style="list-style-type: none"> • Improvement of the wellbeing and livelihoods of all beneficiaries of coastal resources • Environmental planning and management of key economic opportunities • Managing geographical areas of concern and critical habitats 	<p>ICM Issues...</p> <ul style="list-style-type: none"> • Supporting local initiatives, and decision making for intersectoral developments, and harmonizing national interest with local needs • Information availability for decision making • Inadequate human and institutional capacity and awareness 	<p>Initiatives to address the issues</p> <p>Several initiatives have been taken to address the above issues through:</p> <ul style="list-style-type: none"> • NEMC and other National level environmental related sectors • Programmes and Projects (---) • Non - Governmental Organizations • Local Government Authorities • Community
<p>Climate Change and NICEMS</p> <ul style="list-style-type: none"> • Mangroves, coral reefs and seagrass beds make part of the Tanzania marine ecosystem, act as blue carbon sinks. • These are among the most efficient carbon sinks, but unfortunately, they are also disappearing at an alarmingly fast rate. 	<p>Climate Change ...</p> <ul style="list-style-type: none"> • These ecosystems do not only act as blue carbon sinks, they also provide crucial services through food security and shoreline protection – supporting coastal livelihoods and making communities more resilient to climate change 	<p>Climate Change ...</p> <ul style="list-style-type: none"> • There is scientific consensus that the changes brought by climate change are already occurring. • Currently, the coastal population, infrastructure, and marine ecosystems are threatened by impacts from climate change and variability.

<p>Climate Change ...</p> <ul style="list-style-type: none"> Climate change is likely to result in significant alteration of coastal ecosystems, coastal hazards, and lifestyle changes for fishers, other coastal resource users, waterfront property owners and coastal communities. These have far-reaching impacts on a range of challenges for coastal resource managers. 	<p>Climate Change ...</p> <p>Some of the impacts currently being observed include:</p> <ul style="list-style-type: none"> Land loss and damage to coastal structures and properties due to erosion and sea level rise; 	<p>Climate Change ...</p>  <p>Some of the impacts ...</p> <ul style="list-style-type: none"> Land loss and damage to coastal structures and properties due to erosion and sea level rise.
<p>Climate Change ...</p> <p>Some of the impacts ...</p> <ul style="list-style-type: none"> Loss of coastal and marine ecosystems (e.g. mangroves, fish, coral, and sea grass beds); 	<p>Climate Change ...</p> <p>Some of the impacts ...</p> <ul style="list-style-type: none"> Coral bleaching with detrimental impacts to fisheries and tourism; Saline intrusion in fresh water bodies; 	<p>Climate Change ...</p> <p>Some of the impacts ...</p> <ul style="list-style-type: none"> Inundation of low-lying coastal areas and small islands; 
<p>Climate Change ...</p> <p>Some of the impacts ...</p> <ul style="list-style-type: none"> Reduced freshwater flows and changes in pulsing of flows to estuaries due to climate change interacting with human drivers; and 	<p>Climate Change ...</p> <p>Some of the impacts ...</p> <ul style="list-style-type: none"> More frequent and severe coastal flooding. 	<p>Climate Change ...</p> <ul style="list-style-type: none"> Recognizing the impact of climate change, NEMC has started reviewing the NICEMS to incorporate the emerged issues, including the climate change.
<p>Climate Change ...</p> <p>NICEMS and Climate</p> <ul style="list-style-type: none"> Strategy 4. Calls for establish an integrated planning and management mechanism for coastal areas of high economic interest and/ or with substantial environmental vulnerability to climate change and variability, and natural hazards 	<p>Climate Change ...</p> <p>NICEMS and Climate Strategy 4 would address the following issues:</p> <ul style="list-style-type: none"> Increasing pressure on environmental resources; Increasing resource use conflicts on the coastal environment; Inadequate environmental management mechanisms; 	<p>Climate Change ...</p> <p>NICEMS and Climate Strategy 4 would address ...</p> <ul style="list-style-type: none"> Inadequate intersectoral coordination for coastal environment management; and Inadequate adaptation measure to coastal climate change and variability.
<p>Climate Change ...</p> <p>NICEMS and Climate Implementation mechanism for Strategy 4 include:</p> <p>Proactive coastal adaptation mechanisms</p> <ul style="list-style-type: none"> Assessment of vulnerability Selection of course of action Mainstreaming of climate change adaptation measures Implementation of adaptation measures Evaluation of adaptive management 	<p>Climate Change ...</p> <ul style="list-style-type: none"> Tanzania has drawn up a National Adaptation Plan of Action (NAPA). This includes a description of the main problems and a set of key priorities. Recently approved National Climate Change Strategy; and many others 	<p>Climate Change ...</p> <ul style="list-style-type: none"> Though coastal and marine problems are not given priority, it is widely recognized that coastal populations are among the most vulnerable to global climate change.

Climate Change ...


- Recent studies estimated that the costs for climate change adaptation will be the highest in the coastal zones of the world.

Conclusion


- It is time for every stakeholder to consider climate change impacts, develop adaptation measures and mainstream in the plans for implementation.

Thank you for listening





Lessons Learned from NAP Processes



Bagamoyo, Tanzania March 7, 2013

Jenny Frankel-Reed
USAID Global Climate Change Office

Why NAPs

- "Moving from individual activities to a more coherent approach"
- "Address climate impacts to contribute to climate-resilient development"
- "Integrate adaptation into a broader set of national institutions' mandates"
- "A long-term and continuous process"
- "Link strategy to implementation"
- "Facilitate M&E and financing"
- "Periodic revision to consider changing circumstances, new information and knowledge"

Jamaica Example



The Adaptation Story in a Development Context

Goal: Productive and Sustainable Marine and Coastal Economy
Inputs: Fisheries, coastal services, tourism, agriculture, ports, fish, water, oil and gas, etc.

Stresses Non-climate: Pollution, Overfishing, Population growth Climate: Increasing mean temperatures, Sea level rise, Increasing drought, More intense, variable weather	Vulnerability Exposure – what, where, when Fish and coral exposed to increasing ocean temperatures Crops exposed to increasing drought Sensitivity Poor quality of infrastructure Degraded ecosystem health Adaptive Capacity and barriers Early warning systems, disaster zone plan, Lack of information	Potential impacts Declining incomes Food insecurity Increasing disease Etc.
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Response options

Improve fish management Control pollution Reduce agriculture practices	Regulation to control coastal development Develop ecotourism
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Getting Started - Identifying Priorities

Development objectives
Ensure agricultural productivity to support dietary and economic needs

Requirements for development objectives
Inputs – Water, land, seeds, labor, market infrastructure
Enabling conditions – Effective governance of natural resources, Stable market environment

Stresses
Climate – Changes in rainfall and temperature, sea level rise
Non-climate – High population growth, pollution

Diagnosis

Lessons Learned

- ✓ Start with development priorities, not climate projections, to solve the mainstreaming challenge.
- ✓ Be strategic and prioritize where climate change matters most.
- ✓ Look ahead to identify risks that require longer term adjustments.
- ✓ Think about sectors and across sectors to avoid unintended consequences and identify actions with multiple benefits.
- ✓ A NAP is a process. Workshops establish buy-in on priorities that guide next steps, ownership, and action.

<p>Tanzania’s efforts to address the impacts of climate change</p> <p>Vice President’s Office Division of Environment 7th March 2013</p>	<p>Agenda</p> <ul style="list-style-type: none"> Introduction Worries Dimensions of cc Options Efforts <ul style="list-style-type: none"> Global National 	<p>Introduction</p> <ul style="list-style-type: none"> Climate change is one of the most serious global threats to sustainable development, with adverse impacts already vivid on the environment, human health, food security, human settlements, economic activities, natural resources and physical infrastructure. Tanzania is vulnerable to the increased climate variability and climate change
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<p>Why worry?</p>	<p>Why care about climate change?</p>	<p>The Gap (UNEP, 2010)</p>
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<p>Floods in Bibi Titi/Morogoro road</p>	<p>Sea level rise</p>	<p>degraded seawalls i.e. in Pangani</p>
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<p>Degraded seawall along ocean road</p>	<p>Dimensions of climate change</p> <ul style="list-style-type: none"> Political issue Economic issue Environmental issue Security issue Social issue 	<p>Science vs politics</p>
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<p>Which Options do we take?</p> <p>—(Not much choice)</p> <ul style="list-style-type: none"> A – Business as usual B – Assumes a shift to lower-carbon fuels C – Assumes a shift toward renewable resources D – Assumes a shift to renewable resources and nuclear energy 	<p>Efforts</p>	<p>A brief history of the global climate initiatives</p> <ul style="list-style-type: none"> 1992: Rio de Janeiro 1997: Kyoto Protocol 2001: Marrakech Final Agreement 2007: Bali Action Plan 2009: Copenhagen Accord 2010: Cancun Agreement 2011: Durban platform 2012: Doha outcome <p><i>Somewhere in 2013: Poland...?</i></p>
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National efforts

- **NEP, 1997:** Provides a policy framework for environmental issues relating those sectors to climate change
- **Assessment of Vulnerability and Adaptation to Climate Change (1994 - 1996):** The main sectors studied were: agriculture (crop production and livestock), water, coastal resources and forestry.

National efforts

- **EMA, 2004:** Section 75 of EMA describes how climate change issues can be addressed in Tanzania.
- **National Adaptation Programme of Action (NAPA, 2007)**
- **National communications (i.e. 2003, now finalizing SNC)**

National efforts.....

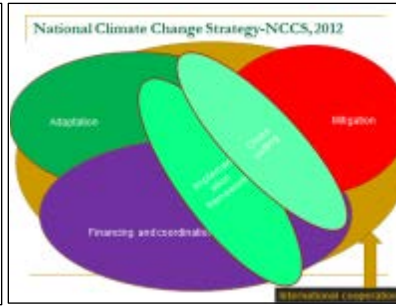
- **Effective participation of international discussions**
- **Climate change Impacts Assessment-Tanzania, 2009:** In water resources, food production, SLR, biodiversity, health
- **Development of guidelines for mainstreaming climate change into MDAs plans and budgets.**

National efforts.....

- **Established the National Climate Change Steering Committee (NCCSC, 2008)**
- **The National Climate Change Technical Committee (NCCTC, 2008)**
- **Awareness raising on climate change and its impacts to livelihoods to community, policy and decision makers**

■ **THA,2010:** Identified environmentally friendly technology to adapt and mitigate climate change impacts in Tanzania. Technologies on coast

- **Protection Options** (Establishment of Protected Areas, Establishment of Networks of Reserves, Identification and Protection of Climatic Refugia, Protection of Physical and Biological Heterogeneity)
- **Restoration of Degraded Habitats (BEACH NOURISHMENT):** Mangrove Replanting, Velvet Grass Planting, Stimulatory/Stimulation of Coral Reefs Growth
- **Building Artificially (BEACH NOURISHMENT)-** Artificially Placing Sand on the Beaches, Coastal Drain Beach Management System,
- **Managed Retreat And Accommodation:** Use of Insurance Premium, Implement Building Regulations and Modification of Land Use, Desalination)
- **Reductions Or Elimination Of Non-climate Stresses and Monitoring** (Elimination of Destructive Fishing Practices and Over-fishing, Reduction of Damaging Extraction, Coastal Ecosystem Monitoring)
- **Line Structures** (Construction of Concrete Groins/Seawalls, Integrated Coastal Protection System)



NCCS,2012

Coastal and Marine environment

- Establishing mechanisms for coastal erosion control
- Promoting alternative sources and technologies to enhance water availability
- Promoting sustainable coastal land use planning
- Enhancing protection and conservation of coastal and marine ecosystems.
- Enhancing decentralization of coastal systems management.
- Supporting alternative livelihood initiatives for coastal communities

Other national efforts

- **African Adaptation Programme, 2011-2012:** Mainstreaming Climate Change Adaptation in the National Sectoral Policies of Tanzania
- **Implementing the project 'Development Core Capacity to address Adaptation to Climate Change in Productive Coastal Zones of Bagamoyo, Rufiji, Pangani and Zanzibar (2012-2017)**
- **Implementing the adaptation project in Dar es salaam: seawall rehabilitation and construction in Ocean road and Kigamboni, drainage systems, mangroves and coral reefs (2012-2017)**

Efforts in progress

- **Establishing a climate change database and a system for information sharing.**
- **Elaboration and implementation of National Adaptation Plans (NAPs).**
- **Raising awareness on climate change at all levels including enhancing broader participation of various stakeholders.**
- **Enhancement of education, training and research in the climate change area.**
- **Participation in the climate change negotiations.**

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Thank you!
Ahsante

Climate Change in Impact in Coastal Tanzania

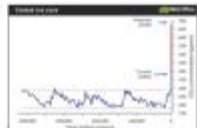
Dr. Yohana W Shaghude
Institute of Marine Science, University of Dar es Salaam

Workshop on Mainstreaming Climate Change Adaptation into Coastal and Marine Development, Stella Maris Hotel, 7-8 March 2013

The Global Climate Regime:


- On the Geological time scale, Climate Change is a natural phenomena.
- The earth had been experiencing cyclic periods characterized by warm and cooler periods (glacial and interglacial periods).

Human activities during the past ~200 years have increased CO₂ in the atmosphere by about the same amounts as naturally occurs between glacial and interglacial periods.



Estimate on Rates of Temperature Change

- The global estimates are quite alarming.
- Average annual temperatures have increased by 1°C since the 1950s and are projected to rise by 1-2.7°C by the 2050s and 1.5-4.5°C by the 2090s compared to the 1970-1999 baseline.

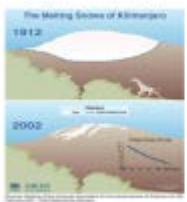


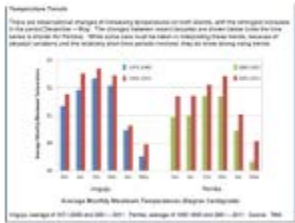
The black line indicates the observed change in surface temperature in Africa over the past century.

Evidence of Increasing Air Temperature in Tanzania

The Mazingo Snows of Kilimanjaro

1912: 80% of the glacier has been lost since 1912. Projected entire glacier will be gone by 2025.






There are interannual changes in monthly precipitation over most years, and the interannual variation is much greater than the interdecadal variation. The interdecadal variation is much smaller than the interannual variation. What you can see is that in comparing these series, because of seasonal variation and the relatively short time period involved, they do not show strong trends.

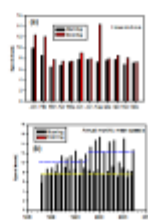
Precipitation

- From 1960-2000, annual rainfall in Tanzania has decreased at an average rate of 3.3 percent per decade.
- Rainfall patterns have become more variable, with an increase in the amount of precipitation falling in isolated events.
- Timings of the seasons highly unpredictable.



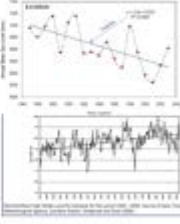
Wind Climate Regime

- The study on wind climate regime (Shaghude et al) for Dar es Salaam, revealed that there has been significant changes in wind speeds over the last 2-3 decades.
- The change in wind regime is considered to have significant impact on the wave climate regime.




Sea Level Changes

- From 1900-2009, global sea levels rose by 1.7 ± 0.3 mm/year (Church and White, 2006).
- Between 1993 and 2009, the estimated rate of sea-level rise was 2.8 ± 0.8 mm/year from in-situ measurements such as tide gauges (Church and White, 2011).
- The Intergovernmental Panel on Climate Change (IPCC, 2007) reported that human influences are very likely to have contributed to this rise over the 21st century.




The Coastal Environment of Tanzania

- Endowed with various resources such as Mangroves, coral reefs, seagrass beds, coastal forests, beaches etc.
- The Coastal resources support the livelihoods of people.
- They also serve as blue Carbon sinks.
- They also protect the coast against erosion.
- Climate impacts on these resources would amplify the climate change problem with it's vast impacts to peoples' livelihoods.



Impacts of Climate Change on Coral Reefs

- Unusually higher sea water temperature that persist for a long time leads to a phenomenon known as coral bleaching.
- Coral bleaching is the whitening of corals, due to stress-induced expulsion or death of their symbiotic protozoa, zooxanthellae. The corals that form the structure of the great reef ecosystems of tropical seas depend upon a symbiotic relationship with unicellular flagellate protozoa, called zooxanthellae, that are photosynthetic and live within their tissues. Zooxanthellae give coral its coloration, with the specific colour depending on the particular shade. Under stress, corals may expel their zooxanthellae, which leads to a lighter or completely white appearance, hence the term 'bleached'.



Impacts of Climate Change on Seagrass Beds

- Seagrass Beds occupy the shallow water environments of the coastal waters.
- Rising temperature trends due to climate change is generally higher on shallow waters than on deeper waters due to the land Heating effects.
- Seagrass beds would tend to decrease under the influence of increasing sea surface temperature.
- The experience of seaweed die-offs in Tanzania during the past 2-3 decades is a good example.
- Floating seaweed farming techniques is currently being seen as an alternative adaptation strategy to rescue the seaweed die-off problem.
- The challenge still remain to rescue the natural seagrass resources.

Impacts on Mangroves

- The climate impacts on mangroves could be associated with:
 - Increased wave climate regime due to increasing wind speeds, which may lead to decrease of mangrove forests due to coastal erosion.
 - Increased sea water temperature.
 - Change in precipitation pattern.

Some of the Potential Socio-economic Climate Change Impacts

- Change in weather and climatic events would affect food production and water availability
 - Sea water intrusion into freshwater due to sea level rise or coastal flooding during spring tides may also influence water availability and farming activities (due to salinization of coastal soils)
 - Loss of coastal settlements and infrastructures due to coastal flooding under extreme rainfall events (e.g 2007 floods).
 - Loss of coastal settlements/infrastructures and coastal vegetations due to coastal erosion resulting from increased wave activity
 - Mortality of corals due to increasing sea surface temperature may have negative effects on availability of fish and fishing activities.

Conclusions

- Climate change in Coastal Tanzania is real, with ample evidence:
 - Increasing air temperature/SST
 - Increasing wind speeds/wave climate regime
 - Change in precipitation pattern
 - Etc.
- Coastal resources which supports the livelihoods of coastal communities are at stake.
- Adaptation strategies for climate change need to be put in place to rescue the coastal resources and the people's livelihoods

Thank You For Your Attention