The BALANCED Project

Population, Health, Environment Situational Analysis for the Saadani National Park Area, Tanzania

February 2011

USAID FROM THE AMERICAN PEOPLE

Coastal Resources Center
University of Rhode Island

PATH Foundation Philippines, Inc.
ALLEVIATING POVERTY * IMPROVING HEALTH * PROMOTING ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT

CONSERVATION INTERNATIONAL

This document can be found at http://www.crc.uri.edu/.
For more information contact:

Coastal Resources Center
University of Rhode Island
Narragansett Bay Campus
South Ferry Road
Narragansett, Rhode Island 02882, USA
Tel: (401) 874-6224
Fax: (401) 874-6920
Email: balanced@crc.uri.edu

Citation:
The BALANCED Project. 2010. Population, Health, Environment Situational Analysis for the Saadani National Park Area, Tanzania. Coastal Resources Center, Narragansett, Rhode Island.

Disclaimer:
"This document is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the Coastal Resources Center at the University of Rhode Island as part of the Building Actors and Leaders for Advancing Excellence in Community Development (BALANCED) Project and do not necessarily reflect the views of the United States Government. This document is funded under Cooperative Agreement No. (GPO-A-00-08-00002-00)."

Cover Photo Captions: Top: Small shop in Sange village that sells condoms. Bottom: Children in the Mikocheni village.
Photo Credit: All photos in this document are taken by Elin Torell

Table of Contents

List of Tables

Introduction

This study summarizes the results of a behavioral monitoring system (BMS) conducted in Tanzania in June 2009. The study was co-sponsored by the *"Building Actors and Leaders for Advancing Community Excellence in Development"* (BALANCED) Project and the *Sustainable Coastal Communities and Ecosystems* (SUCCESS) Project. Both projects are part of the Tanzania Coastal Management Partnership (TCMP), which is a catalyst for effective and sustainable change that both safeguards coastal resource assets and improves the quality of life for those who live and work along the coast. Tanzania is in its second generation of integrated coastal management (ICM). The first helped establish local ICM initiatives, pioneered collaborative fisheries management, established marine protected areas (MPAs) on the mainland and Zanzibar, and created a framework for ICM at the national level (led by the TCMP). This work culminated in 2002, when the Tanzanian Cabinet approved the National Integrated Coastal Environment Management Strategy (ICEMS). Since then, TCMP has supported integrated planning of coastal resources and activities at the local level, through district-based ICM action planning.

The TCMP has been active in Pangani since the year 2000, when it began working with the district to plan and implement ICM action plans. This has included activities related to livelihood development, beach pollution, energy saving technologies, and HIV/AIDS communication and action planning. The TCMP population, health, environment (PHE) demonstration site covers two of the Pangani District Wards and encompasses six villages (see Figure 1). The villages were specifically selected for their importance to biodiversity conservation and they all border or are surrounded by the Saadani National Park (SANAPA), which was established in 2004. The key issues related to PHE that are found in the villages surrounding SANAPA include:

Overfishing and use of destructive fishing methods: Expanding populations continue to threaten near-shore fisheries and aquatic ecosystems in an open access regime. This includes pressures from both local fishers and those who migrate seasonally along the northern seascape. Coral reefs are being permanently damaged by dynamite fishing—which is on the rise after initial gains at eradication. Many families and most women have few livelihood options. This exacerbates the crisis of overfishing and increases the likelihood that individuals will engage in unsustainable and illegal livelihood activities—e.g., game poaching, forest-cutting or dynamite fishing—that have dire consequences on the health and sustainability of the coastal ecosystems and the biodiversity upon which tourism and fisheries depend.

Threats to rare and endangered species: In the marine area, rare and endangered species under threat include the coelacanth and marine turtles. Sea turtles experience high mortalities as incidental bycatch in shrimp trawls and gill nets, through the collection of eggs from nesting beaches, and by beachfront development that alters nesting habitat and lighting. On the terrestrial side, a new large agro-industrial estate for ethanol production located directly south of SANAPA is in the direct path of Saadani's migrating elephants.

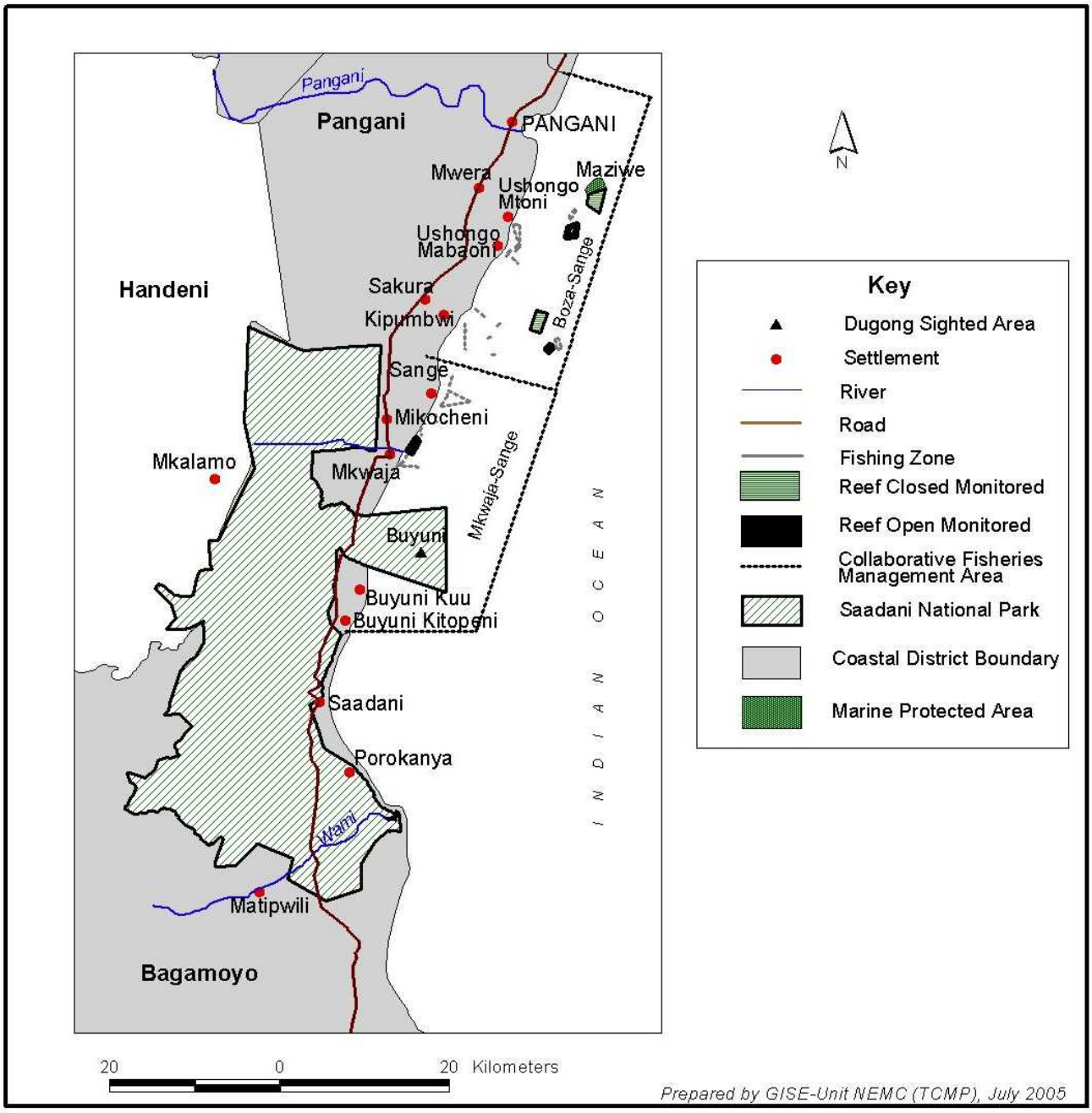


Figure 1.TCMP PHE integration area

Increased withdrawal of freshwater and pollution from agro-industrial development in the Wami River Basin may become a threat to sustaining the ecosystem services of the lower Wami. SANAPA wildlife depends on the Wami as the only constant flow of freshwater in the dry season. Meanwhile, ample freshwater flows in the estuaries are critical for maintaining the abundant coastal shrimp that provide for an industry that seasonally employs hundreds of fishermen.

Loss of critical coastal habitats: Cutting of coastal and mangrove forests for household fuel consumption is accelerated by high population growth and the loss of land converted to agricultural development. Mangroves and inter-tidal salt flats are also at risk due to growth in milkfish and shrimp pond culture and from clearing by hotels that seek open beach and water views for their guests.

A context of poverty, poor health and gender inequity: Underlying drivers of ecosystem degradation include poverty, food security, gender inequity, and health. Over 80% of those living around Saadani National Park live more than five kilometers from the closest dispensary and access to family planning is limited. With an average HIV infection rate of 4.8% among adults between the ages of 15-49 in the Tanga region, a significant proportion of the population in the survey area is HIV-positive (NBS and Macro International Inc. 2009). This has impacts on poverty and resource use. Of particular concern is the issue of migrant labor including 'mobile fishermen with money' who spread HIV/AIDS and the continued pressure on women fish mongers to exchange sex for the exclusive right to purchase fish from the boat.

Population growth rates: The population growth rates for fishing communities such as Saadani and Sange, are above the national average because of permanent or seasonal in-migration. For example, during the high fishing season from March to June, migrant fishermen and businessmen pour into Saadani village, swelling the population of the village from 1,900 to 3,000. The annual population growth rates of Saadani and Sange are 6.1% and 4.2% respectively, which can be compared with the Tanga regional average of 1.8%, the Pwani regional average of 2.4% and the national average of 2.9%) (Torell et al, 2006). Agro-industrial estates being developed south of Pangani are also expected to fuel large in-migrations of people, all of whom place increasing pressures on the natural resources.

Family Planning and Health services: The contraceptive prevalence rate among all women (married and unmarried) in the Tanga Region, which includes the Pangani District, is 40%. The Bagamoyo District, which also has villages surrounding SANAPA just south of Pangani, belongs to the Pwani Region, which has a contraceptive prevalence rate of 20%. This is less than the national average of 26%. In Tanzania, in general, women with children are more likely to use contraception than married women with no children. While it is culturally inappropriate for unmarried women to use birth control, the Tanzania Demographic Health survey reports that unmarried and sexually active women are more likely to use contraception than married women. However, the preferred use of contraception is the condom. Most contraceptive methods are purchased from

public sector outlets.[1] Each region has a health clinic, and there is one health dispensary each in the Mkalamo and Mkjara wards. The Mkalamo and Mkjara wards do not have Ministry of Health community-based distributors.

Climate change: Climate change is further weakening the resilience of coastal ecosystems in the Northern Seascape. Communities are noting changes in rainfall patterns that affect shrimp production; decreases in *Cottonii* seaweed agricultural output due to El Nino and La Nina oscillations that affect sea temperatures; and changes in freshwater sources that put humans in direct competition with wildlife. Sea level rise will drown mangroves and will require new priorities for conservation. Coastal tourism infrastructure is already at risk from erosion and flooding, and if not planned properly, new development will face similar risk. Coral reefs are expected to face massive die-offs from increasing frequency and severity of bleaching events caused by high sea surface temperatures.

Biodiversity Conservation Efforts

Saadani National Park

Saadani National Park (SANAPA) is located along the coast, about 80 km north of Tanzania's capital, Dar es Salaam. The park covers 1,137 square kilometers. Of these, 66 square kilometers are marine (see Figure 1). The park cuts across the Tanga and Coast regions and is situated in the Pangani and Bagamoyo Districts, with a small portion in Handeni district. There are 10 villages bordering the park with a total population of approximately 35,000 persons.

Saadani is the only park in Tanzania that includes both terrestrial and marine areas and the only national park in Tanzania with a marine zone. Situated close to Dar es Salaam, the area is likely to be the source of both local and international tourism growth once adequate facilities, communications and infrastructure are in place. The following are some of the main resource-use issues that have been identified for the park:

- Subsistence and commercial poaching of wildlife, forest products and marine resources
- Threats to resources, biodiversity and ecosystems in general due to development (tourism, proposed coastal road development, Wami River water extraction, mineral prospecting, etc.) – the impacts of this on the environment are not properly assessed
- Lack of up-to-date biological information on status and trends of biological resources
- Resource use and boundary conflicts between communities and the park Authority in balancing conservation needs and community livelihoods

SANAPA Marine Resources

Marine resources include mangroves, sea grasses, algae and reefs. There are approximately 55,635 ha of mangroves in the area. Marine animals include fish, sea turtles, gastropods, echinoderms, and corals. These form an important part of the marine

[1] National Bureau of Statitics (NBS) [Tanzania] and ORC Macro 2005 *Tanzania Demographic and Health Survey 2005-2005* Dar es Salaam, Tanzania, National Bureau of Statistics and ORC Macro.

ecosystem and provide a source of livelihoods for fishing communities. A detailed biodiversity assessment of the marine and coastal areas of Saadani National Park has not yet been conducted.[2]

The park has a short stretch of beach located about 13 km. south of Mkwaja village. The beach stretch is one of the few turtle nesting sites remaining in Tanzania, and the only protected area for nesting turtles along the entire mainland coastline. With no other safe nesting sites along the coast between the Kenyan border and Dar es Salaam, this stretch is critical for the endangered marine green turtle (*Chelonia midas*).

SANAPA Terrestrial resources

Saadani National Park contains animals such as elephant, giraffe, zebra, greater kudu and wildebeest. The special biodiversity value of the park is the existence of the only population of Roosevelt Sable (*swala*) in Tanzania and the most northeasterly population of Liechtenstein's Hartebeest. A survey by the Wildlife Conservation Society of Tanzania (WCST) revealed the existence of more than 200 species of shorebirds and waterbirds, including some migratory species that move to the area from other parts of the world.

The Zarangire forest is reported to be the largest and least disturbed coastal lowland forest in Tanzania. It has a high number of coastal forest endemic plants, birds and invertebrates. As a small remnant of the eastern Africa coastal forest, it is of high biodiversity value. A small wetland that is present in the forest contains sedge, cyperus and other grass flora.

The Wami River and its estuary form part of the ecosystem of the park and are an important source of water for animals especially during the dry season. The Wami River is the only freshwater river source that flows year-round. Hippopotamus, crocodiles and associated inter-tidal wildlife populate the Wami estuary.

Collaborative Fisheries Management Areas

Collaborative management areas (CMAs) were established along the Tanga region's coast in the mid-1990s. These are near-shore marine areas managed primarily for fisheries purposes and include no-take zones that also provide conservation benefits. The fundamental approach is to involve resource users in the participatory development, review, negotiation and implementation of plans. Six CMAs have been established, varying in size from 100 to 559 km^2. Some of the boundaries were determined through a negotiation process and essentially represent the point where there is the smallest amount of overlap in resource use by different villages.

Reef closure has been one of the resource management strategies employed by the CMAs. Criteria for reef closure are discussed and agreed by villagers with facilitation and support of the district officers. These criteria include reef condition, number of fish species, fish density, ease of managing and patrolling, accessibility for older fishers, and the subject reef's position relative to currents and other reefs. Initially, closures were for one year with an option for extension, but all closed reefs have remained closed.

[2] In 2011 TCMP will assist the Park by conducting a biodiversity assessment of its marine area.

The Boza-Sange Collaborative Management Plan includes five shallow water coral reefs located about five km offshore from Ushongo village, and two closed reefs. The Sange-Mkwaja-Buyuni CMA does not have a closed reef. The TCMP PHE activities are implemented in villages that fall within the Boza-Sange and Sange-Mkwaja-Buyuni CMAs. Already implementing integrated coastal management activities that included biodiversity conservation, livelihood development, and HIV/AIDS communication and planning, it made sense to also integrate family planning and to pilot a full-fledged PHE effort in this area.

Maziwe Marine Reserve

Maziwe reef has the highest number of coral genera in the Tanga region and has a good standing stock of fish and octopus, including over 200 species of fish, 35 genera of both soft and hard corals, sea grass, algae, sponges and many types of shorebirds. The Maziwe area is a primary fishing ground for the nearby villages. It also attracts fishermen from other parts of Tanzania as far away as Mtwara, Kilwa, Mafia, and Zanzibar and from Mombasa, Kenya. The area is part of the Boza-Sange CMA.

Swimming, diving, snorkeling, and research are other activities at Maziwe. A visitor fee of 1000 Tanzania shillings (US $0.75) was introduced in 2002 and is charged to tourists visiting the reserve. The Pangani District Council collects and manages the visitors' fees with the help of neighboring hotels. There has been a steady increase in the number of tourists visiting the reserve and, thus, in the amount of fees collected (see Table 1). July to January of each year is the busiest period for tourism.

Table 1. Number of visitors and income from fees collected for entrance to the Maziwe Marine Reserve

Year	Number of Visitors	Total Fees Collected (Tanzanian Shillings)
2002	216	216,000
2003	370	370,000
2004	448	448,000
2005 (Jan-March)	228	228,000
2006-2008 (up to March)	1,271	1,272,000

Source: Pangani District Council, Natural Resources Department

An integrated approach to addressing the issues for those living around SANAPA

Preparing for a new integrated project called the *"Conservation of Coastal Eco-Systems in Tanzania: The Pwani Project"*, TCMP synthesized what they know about the population, health, and environment issues at the village level in the SANAPA area and formed a model that explains these issues and how TCMP interventions can mitigate some of them. Figure 2 below illustrates how *Pwani* actions are designed to affect key leverage points that influence the utilization and condition of natural resources. Arrows with a + sign indicate that the pair of variables move in the same direction, while a – sign indicates that the values move in opposite directions.

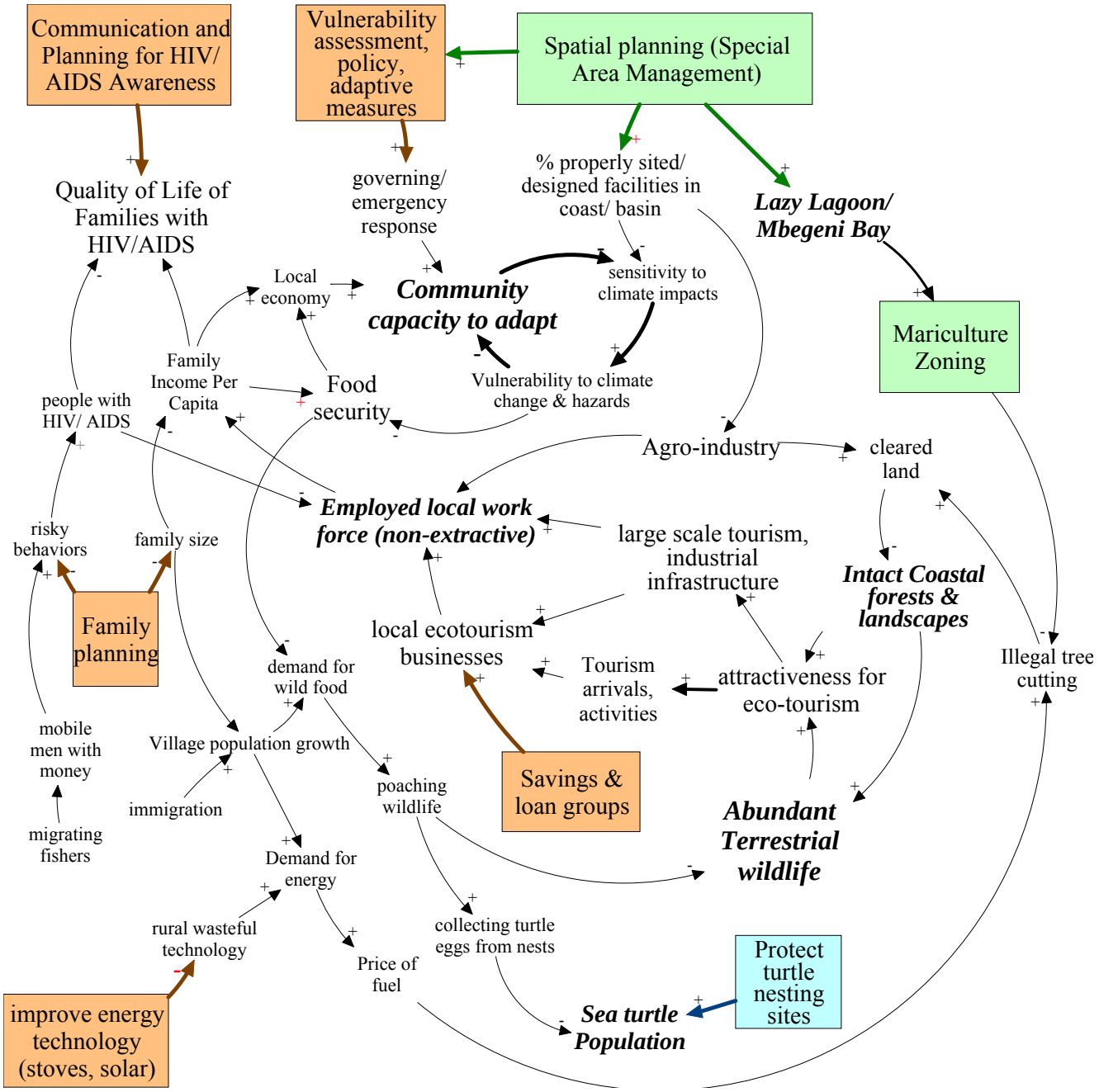


Figure 2. TCMP PHE Model for Pangani

The model shows that there are a number of factors that influence biodiversity, health, and the socio-economic conditions among people living in the area. HIV/AIDS, a lack of access to family planning, climate change vulnerabilities, and wasteful energy solutions

all contribute to food insecurity and increased demand for wild food and resources. People poach and break management rules because they need the resources for fuel and food or because they need money that they can get from selling the resources on the market. Planning, good management and enforcement are positive forces for maintaining biodiversity, whereas illegal cutting of wood, overfishing, and poaching of wild animals degrade biodiversity.

Yet, these and other individual actions do not address the larger problem of increased extraction of resources due to HIV/AIDS. For example, more enforcement and better park management are by themselves insufficient; a focus on only HIV/AIDS-affected households does not solve the entire poaching problem; and offering alternative livelihood options will, alone, not reduce all the stresses on HIV families, etc. These are the reasons TCMP takes a holistic approach—one that addresses the causes of the problem(s), not the symptoms.

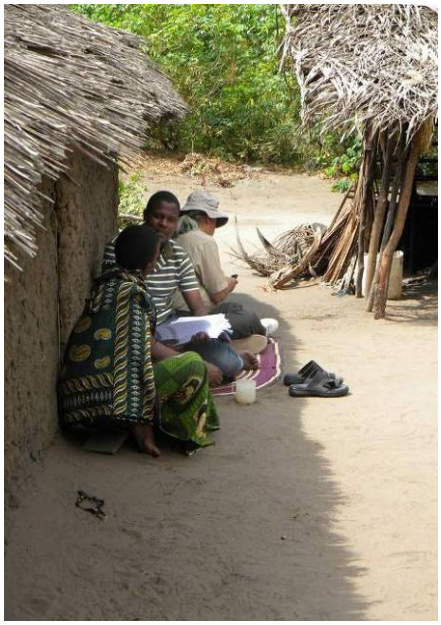
Methodology

The Behavioral Monitoring System (BMS) is one of the information systems developed by PATH Foundation Philippines, Inc. (PFPI) for program monitoring purposes. It uses population-based surveys to collect quantitative information in order to describe target groups in the community, monitor progress toward desired behavior change, and calibrate program implementation strategies. PFPI has refined the system over a period of 14 years and applied BMS methodologies in both urban and rural areas to monitor HIV/AIDS prevention, family planning practice and PHE activities in their project sites. For the TCMP PHE initiative, the PFPI BMS was modified by a team composed of TCMP staff, University of Rhode Island researchers, and PFPI staff. Questions were included to gather information on attitudes and behavior related to indicators for reproductive health, poverty, food security, climate change awareness, HIV/AIDS-related behaviors, and coastal resources management and to assess the integration across these factors. The study aimed to provide a baseline for the PHE integration activities launched in 2009 and to serve as an impact assessment of the HIV/AIDS communication and planning activities that have been ongoing since 2005.

Study Design

This study considered a cross-sectional design using quantitative methods and face-to-face interviews of sample respondents. Data from BMS surveys are then triangulated with data from previous surveys conducted in the area and qualitative information from other sources (focus group discussions and key informant interviews with, for example, local government leaders) to draw inferences for program refinement and policy reforms.

Survey Instrument



BMS interview in Sange village

The BMS instrument (questionnaire) was translated into Swahili and pre-tested in the Bagamoyo District in June 2009 by individuals with prior BMS implementation experience. The instrument was finalized, based on pre-test findings, and contains socio-demographic, health, coastal conservation and climate change-related questions as well as opinion questions on population-health-environment linkages. PFPI developed manuals of procedures and coding instructions to guide the interviewers in the sampling method and in the conduct of the survey.

Survey Areas

The 2009 BMS surveys were conducted in eight villages where TCMP is working, six villages in the Pangani District: Sange, Mikocheni, Mkwaja, and Bujuni in the Mkwaja Ward and Mkalamo and Mbulizaga in the Mkalamo ward; and two villages in the Bagamoyo District: Saadani and Matipwili. The two Bagamoyo villages were considered control sites for future comparative studies, as they were not involved in the population and health-related activities supported by TCMP. However, in this report, all eight villages are reported on as one cohesive group, except in a few cases, where we make comparisons between coastal and inland villages.

Data Collection Methods

The target respondents for the 2009 BMS comprise individuals in the reproductive age group (18-49 years). Sixty households were randomly selected in each village. The interviewers who conducted the survey were extension workers and graduate students who received prior training from PFPI and the University of Rhode Island Coastal Resources Center on BMS survey processes and interview methods. The enumerators were given a two-day training to discuss the nature, purpose, survey procedures, fieldwork techniques and specific aspects of the study to be carried out by the team. Social preparation (e.g. courtesy calls to local officials) was also conducted by the enumerators and project coordinators to secure permission and support from the local authorities in conducting the survey.

Selection of Subjects

The interviewers conducted an initial preparation in the field before conducting the survey. They secured master lists of households from the selected villages and used them to systematically select the sample households. A sample of 480 households was drawn from all the study villages (20% adjustment was included and the actual number of

individuals interviewed was 437). The interviewers selected the respondents from each sampled household using the Kish method/grid3, which allows for selecting a member of each household in a systematically varying fashion so that, across the entire sample, all possible household member-types are represented in the same proportions as in the population (McBurney 1988).

After the interviewer identified the respondent in the household, the interview proper was performed using the pretested BMS questionnaire. Informed consent was secured prior to conducting the surveys and 100% of those who were potential participants did agree to participate. All respondents were interviewed in Swahili and their answers were recorded on the questionnaire during the interview.

Data Processing

The questionnaires were edited by the interviewers while they were still in the field. They also coded the responses using the coding instruction as their guide. Responses in Swahili were also translated to English. After the editing and coding process, the questionnaires were then submitted to the TCMP office to further check for accuracy and completeness. The data were encoded in the data entry program constructed using CSPro 3.4 software. Survey data were checked for consistency and validity prior to analysis.

Overview of 2009 BMS Results

Demographic and Socio-economic Profile

A total of 437 respondents (54% women) from eight villages (five coastal and three inland) were surveyed in June 2009. The age of the respondents averaged 31.1 years. Almost 65% of those interviewed were married or living with someone. A significant number of women who were married to or living with a man (30.6%) stated that they were one of multiple wives. Interestingly, only 8.4% of men reported having more than one wife. This discrepancy may owe to women counting mistresses and informal wives, and the men counting only formal wives. Over 27% of all women and 10% of all men had no education. For women, this is higher than the national average, where reportedly 20% of women and 10% of men have no education (NBS and Macro International Inc. 2009).

The average household size was 4.9 individuals with an average of 2.2 adults between the ages of 18 and 49 years. Fifty two percent of the respondents were natives of their respective villages, whereas 46% lived in the villages for more than one year. Only seven respondents (1.6%) lived in the village less than one year. However, it is possible that some individuals that were temporarily living in the villages—or who had lived there for less than a year—were missed in the survey, as they might not (yet) be on the household lists that were collected from the village headquarters when preparing the samples.

3 Online information about the Kish Method is available from the World Health Organization at: https://www.who.int/chp/steps/Part2_Section2.pdf

Table 2. Demographic variables by gender

Variable	Females	Males
	Mean (*sd*)	**Mean (*sd*)**
Age	30.4 (*8.8*)	32.0 (*8.7*)
Number in household	5.2 (*2.4*)	4.5 (*2.5*)
Highest grade completed *(Among those with some education)*	6.8 (*1.4*)	7.1 (*1.7*)
	Percent (N)	**Percent(N)**
No education	27.2% (64)	10.9% (22)
How long lived in current village		
Less than a year	2.1% (5)	1.0% (2)
One year or more	42.4% (100)	50.5% (102)
Since birth	55.7% (131)	48.5% (97)
Muslim	91.1% (214)	84.2% (170)
Christian	8.9% (21)	15.3% (31)

In many of the villages, there has been a steady increase in female-headed households over the past five to ten years resulting from divorce, separation, and widowhood. The result is an increase in female marginalization and a rise in poor and vulnerable female-headed households (UZIKWASA, 2008).

Livelihoods

Livelihoods in all eight villages are highly dependent on the natural resources in the area—agricultural land, common property natural resources such as marine and freshwater fish, coconut and cashew trees, and forests. About 67% of all respondents get their main source of income from fisheries, farming, or aquaculture. Several of the villages are nearly totally dependent on a single livelihood—fishing or farming. However, because both agriculture and fisheries are currently suffering from a decline in productivity and profitability, these communities are at risk of increasing poverty and severe food insecurity in the near and long term.

Fishing boats in the PHE demonstration area

Artisanal fishing is an important economic activity in the coastal villages involving approximately 70-80% of the male population on a full or part time basis. Fishing households harvest a great diversity of species: fish, octopus, sea cucumbers, spiny lobsters, shells, corals and prawns/shrimp. The fishery is largely coral reef-based, occurring within 15 km of shore. Men do most of the fishing. However, a few women fish in shallow waters for shrimp, process and market fish, and collect octopus and mollusks at low tide. There are approximately 512 specific fishing grounds recognized by fishers, of which 112 have been identified as belonging to CMAs.

The income from fishing across the fishing villages in the study area is low. In all cases, fishers and their families are unable to save money. They live in a continual condition of insecurity. Declining fish abundance and catch, poor boats (unable to fish deeper waters), and a lack of engines and equipment are given as the primary causes of continuing low return. None of the boats in the project area have outboard engines.

The shrimp fishery is particularly important to the villages situated closest to the Wami River Estuary. In Saadani, for example, it is the main fishery. There are two seasons for shrimp. The high season is from March to May (kusi) and the short season is from October to November (maleleji). The end of the shrimp fishing season in Saadani marks the end of any significant economic activity. Therefore, for five or more months, fishers are relatively inactive (a small number of fishers migrate southwards to continue fishing for shrimp).

In the coastal villages, fertile land is scarce and there is little to no farming activity of food crops aside from coconuts and cashew nuts. Most of the potential arable land is within the boundaries of the National Park and therefore cannot be cultivated. There are also severe crop losses from wild animals especially in villages that border SANAPA (Saadani, Buyuni, Mkwaja, and Sange). In the village of Sange, crops like maize, cowpeas, simsim, and rice have been affected by drought and informants report that there have been food shortages for several years. In most coastal villages, people depend on imported agricultural goods from neighboring inland villages and from urban areas.

In the inland villages (Matipwili, Mbulizaga, and Mkalamo), farming is the primary livelihood. Matipwili village is privileged to be located along the fertile shore of the Wami River, the only river in the region that flows throughout the year. Corn and peas are grown in the period of low rains and rice is cultivated during the rainy season, when the fields are flooded. Other crops include plantains, pineapples and cassava. Mkalamo and Mikocheni are experiencing periods of extremely low production in agriculture. In Mikocheni, there have been food shortages for several years. Food insecurity is due to recurrent drought, damage from wild animals, and a lack of interest in agriculture among the younger generation.

Quality of life indicators

Table 3 shows that just over half of the respondents felt that they had difficulty meeting their basic needs and very few were able to save. This corresponds with a survey conducted by the Coastal Resources Center (CRC) in nearby villages in 2003, which found that 38% of respondents had less than three meals per day (Tobey and Torell, 2006).

Table 3. Perception of Poverty

Perceived Standing	Percent
We have difficulty in meeting our basic needs	51.9%
We just meet our basic needs and have no extra	36.4%
We have enough to meet our daily needs and we have some extra	9.2%
We can meet our daily needs and save money afterwards too	2.5%

Other poverty-related variables show most live in homes with thatched or mud walls and thatched roofs. Televisions and refrigerators are very rare, whereas cell phones are relatively common (37.7%). This implies that at least some of the households have a bit of disposable income. There is little physical infrastructure and few social services in the villages. All roads are unsurfaced and many become impassable during the rainy season, leaving villages isolated at times. Six of the eight villages had no electricity, apart from generators. Electrical lines had been installed in Mkwaja and the Makolola sub-village of Sange. However, only a small number of homes were connected—5.4% of all villages in Mkwaja had electricity, compared to 2.1 for the eight villages combined.

Table 4. Poverty related variables

Variable	Percent
House has concrete walls	7.8%
House has tin roof	18.5%
Electricity	2.1%
Cell phone	37.3%
TV	2.5%
Refrigerator	1.8%
Matched living room set	15.1%

Population Composition

Like most other developing countries, a high percentage of Tanzania's population is under the age of 15 years. A 2005 PHE threats assessment found that in seven out of the eight villages that participated in the BMS, 40% of the population was between the ages 0-15 years and recent data from the Pangani District shows that approximately 20% of the population was five years or younger. Such a large proportion of young people indicates a future of rapid growth in the absence of significant out-migration. This is due to the large numbers of children who will soon enter their childbearing years. However, migration also plays a large and important role in the demographic make-up of the villages. Most movement is among men in their most productive years, between the ages of 15-49. For the villages experiencing significant in-migration (Saadani and Buyuni), males out-number females, as reflected in a high male-female sex ratio. Conversely, those villages experiencing out-migration (Matipwili and Mkalamo) have a low male-female ratio. An uneven male-female ratio has implications for the cultural, economic and social conditions of a community.

The 2005 threats assessment also found that while most villages have a lower annual growth rate than the national average of 2.3%, two of the coastal villages have a substantially higher growth rate (6.1% in Saadani and 4.1% in Sange). Overall, the major influence on population dynamics is seasonal migration, as fishermen and traders move from one village to another according to season, economic environment, and opportunities for employment. However, significant changes in the composition and size of the population may occur if there is an increase in HIV/AIDS incidence and prevalence rates. An increase in tourism activities around the Saadani National Park may

also affect population size, composition, economic diversification, and possibly HIV/AIDS prevalence in this coastal area.

Reproductive health situation and practices

Table 5. Reproductive Health Variables by Gender

Variable	Females	Males	
	% (N)	% (N)	
% sexually active	97.0% (229)	95.5% (193)	$\chi 2$ (1)=1.2 p > .05
% married or living with a partner	68.1% (160)	59.9% (121)	χ^2 (1)=3.09, p > .05
% with steady sex partners	82.5% (189)	76.2% (147)	$\chi 2$ (1)=2.7, p=0.1, phi = .08
% circumcised	7.7% (18)	97.5% (196)	$\chi 2$ (1)=347.6, p<.05, phi =.89
% that are not using any form of contraceptive	43.4% (82)	39.5% (58)	χ^2 (1)=.526 p > .05

More than 96% of BMS respondents were sexually active, but only 68% of women and 60% of men were married or living with someone and 82% of women and 76% of men stated that they had a steady sex partner. This indicates that 17-23% of those who were sexually active were in semi-stable or casual relationships. The average age of sexual debut was 17.8 years. According to the 2007-2008 HIV/AIDS and Malaria Indicator Survey, teenage pregnancies are common nation-wide, with 23% of young women (15-19 years) already having children or pregnant with their first child. A behavior baseline prepared by UZIKWASA in 2008 similarly found that teenage pregnancies were common among girls in the Pangani District, with the average age for girls to become pregnant for the first time being 18.3 years (sd = 2.5).

Table 6. Number of children vs. ideal number of children by Gender

Variable	Males	Females
	M (*sd*)	M (*sd*)
Number of children	2.13 (*2.1*)	2.71 *(2.2)*
Ideal number of children	4.69 (*2.7*)	4.33 (*2.0*)
Of those with children, % wanting more	75.8%	66.5%

The lifetime fertility rate among Tanzanian women is 5.6 children (National Bureau of Statistics Tanzania and Macro International Inc., 2009). The majority of BMS respondents (97% of women and 94% of the men) had children with the average number being 2.1 children for men and 2.7 children for women. As the average age of respondents was 30 years for women and 32 years for men, it is likely that the lifetime fertility rate will be relatively close to the national average. The perceived ideal number of children was 4.6 among men and 4.3 among women, and the majority wants more children, indicating there may be relatively low interest in using contraceptives. This reinforces the importance of utilizing a wide range of messages to promote adoption of family planning—including encouraging youth to delay early childbearing and encouraging all who have or plan to have children to space the births.

Among female respondents, 47% indicated that they do not use any modern contraceptives. Among the 53% that reported using one or multiple forms of modern contraceptives, injections and oral contraceptive pills were the most common, followed by condoms[4]. Of those that reported using a modern family planning method, 76.6% (151 individuals) obtained the commodities at a dispensary, while 13.2% obtained them at a hospital. Six percent received commodities from small shops and seven individuals (3.6%) from community-based distributors (CBDs). This is a bit surprising given that there were no trained CBDs in the Mkwaja and Mkalamo wards at the time of the surveys. When asked who has the final say about using birth control with their steady partners, 53.7 % stated that they had equal say, whereas 8.1% said that their partner has more say and 21.5% said that they had more say themselves. Almost 14.6% of the respondents stated that they don not talk about birth control with their partners. This indicates a need for couple peer educators that live in the communities to talk to couples about family planning, and inform them of effective, modern family planning methods.

Table 7. Agreement* with Family Planning Opinion Statements by Gender

Statement	Men	Women	
"Everyone should have the right to choose how many children they want and when to have them."	90.2% (212)	90.6% (183)	χ^2 (1)=0.02, p > .05
"Adolescents should have access to information on sexuality."	82.1% (193)	79.2% (160)	χ^2 (1)=0.60, p > .05
"Teens should NOT have access to contraceptives even if they are already having sex."	23.8% (56)	34.2% (69)	χ^2 (1)=5.7, p<.05, phi = .1
"Condom use can protect us from unwanted pregnancy AND sexual diseases."	86.0% (202)	91.6% (185)	χ^2 (1)=3.4, p=0.07, phi = .09
"People who can have children and don't are useless."	12.8% (30)	20.3% (41)	χ^2 (1)=4.5, p<0.05, phi = .01
"If couples do not practice family planning, they may not be able to send all their children to school."	86.4% (203)	89.6% (181)	χ^2 (1)=1.06, p > .05

*Agree or Strongly Agree

As shown in Table 7, the majority of BMS respondents believe that youth should have access to contraceptives and information on sexuality. This suggests these communities will be receptive to programs targeting teens with reproductive health services. Such services are clearly needed as early sexual debut and teenage pregnancy is common. In these areas, early pregnancy is a stigma that can affect a woman for the rest of her life. Becoming pregnant does not mean that a girl will immediately get married to the father. Also, there is little financial support available from within the family or through the man —who often is sent away from the village until things calm down, and who may not even live in/be from the village. Girls who become pregnant find themselves in a difficult social position. They are no longer considered a child entitled to parental support, and not considered a full adult either (UZIKWASA, 2008).

[4] The percentage of individuals using modern family planning methods is much higher in our sample than the national average of 26.4% reported by UNFPA and the 41% for the Tanga Region as reported by the Ministry of Health (National Bureau of Statistics, 2010). We suspect there may have been a problem in how the survey question was asked and that the real number of individuals using modern contraceptives may be closer to the average reported by the Ministry of Health.

Across the sites, there was a high level of awareness among BMS respondents of the dual protection that condom use affords with 86% of men and 92% of women agreeing that it can prevent pregnancy and sexually transmitted infections. Twenty percent of women and 30% of men reported that they used a condom the last time they had sex. The larger number of men reporting using a condom at last sex might reflect that men have more direct control over condom use or that men have more casual sex, although only 15 men (8% of those sexually active) admitted having non-steady sex partners.

Awareness of reproductive health rights was also high in the study areas as evidenced by over 90% of respondents who agreed with the opinion statement "Everyone should have the right to choose how many children they want and when to have them." Another BMS finding that supports this notion is the high level of concern among BMS respondents that "if couples do not practice family planning, they may not be able to send all of their children to school." Also, few respondents agreed with the traditional Swahili saying that people who *can* have children and *do not* are useless. This indicates that there was a general acceptance about using family planning and that access to commodities might be a bigger problem than reluctance to use modern family planning.

Newly constructed dispensary in the Mkwaja village

Individuals living in the survey area can access pills, condoms, and injectables free-of-charge from the two dispensaries located in Mkwaja and Mkalamo. The dispensaries make these commodities, along with family planning services, available every day. While the dispensary staff has training in family planning, input from interviews reveals that this staff is reluctant to provide pills or injectables to unmarried women or married women who have not had children. The biggest obstacle to accessing pills and injectables is the distance to the dispensaries, which are located between 0 to 25 kilometers from the villages, with an average distance of 7.8 kilometers. This makes condoms the most easily accessible, as they are sold in small shops in each and every village. In Mkalamo village, there is also a private drug outlet that sells pills as well. For other short and long term methods, people must travel to the Pangani or Bagamoyo hospitals, which are located over 70 kilometers from the most remote villages. There are no mobile services or CBDs in the area.

Gender roles

Women in this coastal area of Tanzania have primary responsibility for rearing children and ensuring sufficient resources to meet family needs. Women also are the main managers of essential household resources like water, fuel for cooking and heating, and food for household consumption. Despite these significant responsibilities, it is the male head of household, not the woman, who makes most decisions concerning income expenditure, labor allocation, health care provision, food production and acquisition (both agriculture and fishing), and mobility of family members. Over the past decade, women have been forced to devote more time to income-generating activities for three main reasons: limited access to the cash income earned by men, an increased number of female-headed households, and increased expenditures on food and health care. Women interviewed during the 2005 PHE threats assessment reported that while women use their cash income on family expenses—food, medicines, school fees, etc.—men spend their cash on "their individual wants." Women may never see the money that is earned by men (or goods purchased with this money), and are expected to say nothing of it.

As a result, women have become more entrepreneurial and have adopted coping strategies in an effort to retain some control over at least a portion of household income. The changing role and self reliance of women have changed the power balances between men and women and according to UZIKWASA (2008) the feeling of losing control and respect has led some men to seek sexual relations outside of the marriage. Having multiple wives/girlfriends sometimes leads men to contribute less to their primary household, pressuring women to increase the income that they have to bring in. That, in combination with a wish to gain revenge, leads some women to engage in sex with other men for favors. As a result, many households have become intertwined within social and sexual exchange networks. This keeps the households economically maintained, but destroys them socially. The BMS survey found that transactional sex is relatively common, with 21% of women and 35% of men admitting that they had exchanged gifts, favors, money, or food for sex. Looking at the last year, 9.5% of men and 7.2% of women stated that they had exchanged gifts, etc. for sex. This is comparable to the numbers found in the 2007-2008 HIV/AIDS and Malaria Indicator Survey data, where 8% of men reported paying for sex in the year before the survey.

Public Health and Environmental Health Situation and Practices

The SANAPA communities have very limited access to public health facilities. Matipwili, Saadani, Mkalamo, and Mkwaja have health centers, or "dispensaries", where women can access family planning commodities and vaccines for children, and where people with simple ailments can consult with dispensary staff. The Sange village has a first aid station, but lacks regular staff or a reliable supply of medicines. According to Pangani District statistics, between 70-80% of those living in the Mkwaja and Mkalamo ward have more than a 5 km walk to the closest dispensary. The closest hospitals are in Pangani and Bagamoyo towns, which are situated between 36 and 133 kilometers from the village centers. To get to the Pangani hospital, the villagers must cross the Pangani River by boat or ferry, something that may act as a financial deterrent to making hospital visits. The district lacks a medical doctor and its hospitals and dispensaries are under-

staffed (per Pangani District Statistics 2009, the Mkalamo and Mkwaja dispensaries have only about half the number of staff that are estimated to be needed).

Key informant interviews conducted during the 2005 PHE threats assessment revealed that community health continues to decline, attributed mainly to an increase in cases of HIV/AIDS and other sexually transmitted infections (STIs), tuberculosis, pneumonia, diarrhea, and skin diseases. Approximately 90% of the individuals attending the Pangani hospital seek treatment for malaria, acute respiratory infections, diarrhea, intestinal worms, and pneumonia. Malaria continues to be one of the most common and serious illnesses in the area. Children under the age of five years are especially vulnerable to the disease and mortality is high in this age group. In the village of Matipwili alone, four children under age five years died of malaria during a two-month period at the end of 2004.

Table 8. Number of respondents or family members suffering from disease

Disease / Symptom	% Yes (N)
Diarrhea	32.0% (140)
Pneumonia	27.5% (120)
Skin diseases	16.7% (73)
Sexually transmitted diseases	1.1% (5)
Malaria	83.8% (366)
Tuberculosis	5.3% (23)
Jaundice	3.9% (17)
Reporting 1 + Diseases	89.5% (391)
Reporting 1+ Non Malarial Diseases	57.2% (250)

The respondents were asked if they or a family member had experienced one of the following diseases or symptoms in the last 12 months: severe diarrhea, pneumonia, skin disease, sexually transmitted disease, malaria, tuberculosis, and jaundice. Of the 437 respondents, 89.5% (N=391) reported having one or more of these diseases in the last 12 months. Excluding malaria, 57.2% (N=250) reported having at least one (non-malarial) disease. The rates of diseases reported did not differ significantly across study areas.

Respondents were also queried about their access to safe drinking water and sanitary latrines. Access to safe water is a problem, with only 41.4% of the respondents accessing their drinking water from a protected well, public tap, or a tap in their own yard. Sanitary toilet facilities are even less common, with less than 40% having access to a closed pit latrine or flush toilet. Thirty eight percent of the respondents reported that they have no latrines at all, but use the bush or field. In coastal villages, people often use beaches and mangrove areas as latrines, exacerbating diseases such as diarrhea and cholera during the warmest months. A behavioral study conducted by UZIKWASA in 2008 found that in many areas, both men and women are reluctant to build pit latrines because they prefer to use the beach. The study quotes a young man saying that "he does not dig a toilet pit at home, but instead he goes to defecate along the coast to get that nice breeze." The beach is also a place where people meet for casual sex (often in conjunction with using the beach as a latrine). This adds another layer of complexity to the problem.

Table 9. Access to safe water and sanitation

Variable	% Yes (N)
Protected Water Source (private or public tap or protected well)	41.4% (181)
Sanitary Toilet (own or shared flush toilet or closed pit latrine)	39.1% (171)

Chi-squared tests were performed to determine if the percentage of respondents experiencing one or more disease(s) differed depending on their access to a protected water source as compared to an unprotected water source. No differences were found.

However, a comparison showed that those without sanitary toilets were more likely to report at least one non-malarial disease than those with sanitary toilets ($\chi^2(1)=7.50$, $p<.05$, phi = 0.13).

Finally, a series of chi-squared tests were conducted to determine if the percentage of respondents experiencing at least one disease differed by those who only had access to a sanitary toilet or those who had access to both a sanitary toilet and a protected water source. No differences were found. Of 437 respondents, only 16.5% (N=72) reported having access to both sanitary toilets and a protected water source

Traditional medicine

Traditional medicine continues to play an important role in the health of the residents of the area, particularly for women, and visits to traditional healers are common. Traditional healers are viewed as especially important for treating fertility problems, including difficulty conceiving, miscarriage, and impotence. Most traditional medicines are derived from the roots, leaves, and bark of indigenous plants, but traditional healers declined to identify specific species. There is some concern about the depletion of particular trees of medicinal value in areas outside the Saadani National Park. No animal parts are used in traditional medicines in this area of Tanzania. Other traditional treatments mentioned by healers include invocation of prayer, the power of the Quran, and the use of charms.

Climate Change Awareness and Impacts

The respondents were queried about changes in the climate or environment in their area over the past three years. Across the survey villages, 84% of the respondents stated that over the last three years, they have experienced increased drought. Irregular rainfall, water scarcity, and salt intrusion were also commonly seen by the respondents—all indicating that rain patterns and water scarcity are the main issues related to climate change in the SANAPA area.

The 2005 threats assessment also found that drought was a major problem in the area. Focus group interviewees and key informants in four out of eight villages mentioned drought as a serious issue occurring over the past five years. Irregular rainfall and lack of rainfall has led to poor agricultural production throughout Pangani and in early 2010, the district had to apply for food aid from the central government. An associated issue is lack of water for household consumption. In the Buyuni village, for example, women have to walk over 10 kilometers to fetch water for drinking and cooking.

Table 10. Perceived Climate Change Indicators

Variable	% Yes
More frequent flooding	10.5%
Increasing drought	84.2%
Water scarcity	63.6%
Irregular rainfall	67.0%
Erosion	7.6%
Salt intrusion	52.6%
Rising sea level	29.0%
Ocean pollution	20.9%

Analysis of land use and land cover changes between 1990 and 2000 using data from Landsat images, showed that the amount of bare soil inside the park increased by over 192 km^2 between 1990 and 2000, while the area of grassland decreased by a similar amount. This trend is also seen in the area outside the park, but to a lesser degree. This change may be due to long-term changes in rainfall. Drought coupled with possible overgrazing by wildlife may explain the large difference inside the park. However, since multiple Landsat images used in this analysis were taken at varying times of the year, the observed differences may be affected by seasonal fluctuations.

HIV/AIDS

In Tanzania, the HIV prevalence is estimated to be 5.7% percent of individuals between the ages of 15 and 49. More women (6.6%) are infected than men (5.7%). Overall, the HIV prevalence has declined in the last years from a national average of 7% in the 2003-2004 HIV indicator survey. The prevalence rate in the Tanga region, which includes Pagani, is 4.8% (NBS and Macro International Inc. 2009). Looking at the HIV prevalence rates at various ages, we find that women get infected earlier than men. The peak for women occurs at age 30-34, where 10.4% are infected nationwide. The infection rate for men peaks at ages 35-39 (10.6%). Infection rates are also higher among divorced and widowed men and women—25% of widowed women are HIV-positive (NBS and Macro International Inc. 2009). Up to 50% of hospital beds are occupied by patients with HIV/AIDS-related illnesses and HIV/AIDS has become the leading cause of death among adults (USAID, 2004). However, very few deaths are reported as being related to AIDS, due to stigma. The impacts of HIV/AIDS on the labor force, society and poverty have become one of the major challenges to sustainable development.

Voluntary counseling and testing (VCT) is being provided by dispensaries and hospitals to facilitate behavior change through the counseling component and to provide an entry point for care and support services. According to these survey data, 43.2% of the respondents had been tested for HIV (48.5% of women and 37.1% of men). Of these respondents, 23.8% were tested within the past six months. This is considerably higher than the national average, where only 37% of women and 27% of men have ever been tested for HIV. For Tanzania as a whole, the trend is improving. For example, the 2003-2004 HIV/AIDS indicator survey showed 16% of women and 20% of men in the Tanga region had been tested for HIV.

We also assessed people's readiness to be tested for HIV, using the stages of behavior change (Prochaska, Redding & Evers, 2008) model, which proposes five stages of readiness for change:

1. Precontemplation: those not considering getting tested for HIV within the next six months
2. Contemplation: those thinking about getting tested in the next six months
3. Preparation: those planning to get tested within the next 30 days
4. Action: those who got tested within the past six months
5. Maintenance: those who got tested more than six months ago

As shown in Table 11, 28.4% of women and 36.3% of men were in the Precontemplation stage, i.e., were not considering getting tested within the next six months. Among those who had never been tested (n=121 women & n=127 men), 55-57% were in Precontemplation for getting tested within the next six months. Overall, few respondents (3.4% of women and 4.5% of men) were preparing to get tested in the upcoming month. Given the rates of HIV and sexual activity in the area, this may be an important target area for future work.

Table 11. Stages of HIV testing by Gender

Variable	Females N=235	Males N=202	
	% (N)	% (N)	
HIV Testing Stage			χ^2 (4)=5.8, p > .05
Precontemplation	28.5% (67)	36.1% (73)	
Contemplation	19.6% (46)	22.3% (45)	
Preparation	3.4% (8)	4.5% (9)	
Action	27.2% (64)	19.8% (40)	
Maintenance	21.3% (50)	17.3% (35)	

HIV/AIDS awareness

Almost all the respondents knew about HIV and AIDS, but knowledge about AIDS prevention was less clear. Most of the men and women knew that having only one faithful partner can protect against HIV, but less than 70% of men and 65% of women knew that condoms can prevent HIV (20% fewer than agreed with the Reproductive Health item reported previously), and approximately half of respondents knew that mosquitoes and sharing food does not transmit HIV.

According to the Tanzania 2007-2008 HIV/AIDS and Malaria Indicator Survey, only about 40% of women and 47% of men in Tanzania as a whole have a comprehensive knowledge of HIV—"comprehensive" meaning they answered correctly all five questions in Table 12, which were developed by the World Health Organization (WHO). The BMS respondents were less aware—approximately only 25% of men and women correctly answered all the WHO HIV knowledge questions.

Table 12. World Health Organization (WHO) HIV Knowledge items by Gender

Variable	Female (N=236)	Male (N=201)
	% correct (N)	% correct (N)
Having only one faithful partner can protect against HIV	94.5% (205)	89.4% (178)
Condoms can prevent HIV	77.3% (153)	74.7% (139)
A healthy looking person can have HIV	90.1% (192)	95.3% (182)
Mosquitoes do not transmit HIV	57.5% (103)	53.6% (97)
Sharing food does not transmit HIV	51.7% (105)	49.2% (93)
% all correct WHO questions	24.7% (56)	25.4% (51)

Condom use

In the SANAPA area, condoms are distributed for free at the dispensaries and are sold in small shops, bars, and other outlets. Access has improved in the last five years, as TCMP supported the establishment of 62 condom social marketing outlets in the area. The BMS survey found that 20% of women and 30% of men reported using a condom at last sex. Fifteen percent of respondents reported they used condoms as a family planning method with their steady sex partners. The survey also found that around 55% of men and women in the six villages surrounding SANAPA use condoms with casual partners. This is slightly higher than reported in the 2008 Tanzania HIV/AIDS Commission (TACAIDS) report, which found that among women who reported having had higher-risk intercourse in the past 12 months, 43% used a condom at the last incidence of higher-risk sex. For men, this figure was 53%.

Similar to HIV testing, we used the same stages of behavior change (Prochaska, Redding & Evers, 2008) model (precontemplation, contemplation, preparation, action, maintenance) to assess people's readiness to use condoms. The results of the analysis show that despite the relatively high number of individuals reporting that they used condoms at last sex and the 15% of individuals stating that they use condoms as a family planning method, less than 4% of women and 8% of men are in the Action or Maintenance stage with steady partners. Among those few individuals who reported having casual sex partners (n=27), about 36% of men and 18% of women reported using condoms consistently for six months or longer. This is consistent with other data that indicates that people are aware that condom use is more important with non-steady partners (presumably higher risk) than with steady partners.

Table 13. Stages of Condom Use by Gender in Participants with Steady and/or Nonsteady Partners

Variable	Females	Males	
	% (N)	% (N)	
% with steady sex partners	82.5% (188)	76.2% (147)	χ^2 (1)=2.5, p > .05
Condom Stage *(Among those with a steady sex partner)*			χ^2 (4)=3.9, p > .05
Precontemplation	77.7% (146)	69.9% (102)	
Contemplation	12.2% (23)	15.2% (22)	
Preparation	3.2% (6)	2.7% (4)	
Action	3.2% (6)	6.2% (9)	
Maintenance	3.7% (7)	6.2% (9)	
% with other sex partners	5.3% (12)	7.8% (15)	χ^2 (1)=1.1 p > .05
Condom Stage *(Among those with other sex partners)*			χ^2 (4)=2.3 p > .05
Precontemplation	9.1% (1)	14.3 % (2)	
Contemplation	36.4% (4)	28.6% (4)	
Preparation	9.1% (1)	0.0% (0)	
Action	27.3% (3)	21.4% (3)	
Maintenance	18.2% (2)	35.7% (5)	

Assessments of behavior change to measure the impacts of previous HIV/AIDS prevention activities

The USAID-funded *Sustainable Coastal Communities and Ecosystems* (SUCCESS) Project, implemented in Pangani between 2005 and 2009, promoted HIV/AIDS-related behavior change. With funding from the US President's Emergency Plan for AIDS Relief (PEPFAR), UZIKWASA, a local non-government partner, implemented communications and capacity building activities. The activity focused on using Theatre for Development (TFD), a participatory communication methodology, as a tool to help communities surrounding the Saadani National Park address their HIV/AIDS-specific problems. In conjunction with providing health education, the theater shows were designed to encourage discussions on the state of the environment today vs. in the past and on destructive practices and what villages could do to limit poaching and encourage environmental protection.

Through UZIKWASA, SUCCESS also strengthened the capacity of village multi-sectoral HIV/AIDS committees (VMACs) and other local stakeholders to better address people's needs related to HIV and AIDS. It accomplished this by training the VMACs on HIV/AIDS and facilitating the development and implementation of HIV/AIDS action plans.

Assessing the impact of the UZIKWASA work, the BMS found that 63% of the villagers surveyed in Pangani had seen at least one TFD show. The results showed that TFD performances were highly appreciated by Pangani communities because they addressed issues directly relevant to them. The active involvement of the audience in the play

stimulates people to reflect on a specific problem and propose their own solutions. By the end of the Project, the TFD performances had reached over 44,000 individuals (53% women) and generated lively participant discussions about such issues as how parents can guide their adolescent children to avoid using sex to pay for favors (such as trading sex for a bus ride or the entrance fee to a video session).


Scenes from a TFD performance

The BMS also showed that 39% (124 out of 324) respondents living in Pangani thought that the UZIKWASA activities had made a difference in their community. The table below lists the impacts that respondents had seen in their communities.

Table 14. Agreement* with Impacts of UZIKWASA activities

Statement	% Agreement*
People know where to get condoms	85%
People are using condoms more	82%
People feel better about the community	66%
There are fewer early marriages	63%
There are fewer rapes	60%
People feel more trusting of the VMACs	58%
People are working more	58%
There are fewer temporary marriages	57%
People have fewer sex partners	52%
VMAC more active than before	52%
There is less trading of sex for fish	44%
There is less stigma associated with HIV/AIDS	43%
People are drinking more responsibly	21%

* Agree or Strongly Agree

In follow-up focus group discussions, villagers elaborated upon some of these impacts:

- The common practice of marrying-off young girls to older men for financial gains has become increasingly stigmatized and parents are now conscious that they will face social pressure if their daughters drop out of school just to get married.

- Short-term marriages between visiting fishermen and local girls are nowadays often rejected by parents and the practice is said to be less common in coastal villages.
- People are more open to requesting protective health devices such as condoms after discussions with audiences on safer sex practices. Dispensaries are distributing more condoms and more individuals are being tested for HIV.
- Communities in SUCCESS TCMP Project villages have started to request the village government to provide space for selling fish in the village center, rather than on the beaches where these sales are currently being transacted and where social control is difficult. The goal is to avoid the current practice of fishermen demanding sex from female food vendors who need to buy their fish in order to run their business.

Biodiversity Conservation Awareness and Empowerment

Most of the respondents (73.2%) were aware that there are natural resource management (NRM) activities going on in their area. Of those aware of NRM activities, 87.2% knew about SANAPA, while only 1.6% knew about Maziwe and 14.7% were aware of the collaborative fisheries management (CFM) activities. Within the five coastal villages specifically involved in the CFMs, 23% of these respondants were aware of NRM activities and knew about the CFMs. This is a lot lower than the findings of an MPA and poverty survey conducted in the Tanga region in 2003, which found that 87% of the respondents were aware of the CFMs. One reason for this discrepancy is probably that the 2003 survey only overlapped with the BMS in one village and most of the 2003 villages were north of Pangani, where the CFMs were more active and have closed areas. However, another reason might be that the CFM areas have lost a lot of community support over the last five years.

Among those aware of NRM, 46.6% did not see any benefits from the activities and 10.3% thought that they had a negative impact. Among the 44% who perceived the NRM activities to have positive impacts, about half (21.2%) stated that the NRM is good because it protects fisheries. Many respondents (31% of those that saw benefits other than fisheries protection) felt positive towards NRM/SANAPA, not because it protects wildlife resources, but because SANAPA supports community development in the villages surrounding the park. Frequent responses included that SANAPA is good because it has supported the construction of a school and that it provides financial support and food aid to the communities during difficult times. One respondent also stated that a benefit of SANAPA is that staff sometimes helps transport community members to the Pangani hospital when there is an emergency.

When asked about issues pertaining to community empowerment and responsibility for environmental protection, 41% of the respondents claim that “our community is helpless in protecting the environment” and 34% think that the government is solely responsible for conservation. These trends reflect a need for interventions that can enhance community involvement and understanding of how coastal management can help improve food security.

Table 15. Agreement* with Environmental Awareness Opinion Statements

Statement	% Agree/ Strongly Agree
"Our community is helpless in protecting the environment."	40.7%
"Only the government is responsible for conservation."	33.9%
"Mangrove forests can provide protection against the effects of erosion."	74.0%
"If we throw our garbage on the beach, the ocean takes it away and causes no harm."	29.2%

* Agree or Strongly Agree

Questions related to environmental awareness showed that almost three quarters of the respondents knew that mangrove forests can provide protection against the effects of erosion and 70% knew that it is harmful to throw garbage on the beach. This indicates that people knew that mangrove cutting is unsustainable and that garbage should be properly disposed off, but with SANAPA limiting access to fuel wood and without any village-allocated garbage dumps, it is difficult for people to change their behaviors.

Awareness of Population-Health-Environment (PHE) Linkages

The respondents were presented with several opinion statements designed to gain insights into their level of awareness of PHE linkages. Some of those surveyed (>32.6%) believe food insecurity is linked to "too many people and not enough fish to go around." A much larger proportion (73%) agreed that "if couples do not practice family planning, there may not be enough natural resources to go around in the future." This, together with the fact that 81% believed that families with fewer children are better off economically, suggests that people are aware that reducing the family size is better in both the short and long term. However, most of the respondents did not think that overpopulation was a short term threat to the environment. This was echoed in focus group interviews with district and village leaders, who maintained that the Pangani District "needs more people" and population growth is not recognized as a threat to biodiversity.

Table 16. Awareness of PHE linkages

Variable	% Agree/ Strongly Agree
"This village may soon face a crisis because there are too many people and not enough fish to go around."	32.6%
"If couples do not practice family planning, there may not be enough natural resources to go around in the future."	73.0%
"The garbage problem is getting worse because there is overcrowding in the village."	25.4%
"Families with large numbers of children are better off economically than families with only a few children."	19.0%

One reason why people do not see population growth as an immediate threat is that there is plenty of arable land available (albeit not very fertile) and farming households are located relatively far from each other. However, as explained in the introduction natural resources, such as fish, mangroves, and coastal forests, are increasingly threatened by human activities and making the linkages between population and environmental health

clearer for people in the area makes sense. This might be best done by focusing on how individual households depend on natural resources for their health and livelihoods, rather than talking about population growth in the abstract and its impact on the community's environment.

Conclusions and Recommendations

The analysis presented in this report has provided a snapshot of the population, health, and environment situation and practices in the SANAPA area—analyzing the behaviors that positively and negatively influence the utilization and condition of natural resources in the SANAPA area. This situation analysis will serve as a baseline for several TCMP activities, including family planning, livelihoods, climate change adaptation planning, HIV/AIDS communications, and others. Conducting a follow-up survey in 2011-2012 will enable us to measure awareness and behavioral changes and make inferences regarding the impacts of our activities. In the follow up survey, we will change—and thoroughly pre-test—the question related to contraceptive use, to make sure that it measures the one type of contraceptive that respondents are currently using. This is essential in order to avoid respondents mistakenly reporting that they are using multiple contraceptives at the same time.

The analysis shows that there are many stressors that people deal with on a daily basis. Many have difficulty meeting their basic needs. There is a wide-spread lack of access to fuel, water and sanitation, health care, and family planning commodities. The health care infrastructure is weak. Women bear a heavy load—responsible for most of the household chores, including collecting water, fuel, and food—while having little or no say in decision-making. The situation analysis reinforces the need for an integrated approach to addressing coastal conservation and community development in the SANAPA area. A PHE approach simply makes sense because of the stresses facing people in their every day life. This is particularly so if the approach can also help reinforce behaviors that "connect" the positive feedback loops as presented in Figure 2. None of this is new knowledge and TCMP has been integrating coastal conservation, HIV/AIDS, and livelihoods in the SANAPA area since 2004. However, there is a strong basis for adding even more activities such as family planning and behavior change communication to this already integrated mix.

First, people living in the SANAPA area do not perceive population growth as a driver for biodiversity loss and resource depletion. As such, they do not see an urgent need for family planning—at least not as it relates to biodiversity loss. Further, most of the area is not overcrowded and population pressure is relatively low in contrast to many island states, where people live on top of each other. **However**, arable land is scare in the coastal areas and research data shows fisheries resources are increasingly being depleted. Hence, regardless of community members' perceptions about population growth, there is a definite need to manage the population growth and settlement patterns in the area. There are equally if not more important reasons for family planning. These include the health risks from early pregnancies, too close birth spacing, and the pressures that can go along with large family size (e.g., less food to go around; more individuals to clothe, house, and educate; greater vulnerability to the impacts of climate change; etc),. Making

modern contraceptives more widely available in the communities would enable women and their families to become more resilient and increase their abilities to deal with every day stresses. Moreover, messages and behavior change communication strategies must focus on individuals and their health/livelihoods as the reason for family planning, rather than focusing on family planning in order to reduce the pressures that high population growth places on the environment.

Second, as at least 47% of women in the area do not use modern contraceptives, there is significant unmet need for family planning and modern contraceptives methods/commodities. Many individuals, however, are uncomfortable making a public visit to a dispensary. The alternative is to walk 5-25 kilometers to access what they need. This too is a deterrent. Solutions include reducing the distance to access services, and training local CBDs or accredited drug dispensary outlets (ADDOs) to provide family planning information and commodities. Efforts should also be made to increase access to long term contraceptive methods, which eliminates the need for accessing family planning services/commodities so frequently, i.e., on a monthly or quarterly basis.

Third, despite efforts to reduce HIV prevalence and stigma, increase HIV testing, and encourage condom use, faithfulness, and abstinence, high-risk behaviors are common. These particularly place women in vulnerable positions. It is important to continue the ongoing HIV/AIDS communication activities, focusing on improving people's comprehensive knowledge of HIV and AIDS, especially for prevention purposes. However, it would make sense to expand the HIV/AIDS communication activities to include dual protection messages, i.e. messages that reinforce the idea that people need to take responsibility for their sexuality from both a health and a family planning perspective. An effective communication strategy could be to educate PHE peer educators who can, in turn, reach out to couples and individuals to talk about family planning and the linkages to food security, health, and the environment.

Fourth, youth is a high-risk group that needs special attention. Communications targeting this group should include combined messages that promote not only the delay of childbearing, but also promote safe sex. It is important to make it more culturally acceptable for youth and unmarried individuals to use contraceptives. Such communication activities must be culturally sensitive and designed in a way that is appealing to youth. Again, a viable option is to install a peer education system that would allow youth to be involved in the development and delivery of appropriate IEC messages and campaign materials. This would enhance the effectiveness of the messages and ensure the messages and media are appropriate to the target group's age, education level, and cultural context.

Fifth, integrated PHE communication, training, and advocacy must be based on real and identified personal, family, and community issues that contribute to the positive and negative behaviors that shape the complex model presented in Figure 2. Messages must address root causes of the issues/problems/behavior and acknowledge those behaviors that individuals are empowered to change on their own and those that are rooted in deeper societal factors. Further, it is essential to understand where people are on their

readiness to change their behaviors (stage of change model) in order to tailor interventions accordingly. Behavior change communication should also address the societal structures and patterns that perpetuate inequities. Women are disadvantaged at many levels in the SANAPA area—including education, household and community decision-making, and financially. Women's lack of access to modern contraceptives—and the lack of communication between partners about when and how to prevent pregnancies—restrict women's choice about when to bear children. Women are also hardest hit by the HIV/AIDS pandemic and by climate change impacts.

An additional conclusion that stands out from the situational analysis is that a PHE approach can augment other work that will be implemented by TCMP. For example, the analysis found that increasingly irregular rainfall, drought, and water scarcity have created an urgent need for the development of climate change adaptation strategies in the communities. Future studies should aim to understand how people are coping with the climate change impacts and what adaptation strategies are available. To be effective, adaptation strategies should be integrated into a PHE framework that considers how migration patterns, population growth, health, and biodiversity conservation—directly or indirectly—can be part of both the problem and the potential solutions. Poverty is also a very real issue in the SANAPA communities and without adaptation planning it is bound to worsen as continued drought and other climate change impacts in combination with in-migration from other areas will increase the pressure on available resources. Hence, food security must continue to be a cornerstone for TCMP's integrated activities in the area. This could include strategies to diversify incomes and reduce the reliance on natural resources.

Neither the communities nor the districts are engaged in the management of SANAPA. The park was externally imposed and many do not see its benefits. TCMP could play a role in promoting community involvement, especially in the management of the marine area of the park. This could include integrated messages that show communities how they can benefit both environmentally and economically from the park. TCMP can also use the PHE framework to forge better relationships between the district government, SANAPA, and local communities by engaging all groups in PHE implementation. By facilitating collaboration, the PHE approach may increase the community perception of empowerment and its role in conservation, family planning, and health.

References

National Bureau of Statistics and MEASURE DHS, ICF Macro (2010) Tanzania Demographic and Health Survey 2010: Preliminary Report. Dar es Salaam, Tanzania.

National Bureau of Statistics (NBS) [Tanzania] and Macro International Inc. (2009). Tanzania HIV/AIDS and Malaria Indicator Survey: Key findings. Calverton, Maryland, USA; NBS and Macro International Inc.

Pangani District Council, Statistics for 2009 (unpublished).

Prochaska, J.O., Redding, C.A., & Evers, K. (2008). The transtheoretical model and stages of change. Chapter 5 in K Glanz, BK Rimer,& KV Viswanath (Eds.). *Health Behavior and Health Education: Theory, Research and Practice, 4th Edition.* San Francisco, CA: Jossey-Bass, Inc. p. 170-222.

Tobey, J., M. Thaxton, et al. (2005). HIV/AIDS and Threats to Coastal Biodiversity in Tanzania: Cross-Sectoral Dimensions of HIV/AIDS, Gender, and Population Dynamics in Critical Areas. Narragansett, URI Coastal Resources Center: 51.

Tobey, J. and E. Torell (2006). "Coastal Poverty and MPA Management in Mainland Tanzania and Zanzibar." Ocean and Coastal Management 49(11).

Torell, E., J. Tobey, et al. (2006). "Examining the linkages between AIDS and biodiversity conservation in coastal Tanzania." *Ocean and Coastal Management* 49(11): 792-811.

UZIKWASA (2008). Contradictions between awareness and change: Socio-cultural and structural factors which inhibit behavioral change for HIV in Pangani District, Tanzania. UZIKWASA: 101.

Coastal Resources Center
University of Rhode Island
Narragansett Bay Campus
South Ferry Road
Narragansett, Rhode Island 02882
USA

Tel: (401) 874-6224
Fax: (401) 874-6920
Web: Hwww.crc.uri.edu