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Shama

Integrated Coastal and Fisheries Governance Initiative

Integrated Coastal Management Toolkit

Hɛn Mpoano

THE UNIVERSITY OF RHODE ISLAND GRADUATE SCHOOL OF OCEANOGRAPHY
COASTAL RESOURCES CENTER
DO THE RIGHT THING
Friends of the Nation
SUSTAINAMETRIX
WorldFish

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Cover photo: Fort San Sebastian, Shama
Photo credit: Lucia Rybarova

Acknowledgements

With funding from the United States Agency for International Development (USAID), the Coastal Resources Center of the Graduate School of Oceanography at the University of Rhode Island have worked together with core partners including Friends of the Nation, Worldfish and Sustainametrix to implement the Integrated Coastal and Fisheries Governance (ICFG) Initiative, locally known as Hen Mpoano. We are pleased to compile a compendium of Integrated Coastal Management (ICM) information and knowledge generated through this 4-year Initiative into a toolkit to inform district level planning and management of coastal and marine resources. Compilation of this material benefited from the contributions of a large number of colleagues and practitioners, including many members of the coastal communities of the Western Region of Ghana and beyond, who have assisted in information gathering, research and analysis. We sincerely acknowledge the contribution of the planning departments of the six coastal districts of the Western region in supporting the development of innovative processes that builds ICM into district planning processes and decision making procedures. We are also grateful to the following individuals for providing technical insights and guidance during the production of this material: Dr. Christopher Cripps (Spatial Solutions), Dr. Donald Robadue (Coastal Resources Center, University of Rhode Island, USA), Stephen Kankam (Hen Mpoano), Pamela Rubinoff (Coastal Resources Center, University of Rhode Island, USA), Hillary Stevens (Coastal Resources Center, University of Rhode Island, USA) and Kofi Agbogah (Hen Mpoano). The graphic designs and layouts as well as GIS mapping have been done through the hard work of Justice Camilus Mensah (Hen Mpoano) and Lucia Rybarova (Oil City Magazine).

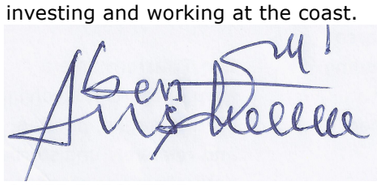
Finally, we would like to acknowledge the fruitful collaboration developed with key officials and institutions, without which this toolkit will not have been possible. At the regional level the partnership developed with the Members, Chief Executives, Directors and Officers of the District Assemblies, Regional Coordinating Council, private companies and traditional authorities is appreciated. At the national level, our collaboration with the National Development Planning Commission, Fisheries Commission, Town and Country Planning Department, Ministry of Environment, Science, Technology and Innovation is acknowledged. It is our hope that this toolkit and the legacy of the Hen Mpoano Initiative will inspire further work in coastal and marine management in Ghana.

Statement from Honourable Enoch K. Appiah, District Chief Executive of the Shama District Assembly

This toolkit is obviously a carefully designed and well-structured piece, which a young district such as ours needs as guidance for coastal planning and decision making. I am truly grateful to the Hen Mpoano Initiative for this level of support.

Since the beginning of the Initiative in 2009, Coastal Resources Center and partners have been supporting the Assembly to manage the overwhelming coastal issues facing the district. In Hen Mpoano's area of operation which covers all six coastal districts, Shama District can boast of being the lead in terms of preparing spatial plans, adopting policies and piloting integrated coastal management approaches. This toolkit complements other efforts being carried out by the government to counter and avoid all the potentially destructive and harmful challenges faced by the coast. .

This Toolkit has put together the rich findings and lessons learned since 2009-2013 and provide the requisite tools developed at the time for all of us to tackle the problems in the coastal zone and take advantage of the emerging opportunities and modern technologies that are available to us. It also serves as a useful tool for mainstreaming coastal management into development plans and programmes of the district assembly. I therefore recommend it for all institutions, bodies and groups investing and working at the coast.



CHIEF EXECUTIVE,
SHAMA DISTRICT ASSEMBLY

Definitions

Adaptive Capacity: capacity of a community to adapt itself to the threats and hazards such as climate change, coastal erosion, loss of livelihoods and inappropriate development.

Artisanal Fishing fleet: traditional canoe-based fishing vessels.

Barrier spit or beach: sandy beaches built up by ocean wave energy and backed by wetlands or river outflows. These systems are in constant movement in response to the energy of the surrounding system.

Built Areas Highly Exposed to Flood Damage: are settlements, businesses, residences and public buildings which are routinely submerged by flood waters, erosion or damage from high velocity stream and drainage flow.

Carbon Sequestration: the absorption of carbon dioxide (a "greenhouse gas" which is responsible for global warming) by vegetation.

Catchment Area The area receiving the waters feeding a part or the totality of a watercourse or watershed.

Climate Change: the changes in climate which are being experienced, including extremes of weather (storms, flood and drought), causing sea levels also to rise.

Community Resourced Management Areas (CREMA): creates a win-win situation by creating a financial incentive for farmers to use and manage natural resources on sustainable basis by devolving management rights and responsibilities to them.

Development: is any man-made alteration to the landscape including grading, filling, dredging, extraction, storage, subdivision of land, or construction of structures, stormwater collection, drainage and discharge works, flood protection works.

Ecosystem: a complex set of relationships among the living resources, habitats and residents of an area. It includes plants, trees, animals, birds, fish, micro-organisms, water, soil and people. Everything that lives in an ecosystem is dependent on the other species and elements that are part of that ecological community.

Eco Tourism: is a a form of tourism involving visiting fragile, pristine, and relatively undisturbed natural areas, intended as a low-impact and often small scale alternative to standard commercial (mass) tourism. Its purpose may be to educate the traveler, to provide funds for ecological conservation, to directly benefit the economic development and political empowerment of local communities, or to foster respect for different cultures and for human rights.

Ecological goods and services: are the benefits provided by wetlands e.g., water purification, supplies of portable water, fishes, plants, building materials and water for livestock, outdoor recreation and education.

Environmental Assessment: is the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

Erosion: is the removal and transportation of soil particles by the action of water, wind, gravity or other geographical agents, whether naturally occurring or acting in conjunction with or promoted by man - made activities or effects.

Estuary: means a body of surface water a) that is part of a water course that permanently or periodically opens to the sea b) in which the salinity is measurably higher as a result of the influence of the sea.

Flood: an overflow of rain water or other sources along the normal confines of a river, stream, drainage way or other water body that causes or threatens damage to property, infrastructure, people, or natural resources.

Flood proofing or protection: means any combination of structural and non-structural additions, changes, or adjustments to existing or new structures which reduce or eliminate flood damage to residential and non-residential buildings and their contents. These can include protective walls and drainage systems to redirect water away from existing buildings, rebuilding structures to make them more resistant to the intrusion of flood waters or the physical force of high velocity water. It also includes special design and construction techniques including piers and elevating the lowest usable floor of a building above the level of water experienced in events.

Floodplain: a level or nearly level land along a stream or river flooded only when the stream flow exceeds the water carrying capacity of the channel. flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding.

Green Belt: an area which has been designated around a settlement for no development in order to provide access to green and open spaces and to encourage more dense urbanization.

High tide line: is the highest point on the shore that is covered by water at high tide. Ghana has two high tides and two low tides each day. The mean tidal range (distance between high and low tides) is 1 meter, and the spring tidal range (time of new or full moon) is 1.3m. For purposes of coastal development, this is the line which development is set back from.

Lagoon: closed or open, a shallow body of water separated from the ocean by a barrier island or spit. It may be open to the ocean occasionally during seasonal flooding or high seas.

Pair Trawling: the joining of nets to two boats in order to increase catches.

Pocket beach: a short sandy shoreline between rocky headlands that prevent long shore transport of sediment.

Restoration: is a broad process of reversing physical, economic and social decline in a coastal area.

Set back: is an area left free of any physical development or modification, commonly used to setback structures from a coastal feature, or from a road in an urban area.

Shoreline protection structures, or sea defense structures: include breakwaters, groins, bulkheads, jetties, and other structures, the purpose or effect of which is to control or prevent the erosion of coastal features.

Traditional Authorities: the traditional governance system of chieftaincy in Ghana.

Watershed: area of land where all of the water that is under it or drains off of it goes into the same place, such as a river or a wetland.

Water dependent uses: are uses that can only be conducted on, in, over, or adjacent to the water; each involves, as an integral part of the use, direct access to and use of the water. These uses cannot physically function without direct access to the body of water along which it is proposed.

Examples of water dependent uses include: docks, piers, fish processing facilities, canoe/ boat repairs, port activities requiring the loading and unloading of vessels. Water dependent uses exclude housing, hotels, motels, restaurants, warehouses, manufacturing facilities (except for those which receive and quickly process raw materials by ship) etc.

Wetland: means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil. Functions within the natural ecosystem include flood attenuation and control, maintenance of underground and surface water supplies, sediment trapping, erosion control, pollution abatement and provision of habitats for flora and fauna.

INTRODUCTION

Hen Mpoano and Shama District Collaboration

This Toolkit is the final output, for Shama District, of the Integrated Coastal and Fisheries Governance (ICFG) initiative, which has become locally referred to as HɛN MPOANO (Our Coast). It is a four-year project carried out by the University of Rhode Island Coastal Resources Centre and partners (see acknowledgments), and funded by the United States Agency for International Development (USAID).

The Overall Goal of the Hen Mpoano Initiative

Overall Goal: to support the Government of Ghana in achieving its development objectives of poverty reduction, food security, sustainable fisheries management and biodiversity conservation.

The initiative's vision is that:

Ghana's coastal and marine ecosystems are sustainably managed to provide goods and services that generate long term socio-economic benefits to communities while sustaining biodiversity.

The purpose of the Integrated Coastal Management Toolkit for Shama District and how to use it

- It is a catalogue which summarizes the marine and coastal information which has been gathered by Hen Mpoano. It is for use by all of those who are actively involved in carrying out Integrated Coastal Management including the Agric and Coastal Sub-committee of Shama District.
- It provides easy-to-follow links to the source material, more detailed technical information– see the "References".
- It suggests "Projects" for incorporating Integrated Coastal Management in the planning processes and practices of the District Assembly.

Contents of the Toolkit

Section

Bibliography listed in section five.

Project proposed to be implemented. Refer to pages 43-44 for more information.

Examples of Best Management Practices in coastal communities

Legend

- Ecotourism
- Fish landing site
- Fort/castle
- Lighthouse at Cape Three Points
- Accomodation facility
- Sandy beaches
- Coastal lagoon inlet
- Rocky shores
- N1/Highway
- Major road
- Proposed roads
- Buffer
- Perception of shoreline 30 years ago
- Perception of shoreline 60 years ago
- Shoreline extend within community
- Drains
- 100 year shoreline
- Green belt
- Gas pipeline
- District boundary
- Water body
- River
- Mangroves / Wetland
- 1974 shoreline
- Natural vegetation
- Tidal influence (yet to be determined)
- Coastal Zone
- Town
- Community Resources Management Areas (CREMAs)
- Coastal zone (1000 m buffer)
- Birds
- Crocodiles
- Turtles / nursery

Section one:

The Coastal Zone and Development Context

Figure 1: The Coastal Zone of Shama District
Source: CRC Ghana

1. What is the Coastal Zone?

The definition of the Coastal Zone.

A. For planning purposes the coastal zone of Shama District is an area with a landward boundary 1km from the shore, or any development in the land area of coastal sub-basins draining seaward, or with a significant likely impact on coastal and marine resources.

B. For economic purposes, the coastal zone also takes into account activities occurring out to 6 nautical miles seaward, or to a depth of 30m whichever is the farther (coinciding with the fishing grounds of the artisanal fishing fleet).

Figure 2: Detail of coastal zone showing typical features
Source: CRC Ghana

Coastal features:

- Beaches, Dunes and Barrier Spits, Rocky Bluffs, Rock Outcrops and some Steep Slopes
- River Estuaries, Drainage Outflows, Mangroves, Wetlands Marshlands and Coastal Lagoons
- Flora, tropical foliage forests, fauna, birds, small invertebrates, sea turtles

Dynamics:

Sandy shorelines are highly dynamic features that evolve in response to waves, currents, tides and wind. In many cases sandy beaches are built up by ocean wave energy and backed by wetlands or river outflows, and are referred to as barrier beaches. These systems are in constant movement in response to the energy of the surrounding system, and as a result are not advisable building sites.

C. Coastal features include beaches, dunes, rivers, estuaries, salt marshes, lagoons, wetlands and mangroves as far as they are influenced tidally, so the coastal zone in some cases, extends beyond 1km from the outer edge of these coastal landscapes or ecosystem features (for detail see Figure 2).

1.2 Area of influence: socio-economic context

The Western Region Spatial Development Framework, the Coastal Sub-Regional Spatial Development Framework, the Korean International Cooperation Agency Plan and the Spatial Development Framework for Ahanta West all concur in outlining the likely broad development pattern over the next twenty years as follows:

- Substantial development of industry, residential and related infrastructure west of Takoradi between the N1 and the coast up to the Butre estuary.
- A well serviced and accessed developing residential, tourism and leisure area between Dixcove and Butre; a major new settlement at Agona.
- New roads and services along the N1 and branching to Princes Town and Egyambra.
- The coast and communities between Dixcove and Princes Town is likely to remain mostly underserviced and reliant on eco-tourism, fishing and agriculture.

D. The "area of influence" is the extent of the area inland in which coastal-related activities are taking place or could take place, both emanating from the coast, going inland, and impacting on the coast from inland (e.g. large scale infrastructure, urbanization, industry, pollution of rivers by mining). In Shama this includes development pressures arising from expansion of Sekondi Takoradi Metropolis eastwards and industrial activities driven by availability of gas by pipeline from the oil fields to the District.

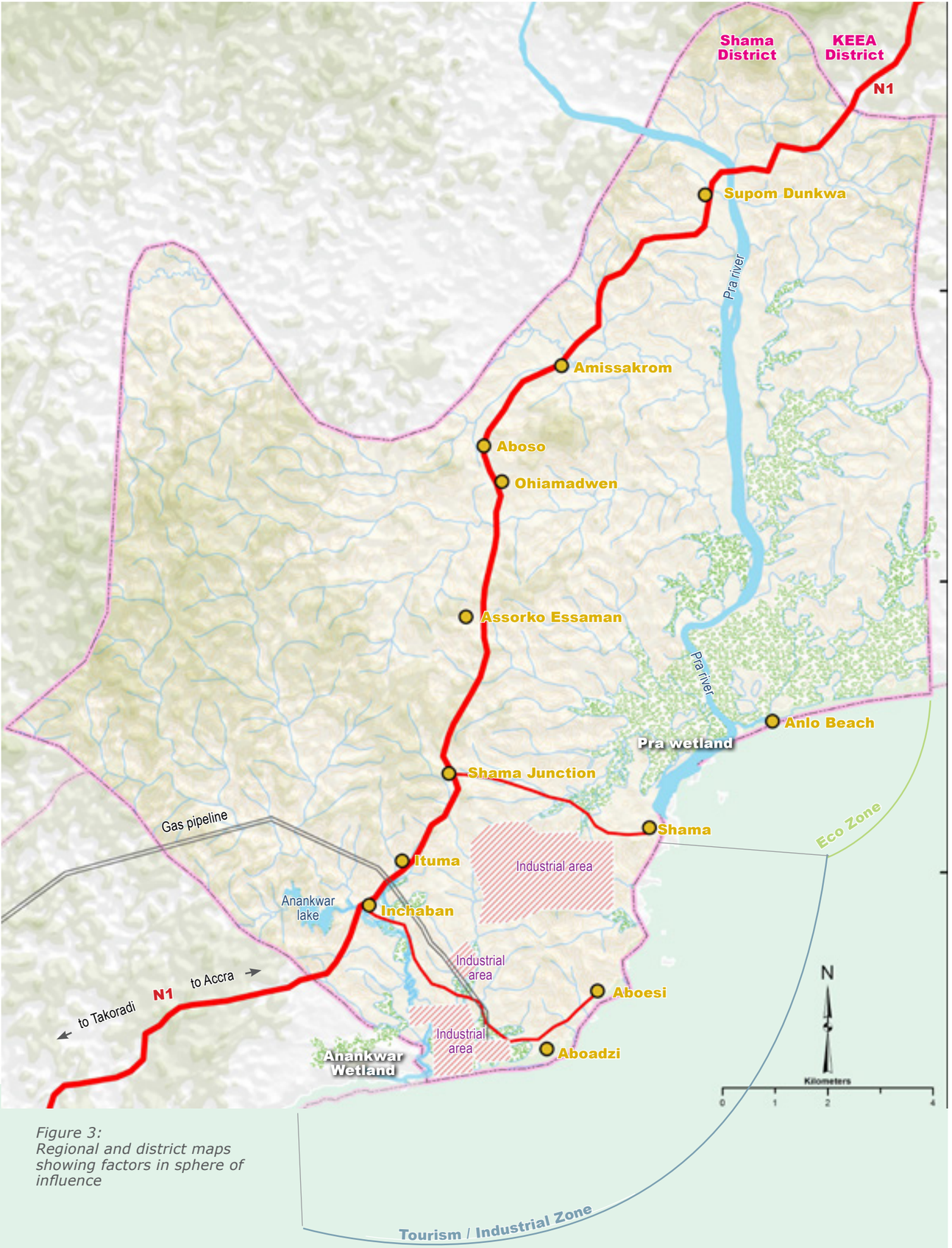


Figure 3:
Regional and district maps showing factors in sphere of influence

Section two:

Integrated Coastal Management - why, what and how?

2.1 Why?

The coast of Shama District surely represents one of its most distinctive characteristics. The development pressures and the role of this small District as entry point to the Sekondi Takoradi conurbation from Accra which is expanding into it; the sensitive Pra Estuary; the presence of the international gas pipeline and power generation project; the need to respect the right of communities, which have lived here for centuries past, to continue to enjoy a prosperous and harmonious life – all of these conflicting interests require careful balancing of land uses.

Reference

R1: Our Coast, Our Future: Western Region of Ghana

This is a major product of the Hen Mpoano initiative. It makes the case that a fresh approach to the governance of the coast and fisheries will take root only when it addresses issues that are perceived by the people of the place as important. It covers the major coastal and fisheries issues and concludes with a discussion of the actions that Hɛn Mpoano proposed to take over a three year period to establish and formalize a governance program for the Western Region that can serve as a model for the nation.

2.2 The Most Urgent Issues

The coastal zone of Shama District is undergoing rapid transformation due to activities of a fast growing oil and gas industry. There is a need to confine oil and gas-related development to certain "hot spots" (as identified, for example by the Western Regional Spatial Development Framework), to maintain sustainable livelihoods, protect the environment and the areas of high landscape value such as the Pra Estuary and Anlo Beach wetland ("green belt areas") which have been identified, while encouraging economic development.

Critical coastal issues confronting the district were identified through technical assessments and participatory land use mapping exercises involving representatives of diverse stakeholder groups including traditional authorities, men, women and youth. These issues include:

- Land Use pressures: the discovery of oil and gas has created a rush for land by prospective investors and speculators in industrial and other related development as well as pressure on the district's coastline for development of residential, leisure and hospitality. In the watershed of the Anankwari river for instance, residential units and squatter settlements have more than doubled in the last decade.
- Fisheries decline: declining fish catches, (the decline in fish catch was mostly attributed to increased canoe numbers due to increasing population), unsustainable fishing methods, poor fish quality and consequently poor life span of processed fish, conflicts between artisanal and semi-industrial fishers/boats and non-existent/ weak local institutions for managing the fishery
- Flooding: Risk of people and property to flood hazards: Infrequent major floods have caused widespread damage to property in the watershed and downstream flood plain of the Anankwar River. Management of the nearly hundred year old dam located on the upstream of the Anankwar watershed is central to the flooding experienced downstream of the watershed. Also the banks and floodplain of the Pra River are flooded during intense periods of rain, prompting the need to resettle some villages.
- Water supply: Increasing demand on existing freshwater supply systems: water supply systems for domestic consumption are increasingly stressed by a rapidly growing population, the construction and operation of large new industrial facilities spurred by the production of oil and gas and the associated hospitality industry.
- Coastal Eco-Systems threatened: Coastal floodplains, wetlands and the district's shoreline have been subjected to varying intensities of uses including sand winning and high rate of development which is accelerating
- Other concerns: community perception of inadequate government representation and attention; chieftaincy disputes; poor road access/infrastructure; rising social problems; general lack of Primary and Junior High school education, electricity public toilets, health posts and refuse containers.

2.3 What? The Core Elements of Integrated Coastal Management

The response to pressures of development could in fact generate long term benefits for coastal ecosystems and their dependent communities. With this in mind, the District Assembly has inaugurated an Agriculture and Coastal Management Subcommittee to drive Management Strategy, of which the core elements are:

- Preservation and restoration of important coastal habitat and features that are critical to sustaining the fishing industry.
- Taking action to control sand winning and destruction of mangroves.
- Creating Land Use and Environmental Policies that balance competing interests of industrial, tourism, food and livelihood security, leisure, commercial and residential activities while protecting the vital ecological functioning of the land and seascape.
- Supporting traditional and finding new livelihoods for coastal communities through agriculture, fisheries and aquaculture, as well as providing the access to fully partake in the new forms of development.
- Reducing vulnerability and building adaptive capacity of coastal communities to threats from hazards and climate change including extreme weather, rising sea levels and coastal erosion.
- Sustained stakeholder enagement and moves to build co-operation with neighboring districts through a Joint Coastal Development Planning Area; and creating effective links to the regional and national levels of government.

2.4 How? Systems for implementing Integrated Coastal Management

Integrated coastal management is a participatory process that engages communities, private sector, traditional authorities and civil society. The mechanisms for implementation at the district level are:

1. The District's Medium Term Development Plan (MTDP), and Community Action Plans which address settlement growth, economic development and the provision of schools, clinics, other services, roads and infrastructure.
2. The District's Spatial Development Framework (SDF), Structure Plans (SPs and Local Plans (LPs), which show what can go where, and resolve potentially conflicting demands on land use in the coastal zone.
3. Bye laws to define and protect the coastal zone.
4. Strategic Environmental Assessment which ensure that the necessary environmental protection measures are taken.

The establishment of an Agriculture and Coastal Sub-committee is a great step forward for implementing Integrated Coastal Management. It provides a necessary forum for integration across sectors such as fisheries, oil and gas related investment activities, land use planningand fresh water supply. The Committee can identify and assess issues, suggest and shape policies, prioritize actions and evaluate outcomes as the Coastal Zone is developed.

At the regional and national scales, many of the objectives of coastal management may only be achieved through joint planning and implementation, involving adjoining coastal districts. For this reason, initiatives such as the Data Hub which has been established at the Western Regional Coordinating Council by Hen Mpoano for technical support, the fledgling Joint Development Planning Area for the Coastal Districts of the Western Region, and

Western Corridor Accelerated Development Authority must be supported by all.

This joint approach to planning and decision-making can involve:

- Adoption of region-wide policies for preventing and mitigating flood hazards.
- Information sharing on techniques for assessing hazards and adaptive capacity of coastal places (eg those used in vulnerability assessment and adaptive planning exercises at Dixcove and Akwidaa).
- Collaboration between agencies at regional and national levels on coastal issues.
- Effective mechanisms for conflict resolution and dialogue with parties affected by development decisions.
- Joint initiatives on protection/restoration of critical habitats, forests and wetlands of regional significance by programs such as Community Resourced Management Areas (CREMAs).
- Decision making on large facility siting and management of alterations of the coastal zone.

All of these will become more evident in coming years if detailed planning and decision-making can be done at community level and linked to regional and sub-regional co-ordination of national and international investments.

Project

P1: Form Working Groups to deal with specific coastal issues.

2.5 Opportunities to Implement Integrated Coastal Management

Use of the above planning and decision making processes and environmental assessment provides the foundation for Integrated Coastal Management. District Assemblies suffer from chronic underfunding, but many development partners (governments of United States, Norway, France, Germany, Korea, Belgium, United Kingdom) and private sector such as the Jubilee Partners are funding projects which provide essential parts of the process, including community linkages. These need to be made sustainable in the long term by funding mechanisms such as Assembly's Internally Generated Funds (eg from property rate, betterment and value capture in new projects), Corporate Responsibility funds of major private investors such as in a Coastal Foundation, and national and international funds for infrastructure and investment.

Section three:

SHAMA DISTRICT COASTAL PROFILE AND DEVELOPMENT ISSUES

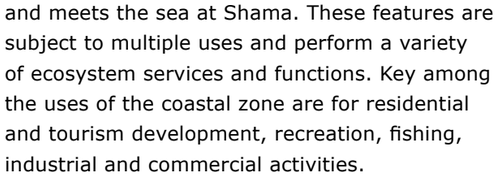
3.1 Characteristics of the Coastal Zone: overview

The Shama District Shoreline is about 13 km stretch from Anlo Beach at the south eastern to the barrier beaches within the vicinity of the Anankwar floodplain at the south western part of the District.

The key features associated with the coastal zone are barrier beaches, sand spit and dunes, uplands, estuary, wetlands and rock outcrops. There is also a major river (Pra river) which flows southwards and meets the sea at Shama. These features are subject to multiple uses and perform a variety of ecosystem services and functions. Key among the uses of the coastal zone are for residential and tourism development, recreation, fishing, industrial and commercial activities.

Anlo Beach and Pra river estuary

This is arguably the most prominent beach and significant coastal ecosystem in the Shama District. It is more than 170m wide in its mid-section tapering longitudinally eastwards but curving at the Pra estuary. It is evident that the Pra provided an enormous amount of sediment to the long shore drift of material in its formation. The meeting of the muddy waters of the Pra and the long-shore drift of beach material provided the materials that built the bar. The Anlo beach is one of the most beautiful beaches in Ghana in terms of its length and width. It can be developed into a tourism facility using local architecture and involving the local community in its development. Mangroves are common in many places behind the estuaries; it is more widespread and well developed in the wetlands of the Pra floodplains behind the Anlo barrier beach.



3.2 Characteristics of Coastal Zone: off-shore marine areas and fisheries:

The off-shore areas of the coastal zone are actively used by the artisanal (traditional) fishing fleets. Fishing is also the province of larger, Ghana-based semi-industrial fishing vessels and industrial, intercontinental vessels. There are locally breeding fish, those inhabiting the Guinean current across West Africa and those that migrate across larger distances (such as blue whales). Surveys have been carried out to determine the location and type of marine life including juvenile fish and their breeding, and Marine Protected Areas are being proposed to protect fisheries and improve food security.

Marine areas experience many other uses such as for a local, national and international highway, for leisure, cables, pipelines, oil and gas

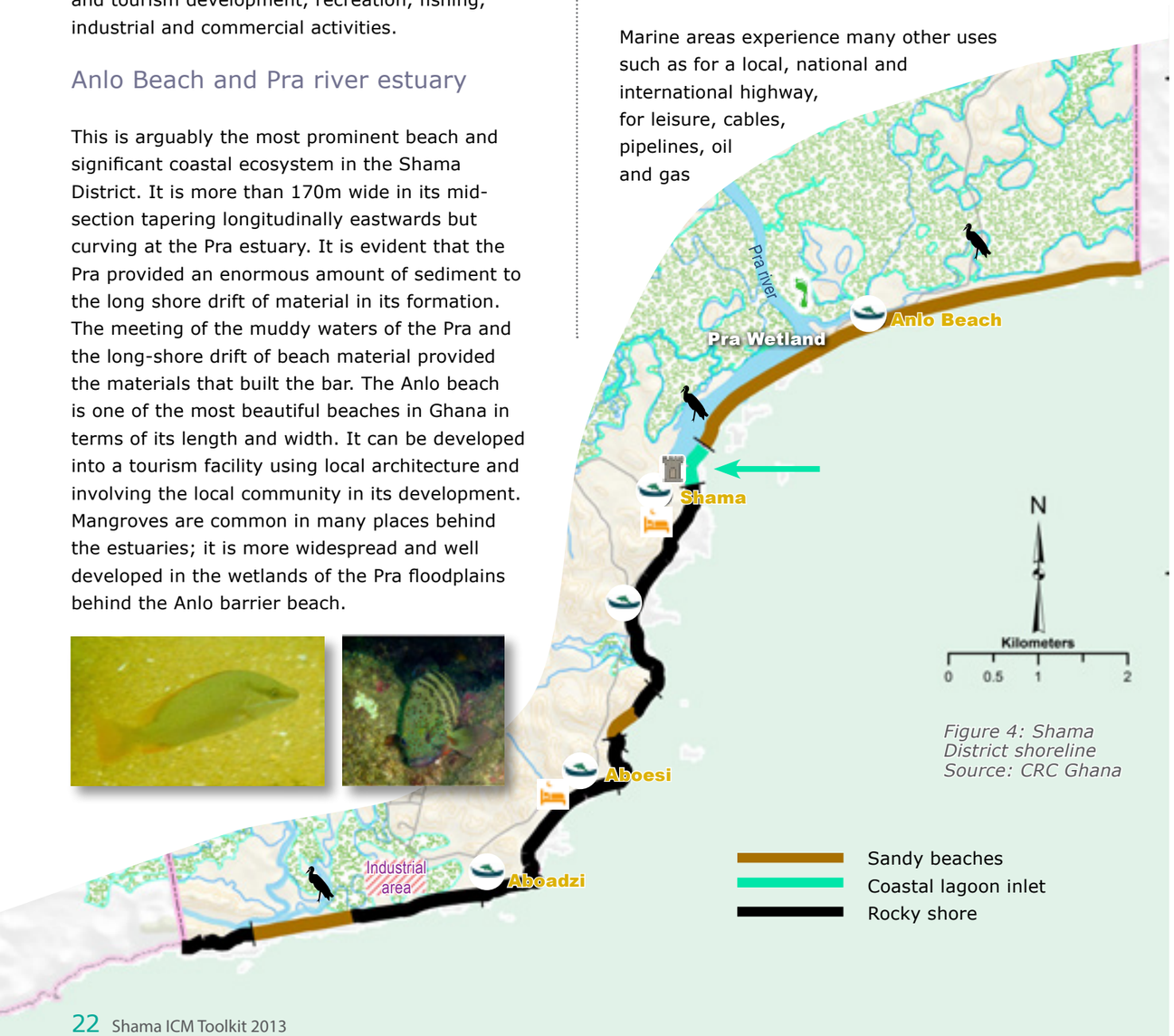


Figure 4: Shama District shoreline Source: CRC Ghana

Project

P2: Prepare Marine Spatial Plan

Reference

R3: Nearshore Rocky Reefs of Western Ghana, West Africa: Baseline ecological research surveys. Ateweberhan,M.,Gough,C., Fennelly L. and Frejaville, Y. 1.

Ecological information on the near shore rocky reef habitats (NSRH) of Ghana is very limited. The present study fills this knowledge gap, by investigating the general status of the NSRH and fisheries of western Ghana, and providing baseline information on the fish, invertebrate and benthic communities.

R4: Assessment of Fishing Grounds in the Nzema East and the Ahanta West Districts

A rapid appraisal conducted in nine (9) main landing sites in the Nzema East and Ahanta West districts between 14th and 21st September 2010. The communities visited were, Ankobra (Sanwoma), Apewosika (suburb of Axim), Miamia, Princes Akatakyi, Cape Three Points, Akwidaa, Dixcove, Busua and Butre. The purpose of this assessment was to ascertain primary information of the spawning and fishing grounds among others. The research team was made up of two persons; a staff of the Western Regional branch of the Ghana Canoe Fishermen Association and a staff of the Friends of the Nation. Data was collected through focus group discussions, participatory mapping, direct observations and key informants interviews.

R5: Determining The Origin And Ecology Of A Macroalgae (Ulva clathrata) Bloom Along The Coast Of Western Ghana And Cote d'Ivoire.

The Ghanaian Ministry of the Environment worked with The Integrated Coastal and Fisheries Governance (ICFG) and CRC-Ghana to form a Task Force of collaborating institutions to extend a survey into Cote D'Ivoire in order to more fully describe the ecology of the "green green" bloom and its underlying nutrient source(s).

exploitation. The Marine areas are subject to increasing kinds of pollution from the wastes of marine and non-marine activities (dumping of waste). As capacity for coastal management increases, spatial planning for the seascape will be necessary to ensure harmony between traditional uses of the sea for fishing and oil and gas production activities. Marine Spatial Plans are now being used throughout the world to cope with the increasing pressures.

Figure 5: Sensitive areas in need of protection in Shama District.

Reference

R6: Report on Characterization of coastal communities and shoreline environments in the Western Region of Ghana.

This report provides information on the conditions and environmental, social and economic issues faced by 89 coastal communities in the six coastal districts of Ghana's Western Region. Rapid appraisals of coastal communities, district level validation workshops and secondary literature review were undertaken to provide additional information that will ultimately contribute to assembling the baseline. While rapid appraisals gleaned community scale information, it also provided the opportunity to socialize the initiative among coastal communities visited. The purpose of district scale workshops was to solicit inputs from local people as well as reactions to findings of the rapid appraisals and to incorporate local perceptions of changes into a district level synthesis of coastal and fisheries governance issues.

3.3 Characteristics of the Coastal Zone: areas of restoration and preservation

Sites which are a priority for preservation are the Anlo beach wetlands and associated estuary and mangrove ecosystems, Anankwar wetlands, key river and lagoonal estuaries and scenic and historic sites. Some are already officially recognized and those that are of more local significance should also be differentiated.

Ultimately this could include the marine part of the coastal zone with protected areas such as Marine Conservation Areas and Sanctuaries, Fishery Conservation and Closure Areas, and Essential Fish Habitats.

Project

P4: Undertake public education on the benefits of conservation of coastal ecosystems.
P5: Work with Marine Protected Areas Inter ministerial Committee over designation of marine protected areas.

3.4 Relief, Drainage and Climate: Coastal Dynamics, Human Uses and Implications

3.4.1 Shoreline Beaches, Dunes and Barrier Spits: human and natural hazards

Due to rising sea level in recent decades, most barrier beaches in Ghana are retreating at a rate of about 1m per year and in the Western region, are estimated to be retreating at 2m per year on the average. Erosion, sea level rise, and sand winning from the beach can all result in land loss and the inland movement of the shoreline.

Eroding coastline Most of Shama's shoreline consists of sloping sandy beaches backed by barrier spits, dunes, low and high bluffs, interrupted by sections of rocky shore and headlands which form the partially protected fishing areas of Aboadze, Aboesi, Shama town and Anlo. Water dependent uses such as fish landing and mooring areas, pipelines (for example at the VRA Thermal plant) and marine transportation terminals need to be located in these dynamic areas, along with a minimum number of facilities necessary to support public access to the shore and recreational use. Fish handling and processing are also found near the shore for reasons of operational convenience, as are military fortifications, light houses and other aids to navigation. Most other uses do not need to be near the shore, especially open coasts exposed to high energy waves, strong currents and periodic storms. However, dense settlements have emerged around the fishing ports, well-to-do property owners are seeking waterfront property and views and investors are seeking coastal locations for resorts and hotels, all placing their investments in the way of natural shore building and erosion processes. The measures used to protect structures placed too close to the sea usually accelerate the erosion and shore change process further.

As a result, coastal erosion is destroying habitats and property including artisanal fishing settlements, fish landing sites and beaches in Shama. Though it slightly varies from one coastal community to the other, overall the Shama District shoreline has eroded by approximately 100 meters in the last 5 decades. Clearly, a combination of high wave energy and human activities, notably the practice of sand winning, is resulting in coastal erosion. Though sand winning is illegal under the bye-laws of the district assembly, it is being practiced intensely along the beach front of some coastal communities. Other key assets and energy infrastructure are also threatened by this activity. Most sand miners who are desperate to make their living vent their spleen on the volumes of sand at the beaches in the district. However, ways to address coastal erosion is a great challenge for many coastal communities.

In Anlo Beach, for example, the whole settlement has been under threat from coastal erosion and sea level rise for many years. Twice a year the community is flooded for several weeks by sea water destroying properties and obstructing economic activities. Similar incidence of coastal flooding has been noted in all the coastal communities with varying impacts based on the elevations above sea level.

Atempts are being made to control shoreline erosion in some areas using gabions and boulders. In other areas, refuse is dumped at the shoreline to delay the rate of erosion. The current trends indicate that these measures have not been adequate in addressing the issue

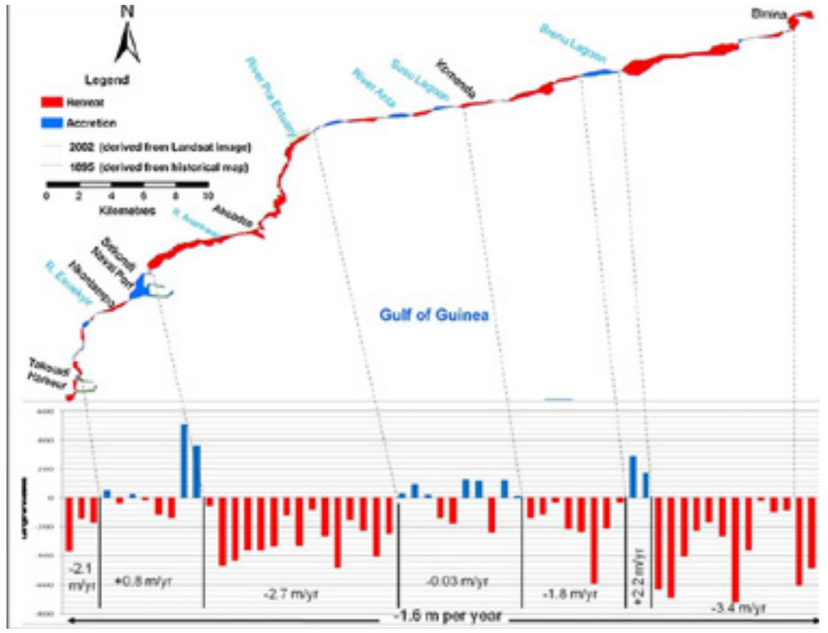


Figure 6: Coastline change over the period 1895 - 2002. Source: Boateng, 2012 (1) (See notes on page 46)

of shoreline erosion. At the same time there is a disconnect between the Hydrological Services Department, projects conceived at the national level, and the district and community level which needs to be radically re-thought.

Several methods are being used by the Hydrological Services Department of the Ministry of Water Resources, Works and Housing to control shoreline erosion including the use of gabions and boulders and other engineering solutions. However, high energy waves, strong currents and periodic storms expose the weakness of these defense mechanisms. In many cases relocation is the only real alternative, but accepting this is difficult, and therefore attempts to reserve lands for relocation of settlements are inadequate.

Case study

Good Management Practices
Support Urbanization, Sanitation and Wastewater Management in the Coastal Zone:
Dixcove Case Study

Project

P6: Increase collaboration with the Ministry of Water Resources, Works and Housing for regulating private development and installing publicly funded defenses.
P7: Where acceptance of land loss is agreed as the best option long term, plan re-settlement schemes and incorporate as objective in Structure Plans.
P8: Develop a public education programme on coastal hazards and climate change
P9: End destructive sand winning practices by use of bye laws and community sensitisation
P10: Prepare coherent shoreline management plans to regulate coastal land use.

3.4.2 River Estuaries, Drainage Outflows, Mangroves, Wetlands, Marshlands and Coastal Lagoons

Wetlands and coastal water resources serve vital functions in the environment. They provide habitat for many plants and animals, including migratory birds and many types of fish. Mangrove areas, in particular, are important to the overall health of the marine fisheries, because they provide habitats for shellfish as well as nursery grounds to juvenile fish. Mangrove wood is harvested for a variety of purposes, but this practice should be limited due to the damage to wetlands that overharvesting causes.

From a hydrologic perspective, wetlands serve to dampen the effects of changing water levels, thereby providing protection from flooding. In the process of slowing floodwaters, wetlands trap and store sediments, limiting erosion and in some cases actually building up soil. Through this process, they protect coastal waters from excessive runoff and sedimentation. Coastal communities often rely on these areas for their drinking supply, so maintaining the flow levels and cleanliness of the water is vital to community health.

In recent times however, coastal floodplains and wetlands in the district have been subjected to varying intensities of uses and high rate of development, due in large part, to a rapidly growing population of the district and associated pressure on land resources. In the watershed of the Anankwari river for instance, residential units and squatter settlements has more than doubled in the last decade. Management of the nearly 100 year old dam located on the upstream of the watershed is central to the flooding experienced in the floodplains located downstream of the watershed.

Infrequent major floods have caused widespread damage and loss of life in the watershed and downstream flood plain of the Anankwari River. In recent years, the banks and floodplain of the Pra river are flooded due to intense periods of rain, prompting the need to resettle some villages. The mouth of the Pra river consists of a barrier spit and dynamic nearshore environment that is generally accumulating beach area due to the fact that the Pra is a major source of sand to the beaches of the region. However, other parts of the shore, including the length of Shama town, are experiencing high rates of erosion prompting the installation of hardened shoreline, mainly riprap. The gas pipeline landing at the VRA Thermal Plant also has extensive riprap. Gabions (rocks enclosed in wire baskets) are found in several locations, the idea being to create groins that trap sand moving along the shoreline. However, all of the gabion installations are broken and not serving their intended function.

Changes to coastal floodplains and wetlands are evident in the creation of impervious surfaces caused primarily by the construction of roads in low lying areas. Over the years, this has reduced the amount of vegetative cover required to intercept storm water run-off. In low lying areas where mangrove wetlands are part of the ecosystem, mangroves are harvested without re-planting or undertaking any systematic regeneration activities.

In most cases, removal of mangrove stands paved the way for dumping of garbage in the wetland areas. This practice does not only reduce water retention capacity of these systems, but also reduce the abundance of the fishery in these areas by diminishing the nursery grounds, which is a key function of mangroves and their associated estuaries. Another common problem in the district is the continuous filling of coastal floodplains and wetlands for constructing residential, industrial and commercial facilities. This practice has degraded several floodplains and wetlands and disrupted the associated flood control functions performed by these ecological systems.

As a result, flooding episodes (2) have caused varying degrees of destruction to infrastructure and property in the district. For instance, the flooding of July, 2009 resulted in the destruction of 60 and 78 houses in Krobo and Anlo Beach respectively; the most recent flooding in July 2011 on the Anankwari floodplain displaced 625 people at Inchaban; this was in addition to hundreds of people displaced and thousands of cedis worth of crops and livestock destroyed through the process. Other communities such as Adjokrom, Bosomdo, Supomu Dunkwa, Abuesi, Aboadze, Fawomanye and Shama Town, witnessed many more losses of property and livelihoods.

Reference

R7: Rapid assessment of mangrove status and conditions for use to assess potential for marine payment for ecosystem services in Amanzule and surrounding areas in the western coastal region of Ghana, West Africa

Ghana's mangrove ecosystems are tremendously valuable, providing ecosystem services like carbon sequestration, protection from storms, floods, and erosion, provision of timber and non-timber forest products, processing of waste and nutrient pollution, aquaculture and agriculture support, and habitat for aquatic and terrestrial species. Yet, as in many other parts of the world, short-term development needs are undermining long-term mangrove health and survival. Fortunately, economic mechanisms have the potential to tip the balance toward restoration, maintenance, and protection of mangrove forests. The need for proper valuation of mangrove ecosystem services underpins such mechanisms towards the establishment of any realistic payment for ecosystem services scheme in any given mangrove or wetland habitat.

R8: Coastal Hazards and Flooding Risk in Ghana's Western Region

This issue brief highlights the key issues facing Ghana's Western Region in terms of coastal flooding in low-lying areas as well as shoreline erosion, and recommends policy options to improve public safety and reduce environmental impacts.

R9: Carbon Stocks And Soil Nutrient Dynamics In The Swamp Forests Of The Amanzule Wetlands & Ankobra River Basin

The swamp forests of the Amanzule Wetlands and Ankobra River basin is a truly unique landscape. Threats to the swamp forest, while still minimal, may be mounting, particularly in the form of small-scale artisanal logging, firewood harvesting, and conversion to food crops like maize and cassava farming. As demonstrated by this study, these anthropogenic activities have a detrimental impact on the ecosystem's ability to store and sequester carbon, as well as on biodiversity and nutrient dynamics. Therefore, conservation of this intriguing and rare landscape is crucial. While more research is required, it is possible that carbon finance, in the form of REDD+, soil carbon, or climate smart agriculture could form part of a dynamic conservation and livelihood strategy.

R10: Mapping and Modelling Mangrove and Swamp Forests Dynamics in the Great Amanzule Wetlands, Ghana

Ghana's mangroves continue to reduce in health and coverage, especially in areas outside the five Ramsar designated sites in the country. Moreover, the use of compensatory mechanisms in addressing the exploitation of coastal ecosystems and climate change mitigation is in its nascent stages in Ghana because of the uncertainties in their carbon stock estimates due to uncertainties in their real extent. The main objective of this study was to apply remote sensing technology to map the past and present areal extent of mangroves in the Ellembelle district in the western region of Ghana, especially in the face of limited data. Three main remotely sensed data were used in the study: a true color orthorectified digital aerial photo (AP); and two satellite data sources - RapidEye and Landsat Thematic Mapper (TM) imagery. Additional data were acquired through a participatory mapping exercise and a GPS survey. Other ancillary data like an existing land use/ land cover map of the area was used for the mapping.

R11: Biodiversity Threats Assessment for the Western Region of Ghana.

This review of biodiversity threats in the coastal zone of the Western Region of Ghana covers both terrestrial and marine systems and includes maps and descriptions of important wetlands and habitats.

R12: Rapid Biodiversity Assessment on the Essei and Butuah Lagoons and the Whin River Estuary in the Sekondi-Takoradi metropolis of the Western Region of Ghana

This rapid Biodiversity Assessment on the Essei and Butuah Lagoons and the Whin River Estuary in the Sekondi-Takoradi metropolis of the Western Region of Ghana concludes that deplorable management, ignorance or conflict of interest on the part of users has led the wetlands onto a path of potentially irreversible destruction. A new type of coastal management thinking and practice are needed that takes into account Ghanaian economic, socio-cultural and environmental perspectives.

R13: Approved byelaws for wetland conservation in 4 areas (Butre, Busua, Akwidaa, and Princes Town)

Cape Three Points – Princes Town CREMA Constitution and Resource Management Bye-law was amended to include provisions that call for the development of management plans for CREMA wetlands. The revised bye-law was approved by the Assembly.

R14: Model Bye-laws for Coastal Management in Ghana:

Experiences from Shama District

Through Hen Mpoano-facilitated technical assessments, stakeholder engagements and participatory mapping exercises, model bye-laws and policy statements for flood hazard mitigation, shoreline and wetland management were formulated and approved by the district assembly.

R15: Report on Land use mapping, shoreline classification and vulnerability assessment in the coastal zone of Shama District.

General reference maps showing annotated settlements, water bodies and areas liable to flooding were composed for the six coastal districts. Additionally, large format thematic maps of Hen Mpoano's focal areas, namely: Anlo Beach–Shama District, Anankwari Catchment Area–Shama District, Cape Three Points – Ahanta West District and the Greater Amansuri Area – Ellembelle and Jomoro Districts were generated.

Shoreline features were also identified and classified and their significance determined. This provided preliminary information to guide local level management of the shoreline.
Vulnerability assessment was conducted for Shama and Inchaban, where people, natural environment and property are at risk from flooding.

Project

P11: Establish new and support existing Community Resource Management Areas (CREMAs) to protect and enhance wetlands
P12: Designate both on shore, including wetlands and mangroves, and maritime preservation areas in Structure Plans and Local Plans
P13: Incorporate policies in plans and bye laws to reduce impact of dams, creation of impervious surfaces in development and blockage of water courses
P32: Undertake public education on values and importance of wetland ecosystems

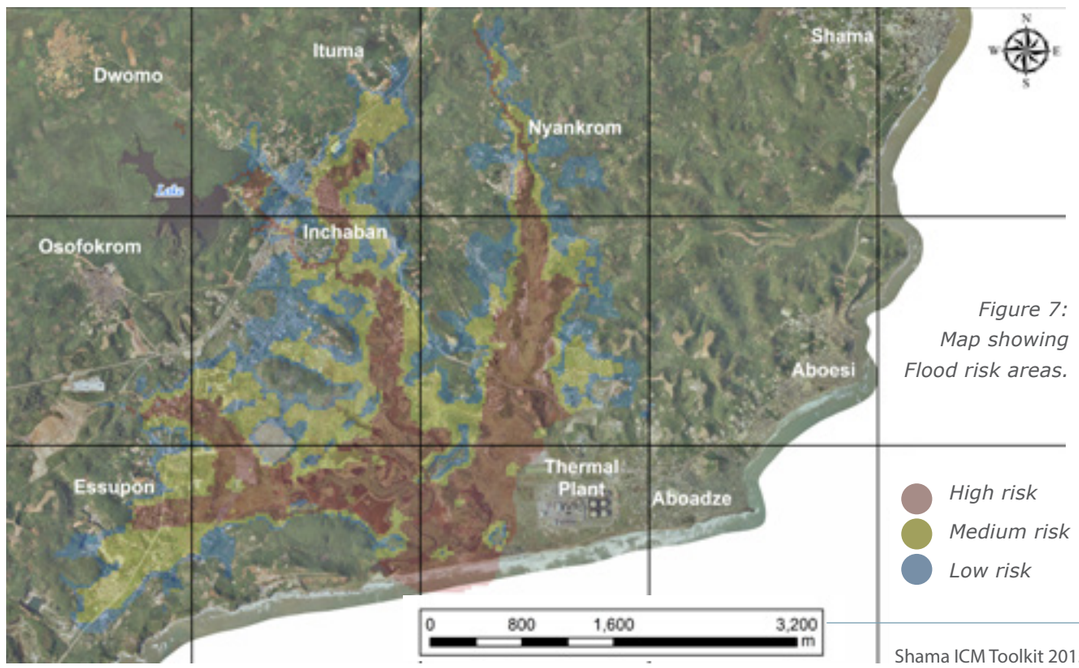


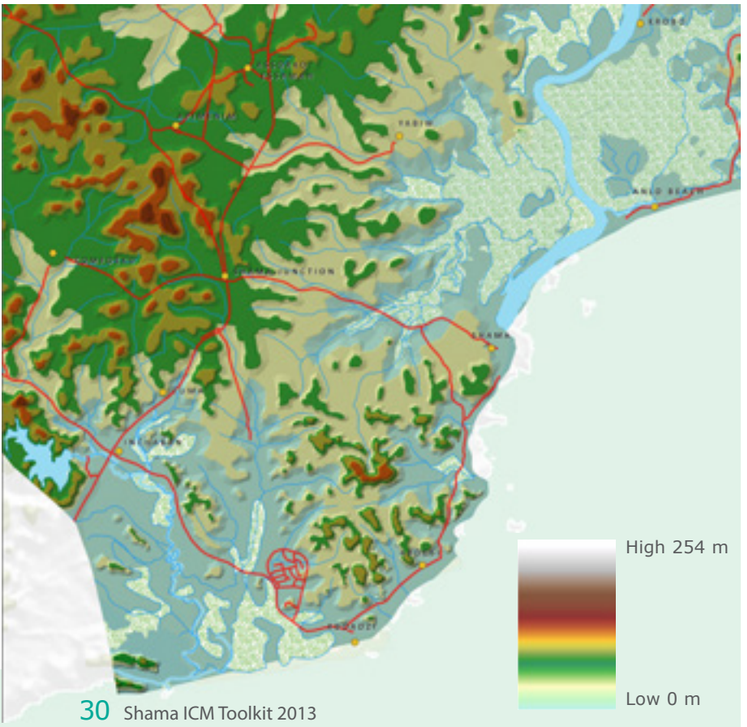
Figure 7: Map showing Flood risk areas.

3.5 Vegetation, Flora, Tropical Foliage Forests, Wildlife

3.5.1 Coastal Vegetation, farming, forest reserves.

The Digital Terrain Map (Figure 8 below) shows how little of the coastal zone is neither covered by wetlands nor settlements. The original forested vegetation in the district has been reduced to coastal shrubs. However, there are patches of secondary thick bushes and other small size trees in the northern parts of the district. This kind of vegetation supports oil palm and maize which are done on limited bases in the district. This reduction in forested cover is attributable to poor farming practices, bush fires and sand winning activities. Coastal communities combine farming and fishing for their livelihoods, with a mixture of cash and subsistence food crops. Subsistence food crop areas suffer from over exploitation and subdivision among increasing number of family members. The participatory mapping exercises which Hen Mpaono carried out for the whole of Shama District led to policies in the Spatial Development Framework which identified conservation areas and inland "green belt" which should be reserved for subsistence agriculture and cash crops, i.e. use by traditional farmers.

Figure 8: Digital Terrain Map of Shama District.



The balance between income from cash crops and land available for food, is a key factor in sustaining livelihoods and food security. The mapping of rural land uses and slope analysis will enable decisions to be made about the most efficient balance of uses. This designation of land for agriculture, added to protected areas/corridors for wildlife will enable the best decisions to be taken about areas for urbanisation, tourism, leisure and industrial development.

In this context, it has been proposed (3) that, considering that even large areas of green resources may be permanently destroyed through unplanned development, the concept of a "Green Network" such as has been adopted by Ahanta West, based on the Korean International Cooperation Agency Plan, will be a useful development planning tool for the District.

Reference

R16: Land Cover Mapping of the Greater Cape Three Points Area Using Landsat Remote Sensing Data Map Book

This is the companion book of maps for the land cover study. The land use and land cover map products created in this study are the first available data for the coastal region of Ghana. The maps represent an important step in the management of its natural resources. Land use and land cover maps allow land managers, policy and decision makers, and local communities to make informed decisions about the future of their natural, cultural and economic resources. This set of maps can also provide a window into how the landscape has changed as the baseline data for possible future work. With the baseline data ready, the next step of change analysis will be possible. The choice to use the U.N. Land Cover Classification System also provided the flexibility to meet classification needs in the future while still maintaining continuity with past work.

R17: Report from Community Conservation on Primates in the Western Region.

Field notes from Horwich's site visit and recommendations for improved management of the forest reserves and alternative livelihoods for the adjacent communities. Horwich made two additional visits in 2012 which are also included in this report.

Project

P14: Map and plan rural land uses areas. Develop strategy for balance of agricultural land uses and set buffers for food crop production as well as conserve ecosystem functions and services.
P15: Develop the eco-tourism potential of Cape Three Points Forest.
P16: Establish green networks in District Spatial Development Framework and to protect wildlife, agricultural and forest areas. Include green corridors in Structure Plans and Local Plans.

3.6 Settlements, Spatial Analysis, Siting of Infrastructure

3.6.1 Growth of the Coastal and Fishing Settlements

According to the 2000 Population and Housing Census (PHC 2000), the population of Shama district was nearly 70,000 and this increased to nearly 90,000 by 2008. The growth rate in the district was higher than the regional and national averages. Reasons for the increase in population (4) were high in-migration of fisher-folks from central region, uncontrolled births and teenage pregnancy especially in the fishing communities resulting in high school drop-out rate. Since the last 3 decades the district has witnessed an increase in the number of basic and secondary schools. However, performance at the basic education level has consistently fallen in the past decade. Fertility in the district is quite high with 2,115 pregnancies in 2008 increasing to 2,491 in 2009.

Areas with high population density include Shama, Aboadze and Abuesi which are fishing communities. Other highly populated areas are Inchaban and Supomu and Dunkwa.

The natural growth of populations in existing impoverished coastal communities, which is substantial, will be met by in-migration of those more wealthy individuals who are seeing the potential of the coast for residential, leisure and new industrial development.

3.6.2 Cultural context and traditions in Coastal Communities

The Shama traditional area is headed by a Paramount Chief with jurisdiction over three main Chieftain Divisions and several sub chiefs. The three Chieftain Divisions are Inchaban, Yabiw and Dunkwa. All traditional stool lands are vested in the paramount Chief of the traditional area.

Fante is the dominant ethnic group in Shama, constituting 86.49% of the total population while settlers account for 13.51%. The Fantes mainly reside westwards of the Pra River. Two main groups of Fantes can be distinguished; the first are the indigenes of Shama who identify themselves as Fantes with Techiman as their ancestral origin while the second are migrant Fantes from Moree, Apam and Winneba in the Central Region who acquired permanent residency in Shama over 5 decades ago. While the indigenes reside at Shama Bentsir and Shama Apo, the migrants are confined to Amena-ano. There is a fair level of interaction between these two groups. Residing at Anlo Beach, on the farthest South-east, are the Ewes who are the ethnic minority in terms of population size. Canoe or boat transport is by far the major means of transportation from Shama to Anlo Beach.

Artisanal fishing communities represent a unique and distinct culture which arises from the activity. Fishermen are at sea in canoes for three to four days at a stretch, while others are mending and making boats, nets and fishing gear. Women prepare, smoke and sell the fish.

Fishing migration is a common practice in Shama to other coastal areas in Ghana or coastal countries in the sub-region in response to availability of fish or the need to raise

money to payback accumulated debts. At times, whole families migrate or the fishmonger/maamenie migrate with the canoe to other countries. They spend between 2 months to 2 years or even longer periods depending on the destination and market. At their countries or places of destination, fishmongers work for enough money to remit home and also to payback debts. It is also noteworthy that price of fish is a driver of migration, particularly in cases of in-migration to other coastal communities in Ghana.

The people of Shama celebrate the 'Pra Nyinani Afahye' which is the major festival organised in September of every year. The town witnesses massive influx of people from within and outside the country during the festival.

Project

P33: Support local festivals and educate/ promote on retention of cultural identity of coastal and fishing communities.

Reference

R19: 'Faith In Action' Faith Based Action For Creation Care In Coastal Communities Of Western Region.

This report details engagement with religious leaders in six coastal districts in the Western Region of Ghana from the 12th of December 2011 to the 9th of February 2012. In all, over 123 religious leaders were trained in reference theology on environmental stewardship and creation care. The programme led to the establishments of six interfaith eco-networks in six coastal districts in the western region of Ghana. The programme was a big success and both participants and organisers benefitted immensely from the exchanges and experiences shared. The main recommendations for keeping the fire burning is ensuring that the eco-networks which have been established live beyond the lifespan of the initiative to perform the functions of mobilising religious organisations and advocating for responsible coastal resource use.

3.6.3 Land ownership

Traditionally, land was in the "customary ownership" of chiefs, who dispensed and allocated it on behalf of their people. Subsequently the colonial authorities negotiated treaties under Romano-British law which led to individual land titles and leases being granted, and substantial land being taken into government ownership. Now the chieftaincies often negotiate transfer of titles to developers without compensating the people who farm the land. Where most land is not registered, there are frequent conflicts over its ownership. In areas where farmlands have been acquired for other uses, it emerged during consultations at the community level that compensations are either unpaid or delayed. Families who have subsisted on the land for generations are summarily evicted without compensation, and incoming investors are caught up in land disputes so that nothing materializes.

All of this requires that the land agencies should work more closely with local communities; that land transfers by chiefs should be transparent; and that adequate compensation systems are in place where families are disposed of their land by development. The land agencies currently operate in a very separate institution. By resolving this element, the implementation of integrated coastal management will become easier.

Project

P34: Work with Lands Commission at local level on land security and compensation

3.6.4 Spatial Analysis: Coastal Settlements in Shama

There are six communities on the coast of Shama District. Starting from the South Western part is Aboadze and ends with Anlo Beach at the south earthen part of the District. Most of the houses located in this area are mainly cement-constructed and roofed with corrugated asbestos. Only few are built from clay bricks and roofed with thatch, aluminum sheets or bamboo. In all these areas except Anlo Beach, the houses extend close to the coastline and are interspersed

Figure 9:
VRA and Aboadze settlements

with fish processing facilities. Almost all the areas except within the VRA Township the houses are not well planned with no spaces in between them for vehicular access. With Volta River Authority (VRA) township, settlements comprise relatively modern houses of single storey which are inhabited by officials of VRA. The estate is well planned with spaces between houses for vehicular access, but is an example of segregation, and lack of interaction in the development process with existing settlements.

Most of the road network from the District capital to the coastal communities are tarred except the road that leads to Anlo Beach from Takoradi-Accra highway.

In order for development to happen in a way which creates an orderly, modern town in which the existing community and incomers both benefit from a high quality environment, investment in social amenities, water, power, connecting roads, water courses needs to be made for a larger urban area which includes the existing area. This should easily be able to be financed by new investments such as the Aboadze Power Plants or indeed the proposed new fertilizer plant between Aboade and Shama, if the planning and permitting process negotiates sharing of improved land values.

On the other hand settlements such as Anlo Beach has the potential to be a vibrant visitor resort if planned in an ecologically friendly manner. First it will have to take its own protective measures, see for example Princes Town Case Study, while developing low cost but high quality visitor facilities such as can be seen emerging between Dixcove and Princes Town (Ahanta West) or at Beyin (Jomoro).

Case study

Good Management Practices Reduce Impacts from Flooding and Erosion: Akwidaa Case Study

Reference

R20: A Climate Change and Natural Hazards Vulnerability Assessment and Adaptation Plan for Dixcove, Ahanta West District.

This is an initial Coastal Resilience Plan for Dixcove which aims to make the coastal community more resilient (less vulnerable) in the short, medium and long term. It provides an overview of the planning context and describes the key coastal features and their physical characteristics. A vulnerability assessment based on this information, focusing on the adaptive capacity in key facets including economic, social, governance and physical. A set of short and longer term actions are identified in conjunction with the community to improve its adaptive capacity and strengthen overall resilience.

R21: A Climate Change and Natural Hazards Vulnerability Assessment and Adaptation Plan for Akwidaa and Ezile Bay, Ahanta West District.

This is an initial Coastal Resilience Plan for Akwidaa and Ezile Bay which aims to make the coastal community more resilient (less vulnerable) in the short, medium and long term. It provides an overview of the planning context and describes the key coastal features and their physical characteristics. It is a vulnerability assessment based on this information, focusing on the adaptive capacity in key facets including economic, social, governance and physical. A set of short and longer term actions are identified in conjunction with the community to improve its adaptive capacity and strengthen overall resilience.

Project

P16: Prepare Local Plans for coastal settlements.
P17: Prepare Community Action Plans to address vulnerability and improve resilience for all coastal communities by building on Dixcove and Akwidaa vulnerability assessments
P18: Apply good coastal management practice in major leisure developments such as Princes Town.

In all cases proposals for new development need to be discussed with existing communities in a participatory manner, so that solutions can be found which benefit all, and connections are made which prevent long term conflict between new and existing residents.

3.6.5 Siting of Infrastructure/ Settlements

It is essential that water dependent and water enhanced uses with resulting value returns are used to maximize value in areas of the coastal zone, and that their siting prevents erosion and further damage to the coast. To achieve this it will be necessary that the ground rules for shoreline development are included in the Structure Plan, Local Plans and through Assembly Bye-Laws. However, certain critical questions need to be answered in the siting of infrastructure and settlements. These include but not limited to:

- What are the cumulative social and environmental impacts?
- What is the role of the Districts in making siting decisions?
- By what mechanisms are impacts on affected people addressed?
- What steps should be taken to ensure positive outcome 5 to 10 years from now?

3.6.6 Social issues, water, waste, and sanitation

Education

In terms of education, the district has witnessed an increase in the number of basic and secondary schools. However, performance at the basic education level has varied in the past decade. Most teachers linked low enrolment and poor performance of children in particularly fishing communities to the lack of incentives including provision of free school uniforms, poor parental care and control, as well as inadequate teachers. Lack of parental interest in education was also mentioned as contributing to this problem (4). Almost all the school drop-out and those who fail to pursue second cycle education take refuge in fishing since fishing is the major source of livelihood for people living in coastal communities.

Meanwhile, the District Assembly and some private companies have instituted scholarship schemes to incentivise high performance of students in the district.

Poor parenting is also a major problem in coastal communities, with many parents appearing to be indifferent about their children's education. An appreciable number of children between the ages of 6 and10 years are seen loitering at the beaches during school hours. Poor parenting has fertilized truancy, teenage pregnancies and early parenting and is contributing to high school dropout rate in the district.

The depreciation of livelihoods appears to accompany a decrease in social self-support and neglect of services. Standards have measurably declined in recent years. This decline emphasizes the gap between existing communities of long standing and newcomers who are enjoying the benefits of new development and investment. While the coast is still a place which welcomes incomers, these serious problems could degenerate into uncomfortable levels of resentment and insecurity.

Waste

The Shama District Assembly through Zoomlion is responsible for waste management. Collection of both liquid and solid waste are routinely done and transported to Sekondi Takoradi Metropolitan Assembly for treatment and disposal. Major settlements like Shama, Aboadze, Abuesi, Inchaban and Beposo have refuse collection points where large containers are placed for this purpose. In addition to these collection points, in some parts of the community refuse is dumped in areas which people find convenient especially if the designated collection points are far away. Most of these places are close to small streams, rivers and nearby bushes. In places like Shama, huge piles of refuse deposited into the sea have washed back on shore creating an unhygienic atmosphere along the beach.

With the current rate of residential buildings rising daily, there is the fear of an equally swelling problem of haphazard disposal of waste all over the district, which is likely to promote diseases. Garbage piles are used as improvised shore protection. In addition to the waste dumped at the shoreline, solid wastes from inland settlements are washed onto near shore marine areas through run-off.

Although ZOIL has deployed personnel to clean beaches, there are significant challenges as regards ensuring adequate cleanliness of beachfronts. The District needs refuse trucks and more metal containers to be able to control household as well as publicly generated refuse. Most importantly, the SDA should start to consider developing a district waste management plant instead of relying on STMA.

Sanitation

There are a number of public toilets in all the settlements within the district. However, the Assembly needs to device ways of encouraging residents to provide household toilets. The distribution of public toilets in the bigger and commercial towns like Shama, Aboadze, Abuesi, Inchaban and Beposo could be said to be woefully inadequate. A number of houses have private toilet with decent sizes of septic tanks. However, most communities along the coastline use the beach as places of convenience. Information from some residents at Shama Bentsir, a coastal community suggested that disposal of effluents from the public latrine located at the shoreline of Shama Bentsir is through flushing into the marine environment.

Water

The quantity of water supply in the district is not a major problem but the quality of potable water supply is poor. Surface water is mostly abstracted from the Pra and Anankwari rivers. The Inchaban headworks, located upstream of the Anankwari watershed, is a combined reservoir and boosting station that receives water from these two sources. Over 6 million gallons of water is discharged daily from the Pra River into the reservoir and 4 million gallons from the Anankwari River, which is predominantly rain-fed. Water from the reservoir is supplied to portions of the Shama district and the whole of Sekondi-Takoradi Metropolitan Assembly (STMA). Upstream of the Pra River, is the Daboase treatment facility and pumping station that supplies water to major towns in the Central region. However sedimentation of the Pra River and Inchaban water intake as a result of the combination of alluvial gold mining operations, which have polluted the river Pra with heavy metals and inappropriate development within the catchment of the water intake, coupled with salt water intrusion into coastal aquifers and the Pra River, has reduced access to good quality and quantity of water for household, commercial and industrial uses. In Anlo Beach, a coastal community and some riparian communities like Krobo, Bosomdo and Atwereboanda, it was expressed that the Pra River is used as supplementary to drinking water from other sources. However, it is widely held at the local level that upstream gold mining operations on the Pra River is changing the taste of the water from this source. Perceptions in these communities point to the fact that recent cases of vomiting and skin itching were as a result of consumption of copious amount of water from the river source. The Community Water and Sanitation Agency (CWSA) has provided a number of water supply points within the communities but the total supply continues to be inadequate.

The analysis of the distribution of water facilities brings to the fore the fact that, there is inadequate supply of safe water in the Shama District as coverage under all the Ghana Water Company systems were less than 30%. Added to community needs are those of the major industrial and tourism and leisure projects. The situation poses a challenge to the proposed siting of downstream petroleum chemical industries in the sub-region like the fertilizer plant proposed to be sited at Nyankrom. These consume water on a much larger scale, yet the Water Resources planning for the region indicates the likelihood of a growing crisis gap between supply and demand. This is made worse by the pollution from mining of the regions', major rivers and water courses.

Project

P19: Map critical watersheds shared by adjoining districts and subject to collaborative management
P20: Continue and extend coastal and shoreline waste management schemes
P21: Reinstatement of wells and boreholes to be conditions of new developments and take account of salination threats

R22: Opportunities for integrating family planning, health and nutrition interventions into coastal-fisheries governance agendas in Western Region, Ghana

Opportunities for integrating family planning, health and nutrition interventions into coastal-fisheries governance agendas are identified for the coastal districts of Ghana's Western Region.

R23: Facilitating Integrated Population Health and Environment in Five Communities in the Shama District and Two Communities in the Ahanta West District: Achievements and Lessons Learned

This report outlines the accomplishments and lessons learned through the implementation of integrated Population, Health and Environment (PHE) initiatives by the Central and Western Fishmongers Improvement Association (CEWEFIA) in seven coastal communities in Ghana's Western Region. The report elaborates on the socio-environmental context in the communities before the piloted interventions and the relevance of PHE as an approach for addressing the issues faced by the target communities and associated ecosystems. The way forward for improving PHE programmes in such communities is suggested to inform similar actions in other parts of the country and elsewhere in the world.

R24: Freshwater supply and distribution: a developing crisis in the Western Region

This issue brief highlights the key issues facing Ghana's Western Region in terms of fresh water supply and distribution and recommends policy options to protect water resources and insure equity in their use and distribution.

R25: Improving Livelihoods through Plastic Waste Management in Coastal Communities of the Western Region of Ghana: Achievements and Lessons Learned

This report outlines the accomplishments and lessons learned through piloting integrated sanitation and livelihood improvement interventions in four coastal communities in the Western Region of Ghana by Daasgift Quality Foundation. It highlights the issues of plastic waste management in coastal communities and describes the business model applied to facilitate household income generation through plastic waste management in the target communities. The way forward for improving plastic waste management in coastal communities is suggested to inform similar and future initiatives in other parts of the country.

3.7 Economy and Livelihoods

3.7.1 Overview

The economy of the district revolves around fishing, farming and petty trading. Shama has a long history of fishing pre-dating the colonial era. Majority of the people (68%) are engaged in agriculture and within this sector more than 60% are fishermen engaged in marine fishing. Thus the Shama district can be described as a predominant fishing community particularly in the southern sector. Emerging trends indicate declining fish catches which is contributing to loss of livelihoods and reduced quality of life for people living along the coast of Shama.

R26: Livelihoods and poverty reduction in coastal communities in the Western Region of Ghana: analysis of livelihoods baseline data by the ICFG program

This report is the result of the livelihoods baseline survey as part of the USAID-funded Integrated Coastal and Fisheries Governance (ICFG) Program for the Western Region of Ghana (Hen Mpoano). The survey aims to provide a baseline for interventions to be implemented as part of the Hen Mpoano by:

1. Establishing a baseline of the status of livelihoods of households in target communities (assess income levels and sources, seasonality issues, assets, vulnerability)
2. Establishing a simplified nutritional baseline of households in target communities and fish species consumed
3. Identifying opportunities for livelihood diversification in the target opportunities

Income diversification is a means to cope with risks and seasonality related to agriculture and fisheries. Poverty is multi-dimensional as it not only relates to income and consumption levels, but also to a lack of basic needs (access to shelter, health, and sanitation) and the ability to cope with shocks. Understanding poverty therefore requires the analysis to go beyond measuring income, to include factors such as education levels, health status, ownership and control over capital, financial and natural assets and access to social networks. The livelihoods survey conducted by the Hen Mpoano project aimed to encompass all these dimensions.

R27: Livelihood Diversification and fishing communities in Ghana's Western Region

Livelihood diversification in the fishing communities in Ghana's Western Region requires a focused effort to develop oil or tourism in a way that creates local employment and encourage people to exit fishing, leaving a less-crowded sector, more amenable to gradual change, with a more educated younger generation shifting into other sectors and places.

3.7.2 Agriculture

The farmers in the district are next in number to fisher folks and cultivate about 72% of lands in Shama as farms. A fair number of people from the middle belt to the north of the district are engaged in food crop production. Common crops produced are maize, cassava, plantain and rice. Cultivation of rice is heavily encouraged by MOFA in places like Badukrom, Ohiamadwen, Kobina Anokrom, Asemasa and Anto. There are isolated places where cash crops are produced. Cocoa and oil palm are produced on a smaller scale in places like Abotareye, Essumankrom, Beposo and Afransie while sugar cane is produced in Daboase Nkwanta, Obinimokyena and Komfueku. The sugar cane is mostly used in akpeteshie distilling which is also an important agro-based activity in the District.

But as noted above, earmarking land for development creates insecurity and is a disincentive to further inputs to farming. Fishing and farming livelihoods are interlinked. In the farming season (raining seasons) income from fishing are used to purchase farming inputs whilst investments shift back to fishing during the fishing seasons. Coconut was one of the main cash crops until the Cape Saint Paul Wilt disease gradually destroyed most of them from the 1930s onwards and this has also added to the pressures on coastal communities.

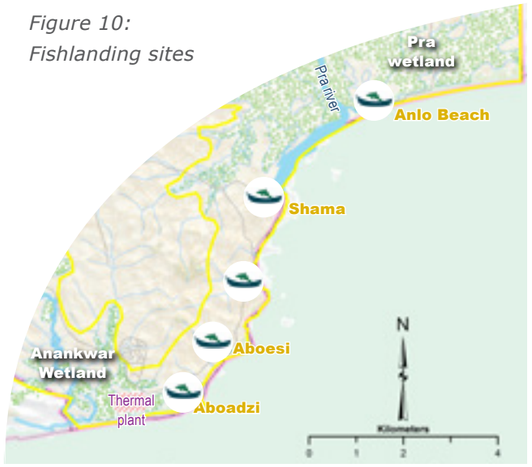
Project

P14: Map and plan rural land uses areas. Develop strategy for balance of agricultural land uses and set buffers for food crop production as well as conserve ecosystem functions and services. This could include further work with GREL to continue the policy for set-aside of land in plantations for subsistence.
P25 Create land banks or reserves for agriculture for local food production

3.7.3 Fishing

The coastal strip of Shama district is dominated by the artisanal fishing industry. Approximately 800 canoes ranging between small, medium and large sizes operate in the district. For a small district this is a phenomenal number. The large canoes are motorized and deploy between 20 – 30 crewmen. Most of the medium sized canoes are motorized while the small sized are non-motorized. The main fuel for motorized canoes is premix. Gears for fish harvesting are the gill nets, ring nets, bottom set nets, hook and line and beach seine. The main fish species harvested by fishers in Shama district include among others, sardinellas, tunas, marlins, sharks, sailfish, dolphins, burrito, barracuda, cassava fish, lobsters, shrimps, crabs and snappers. Processing of over 90% of the fish harvested in the district is done through smoking in the sheds that line the shorefront areas. The fishing settlements, particularly in Aboadze and Abuesi are nucleated and clustered at the landing site and are poorly served by road. The minimum facilities required to enhance the operational efficiency of fish handling and processing are needed at the landing sites.

Figure 10: Fishlanding sites



Reference

R28: Smoked marine fish from Western Region, Ghana: a value chain assessment

The assessment of the smoked marine fish value chain assessment in the Western Region, Ghana concludes that there does not seem to be any significant market at present for a premium smoked product. It discusses possible risks with any change to the status quo and makes suggestions for pilot scale interventions.

R29: Ghana Coastal Fisheries Governance Dialogue.

The second national Fisheries Governance Dialogue aimed to help stakeholders in the fisheries sector generate a shared understanding of critical lessons and pathways for fisheries co-management success in Ghana. The dialogue was held in direct response to the call from both fisheries communities and the government of Ghana for a radical change from the way fisheries resources are currently being managed.

R30: Ghana Coastal Fisheries Governance Dialogue: Developing Options for a Legal Framework for Fisheries Co-management in Ghana

The Dialogue was a direct follow up on the Second Dialogue held in Elmina in April 2012. The two-day meeting was attended by 79 fisheries stakeholders representing government, donor agencies, research institutes, fisher folks, non-governmental organisations and civil society organizations.
It was generally agreed that there was need for three key structures:

1. National-level management for pelagic fisheries. Laws will be developed to manage pelagic fish at the national level since they are highly migratory and cross regional and national boundaries. Management will also need to involve enforcement agencies (e.g. Marine Police and Navy).
2. Regional-level management of near shore demersal species and the Volta Lake. Management authority should be devolved to the regions with full authority to approve management plans for fisheries resources in their areas.
3. Local management of lagoons and estuaries and small freshwater lakes. Management and rule making powers devolved to local communities – and the rules made to be passed as by-laws by district assemblies.

R31: Marine Police Training Workshop Proceedings, September 25 – October 4. Fresh Approaches for promoting compliance and enforcement.

The Hen Mpoano Initiative discussed with the Fisheries Commission and the Ghana Police Service (GPS) on ways to support aspects of the training of the newly assembled officers of the MPU on the ecological justifications of the Fisheries Regulations. Approval was sought from USAID to organize short training modules for the unit. A curriculum for the training was approved by the GPS, FC and USAID which paved the way for the training workshop. It consisted of series of lectures, group assignments, presentations and discussions, role plays, and field visits to fish landing sites and fishing communities. The visits were important for the Marine Police Officers (MPOs) as that inducted them into the communities.

R32: Joining Forces to Collaboratively Manage Ghana's Fisheries Resources: the role of a Fisheries Working Group

In order to sustain the socio-economic benefits from coastal resources and biodiversity, there was the need for a collaborative approach to management rather than leaving the Fisheries Commission to single-handedly manage the fisheries and coastal resources. A Fisheries Working Group (FWG) was therefore catalyzed by the ICFG Initiative. Its members were carefully selected to comprise representatives of Fishers and State Regulators of the fishing industry, to play an advisory role among others to the Fisheries Commission relative to policy and management issues. In addition to this, the FWG sought to address ineffective communications among fishers and stakeholders including the Petroleum industry.

R33: Region Fisheries Sector Review

This report concludes that any attempt to promote fisheries development and fisheries management reform in Ghana's Western Region must address a wide range of issues, including an understanding of the dynamics of the fishery, solutions for improved management, promoting pro-poor livelihood opportunities, and building a stronger constituency to tackle these issues in transparent and equitable ways.

Project

P26: develop co-management committees and management plans for small scale fish stocks in Cape Three Points and adjacent nearshore marine areas

3.7.4 Industry and related services

During a participatory land use mapping exercise, the accelerating pace of land development in the District was revealed. Industrial, commercial and tourism uses are increasing along with quarries, sand, gravel extraction and other forms of mining that provide construction materials. Quarrying and sand wining are mostly mined in settlements closer to the N1 particularly in Botodwina and Anto. It is expected and recommended that activities of sand winners and quarrying companies especially West Rock, Prime Stone) should be monitored to avoid negative environmental issues in any new expansion drive.

The Abaodze Power Plant will shortly receive gas from the Jubilee oil field, and the pipeline will also be able to supply other sites in the district, like the fertilizer plant for which a site has been identified at Nyankrom near Shama. It is proposed that such industries be sited at the areas which have been zoned for that purpose in the Spatial Development Framework.

The effects of the major industrial and ancillary services surge in Takoradi resulting from the oil and gas industry can be seen as spin-off warehousing and industrial developments particularly along the N1. The increased activity will increase pressure on the ecological goods and services which are available, particularly on the coastline.

In regard to siting of any further major facilities, including the power plants at Aboadze, some of the key points that need to be considered include:

- Potential for employment and attraction of funds to deal with some of the endemic and long term problems which are being faced by coastal communities.
- Relationship to existing communities: connectivity to existing road and infrastructure networks; security, pollution (noise, air, land and water-based).
- Relationship to existing coastal and marine eco-systems: preventing damage to water resources, below ground aquifers, drainage, coastal and marine systems and bio-diversity. Care in understanding impacts of any incursions into coastal features and remedial measures to solve any existing long term problems and counter any new damage which might be a consequence of the new facility.
- Use during construction phase and operating phases of already overstretched services, health, education, water, power etc. Provision of properly planned and constructed settlements for the above as opposed to allowing temporary structures which evolve long term into slums. Respect for existing cultures and lifestyles and measures to effect good relationships between incomers and existing populations.

Planning a process in which existing settlements, livelihoods, landscapes and eco-systems come out as improved as opposed to damaged or destroyed by new facilities.

All of the above will be considered in an Environmental Impact Assessment for any major project. It is necessary to use the Integrated Coastal Management mechanisms to ensure that this is full, comprehensive and understood and supported by local communities.

It should be noted that as soon as any major new facility comes into being, there is a major impact on surrounding areas in the form of those wanting to take advantage of supply chain opportunities – housing, shops, commercial services, warehousing and industrial services. The mechanism for ensuring that these unfold in an orderly manner is the Structure Plan and Local Plan. But in the case of very large projects such as the Gas Plant, Oil

Refinery or proposed Fertilizer Plant. The impact can only be fully understood and planned for at a sub-regional and even regional level, hence the need for joint planning across districts such as has been mentioned earlier.

Project

P24: Prepare Structure Plans and Local Plans for areas west of Takoradi up to Butre estuary and Agona; also Butre/Busua/Dixcove area.
P27: Ensure local monitoring/input to Environmental Impact Assessment process by the Coastal and Marine Committee

3.7.5 Tourism and Leisure

There are no key tourism sites yet established in the coastal zone of Shama District but the Pra Estuary and Anlo Beach have been identified as a tourism area. There is a golf course near Aboadze, and attractive beaches between Aboadze and the Anankwari river adjacent the power plants.

The beautiful sandy beaches, coastal landscapes, traditional settlements, wildlife, historic and cultural sites (Shama Fort, traditional fishing communities), hiking, opportunities for canoe paddling, and turtle watching are there.

These opportunities are yet to be taken up on any scale by holiday visitors, and the majority use of facilities is still for business and development projects. To get onto the mass/global tourism market requires a regional/sub-regional initiative to provide access and infrastructure on a scale which could be an objective of sub-regional or sub-national bodies such as the proposed Joint Coastal Development Planning Area and the Western Corridor Development Authority.

Many of the measures which have described in above sections and other measures recommended in a recent report on Tourism (7) are pre-requisites for the tourism industry to take off and to become a desirable use of the coast in balance with other activities.

Figure 11: Tourism Map

Project

P14: support local festivals and educate/ promote retention of cultural identity of coastal and fishing communities
P28: Continue and extend waste management schemes to keep beaches clean to more remote beaches, and expand to include security measures for visitors
P29: Tourism supply chain: involve local communities in the delivery of the product such as local food, fish/ fishing and other products:
P30: Promote tourism and leisure investment through establishment of investors forums.
P31: Work with Ghana Museums and Monuments Board, Ghana Wildlife Society and others to extend the tourism product range – eg Historic Forts, Anlo Beach , Pra Estuary, wildlife conservation - and develop a sustainable eco-tourism development plan for the coastal zone

Section four:

INTEGRATED COASTAL MANAGEMENT INSTITUTIONS AND PROCESSES: Development Goals, Projects and Priorities

4.1 Governance: management institutions and processes

Institutional frameworks for effective implementation of ICM are yet to be fully developed at all levels - district, regional and national. To be successful, such mechanisms should recognize and institutionalize the roles of private sector, civil society and traditional authorities in addition to government. In Shama District, a pilot institutional mechanism was developed under the collaborative program with Hen Mpoano through the formation of sub-committee on agriculture and the coastal management. The committee is a good example of how to link and integrate issues at the coastal community scale with planning and decision making processes at the district level.

On the other hand, coastal issues that find expression at the sub-regional and regional levels (alteration of the coastal zone, coastal erosion, conflicts arising from siting large scale infrastructure) will require mechanisms that allow for negotiation, coordination and better communication between national and regional level institutions since the district level mechanisms for planning and decision making will not provide the most effective responses to these bigger scale issues. The Legal Instrument (LI) for Joint Development Planning Area and associated Executive Instrument provides adequate institutional and legal framework for addressing specific challenges which faces two or more

Reference

R34: A Fresh Approach to the Governance of the Western Region's Coastal Zone

The fundamental purpose of designating the six coastal districts of the Western Region as a Joint Development Planing Area is to provide for sustained planning and management that addresses the issues that affect the Western Region's coastal zone as a whole and cannot be effectively addressed by the coastal districts individually. It provides the districts with an explicit high-level mandate and an additional source of funding to work collaboratively on specified issues posed by development in the Western region's coastal zone. The joint development planning and management process is to manage, preserve, protect, develop, and where possible restore, for this and succeeding generations, the resources of the coastal zone of the Western Region. This would be accomplished through comprehensive and coordinated long range planning and management designed to produce the maximum long-term benefit for society. The sustainable use of socio-ecological systems would be the primary guiding principle upon which alterations and new uses in the coastal zone would be measured, judged and regulated.

R35: A nested coastal and marine governance system

This brief puts forward options for a nested coastal governance system. These ideas will be refined and augmented by ideas introduced by other papers in the series. The papers focus on coastal and fisheries issues in the western region to identify their causes, social, economic and environmental implications and how they might be addressed by a strengthened governance system. These briefs draw upon Hen Mpoano's "learning by doing" process as it works with communities, districts, governmental agencies and other stakeholders to practically address problems and specific opportunities along the coast and within the fishery. The process and proposal is supported by the advisory council of the Hen Mpoano initiative.

R36: Managing our coastal wetlands: lessons from the Western Region

Though the government of Ghana has made clear commitments for wetlands management and protection, there remain significant challenges in the implementation of conservation strategies and encroachment and degradation continues to evolve. The Western Region is home to some of the richest and most diverse coastal wetlands areas in Ghana and yet there are no formal mechanisms for their management and protection. These wetlands provide a host of critical functions and services but they are increasingly under threat for accelerated development resulting from the rapidly evolving oil and gas sector and record high commodity prices for a host of products exported from the region. This paper proposes a "way forward" that calls not only for commitment within agencies of government but also the active involvement of civil society and a change in the attitude of the traditional authorities and private sector interests that are fueling, directly or indirectly, the threats to the coastal wetlands of the Western Region. It also suggests mechanisms for managing and protecting vital wetlands resources in the western region.

coastal districts as a whole and for which each individual district will be unable to tackle.

The table below illustrates the current system of governance as applied to the coastal zone. It shows that the system is working in part, but there are serious deficiencies, not least those arising from lack of resources. Listing these from the bottom up:

Table 1: Current system of coastal governance and its limitations.

Institution	Description	Linkages and effectiveness
Unit Committees and Area Councils	Unit Committees exist at Settlement level and can prepare Community Action Plans which should be incorporated in District level planning. They report to the 6 Area Councils into which the District is sub-divided, which in turn report to the District Assembly.	There is a community level perception of inadequate government representation and attention. They complain of a big gap between the community and the District Assembly. Even communities with Assembly Members who reside in the communities claim they hardly pay visits and only see them during general elections. Unit Committees which are supposed to fulfill this function lack the resources; to effectively represent communities or carry out Community Action Plans. Such Plans (for examples see Akwidaa and Dixcove) could promote community resilience, improve wellbeing and livelihoods. Representation can be thwarted by chieftaincy disputes.
District Assemblies	District Assembly is the main institution of decentralized government. Assembly members are elected while District Chief Executives and Presiding Members are appointed by the President. Integrated Coastal Management can be applied through the Development Planning and Physical Planning systems. The Assembly has created a Agriculture and Coastal Management Subcommittee. This can be the vehicle for driving a strategy which can implement many of the proposals contained in this toolkit	The development planning system suffers from weak finance for implementation and frequent over-riding from the centre. There is also a lack of integration of Physical plans with Development Plans. The Agriculture and Coastal Management Committee has just been inaugurated and requires ongoing support to become effective. The Projects that have been identified which fit within the remit of this committee are noted in Table 2 below
Joint Coastal Development Planning Area	The LI for Joint Development Planning Area and Executive Instrument for designating areas as such, enables adjoining districts to act jointly on projects which run across their boundaries. Certain aspects of Integrated Coastal Management fall into this category and steps are being taken to set up such a body for the six coastal districts of the Western region.	The Joint Development Planning Area is at a formative stage and negotiations are underway to pilot such a mechanism in the six coastal districts of the Western region. The Projects that have been identified which fit within the remit of this are noted in Table 2 below. In addition working across districts will assist with maintaining consistent policies for coastal management.
The Regional Co-ordinating Council	The Regional Coordinating Council has been set up to co-ordinate and harmonise district level planning within the region. Apart from harmonization of Development Plans, it has also recently prepared and approved a Regional Spatial Development Framework. The Physical Planning Department also houses a Geographical Information System (GIS) training and development hub which has trained physical planning officers in five of the six coastal districts.	Monitoring of projects in development plans is the main role at present. The physical planning hub has been active and may play an ongoing role in servicing any Joint Coastal Management Planning Area

4.1.1 Projects for the Medium Term Development Plan and the National Medium Term Development Framework

The Projects which have been identified in SECTION 3 above are here listed and numbered as under the main relevant section of the Government of Ghana's forthcoming Medium Term Development Framework 2014-17. Most of them fall under the Sub theme: Sustainable natural resources management (which includes marine and coastal resources).

Table 2: Projects listed under National Development Planning Guidelines.

Sustainable natural resources management	MTDP	JDPA
1.1 Sustainable use of coastal forests and wetlands		
P4: Undertake public education on the benefits of conservation of coastal ecosystems	X	X
P9: End destructive sand winning practices by use of bye laws and community sensitisation.	X	X
P11: Establish new and support existing Community Resource Management Areas (CREMAs) to protect and enhance wetlands.	X	
P12: Designate both on shore, including wetlands and mangroves, and maritime preservation areas in Structure Plans and Local Plans.	X	
P13: Incorporate policies in plans and bye laws to reduce impact of dams, creation of impervious surfaces in development and blockage of water courses.	X	
P14: Map and plan rural land uses areas. Develop strategy for balance of agricultural land uses and set buffers for food crop production as well as conserve ecosystem functions and services.	X	X
P15: Develop the eco-tourism potential of Cape 3 points Forest.	X	
P16: Establish green networks in District Spatial Development Framework and to protect wildlife, agricultural and forest areas. Include green corridors in Structure Plans and Local Plans.	X	
2.1 Develop a co-management framework for fisheries with explicit mandate for MMDAs and communities		
P26: Develop co-management committees and management plans for small scale fish stocks in Cape Three Points and adjacent nearshore marine areas.	X	X
2.2 Promote fisheries development for food and livelihood security		
P2: Prepare Marine Spatial Plan.	X	X
P5: Work with Marine Protected Areas Inter Ministerial Committee over designation of marine protected areas.	X	X
P3: Continue with research on Algae Bloom leading to proposals for its eradication.		X
2.3 Improve access to coastal land for food crop farming		
P14: Map and plan rural land uses areas. Develop strategy for balance of agricultural land uses and set buffers for food crop production as well as conserve ecosystem functions and services. This could include further work with GREL to continue the policy for set-aside of land in plantations for subsistence.	X	
P25: Create land banks or reserves for agriculture for local food production.	X	X
P29: Tourism supply chain: involve local communities in the delivery of the product such as local food, fish/fishing and other products.	X	X
2.4 Create opportunities for generating wealth, jobs and diversified livelihoods from the oil and gas sector		
P23: Create links between local communities, tertiary/ vocational education and incoming developments in oil and gas, supply industries, tourism and hospitality, new residential developments, and construction.	X	X

Sustainable natural resources management	MTDP	JDPA
3.1 Designate areas for large facility siting in the coastal zone		
P24: Prepare Local Plans for coastal settlements from Aboadze to Shama.	X	
P27: Ensure local monitoring/input to Environmental Impact Assessment process by the Coastal and Marine Committee.	X	X
3.2 Develop tourism and leisure potential of coastal areas		
P33: Support local festivals and educate/promote on retention of cultural identity of coastal and fishing communities.	X	
P15: Develop the eco-tourism potential of the Pra Estuary.	X	X
P28: Continue and extend scheme to keep beaches clean to more remote beaches, and expand to include security measures for visitors.	X	
P29: Tourism supply chain: involve local communities in the delivery of the product such as local food, fish/fishing and other products.	X	X
P30: Promote tourism and leisure investment through establishment of investors' forums.	X	X
P31: Work with Ghana Museums and Monuments Board, Ghana Wildlife Society and others to extend the tourism product range – eg Historic Forts, Anlo Beach, Pra Estuary, whale watching, wildlife conservation and develop a sustainable eco-tourism development plan for the coastal zone.	X	X
4.1 Develop partnerships for waste management involving shorefront communities.		
P20: Continue and extend coastal and shoreline waste management schemes.	X	
4.2 Improve access to water and sanitation facilities		
P19: Map critical watersheds shared by adjoining districts and subject to collaborative management		X
P21: Reinstatement of wells and boreholes to be conditions of new developments and take account of salination threats.	X	
5.1 Reduce vulnerability of people, property and infrastructure to coastal hazards		
P6: Increase collaboration with the Ministry of Water Resources, Works and Housing for regulating private development and installing publicly funded defenses.	X	X
P7: Where acceptance of land loss is agreed as the best option long term, plan re-settlement schemes and incorporate as objective in Structure Plans.	X	
P8: Develop a public education programme on coastal hazards and climate change.	X	
P32: Undertake public education on values and importance of wetland ecosystems.	X	
P10: Prepare coherent shoreline management plans to regulate coastal land use.	X	X
P16: Prepare Local Plans for Coastal settlements.	X	
P17: Prepare Community Action Plans to address vulnerability and improve resilience for all coastal communities by building on Dixcove and Akwidaa vulnerability assessments.	X	
P18: Apply good coastal management practice in any major leisure developments similar to Princes Town.	X	
Other Sections of the MTDF		
P1: Form Working Groups to deal with specific coastal issues.	X	X
P14: Support local festivals and educate/promote retention of cultural identity of coastal and fishing communities.	X	
P34: Work with Lands Commission at local level on land security and compensation.	X	X

4.3 Regulation

The district's permitting and regulating decision making processes are crucial for implementing certain aspects of coastal planning and management. These processes can rely on best management practices for addressing urbanization and shoreline sanitation issues (example Dixcove), flood hazard management (example Akwidaa) and large scale tourism facility siting (Princes Town). The district also has the power to formulate bye-laws to regulate different activities in its coastal zone. Example is the wetlands and shoreline management bye-law that has been prepared and approved by the district assembly.

4.4 Priorities and Actions

The above projects emerge from the participative working with coastal communities and other stakeholders, the evidence that has been gathered and analyzed. The list does not take account of priorities or the capacity of stakeholders to carry out the projects. Some will align with Government of Ghana national priorities, others may fit well within the objectives of foreign aid or corporate responsibility. The Agriculture and Coastal Management Subcommittee will be a point of discussing and setting priorities, which will be reflected in the Medium Term Development Plan and Spatial Plans, and coordinating joint action by stakeholders.

Priorities that are highlighted here include the urgent approval of bye laws, designation of protected areas, along with continuing to develop community resourced management of them. Public education initiatives in the list of projects are a pre-cursor to action. Some of the projects listed should be routine functions of the District Assembly, but it is proposed that they become "projectised" as a way of ensuring that they maintain a high priority in local administration and action with stakeholders. The table also indicates which projects are purely within the province of the Assembly, and those which need to be shared in a Joint Planning Area.

4.5 Funding

The Medium Term Development Plan is the document which ties together local needs, national policies, projects and action plans with funding sources. Yet the funding systems remain weak compared to the task. In order to achieve the objective of "goods and services that generate long term socio-economic benefits to communities while sustaining biodiversity" multiple funding streams will need to be co-ordinated. These will have to include central government and donor support, internally generated funds, especially from a share of the increased land values that are being created (betterment and land value capture) which has to be negotiated on each development proposal; from local property taxes which if well established can be used to underpin bond issues for funding infrastructure; and from CSR policies of major investors, including setting up of a Coastal Foundation.

Notes to text

(1) Boateng, I. 2012. An application of GIS and coastal geomorphology for large scale assessment of coastal erosion and management: a case study of Ghana. Journal of Coast Conservation 16:383–

(2) Major locations experiencing flooding

Place	Flooding and related concerns
Lower Inchaban	Important commercial and industrial hub of the district with sprawling sub-urban growth and associated creation of impervious surfaces in a floodplain. The settlement experiences seasonal flooding. Upstream to the area is the water intake and dam that poses potential flood risks. The recent flooding in July 2011 displaced over 625 people and resulted in significant loss of property and livelihoods.
Anlo Beach	Flooding is locally perceived to be caused by a combination of intense rainfall, high tides and elevation of Pra estuary. This happens twice yearly, usually in the months of July, August and September. Degradation of mangroves is perceived to be resulting in declining fish catch in the Pra estuary. In the past, mangrove re-planting was attempted by the community with the support of the Environmental Protection Agency (EPA). This effort failed, as mangrove propagules were washed by floods. Mangrove is the source of building materials and fuel wood and its harvesting is a livelihood option for unemployed youth in the community.
Krobo	Experiencing river erosion and seasonal flooding. 60 houses destroyed in July, 2009 flooding and many more people displaced. Community is waiting to be resettled in a newly designated area.

See also Ghana's Riparian Buffer Zone Policy for Managing Freshwater Bodies in Ghana, 2011. Ministry of Water Resources, Works and Housing. Government of Ghana. The following are relevant detailed definitions:

Flood Hazard Boundary Map is a map upon which the boundaries of the flood hazard zone has been delineated. It is periodically updated as new information becomes available.

Flood Hazard Zones: Zone B is the additional land and wetlands which lie within and form part of the boundaries of the flood zone as illustrated in the Flood Hazard Boundary Map. This area has a probability of 1 in 5 or 20% in a given year to be covered by floodwater during a period of intense rainfall, as well as have temporary extensive areas of standing water, and also includes permanent and seasonal wetlands and normal river flow. Flood Hazard Zone C is an expanse of relatively flat land that spans from the main stem of a river or stream, possessing wet soils that include sediment carried and dropped by the stream, and is susceptible to being inundated by periodic flood waters from any source with a probability of 1 in 25 in a given year. This zone incorporates the river buffer zone A and the High Flood Hazard Zone B.

Floodplain is a level or nearly level land along a stream or river flooded only when the streamflow exceeds the water carrying capacity of the channel. It is also a flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding.

Riparian Buffer Zone is a riparian buffer zone strictly defined, comprises only the vegetation in a stream channel and along riverbanks; However, the term has recently been used more broadly to include adjacent landscape that exerts direct influence on a water bodies and associated aquatic ecosystems. It generally encompasses undisturbed native strip of vegetation either original or established that borders streams and rivers, ponds, lakes and wetlands and is therefore the interface between terrestrial and aquatic ecosystems. It may include trees, shrubs, herbaceous plants and grasses extending from the defined edge of a stream, river or shoreline. To conserve these resources requires that buffer zones are designated to the maximum extent practicable and include best management practices that will ensure the maintenance and integrity of the waterway, biota, and habitats and reduce pollution that would result in water quality improvement and fresh water supply at low cost from well conserved water bodies.

River Buffer Zone A is a land area on or contiguous to the main river channel or wetland that shall be retained in its natural or undisturbed condition. This includes vegetation, wet soils, slopes and vegetative cover within. Buffer width varies for major rivers/ streams (10 - 60m), minor streams (10 – 20m), and seasonal streams (10 – 15m). See Riparian Buffer.

(3) Korean International Cooperation Agency, (KOICA) Strategic Development Planning, Ahanta West District, Final Report 2012, 'Green Networks' concept p.112

(4) Based on Rapid Assessments of Coastal Communities, 2010

(5) The key points which have been identified for this are:

- Constructions at beach destinations should be behind the tree line and lower than the tree height so that from the beach the view is dominated by the trees and the building are hidden. This means repair existing/stopping new undesirable structures from being built.
- Add tourism investment to the justification for infrastructure investment in coastal communities, and seek partnership with tourism facility investors in providing them (electricity, water, sanitation, waste).
- Support to farming should seek to link locally sourced food with tourism development.
- Protect and secure beaches: prevent further erosion and damage sand and stone winning. Keep beaches and the sea clean. Ban driving beach buggies or motor bikes on popular beaches, publicise the dangers of being in fish landing areas, establish life guards and security.
- Involve local communities in the delivery of the product: increasingly poor local communities are well aware of the opportunities which tourists provide, but there are many ways in which these linkages could be developed as a source of business. For example, fishermen who could introduce and show visitors their industry, tours of settlements, cultural tours, farm visits, supplies of food and fish among others. All of these happen informally but could be scaled up if training and other essentials could be provided.
- As a strong complementary asset to beach tourism, other sites must be strengthened further developed. The Marine and Coastal Committee can work with the relevant authorities such as the Ghana Museums and Monuments Board, the Wildlife Division, Ghana Wildlife Society amongst others to:

1. Improve access to ecotourism areas as well as signage and facilities such as in Cape 3 Point Forest Reserve.
2. Develop new attractions, for example sites like Cape Three Points Lighthouse should be developed as prime whale watching sites (8).
3. Support and promote initiatives that are helping conservation and protection of marine and shore-based wildlife such as the efforts of certain beach resorts to offer turtle volunteer opportunities.
4. Maintain and develop historic and cultural sites: there is huge scope for extending the current offer.

Section five:

BIBLIOGRAPHY OF DOCUMENTS AND MAPS PRODUCED BY THE INTEGRATED COASTAL AND FISHERIES GOVERNANCE PROGRAMME

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5.2 List of data files

Theme	Feature	Description	Object	Source	Year
Anankwar Bye-Law Zone	Bye-law Boundary	Boundary of the Anankwar bye-law zone.	Polygon	ICFG	2012
Anankwar Bye-Law Zone	Bye-law Riverine System	The riverine systems that are located within the bye-law application region	Line	ICFG	2012
Anankwar Bye-Law Zone	Anankwar Main Channel	The major river channel that flows from the Anankwar Lake through the Anankwar floodplain downstream.	Line	ICFG	2012
Anankwar Bye-Law Zone	Highly Flood Hazard	Areas which lie within and form part of the boundaries of the flood zone.	Polygon	ICFG	2012
Anankwar Bye-Law Zone	Flood Plain Hazard	Periodically flooded areas.	Polygon	ICFG	2012
Anankwar Bye-Law Zone	Built Area Flood Hazard	Built Area Highly Exposed to Flood Damage.	Polygon	ICFG	2012
Boundary	Shama District boundary	The boundary of Shama district including the coastline.	Polygon	ICFG	2012
Boundary	Shama District boundary (TCPD)	The boundary of Shama district including the coastline.	Polygon	TCDP	2012
Boundary	Coastal Zone (1000m)	1000 meter buffer of the coastline which defines the landward boundary of the coastal zone.	Line	ICFG	2012
Boundary	Coastal Zone (30 meter Bathymetry)	30 meter bathymetry line indicating the seaward boundary of the coastal zone.	Line	ICFG	2012
Boundary	Coastal Zone (6 Nautical miles)	6 Nautical mile buffer of the coastline indicating the seaward boundary of the coastal zone.	Line	ICFG	2012
Boundary	Coastal Zone(Landscape and Seascape)	The coastal zone of Shama district.	Polygon	ICFG	2013
Boundary	Shama Area Council	Boundary of the Shama Area Council.	Polygon	ICFG	2012
Coastal Resources	Birds	Bird diversity along the coastal stretch of Ellembelle district.	Point	EPA	2004
Coastal Resources	Coast Type	Representation of the district's coastline classified into sandy beaches, rocky shores and mouth at lagoon	Line	EPA	2004
Coastal Resources	Beach Seine	Location of beach seine activities.	Point	EPA	2004
Coastal Resources	Ecological Ranking	Sensitivity of Coastal ecosystems to potential oil spills.	Line	EPA	2004
Coastal Resources	Fish and Shrimp	Distribution of nursery and spawning sites of fish species.	Point	EPA	2004
Coastal Resources	Fish Landing Sites	The location of fish landing sites, the number of beach seine activities, number of fishermen and the number of canoes.	Point	EPA	2004
Coastal Resources	Human Use Ranking	Classification of human use along the coast.	Line	EPA	2004
Coastal Resources	Sand Bar	The sandbar or sandspit at the estuary of the Pra river.	Polygon	ICFG	2011
Coastal Resources	Shama Shoreline Classification	Classified coastline of Shama district.	Line	ICFG	2011
Elevation/Bathymetry	Contour (20 meters)	20 meter interval contour lines.	Line	ICFG	2011
Elevation/Bathymetry	Elevation and Bathymetry (20 meters)	20 meter interval elevation and bathymetry (sea depth).	Line	ICFG	2011
Elevation/Bathymetry	Aster 30meter Bathymetry	30 meter resolution Aster bathymetry (sea depth).	Raster	ICFG	2011
Elevation/Bathymetry	Aster 30meter Elevation	30 meter resolution elevation.	Raster	ICFG	2011
Focal Area Zone	Shama Focal Area	Boundary of the Shama focal area.	Polygon	ICFG	2012
Hydrography	Coastal Wetlands	Water bodies, wetlands and adjourning ecosystems that promote aquatic life along the coastline of the district.	Point	EPA	2004
Hydrography	Anankwar lake	Boundary of the Anankwar lake.	Polygon	ICFG	2012
Hydrography	Areas Liable to Flood	Areas Liable to Flood.	Polygon	ICFG	2012
Hydrography	Shama Boreholes	Location of active and inactive sources for dugout water access.	Point	ICFG	2012
Hydrography	South Inchaban Wetlands	Boundary of the Inchaban wetland.	Polygon	ICFG	2012
Hydrography	Rivers	River systems.	Line	ICFG	2012
Imagery	Orthophotos	Ortho-rectified aerial photos of the coastal stretch of the district.	Raster	Survey dpt.	2005
Imagery	Toposheets	Scanned topographic sheets of the district.	Raster		1986
Industrial	Industrial Development	Various industrial developments in the district.	Point	EPA	2004
Industrial	Aboadze Thermal Plant	Location of the Aboadze thermal plant.	Polygon	ICFG	2011
Industrial	Quarry Sites	Location of quarry sites in the district.	Point	ICFG	2011
Industrial	Mineral Deposits	Location of the different types of mineral exploration activities.	Point	EPA	2004
Industrial	Tourism	Tourism destinations in the district.	Point	ICFG	2013
Land use	Present Land Use	District-wide, seamless digital dataset of the land cover/land use for the Shama District	Polygon	ICFG	2011
Land use	Future Land Use (Women)	Preferred future land use pattern of the Shama district as perceived by women.	Polygon	ICFG	2011
Land use	Future Land Use (Men)	Preferred future land use pattern of the Shama district as perceived by men	Polygon	ICFG	2011
Land use	Future Land Use (Youth)	Preferred future land use pattern of the Shama district as perceived by the youth	Polygon	ICFG	2011
Land use	Future Land Use (Chiefs)	Preferred future land use pattern of the Shama district as perceived by traditional authorities	Polygon	ICFG	2011
Physical	Soil	Principal soil types/associations according to the FAO system.	Polygon	Soil Research Institute	1998
Roads	Shama Roads	Street center lines for the major transportation highways, roads, and streets.	Line	ICFG	2012
Settlement	Shama Towns	Administrative names and the location of all the major settlements.	Point	ICFG	2011
Settlement	Shama Coastal Towns	Names and locations of some selected coastal towns/ communities in the district that fall within the Shama focal area.	Point	ICFG	2011

Case study

Good Management Practices

Reduce Impacts from Flooding and Erosion: Akwidaa Case Study

Good Management Practices

Reduce impacts from flooding and erosion.



Akwidaa Case Study

Objective 1 - Citizens, leaders and sectors are fully aware of vulnerabilities from natural flood hazards and options to reduce risk today and in the future.

1. **Develop programs to inform health, agriculture, and fisheries sectors on the impacts of climate change.** Changes in precipitation, temperature and weather patterns affect the health and wealth of the community. Work with government and non-government organizations and academia to share up-to-date information on impacts and actions that can be taken by different sectors of society to be more resilient.
2. **Establish early warning system and disaster preparedness plans.** Community-based programs should include participatory mapping of risk evacuation routes, drills to practice warning and evacuation, and information exchange. Early warning can include informing the community of extreme high tides, heavy rains, and wave activity. SMS and community networks have been successful at getting the word out.
3. **Monitor beach and wetlands to understand changes and the implications for future.** Work with NGO and university to establish a program to track changes, such as beach erosion and levels of flooding. Additionally, wetlands that provide habitat for fisheries will likely change as sea level rise results in higher salinity further upstream. Monitoring can be performed by members of the Community Resource Management Areas (CREMA) or students together with wetland curriculum that could support increased awareness.
4. **Map existing and future floodplains utilizing best available data, models, and results from vulnerability assessments.** The flood hazards map can become an overlay to the physical plan, showing river channels, watercourses, approximate extent of the flood waters, and expected flood elevations. Estimate historical flood elevations using local knowledge and other data and consider future changes in rain fall intensity.

Objective 2 – Changes are made to existing development that accepts the long-term impact of erosion and flooding in high hazard areas

5. **Relocate vulnerable families to New Town**, encouraged through providing homes, utilities and services. Relocate structures at high risk of flood, or those damaged by disaster. Pre-planned urban development with houses and associated services will provide an incentive for families to relocate.
6. **Elevate and set back structures to reduce impacts of flooding and erosion**. Consider the levels of historic storms, tides and anticipated sea level rise when elevating structures or moving them back from the shoreline.
7. **Minimize impacts to fishing businesses and assets.** Boats, gear, landing facilities depend on being waterside and should be set back or elevated to prevent future storm damage. Prepare long term plans for locating other associated activities, such as market, fisherman houses, and gear that do not require a waterfront location away from the shore and not in harm's way.
8. **Upgrade and maintain concrete storm drain channels to accommodate heavy rains and floods**. Use national design standards to reduce flooding of adjacent urban areas

Objective 3: New development is located safely away from high hazard areas

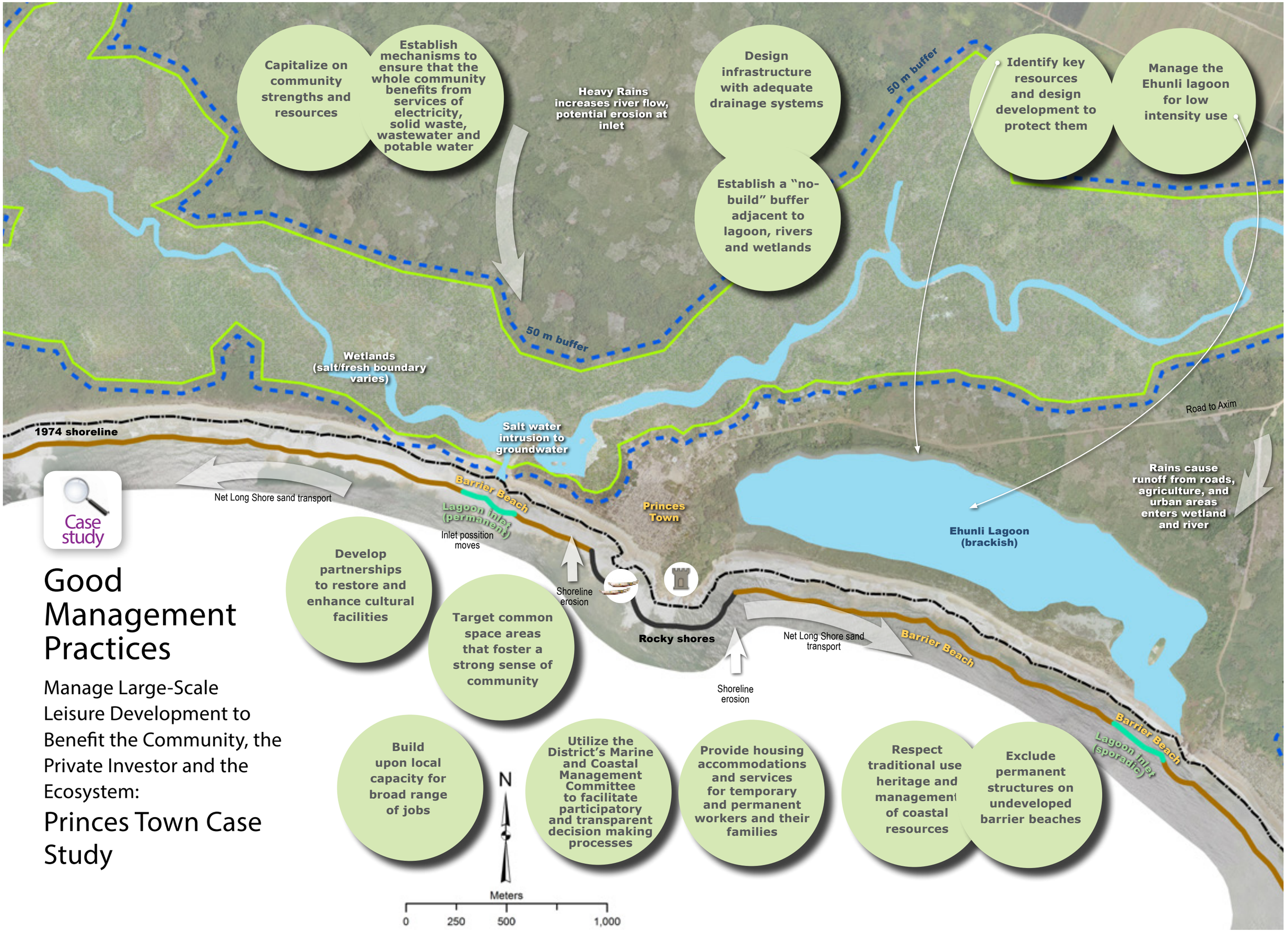
9. **Exclude permanent structures on undeveloped barrier beaches.** The dynamic processes of erosion and wave overwash keep the beach healthy. Temporary, low impact structures may be acceptable, but should be elevated to allow for beach movement. Sea defenses should be prohibited in these areas.
10. **Sea defenses should be the last option in dynamic beaches and inlet.** With the dynamic inlet to the Ehunli Lagoon, erosion control structures, seawalls and jetties will likely impact adjacent areas and increase erosion. Erosion control must be carefully designed to meet engineering standards for expected waves and river flow and precautions taken to reduce erosion potential adjacent to these structures.
11. **Establish a "no-build" buffer adjacent to lagoon, rivers and wetlands.** A vegetated and undisturbed strip of land will reduce pollution, erosion, flooding and habitat destruction. Maintain a "no-net loss" practice for wetlands. If there must be a wetlands alteration, mitigation actions are recommended to accommodate flood storage needs. This mitigation shall take place nearby so that flooding impacts downstream will not increase.

Case study

Good Management Practices

Manage Large-Scale Leisure Development to Benefit the Community, the Private Investor and the Ecosystem:

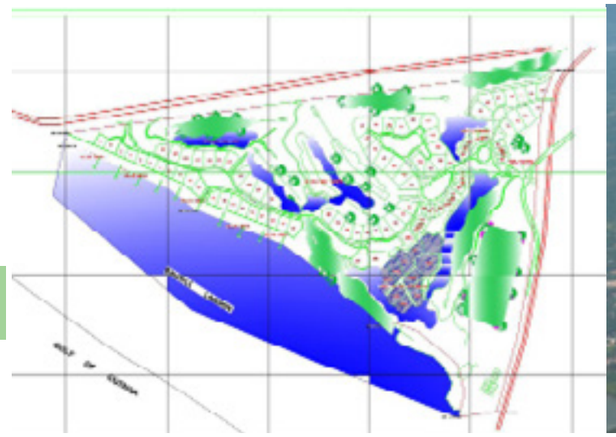
Princes Town Case Study



Good Management Practices

Manage Large-Scale Leisure Development to Benefit the Community, the Private Investor and the Ecosystem:

Princes Town Case Study



Objective 1 - Development is harmonized with conservation, increasing quality of life by designing with nature

1. **Respect traditional use, heritage and management of coastal resources.** Traditional knowledge for managing occasional opening of the Ehunli lagoon to the ocean helps maintain salinity for fisheries and reduce flooding of elevated lagoon water levels. Protecting mangroves are critical for bird and monkey habitat and respects local culture, where hurting monkeys is taboo. Maintaining existing public access to lagoon, forest, and coast is important for economic and cultural uses.
2. **Exclude permanent structures on undeveloped barrier beaches.** The dynamic processes of erosion and wave overwash keep the beach healthy. Temporary, low impact structures are allowable, but should be elevated to allow for beach movement. Sea defenses should be prohibited.
3. E**stablish a "no-build" buffer adjacent to lagoon, rivers and wetlands.** A vegetated and undisturbed strip of land will reduce pollution, erosion, flooding, and habitat destruction. Wetlands should not be filled, however, if there is over-riding public benefit for filling wetlands or waterway (i.e. a road access), consider other alternatives including relocation, bridge, or adequate culvert to reduce impacts and flooding. Maintain vegetated buffers for rivers, streams and lagoons (10 – 60m).
4. **Manage the Ehunli lagoon for low intensity use**. Identify areas for both traditional use and non-damaging new uses. Limit boating to vessels without motors. Minimize the number of piers and promote shared use of the water area to reduce disturbance of habitat.
5. I**dentify key resources and design development to protect them.** Map areas of high value habitat and resource value as a first step in locating new development. Undeveloped green spaces (forest, mangrove, wetlands) can be used for passive recreation and tourism. Connecting these areas provides a habitat corridor for wildlife. Grouping/clustering buildings away from key resources will minimize destruction of valuable habitat.

Objective 2 - Services and infrastructure are in place that improve the standard of living for existing and future residents and visitors

6. **Design infrastructure with adequate drainage systems.** Roads should include drains or vegetated buffers to reduce flooding and pollution to rivers and wetlands during rainfall. Building designs and grading should reduce impacts to nearby properties and waterbodies. Where feasible, include cisterns for rain water harvesting and storing drinking water.
7. **Establish mechanisms to ensure that the whole community benefits from services of electricity, solid waste, wastewater and potable water.** Identify approaches such as co-financing, co-management, partnership agreements or service contracts. Locate facilities for solid waste and sewage disposal in safe areas not prone to flooding and ensure proper design.
8. **Provide housing accommodations and services for temporary and permanent workers and their families.** Large tourist developments require additional workforce housing during construction and for continued operation of the expanded community.
9. **Develop partnerships to restore and enhance cultural facilities.** Build upon efforts to restore the facilities, such as Fort Gross Friedrichsburg and partner with Ghana West Coast Destination Management Organization to promote a cultural tourism corridor in Ahanta West.

Objective 3 - Sustained engagement among District, community and development sectors provides mutual benefits

10. **Utilize the District's Marine and Coastal Management Committee to facilitate participatory and transparent decision making processes**. The committee will help develop and implement formal mechanisms for decision making, negotiation, conflict resolution, and participation by stakeholders.
11. **Target common space areas that foster a strong sense of community.** Design spaces to support engagement between existing and new community members. Markets, parks, or buildings can provide opportunities to share experiences, including cultural exchange, outdoor activities and special events.
12. **Build upon local capacity for broad range of jobs**. Work with local and regional leaders, educators and businesses to build capacity of local residents to support new jobs in construction, management, tourism, and services. Business concepts can emerge from initial joint projects between the leisure operator and the community.
13. **Capitalize on community strengths and resources.** Identify ways for enhancing the value of resorts by including local fish and agriculture products, cultural amenities and other eco-tourism approaches as part of the package.

Case study

Good Management Practices

Support Urbanization, Sanitation and Wastewater Management in the Coastal Zone:

Dixcove Case Study

Set aside areas for future relocation of families and businesses

Upgrade and maintain concrete storm drain channels to accommodate heavy rains and floods

Establish and maintain "no-build" areas for river channels and river buffers.

Improve and extend road system to connect with adjoining communities

Create a green belt around the urban core

Designate areas for landfill and establish waste management systems

Establish a tourism corridor

Map existing and future floodplains

Manage and improve developed areas in flood prone areas to reduce damage to life and property

Design and manage sanitation for fishing activities to reduce pollution to the sea and improve product quality

Designate water-dependent areas in the coastal strip

Designate a limited man-made shoreline area, with adequate shoreline defenses

Busua

Wetland

Busua river

Forest

Drains

50 m buffer

Sandy beaches

Coastal lagoon inlet

Rocky shores

Nfuma river

Dixcove

1974 shoreline

N

Meters

0 125 250 500

Good Management Practices

Support Urbanization, Sanitation and Wastewater Management in the Coastal Zone:



Dixcove Case Study

Objective 1. Planned and well-maintained urban areas that increase quality of life of the community

1. **Establish and maintain "no-build" areas for river channels and river buffers.** Enforce a no-build area adjacent to the river channel or watercourse. If there is over-riding public benefit (i.e. a road that cannot be located elsewhere) for developing or filling in the watercourse, ensure that flooding will not increase (i.e. raise height of road or install culverts of adequate size). Maintain vegetated buffers that support natural functions for rivers/streams (10 - 60m), minor streams (10 – 20m), seasonal streams (10 – 15m).*
2. **Create a green belt around the urban core**. Protect and manage healthy forests and wetlands in order to capture rainwater, reduce flooding, and support groundwater drinking supplies, while supporting sustainable livelihoods. Connected forests will provide a corridor for wildlife, defines a transition from urban to rural areas and benefits recreation and tourism.
3. **Map existing and future floodplains utilizing best available data, models, and results from vulnerability assessments.** The flood hazards map can become an overlay to the physical plan, showing river channels, watercourses, approximate extent of the flood waters, and expected flood elevations. Estimate historical flood elevations using local knowledge and other data and consider future changes in rain fall intensity and increased development of urban areas.
4. **Set aside areas for future relocation of families and businesses.** Relocate structures at high risk of flood, or those damaged by disaster. Pre-planned and pre-built urban development with houses and associated services provide an incentive for families to relocate.
5. **Establish a tourism corridor** to provide uniform promotion, signage and maintenance of communities, landscapes, cultural and heritage sites that have tourism value. Prepare plans for development and support services that support District goals to promote the tourism industry. Train local residents to work as guides for tourists, ensuring some local income and promoting interest in natural and cultural assets.
6. **Improve and extend road system to connect with adjoining communities.** The "ring road" approach would mark a clear transition from urban to rural where services, densities and land uses are different. Design adequate storm water drainage adjacent to the roads to reduce flooding.

Objective 2 - Shoreline protection that supports long term safety and security of waterfront activities

7. **Designate a limited man-made shoreline area, with adequate shoreline defenses.** Assess condition of current shoreline and defense systems to determine their level of effectiveness to reduce flooding and long term shoreline recession. Upgraded or new structures shall be designed and constructed with engineering standards; consider the need to maintain access for water dependent uses; and reduce impact (erosion, wave damage) to adjacent beaches and properties.
8. **Designate water-dependent areas in the coastal strip.** Prioritize and promote uses that must rely on the sea (water dependent uses) for the water front. These include fishing, swimming, and boat repair. Design of these areas ensures safety to humans and property and respects flood hazards from the land and the sea and long term shoreline erosion.
9. **Manage and improve developed areas in flood prone areas to reduce damage to life and property.** Upgrade or reconstruct structures so they are elevated above flood water levels. Safe heights can be established from local knowledge or maps. If existing structures are highly damaged by flood, encourage residents to relocate away from floodplain.

Objective 3 – Wastewater management and shoreline sanitation improvements that enhance health of residents and ecosystems

10. **Upgrade and maintain concrete storm drain channels to accommodate heavy rains and floods**. Use national design standards to construct drainage and reduce flooding of adjacent urban areas. Plan for maintenance of these channels, including programs to keep them free of solid waste. This could include sensitization of residents on how to identify and useother areas for solid waste disposal and household wastewater.
11. **Designate areas for landfill and establish waste management systems.** Locate disposal sites outside of areas which are vulnerable to floods, with a minimum 90 m buffer to water and streams.* Where feasible, locate outside the coastal zone. Support income generating programs for plastic recycling and collection.
12. **Design and manage sanitation for fishing activities** to reduce pollution to the sea and improve product quality. Identify and carry out programs to ensure that fish handling area and cleaning stations are sanitary. Identify options for clean potable water including piping in or installing water tanks (filled by rain water or tank truck). Explore fish waste disposal opportunities that benefit others, such as composting waste for fertilizer or using it as feed for animals.

** see National Riparian Buffer policy for more information*