

Climate Change Adaptation Series: Document 10

VILLAGE VULNERABILITY ASSESSMENT AND CLIMATE CHANGE ADAPTATION PLANNING: MWEMBENI VILLAGE, PANGANI DISTRICT, TANZANIA

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Prepared by the Pwani Project
in Partnership with the Pangani District Council



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COASTAL RESOURCES CENTER
University of Rhode Island



This report is part of the Pwani Project's Coastal Community Adaptation Series, which includes the following documents:

1. Coastal and Marine Ecosystems in a Changing Climate: the Case of Tanzania.
2. Workshop Proceedings: Tanzania Coastal Climate Change National Adaptation Planning Workshop
3. Village Vulnerability Assessments and Climate Change Adaptation Planning (V & A): Kitonga, Bagamoyo District
4. Village Vulnerability Assessments and Climate Change Adaptation Planning (V & A): Mlingotini, Bagamoyo District
5. Rapid Assessment of Shoreline Characteristics and Dynamics of the Lazy Lagoon at Mlingotini Village, Bagamoyo
6. Livelihoods, Climate and Non-Climate Threats and Adaptation: Pangani District Coastal Villages
7. Livelihoods, Climate and Non-Climate Threats and Adaptation: Bagamoyo District Coastal Villages
8. Village Vulnerability Assessments and Climate Change Adaptation Planning (V & A): Jambiani and Paje, Zanzibar
9. Village Vulnerability Assessments and Climate Change Adaptation Planning (V & A): Kitonga and Mlingotini Villages, Bagamoyo District (Summary Report)
10. Village Vulnerability Assessments and Climate Change Adaptation Planning (V & A): Mwembeni, Pangani District
11. Village Vulnerability Assessments and Climate Change Adaptation Planning (V & A): Sange, Pangani District

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Front cover: Banana crops planted in Mwembeni as a climate change adaptation following the V&A.

Photo Credit: Jairos Mahenge

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1. INTRODUCTION

There is now wide agreement by most scientists and climate change professionals that climate change and increased climate variability are already occurring and having serious consequences for many African countries, including Tanzania. The predictions from the experts on climate change are that the problems caused by climate changes will increase and make management of coastal ecosystems and improvements to community resilience even more difficult. The following threats are predicted to cause major problems for coastal resources and the well-being, safety, and food security of coastal communities:

1. More unpredictable precipitation (seasonality and intensity)
2. Increases in strong storms
3. Sea level rise
4. Increased sea surface and ambient air temperatures
5. Increased ocean acidification

These climate and chemical threats and the problems they create are on top of and in addition to existing local stresses. In most of coastal Tanzania, these include deforestation, over fishing, deterioration in water supply and quality, and development pressures.

Beginning in 2010, the Pwani Project initiated an effort to help local leaders and government to assess climate change impacts and find ways to adapt to current and future climate change impacts in a strategic way using their own resources and knowledge. This is part of a larger coastal management effort in a partnership with the government of Tanzania and the United States Agency for International Development (USAID). This Project has a geographic focus on the island of Unguja in Zanzibar and the ecologically important northern coast of mainland Tanzania – Bagamoyo and Pangani Districts. The overall goal is to help sustain the flow of environmental goods and services; reverse the trend of environmental destruction of critical coastal habitats; and improve the wellbeing of coastal residents in the Bagamoyo-Pangani and Menai Bay Seascapes.

Following a rapid vulnerability assessment, carried out in Pangani District, Mwembeni was selected for village level vulnerability and assessment planning (V&A). The village was selected because of a combination of evident livelihood impacts from climate change, active village leadership and interest, and the potential for identifying small doable adaptation actions.

Mwembeni is situated along the Pangani River.¹ The village has an area of 1,127 hectares and a population of 1,042 living in 316 households. The Sub-villages include

¹ The history of Mwembeni village begins around 1950. Its name originates from a mango tree which is still standing. The core word “embe” means mango. In the early days, people who were passing along the road identified it by the tree by saying “at the mango tree”—hence, the name “Mwembeni”.

Mwembeni, Makuyuni, Nunda and Mitiulaya. Mwembeni is in Madanga Ward. It borders with Boza village to the East, Bushiri village to the West, Kimang’a village to the North, and Pangani River to the South.

The specific objectives of the Mwembeni V&A include the following:

- To develop awareness and understanding of the concept of climate change
- To develop awareness and understanding of natural processes and anthropogenic causes of shoreline and ecosystem change
- To promote good practices of shore management and small-scale agriculture
- To identify doable climate change adaptation actions

Definitions

Climate Change	A shift in weather averaged over decades or centuries due to natural variability or because of human activity
Vulnerability	The degree to which a human or natural system is susceptible to, or unable to cope with, adverse effects of climate change. Vulnerability is a function of the types and amount of assets at risk (exposure), the degree to which those assets and people are impacted (sensitivity), and the ability to cope with actual or expected changes (adaptive capacity).
(Planned) Adaptation	Is a process of deliberate decision making to take societal actions in response to actual or expected climatic changes or their impacts, so as to reduce harm or exploit beneficial opportunities
Exposure	Refers to assets (land, infrastructure, human society) at risk to the impact of climate change
Sensitivity	The degree to which assets are sensitive to incurring negative impacts from climate change and climate variability

2. METHODOLOGY

This vulnerability assessment and adaptation planning follows the guidance of the USAID report “Adapting to Coastal Climate Change: A Guidebook for Development Planners” prepared by the Coastal Resources Center at the University of Rhode Island (see references).

The V&A applied Participatory Rapid Appraisal (PRA) tools and used focus group techniques for obtaining information from the community. The village government identified 37 representative community members to participate in the V&A. They represented Village Government, Village Council Members, respected village members and 12 villagers who were selected to form a village Climate Change Committee (see Appendix 1 for a list of village V&A participants). The composition of the Climate Change Committee was formed with the following criteria:

- Equal number of men and women
- Must be actively involved in village volunteer activities

- Must represent community groups or important sectors in the village (e.g. farmers, fishers, business, health, environment, education, youths, etc.)

Semi-structured questions focused on observed climatic trends (e.g. seasonality, precipitation intensity and timing, and sea temperature), natural resource and other observed climate effects, non-climate pressures and impacts, and adaptive capacities. Four areas of adaptive capacity were evaluated with respect to the village and Pangani District:

- Coastal Resources Management
- Risk Awareness and Emergency Response
- Economy and Society
- Governance and Leadership



Photo 1. The community members of Mwembeni village during information gathering guided by semi-structured questions

Individual interviews were also held with key village leaders, elders, women and poor or otherwise marginalized individuals to get their views and perceptions so as to triangulate the information obtained. The V&A team included the Pangani District Climate Change Task Force.

The team collected information on the condition of natural resources, current land use planning, livelihoods, climate and non-climate stressors, and environmental changes within the community through a transect walk in the village (Photos 2 A and B).



(A)

(B)

Photo 2. The entry point of the traditionally protected Mziha forest (A), and a well inside the forest (B). This well does not dry up even during severe drought.

In the end, the project staff reviewed the findings together with the Pangani District Climate Change Task Force (Photo 3) and drafted an adaptation plan, which was later vetted with the village council



Photo 3. The Pwani assessment team and Pangani District Climate Change Task Force in meeting held in Pangani District Council discussing V&A findings

3. CLIMATE CHANGE TRENDS AND PROJECTIONS

The overall projections from climate models for coastal Tanzania are that surface water temperature and ambient air temperature will rise, sea level will rise (from the thermal expansion of the sea), the sea will become more acidic from carbon sequestered in the sea which then forms carbonic acid, and areas with bimodal rainfall patterns (as in Mwebeni) will experience increased rainfall and less predictable seasonality and

temporal distribution of precipitation. The results of these precipitation and seasonality changes are both flooding and droughts.

From this starting point, the village level V&A sought to overlay local knowledge on climate trends that are beginning to show themselves in the village and to plan accordingly. For example, local knowledge can help answer the basic question: “Has the frequency, magnitude, or timing of precipitation, flooding, or drought events changed in the last several decades?” By integrating best available scientific data with local knowledge, communities and government can take responsible action even in situations where there is imperfect climate change information.

Current climate variability, such as the major droughts of 2005/6 and the major floods of 1997/8, has significant economic costs in Tanzania.

These periodic extreme events cause major macro-economic costs, reduce economic growth and affect livelihoods: the 2005/6 drought affected millions of people and had estimated costs of at least 1% of GDP.

These events also reduce long-term growth and development and it is clear that Tanzania is not adequately adapted to deal with existing climate risks.

Models indicate that climate change could lead to net economic costs that are equivalent to a loss of almost 2% of GDP each year by 2030 in Tanzania.

Source: we adapt.org (2011)

4. OBSERVED CLIMATE AND NON-CLIMATE THREATS AND IMPACTS

Participatory Rapid Appraisal (PRA) tools were used to collect historical information on trends in natural resource change as well as changes in biodiversity caused by climate change, climate variability and human activities. The PRA and semi structured interviews identified climate and non-climate threats experienced by those living in the Mwembeni village (Table 1). The team noticed that the village’s ecology and natural resources were severely degraded. Although there are only few settlements along the river shoreline, the mangrove forests are degraded by deforestation.

Table 1. Climate and Non Climate Threats Identified in the Mwembeni Village

Threats	Impacts
Climate related threats	
Droughts	Reduced agricultural productivity
Changing water patterns	Reduced crop diversity, lack of reliable water source for irrigation
Lack of drinking water	Reliance on water from Pangani town
Reduced water flow of the Pangani River	Reduced soil water content in the forest; salt water intrusion; reduced agricultural productivity
Other threats	
Clearance of shrubs and mangroves	Loss of income and reduced food security

Villagers involved in the vulnerability assessment maintained that the village is experiencing changing rainfall patterns and a declining water table. These climate-related issues have made food production more difficult. Mwembeni is dependent on drinking water from Pangani town, because the village only has one water source, which is a spring. Unfortunately the water supply from Pangani town is not reliable and many complain about water scarcity.

The *Mziha*² permanent water spring is surrounded by dense forest. This is an alternative domestic water source for Mwembeni villagers which, when all other areas experience water shortages, people are able to access water there. The spiritual beliefs associated with this area have contributed to the conservation of forest around the water source. According to the villagers, the forest soil water content was higher in the past. Reduced soil water content is thought to be associated with increased temperatures and less fresh water flows of the Pangani River due both water extractions for agriculture and energy use in the Pangani basin as well as changing precipitation patterns. In addition, clearance of shrubs for agriculture around the forest has also contributed to reduced water percolation to the forest.

The area around “*Mitiulaya*” bridge was previously well known for paddy rice, sugarcane and banana cultivation. Currently, the area is abandoned due to saline water intrusion. Now, various saline resistant species of mangrove grow there: *Heritiera littoralis*, *Bruguiera gymnorhiza* and *Rhizophora mucronata* (Photo 4).

The area called “*Kwa Sapa*” just close to *Mitiulaya* area is another inland part of Pangani River that exhibits environmental changes due to increased salinity. Marine species now dominate the catch of the area and vegetation is now a mix of saline and non-saline tolerant species (Photos 5 and 6). The saline intrusion up the river is thought to be due to reduced freshwater flows.

² Mziha is Mwembeni villager’s name for local spirits.

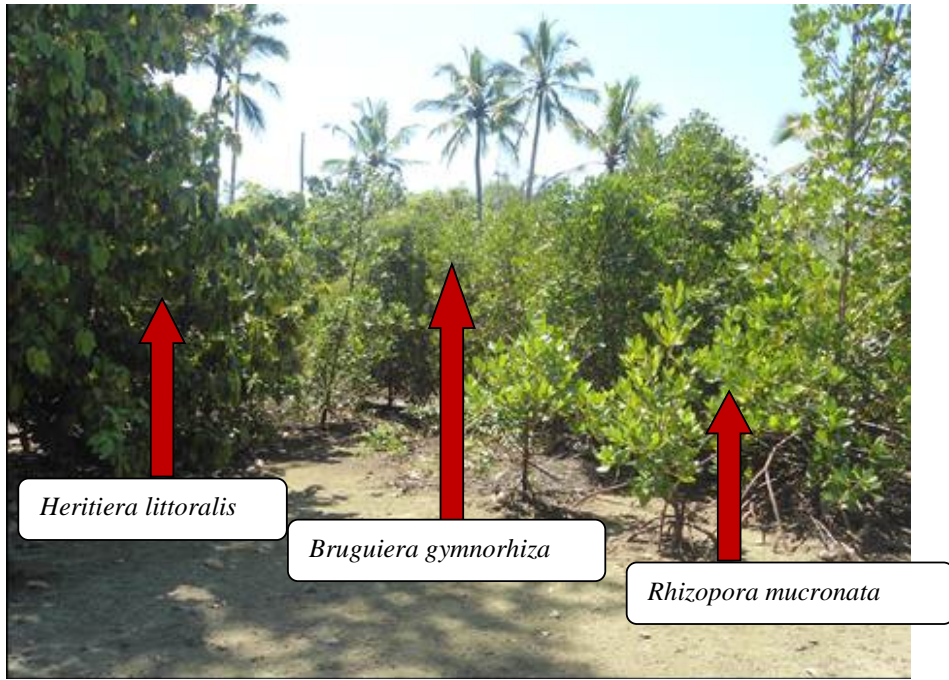


Photo 4. Mitiulaya bridge area which was once was a rice paddy farm is now covered with mangroves



Photo 5. Fishers along Pangani River at Kwa Sapa area



(A)



(B)

Photo 6 (A) and (B). *Uca* marine dependent crab species on the left and the co-existence of mangrove and coconut trees at Kwa Sapa area on the right

The residents of Mwembeni village identified three big climate related events that happened in the past:

1954: Severe drought where the only place to get water was at Mziha forest.

1974: Severe drought where the only place to get water was again at Mziha forest.

1998: Heavy rains “Elinino” which created water pools large enough and permanent enough for cat fish and tilapia to grow and be fished near the Koogoni sub-village.

There is worry in the village that current trends of changing rain patterns and increased temperatures will make these sorts of events more common in the near future.

5. ADAPTIVE CAPACITY

Adaptive capacity was measured through a survey completed during a work session with the Climate Change Committee. The survey measured the Mwembeni village’s adaptive capacity within four areas: economy and society; coastal resources management; community risk awareness and emergency response; and governance and leadership. Tables 2 to 5 shows the scores given by the committee members for each of the areas measured. Each section or subsection began with an overview question (in bold) followed by a number of sub-questions. Furthermore, the questions asked had a five point scale of zero to four points. For example, for the first question: “*Do people earn their livelihood mainly doing the same thing all the time or does the community have a range of income sources and options, and individuals participate in several of these*”, the scoring choices were: *No livelihoods (0) one livelihood (1) up to three livelihoods (2) up to 5 livelihoods (3) over five livelihoods (4)*. The complete survey with all scoring choices can be found in Appendix 2.

The work session participants found that the adaptive capacity is low in Mwembeni. Some of the primary reasons for the low adaptive capacity are: poor land and resource management, vulnerable subsistence livelihoods, and weak leadership and governance. Combined with the effects of climate change and non-climate human stressors, the village has become highly vulnerable. Nevertheless, there are signs of responsive and coping actions, most notably willingness to experiment with alternative drought resistant food and cash crops.

Coastal Resources Management

Table 2. Scoring summary for the theme coastal resources management

Theme: Coastal Resource Management	Score
Condition of coastal resources (overview)	0
What shape are your coastal resources in?	0
Is the way land is allocated for use deemed fair and adequate for community needs?	0
Is infrastructure development being done in a wise and thoughtful manner, using traditional understanding of how coastal resources behave?	2
Does the community get the infrastructure that it needs to insure the safety and well-being of its citizens?	1
To what extent has the community taken the initiative to address its coastal issues and to plan for future uses?	2
How well can the community mobilize to put a plan into action related to the use of its coastal resources?	4
TOTAL	9 (out of 28)

Assessing the conditions of coastal resources, the Mwembeni stakeholders concluded that their coastal resources are in bad shape. The combination of land scarcity, poor condition of resources, and an unpredictable climate have lead many youth to migrate to urban centers. Coastal resources management, land use planning, and enforcement is weak and uncoordinated. For example, it was reported that the Mangrove Committee

members offer logging and timber permits without the consent of the village government. Villagers are also displeased that they were not consulted when allocating 5.2 acres of prime village land for the construction of residential housing for the Bahari Pori Bandas hotel staff. The construction is led by a private foreign company known as MAQROLL Tanzania Limited.

Economy and Society

People living in Mwembeni are heavily dependent on natural resources for fishing, rain-fed agriculture, subsistence livestock keeping, and biomass for household cooking. Natural resource-based livelihoods are vulnerable to changes in climatic conditions. A rapid assessment of Pangani coastal villages, conducted prior to the Mwemeni assessment found that farmers and fishers have responded to climate change by diversifying their livelihoods to include livestock keeping, engaging in daily wage employment, seasonal migrations, and improving farm practices (e.g. switching to more drought tolerant crops). The same was found in Mwembeni, where the climate change assessment team concluded that village households often engage in up to five different livelihoods (Table 3).

Table 3. Scoring summary for the theme economy and society

Theme: Economy and Society	Score
Economy and society (overview)	1
Do people earn their livelihood mainly doing the same thing all the time or does the community have a range of income sources and options, and individuals participate in several of these?	2
Are the main livelihoods in the village at risk from natural, social or economic hazards and change?	1
How is the status of the village economy evolving?	1
Does the community believe it has the capacity to move its economy forward in a positive direction?	3
Have supplementary or alternate livelihoods been identified that can make a difference for individuals or the community as a whole?	2
Are livelihoods dependent on outside market forces in a given year?	2
Attention to marginalized communities (overview)	2
Does the community do a good job in taking care of the needs of disadvantaged groups?	2
Total score:	16 (out of 36)

There is some optimism in Mwembeni, because the community believes it has the capacity to move its economy forward in a positive direction. The village has piloted some improved agricultural activities things and there are positive signs. For example, the Mikocheni Coconut Research Institute has piloted drought resistant crops, including improved varieties of cassava, cowpeas, cashew nut, simsim (sesame seed), coconut, and grafted mangoes and oranges.

There is widespread agreement that the poorest of the poor and marginalized groups are the most vulnerable to climate change—around there are initiatives to improve the situation for those most vulnerable. The village works with a Pangani-based NGO called UZIKWASA to improve the livelihoods for HIV/AIDS vulnerable groups and handicapped. Through a special basket fund, vulnerable individuals are enabled to join a local savings and credit cooperative. The African Women Aids Working Group (AFRIWAG) is also contributing to the support of vulnerable students to attend elementary and secondary schools in Mwembeni and other Pangani District villages.

Community Risk Awareness and Emergency Response

The Mwemebeni village scored poorly under the theme risk awareness and emergency response (Table 4). Information on different emergencies is acquired by villagers through radio and word of mouth. The village, with assistance from the Pangani District Council established a Village Disaster Management Committee in 2006. This Committee is comprised of the heads of hamlets, religious leaders, traditional leaders, and civic organizations. The Village Chairperson chairs the Committee and the Secretary is the Village Executive Officer.

Table 4. Scoring summary for the theme risk awareness and emergency response

Theme: Risk awareness and emergence response	Score
Public awareness of local awareness condition such as erosion, shifting of rivers course /delta (overview)	0
What are the main causes of these problems?	0
What formal or informal education programs exist in this community to promote risk knowledge and help with adaptation	0
What are some of the steps the community is taking to reduce the impacts of the risks	1
Emergency response (overview)	1
Do people get enough information in time to react to a local emergency?	2
As far as you can remember, how often has the community mobilized resources to address emergency situations?	1
Are there any formal/informal groups that help out during emergency situations?	1
When there are emergencies or problems that affect people and create sudden hardship, how well does the community do in taking care of these cases?	1
Is there enough training that help the community handle emergency situations?	0
Total Score	7 (out of 40)

The functions of the committee include: 1. Identify and register families and people who should receive relief supplies, 2) relief supply distribution, 3) public awareness and information dissemination on disaster related issues, 4) mobilize communities to take disaster preparedness and mitigation measures.

In Mwembeni—as in Tanzania in general—disaster management focuses on distribution of relief during droughts and other extreme events rather than disaster preparation, planning and response. Implementing the National Disaster Management Act and overall response to disasters has shown that the legal instrument and institutional arrangements for dealing with disasters in the country are inadequate. There is a need to train local communities and help them prepare and plan for future weather related stresses and shocks.

Governance and Leadership

Mwembeni villagers reported that the village has a structured leadership and local organization, but that it is weak. Although the village government and assembly representatives sometimes communicate and consult with fellow villagers, people complained that leaders are unwilling to take responsibility for community issues and that cooperation is weak. There is also disunity among sub-villages and this is tied to the Village Council’s limited effort to provide leadership to unify the villagers and resolve issues. On the positive side, those living in Mwembeni feel safe in the village and they do not have to rely on outside sources of help for maintaining security (Table 5).

Table 5. Scoring summary for the theme leadership and organization

Theme: Leadership and local organization	Score
Leadership and local organization (overview)	1
Does the local village government discuss issues with the entire community?	2
Do Assembly representatives communicate with the community?	2
How well do village committees function?	2
Security ,law and order (overview)	4
How safe do people feel who live in the village?	4
Is it true that most community members comply with local and national government laws?	2
Is it true that most community members go along with social norms of the village?	2
Local leaders insure that there is good enforcement of laws	2
Local leaders make sure that social norms are followed	3
How much reliance is made on outside sources of help for maintaining security	4
Total score	28 (out of 45)

Figure 1 sum up the adaptive capacity scores for the Mwembeni village. It shows that despite complaints about weak leadership, the village’s greatest strength is its strong leadership and organization. This is something that the village can build on as it strengthens its adaptive capacity in the areas that are lagging behind—especially coastal resources management and risk awareness and emergence response. The weakest area relative to the total possible score is risk awareness and emergency

response. Hence, to build adaptive capacity, this is an area that will require strengthening.

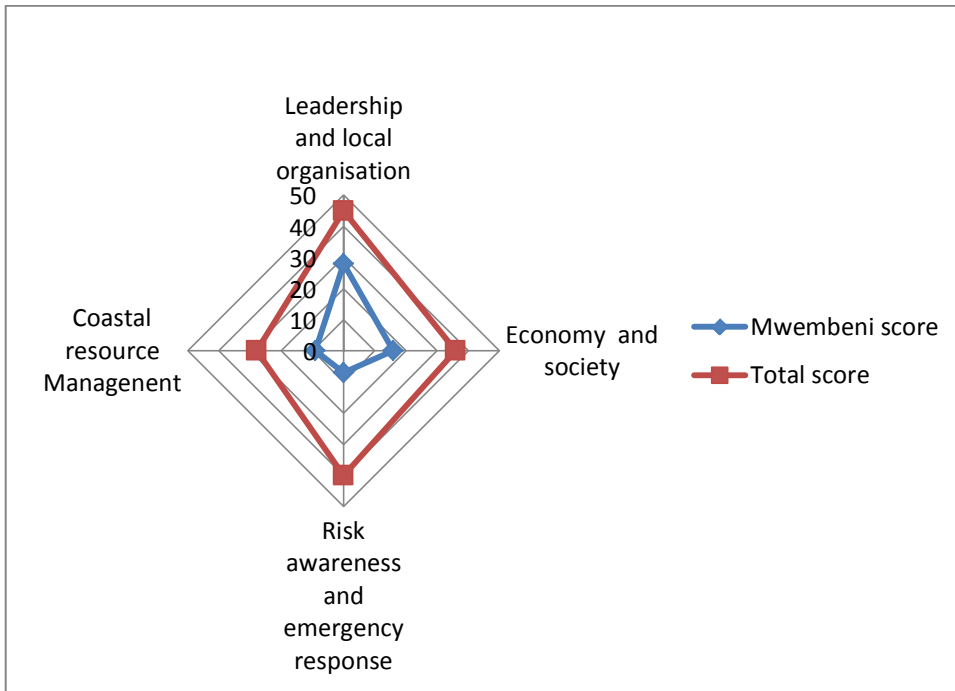


Figure 1. Summary of Adaptive Capacity for the Mwembeni Village

6. ADAPTATION ACTIONS

Community members from different representative groups gathered to identify doable adaptation actions in the village. The stakeholder groups included members from livelihood groups (agriculture, fishing and petty trade) and the climate change committee. Ideas focused on planting drought and pest resistant crops, mariculture, and improving disaster preparedness.

These ideas were translated into an action plan roadmap for follow-up actions (Table 6). The village Climate Change Committee is taking the responsibility for implementing the planned activities under the supervision of the Village Council.

Specific Objective	Activities	Responsible Group
1. Improved coastal resources management	(a) Create awareness among committee members and the local community about climate change and its impacts (b) Establish tree nurseries and plant trees (c) Better enforce water sources management	1. Climate change committee 2. District Climate Change Task Force 3. Community
2. Improve understanding on disasters and emergency responsiveness	(a) Create disaster awareness and outline how to manage the climate change committee, the disaster committee, and the community (b) Provide disaster preparedness and management information to the community	1. Climate change committee 2. District Climate Change Task Force 3. Village Council
3. Improved Socio-economic activities	(a) Conduct training on entrepreneurship skills for the community (b) Create awareness on integrated PHE to the community (c) Establish and promote drought resistant crops (cassava, maize, bananas and simsim) by using of resistant cultivars. (d) Establish drought resistant fruit tree nurseries (oranges and mangoes) (e) Promote drought resistant fruit cultivation	1. Climate change committee 2. District Climate Change Task Force 3. Village Council 4. Community members

Specific Objective	Activities	Responsible Group
4. Improved governance and leadership	(a) Conduct training on leadership and good governance to climate change committee and village council	<ol style="list-style-type: none"> 1. District Council 2. Village Council 3. Pwani Project 4. Other stakeholders

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**APPENDIX 1. LIST OF PARTICIPANTS THAT HELPED PREPARE THE
CLIMATE CHANGE VULNERABILITY ASSESSMENT AND
ADAPTATION PLAN**

No.	NAME	TITLE/REPRESENTATION
1	Ali R. Semfuko	Ward Executive Officer
2	Ali Kanyemka	Member, Climate Change Committee
3	Mussa Mmasai Suwaka	Member, Village Council
4	Mwerekwa Mohamedi	Sub-village Chairperson
5	Mtoo Jumaa	Member, Village Council
6	Magdalena Maulus	Member, Village Council
7	Paullo Mlula	Member, Climate Change Committee
8	Ramadhani M. Mtandilah	Member, Climate Change Committee
9	Joseph Lendome	Member, Village Council
10	Alphani Sugwa	Member, Village Council
11	Amina Zuberi	Member, Climate Change Committee
12	Awetu Mohamedi	Member, Village Council
13	Mwanaisha Ismaili	Member, Village Council
14	Marta Adeus	Member, Climate Change Committee
15	Paulina Jonas	Member, Climate Change Committee
16	Mboni Salehe	Member, Climate Change Committee
17	Hadija Zuberi Waziri	Member, Village Council
18	Mboni J. Asumani	Member, Village Council
19	Siwazuri Rashidi Akida	Member, Climate Change Committee
20	Agatha C. Rikora	Community Member
21	Bahati Hassani Salimu	Member, Climate Change Committee
22	Jairo S. Jairo	Community Member
23	Hamis Halfani	Community Member
24	Athumani M. Samofi	Sub-village Chairperson
25	Mohamed J. Mjanaheri	Member, Climate Change Committee
26	Pili Yusufu	Sub-village Chairperson
27	Mwapwani Akida	Community Member
28	Mganga Halfani	Member Climate Change Committee
29	Ali M. Suwaka	Community Member
30	Zuhura Awadhi	Primary School Teacher
31	Hamisi Omari	Member, Climate Change Committee
32	Saidi M. Majira	Ward Councilor
33	Hamisi M. Ng'ombe	Sub-village Chairperson
34	Comfort J. Mshana	Village Executive Officer
35	Jumaa Saburi	Village Chairperson
36	Farid Mrisho	Village Medical Assistant
37	Mwanahamis S. Ngereza	Nurse Attendant

**APPENDIX 2. DETAILED ASSESSMENT OF CLIMATE CHANGE
VULNERABILITY AND RESILIENCE IN COASTAL COMMUNITIES**

Focus Group Questionnaire

GROUP MEMBER COMPONENT.....

NUMBER OF MEMBERS.....

FOCUS GROUP INTERVIEW FACILITATOR.....

Thematic Areas:

- Governance and Leadership
- Coastal Resources Management
- Risk Awareness and Emergency Response
- Economy and Society

Theme 1: Governance and Leadership (GL)

Governance is a very broad indicator that measures a variety of characteristics that together indicate how process and decisions are made to serve the best interests of the community and stakeholders. We focus here on leadership and stakeholder participation in management and decision-making. (Source: SocMon and SEM-Pasifika 2011)

Good governance is about achieving desired results and achieving them in the right way, in compliance with laws and policies and shaped by cultural norms and values of an institution, organization, or community. Governance provides the enabling conditions for coastal communities to absorb or resist perturbations, bounce back from disturbances, and adapt to change. (Source: Resilient Community Thailand 2007)

Leadership measures the presence of community leaders or government officials who can mobilize climate change responses and resources to support adaptation, and their effectiveness or credibility. This indicator is important because communities with strong, trustworthy, effective leaders will be more able to adapt. Stakeholder participation in management and decision-making is critical to buy-in of any new program related to climate change. (Source: SocMon and SEM-Pasifika 2011).

The overall measure of governance and leadership is a combination of two themes of 1) leadership and local organization and 2) security and law and order. The score for each theme could be the aggregate of all of the indicators/questions under each theme. The overall score for this area could be the aggregate of the themes or a modification thereof justified by discussion notes.

Topic 1: Leadership and local organization

Absent (0); Exists but weak (1); Exists but fairly strong (2); Exists and strong (3); Exists and very strong (4)

Introductory Question:

What major leadership problems do you have in the community?
 When there is a problem in the community, whom do you count on to charge and lead to find a solution?
 Who are the key leaders in your village?

Notes and comments

Question or indicator	Coding scheme for responses
GL-1 Do the local village government discusses issues with the entire community? (This is a rating based on direct questions as well as how the traditional authority is referred to in discussions)	Never (0); Very rarely (1); Sometimes(2); Many times (3); all of the time (4)

GL-1 Notes and comments

GL-2 Do Assembly representatives communicate with the community? (How does the Assembly representative communicate with the village? Open ended responses might be a range from—we never hear from him/her; only tells his/her friends; comes to meetings regularly; initiates meetings when something important is happening)	Never (0); Very rarely (1); Sometimes(2); Many times (3); all of the time (4) To note if communications is perceived to be one-way or two-way?
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GL 2 Notes and comments

GL-3 How many committees does the village government have?

How do they function

(0)Not function (1)Poorly functioning (2)Fair functioning (3)Good (4)Very good

Topic 2: Security, law and order

Unsafe and no compliance with laws/norms (0) somewhat safe but little compliance with laws/norms (1) safe but little compliance with laws/norms (2) very safe but little compliance with laws/norms (3) somewhat safe but average compliance with laws/norms (4) very safe and total compliance with laws/norms (5)

Introductory questions:

- 1) What are the security problems in the village?
- 2) What kinds of laws and local rules or norms are most frequently broken in the village?

Notes and comments

Question or indicator	Coding scheme for responses
GL-4 How safe do people feel who live in the village?	No security (0); Very unsafe (1); Somewhat safe (2) Most of the time feel safe (3); Always feel safe (4)
GL 4 Notes and comments	
GL-5 Is it true that most community members comply with local and	Never (0) , very little compliance – (1); average compliance (3) almost 100 % compliance (3); 100%

national government laws? (needs to be couched to simpler conventional laws on resource use)	compliance (4)
GL 5 Notes and comments	
GL-6 Is it true that most community members go along with social norms of the village? (simple social norms/customs/taboo on possible resource use)	Never (0) , very little compliance – (1); average compliance (3) almost 100 % compliance (3); 100% compliance (4)
GL 6 Notes and comments (list social norms)	
GL-7 Local leaders insure that there is good enforcement of laws (What usually happens when someone breaks a law? How often do you need outside help to deal with these problems?)	Never (0) less often (1); often (2) very often (3) Always (4)
GL 7 Notes and comments	
GL 8 Local leaders make sure that social norms are followed (What usually happens when someone is violating important norms?)	Never (0) less often (1); often (2) very often (3) Always (4)
GL 8 Notes and comments	
GL 9 How much reliance is made on outside sources of help for maintaining security (What usually happens when someone is violating important norms?)	No reliance (0) , very little reliance (1); average reliance (3) almost 100 % reliance (3); 100% reliance (4)
GL 9 Notes and comments	

Theme 2: Coastal Resource Management (CRM)

Topic 1: Condition of coastal resources

Poor (0); Fair (1); Good (2) Very Good (3) Excellent (4)

Question or indicator	
Introductory question: What are the main coastal resources that the community has? (map the coastal resources with community people)	
Notes and comments	

Question or indicator	Coding scheme for responses
CRM 1: What shape are your coastal resources in?	Poor (0); Fair (1) Good (2) Very good (3) Excellent (4)
CRM 1 Notes and comments	
CRM 2: What are the ways in which coastal resources are kept in good shape so they can be available to your children? (List the ways that seem to work well to keep coastal resources in good shape. What are the traditional ways that the village has managed its resources? What are the new ways that villages can utilize to manage their resources?)	
CRM 2 Notes and comments	

Topic 2: Land Use Decision Making and Planning

Poor (0); Fair (1); Good (2); Very Good (3) Excellent (4)

Introductory Question What are the processes for land acquisition in this community? What is the land ownership regime?	
CRM 3: Is the way land is allocated for use deemed fair and adequate for community needs? Is there an equitable distribution of access to resources and opportunities?	Coding scheme for responses Unfair (0); Somewhat fair (1); Fair and adequate (2); Most of the time is adequate (3) All the time is adequate (4)
CRM 3 Notes and comments	
CRM 4: Is infrastructure development being done in a wise and thoughtful manner, using traditional understanding of how coastal resources behave?	Never (0); Rarely projects seem to have many problems (1) sometimes projects have problems (2) most of the time projects are built and located correctly (3) All the time projects are built and located correctly (4)
CRM 4 Notes and comments	
CRM 5: Does the community get all of the infrastructure that it needs to insure the safety and well-being of its citizens?	Almost never (0); rarely projects seem to deliver benefits to village (1) sometimes projects deliver benefits to the village (2); most of the time we get the projects that we need (3) All the time we get projects we need (4)
CRM 5 Notes and comments	
CRM 6: To what extent has the community taken the initiative to address its coastal issues and to plan for future uses?	No initiative (0); initiated something but failed (1); there are a few good examples but no plan (2) the community is working on a plan (3) the community has adopted and is implementing a plan (4)
CRM 6 Notes and comments	
CRM 7: How well can the community mobilize to put a plan into action related to the use of its coastal resources? (What are some examples of how the village is dealing with any problems in using coastal resources?)	Never discussed (0); discussion but noting happens (1) discussion with limited action (2) discussion with more action (3) discussion with implementation (4)
CRM 7 Notes and comments	

Theme 3: Risk Awareness and Emergency Response (RA)

Awareness of household vulnerability of climate hazards measures a household's knowledge of susceptibility to climate hazards and its ability to cope with, recover from, or adapt to those hazards. Climate hazards are climate-related events that have the potential to cause harm. Households may be at risk for different types. Some may be transient—characterized by rapid onset and identifiable termination (such as a storm, flood, or drought). Others may result from a longer-term change in climatic variables (such as temperature or precipitation), be gradual, or result in related events such as sea level rise, mass coral bleaching, or ocean acidification. It is important to keep in mind that different households in the same community may experience each of the factors at a different level, and thus have different levels of awareness about their vulnerability to the same types of hazard. Access to and use of climate-related knowledge measures household access to different sources of information related to climate change, climate variability, and its impacts, and how this information is used. It

also includes access to any type of early warning system and can include past experience, traditional or local knowledge of climate patterns and events, as well as other sources of education, media, and communications. (Source: SocMon and SEM-Pasifika 2011)

The ability of a community to reorganize refers to the degree to which it is able collectively to learn, plan, and make necessary changes to cope with climate impacts in such a way that the main functions of the community are sustained. This may require restructuring organizations, changing plans, shifting priorities, adjusting roles, carrying out activities in a different way, or applying lessons from the past to better face a climate hazard. Degree of community reorganization is a critical indicator of resilience to changing climate. Level of community reorganization is a function of factors including cooperation and collaboration among community members, planning for climate change, level of collectivism in the culture, community leadership, shared goals and responsibilities, and access to and support from other sources in reorganization. (Source: SocMon and SEM-Pasifika 2011)

Topic 1: Public awareness of local conditions such as erosion, shifting or river course/delta

Unaware (0); low level of awareness (1) average level of awareness (2) high level of awareness (3) very high level of awareness (4)

<p>Introductory question: What are the main natural and environmental threats that the community faces? <i>Rainstorm; Storm surge; Sea level rise Coastal/beach erosion; Saltwater intrusion into gardens/fields/water sources; Changes in rainy and dry seasons, leading to changes in planting seasons, etc.; Drought; Flood; Climate related hazard caused by heat and dryness; Hotter climate; cholera; malaria; diarrhea outbreaks; agro- pests; soil fertility; famine</i></p>
Notes and comments

Question or indicator	Coding scheme for responses
RA 1: What are the main causes of these problems?	No ideas (0); Causes named for a few threats (1); Causes named for several threats (2) good ideas about the causes of most threats (3) good ideas of listed threats (4)
RA 1 Notes and comments	
Question or indicator	Coding scheme for responses
RA 2 What formal or informal education programs exist in this community to promote risk knowledge and help with adaptation (List the educational programmes)	None (0) very few (1) several but informal (2) several and more formal (3) educational programmes for all risks (4)
RA 2 Notes and comments	
RA 3 What are some of the steps the community is taking to reduce the impacts of the risks (Recall a risk that was mentioned and ask whether some kind of action is being considered or has been taken)	We aren't doing anything (0) one or two projects (1) several actions with limited impacts (2) several actions with positive impacts (3) actions for all risks with positive impacts (4)
What is the level of involvement of the community in these projects? (Probe what exactly has been done? Who is doing the project? How is the community involved)?	Not involved (0); involved at few stages (1); involved at many stages (2) involved at most stages (3) involved at all stages of project (3)

Topic 2: Emergency Preparedness

Unprepared (0); somewhat prepared (1) prepared (2) well prepared (4) very well prepared

Introductory question: What kind of social or economic emergencies happen in the village? List the kinds of emergencies. How do community people get emergency information? List the ways people receive information. Try to rank order the most important sources.	
Notes and comments	
Question or indicator	Coding scheme for responses
RA 7 Do people get enough information in time to react to a local emergency?	No one tells us what is going on (0) Most of the time we don't hear anything (1) Once in a while we get an alert or warning (2) We usually know in advance what is happening (3) we are always informed in advance
RA 7 Notes and comments	
RA 8 As far as you can remember, how often has the community mobilized resources to address emergency situations?	Never (0); one time (1) a few times (2) most cases (3) all cases (4)
RA 8 Notes and comments	
RA 9 Are there any formal/informal groups that help out during emergency situations?	None (0) few but non-functional (1) several but semi-functional (2) several but functional (3) enough and functional (4)
RA 9 Notes and comments	
RA 10 When there are emergencies or problems that affect people and create sudden hardship, how well does the community do in taking care of these cases? <i>(Example; family house burns down or destroyed by flood)</i>	Nothing happens and no support (0) seek outside help – eg. from NADMO, church etc (1) sometimes we are able to respond effectively (2) there have been numerous times when we took care of things ourselves (3) we always handle things ourselves (4)
RA 10 Notes and comments	
RA 11 Is there enough training that help the community handle emergency situations?	No one has received any training (0) a few times someone attended a training (1) there have been several trainings but capacity remains low (2) several trainings and capacity is growing (3) we are well prepared (4)
RA 11 Notes and comments	

Theme 4: Economy and Society (ES)

Changes in the economy and people's quality of life are often the main criteria upon which a community's resilience is judged after a disaster. The strength of the economy and the diversity of livelihoods greatly influence the community's ability to prepare for disasters, quicken the recovery process, and adapt to changes that make them less vulnerable in the future. Despite changes in coastal ecology, health, laws, governance frameworks, or hazard response programs, it is the improvement or decline in a person's livelihood that directly affects resilience. (Source: Resilient Community Thailand 2007)

Topic 1: Livelihoods and rural economy

seriously declining (0) getting worse over time (1) about the same as a few years ago (2) improving (3) prosperous (4)	
Introductory question: what are the main ways people in the village earn their livelihood?	
Notes and comments	
Question or indicator	Coding scheme for responses
ES 1 Do people earn their livelihood mainly doing the same thing all the time or does the community have a range of income sources and options, and individuals participate in several of these?	No livelihoods (0) one livelihood (1) up to three livelihoods (2) up to 5 livelihoods (3) over five livelihoods (4)
ES 1 Notes and comments	
ES 2 Are the main livelihoods in the village at risk from natural, social or economic hazards and change? (Note which ones are most at risk)	All (0) most (1) half (2) a few (3) none at risk (4)
ES 2 Notes and comments	
ES 3 How is the status of the village economy evolving?	Seriously declining (0) getting worse over time (1) about the same as a few years ago (2) improving (3) prosperous (4)
ES 3 Notes and comments	
ES 4 Does the community believe it has the capacity to move its economy forward in a positive direction?	We can do nothing to improve things (0); there are one or two things we can try (1); we are trying a few things but they are not working yet (2) we are trying a few things and there are positive signs (3) making progress and doing well (4)
ES 4 Notes and comments	
ES 5 Have supplementary or alternate livelihoods been identified that can make a difference for individuals or the community as a whole?	We don't have any options or ideas(0) there are one or two ideas but not yet being tested (1) one or two ideas are being tested but not yet proven (2) several livelihood options have shown positive results (3); we have options that are making a big difference (4)
ES 5 Notes and comments	
ES 6 Are livelihoods dependent on outside market forces in a given year?	Totally (0) to a certain extent (2) not at all (4)
ES 6 Notes and comments	

Topic 2 Attention to the needs marginalized groups

Not at all (0); poorly (1) at times people get adequate help (2) most of the time (3) we do a good job (4)	
Introductory question: Who are the most marginalized groups in the village? <i>Marginalized people are those who do not benefit from the community's resources and or not involved in decision making processes at the community level.</i>	
Notes and comments	
Question or indicator	Coding scheme for responses
ES 8 Does the communities do a good job in taking care of the needs of disadvantaged groups?	Not at all (0); poorly (1) at times people get adequate help (2) most of the time (3) we do a good job (4)
ES 8 Notes and comments	