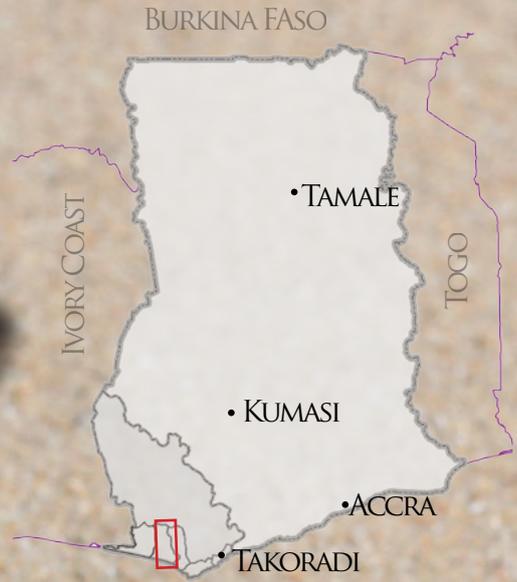




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FROM THE AMERICAN PEOPLE

# Ellembelle



Integrated Coastal and Fisheries Governance Initiative

# Integrated Coastal Management Toolkit

**Hɛn Mpoano**



This publication is available electronically on the Coastal Resources Center's website at <http://www.crc.uri.edu>.

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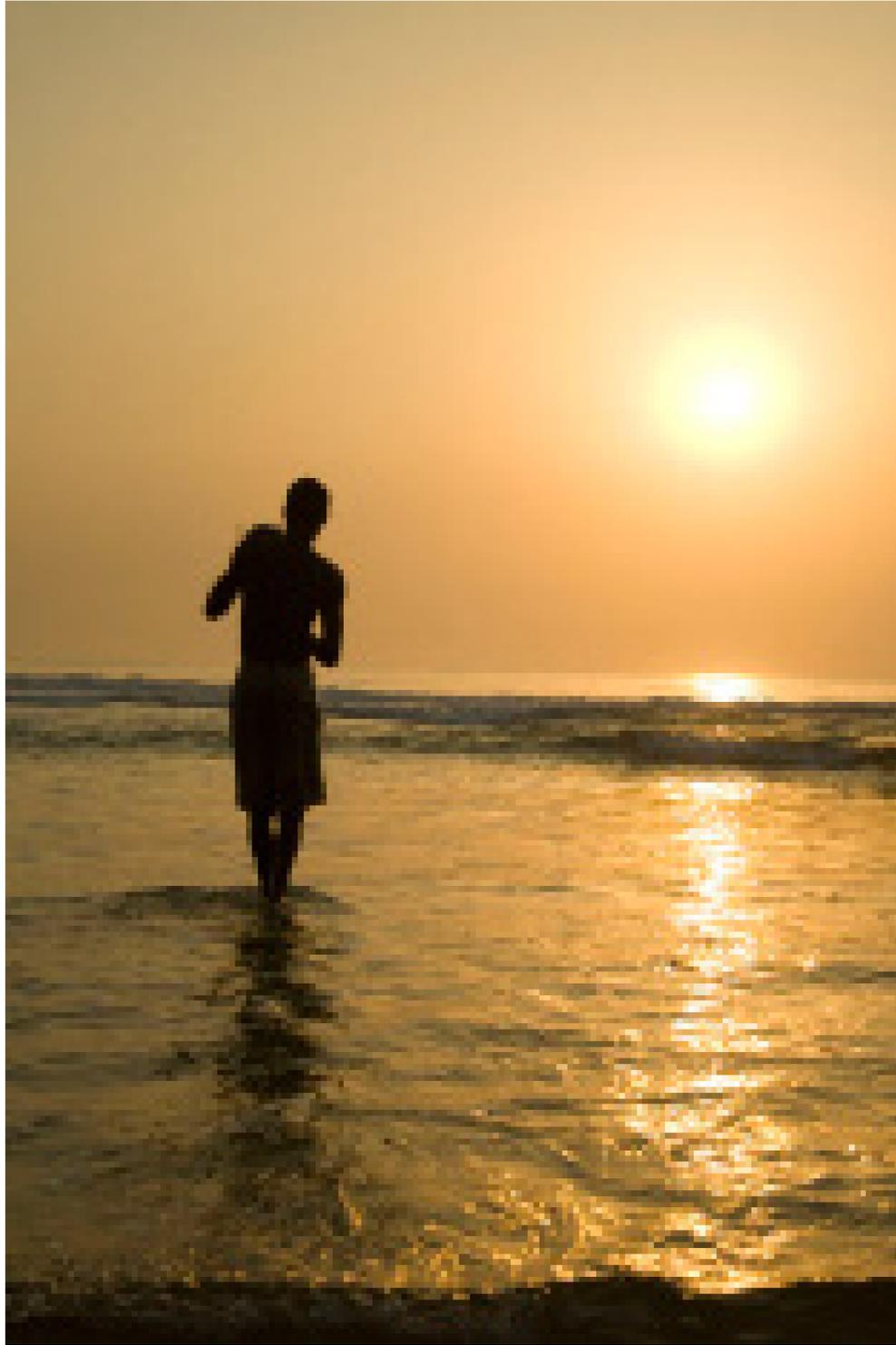
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Cover photo: Turtle, Ellebelle District  
Photo credit: Lucia Rybarova

## 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 Sustainamatrix 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, traditional authorities and private companies 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 Daniel K. Eshun, District Chief Executive of the Ellembelle District Assembly

The District Assembly has been working with the Coastal Resources Center on the Hen Mpoano Initiative since the beginning in 2009 and has come to cherish the collaborative programmes developed to strengthen coastal planning and management in the district. This toolkit, which is one of the many legacies of the Hen Mpoano Initiative has come at a time when innovative and creative tools are needed to address the new challenges that confront coastal communities and ecosystems in our district and the Western Region as a whole. I commend the Coastal Resources Center and partners for their leadership role in the production of this material.

The toolkit expands our knowledge on coastal ecosystems and their functions and provides us with practical guidance that complements other efforts being carried out by the government to counter and avoid all the potentially destructive and harmful challenges faced by the coast. It shows how the coast may become a place of pride, harmony and abundance, based on the rich resources that have been enjoyed by its people for centuries past, while welcoming the incredible technologies of the 21st century which are now well among us. It is our believe that planning and development decision making in the coast will be significantly enhanced through the application of the information in the toolkit.

I hereby recommend this toolkit for all stakeholders whose activities impact the coastal zone in one way or the other.

CHIEF EXECUTIVE,  
ELLEMBELLE 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 Resource 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 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 Ellembelle District Collaboration

This Toolkit is the final output, for Ellembelle District, of the Integrated Coastal and Fisheries Governance (ICFG) initiative, which has become locally referred to as H&N 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 Ellembelle 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 in Ellembelle District.
- It provides easy-to-follow links to the source material, more detailed technical information.
- To suggest "Projects" for incorporating Integrated Coastal Management in the planning processes and practices of the District Assembly.

## Contents of the Toolkit

Section

**ONE: The Coastal Zone and Development Context**

**TWO: Integrated Coastal Management**

**THREE: Ellembelle District Coastal Profile and Development Issues**

**FOUR: Integrated Coastal Management Institutions and Processes**

**FIVE: Bibliography of Documents and Maps produced by the Integrated Coastal and Fisheries Governance Programme**

**SIX: Best Management Practices**

Section one:

# The Coastal Zone and Development Context

 Bibliography listed in section five.

 Project proposed to be implemented. Refer to pages 42-44 for more information.

 Examples of Best Management Practices in coastal communities

## Legend

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

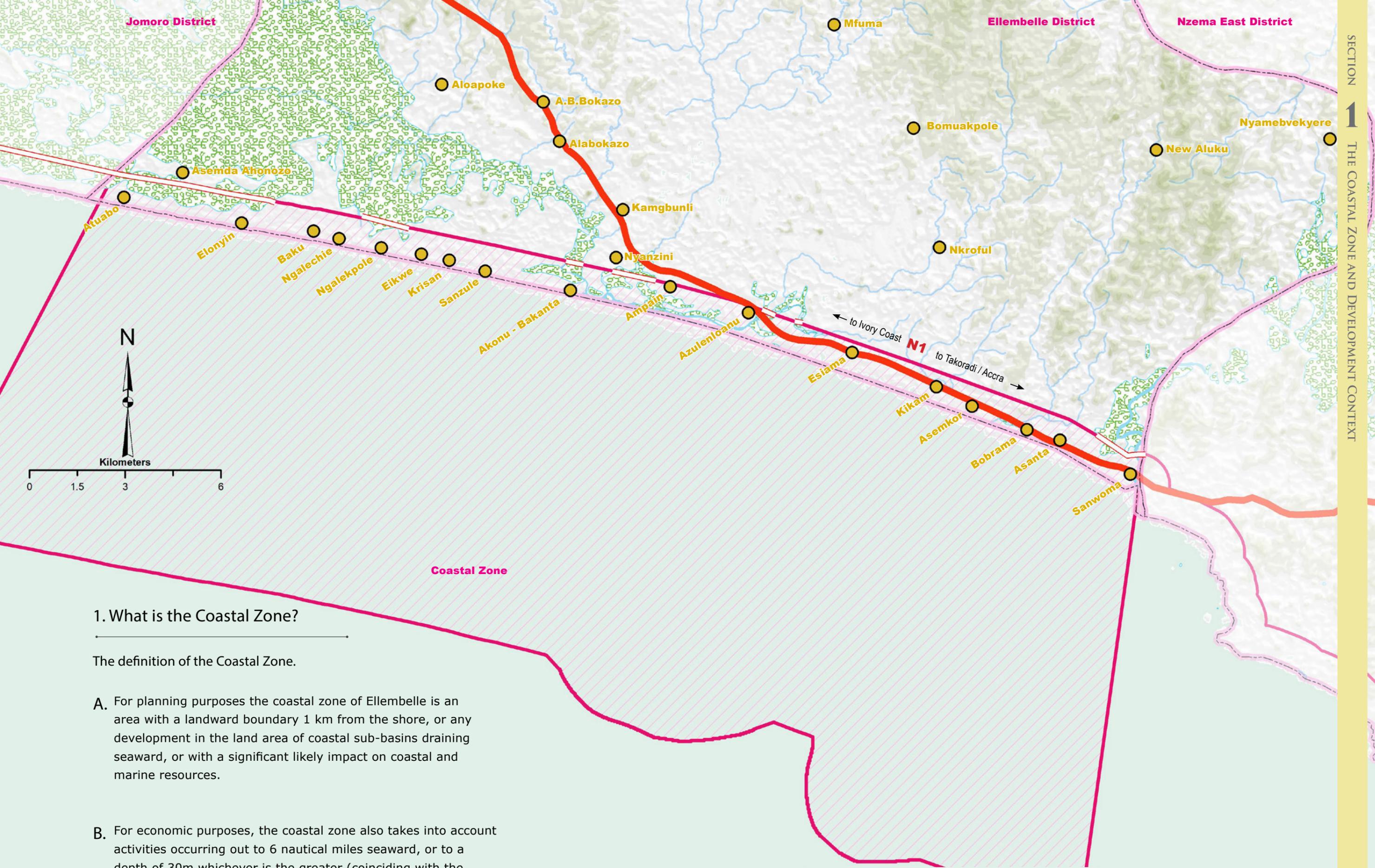
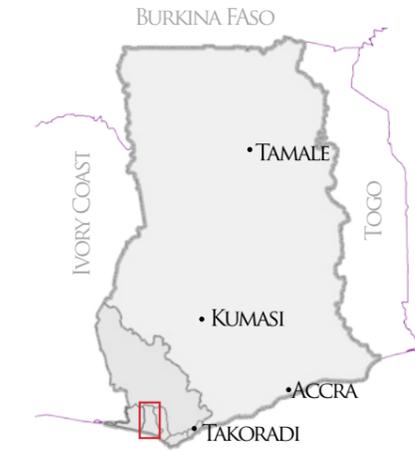
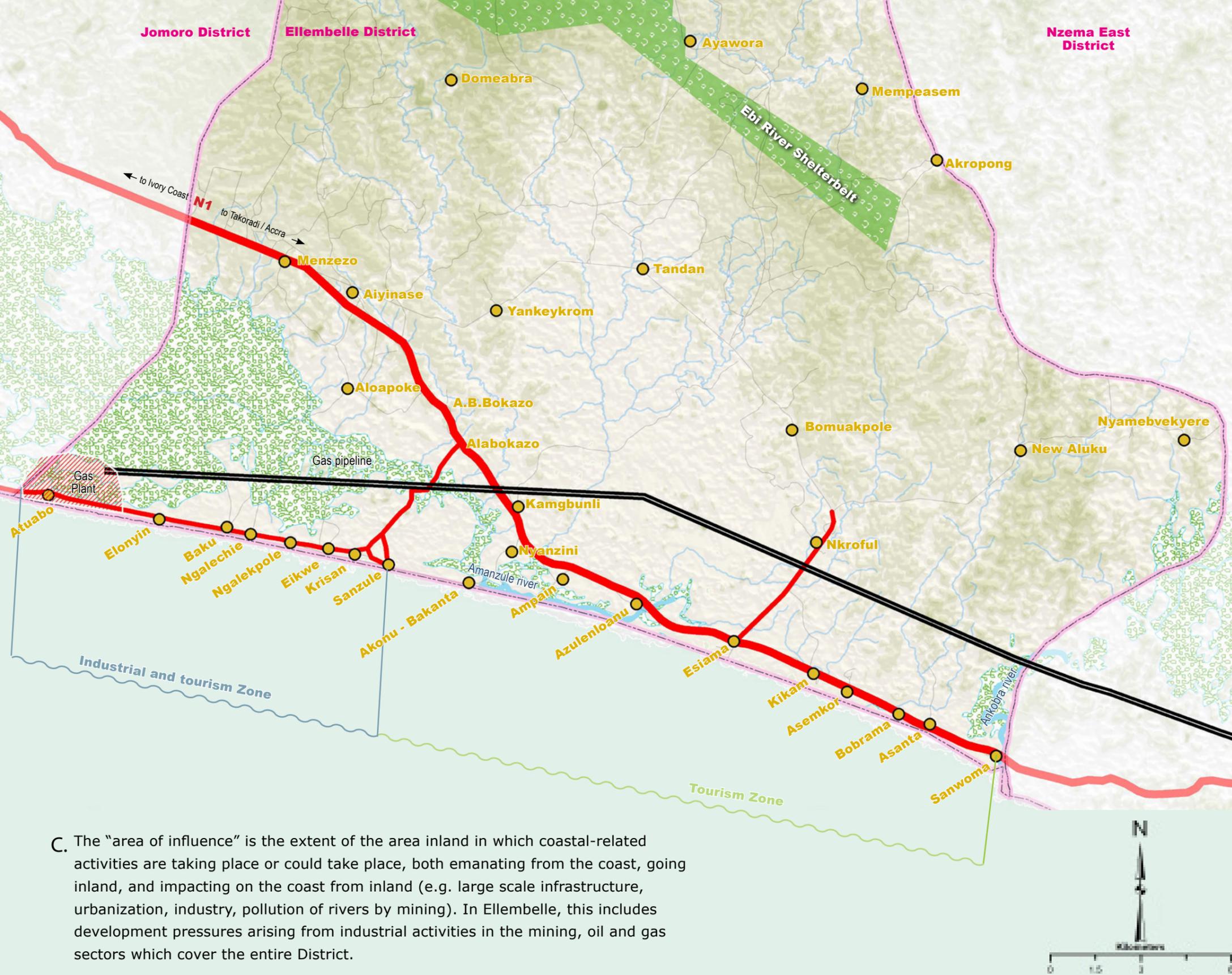


Figure 1:  
The Coastal Zone of Ellembele District  
Source: CRC Ghana

1. What is the Coastal Zone?

The definition of the Coastal Zone.

- A. For planning purposes the coastal zone of Ellembele is an area with a landward boundary 1 km 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 greater (coinciding with the fishing grounds of the artisanal fishing fleet).



### 1.2 Area of influence: socio-economic context

Ellembelle coastal zone stretches between the Ankobra river, to the east, and a point about halfway between the two main Nzema paramunicipalities at Beyin and Atuabo, to the west. An extensive part of the Greater Amanzule wetland is shared with Jomoro District to the west side. The main N1 West African Coastal Highway comes in from the west, skirting this, and rejoins the coast at Esiama, continuing then along the coast towards Axim.

The agricultural activities back from the immediate coastal zone are hampered by the wetland; there were many coconut plantations but these have declined over the past eighty years due to the Cape Saint Paul Wilt disease. The recent big influences are: the major gold mines being developed by Endeavour to the middle east of the district; the construction of a gas processing plant near Atuabo with its supply pipeline to Shama District, east of Takoradi Sekondi; the proposal for an Oil Services Terminal at Atuabo with a 2km breakwater which would have a major effect on the coast; and other gas processing and related industrial sites between Atuabo and Sanzule. All of this activity is impacting strongly on coastal communities such as Esiama and inland at Aiyinase which has been designated as a major regional growth pole.

C. 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 Ellembelle, this includes development pressures arising from industrial activities in the mining, oil and gas sectors which cover the entire District.

D. 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 3).

Figure 2: Regional and district maps showing factors in sphere of influence.



Figure 3:  
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.

Section  
two:

## Integrated Coastal Management - why, what and how?



## 2.1 Why?

The coast of Ellembelle District surely represents its most distinctive feature, and the one which gives its greatest competitive advantage. But the development opportunities need to respect the right of communities, which have lived here for centuries past, to also continue to enjoy a prosperous and harmonious life. All will have to meet the ongoing socio-economic challenges exacerbated by climate change and coastal erosion. Those inland, within the District, are also highly dependent on the health and well-being of the coast.



### RI: 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 Hen 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 Ellembelle District is undergoing rapid transformation due to activities of a fast growing oil and gas industry. A balance must be found between development and the flow of coastal ecological goods and services. 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 ("green belt areas") which have been identified, while encouraging economic development.

The Rapid Assessment of Communities in Ellembelle showed the following key points:

- 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 coastline for development of residential, leisure and hospitality. This, coupled with the huge area which is taken up by wetlands creates strong competition for the space available for fishing and for subsistence agriculture. These are generating concerns for more effective land use and spatial planning that addresses existing vulnerability.

- Fisheries decline: Bad fishing practices coupled with the regular incidence of algal bloom in the marine environment is resulting in dwindling fish catch and displacing fishery-based livelihoods and threatening food security. This problem is aggravated by the prevailing low agricultural productivity in the district.
- Coastal Eco-Systems threatened: Incidence of sand winning and sea erosion, destruction of mangroves, wetlands, drainage systems and sedimentation of major rivers.
- Other concerns: community perception of inadequate government representation and attention; low community participation in resource allocation decision making, chieftaincy disputes; poor road access/ infrastructure; inadequate Primary and Junior High school educational infrastructure, electricity, pipe-borne water, 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. The following core elements of Integrated Coastal Management strategy could possibly be sanctioned by the district, by forming a Marine and Coastal Management Committee such as has been done at Ahanta West and Shama, to drive Management Strategy. Alternatively the remit of the Amanzule Working Group could be expanded to include implementation of such a strategy of which the core elements are:

- Preservation and restoration of important coastal habitat and features that are critical to sustaining the fishing industry.
- Expanding Community Resource Management Areas (CREMAs) in existing conservation management clusters to cover other important coastal wetland areas and features.
- 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/against threats from hazards and climate change including extreme weather, rising sea levels and coastal erosion.
- Sustained stakeholder engagement 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 implementing 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. Strategic Environmental Assessment which ensures that the necessary environmental protection measures are taken.

The formation and activities of the Amanzule Working Group is a first step at ensuring that the greater Amanzule wetlands, which are shared between Ellembelle and Jomoro districts, attain formal conservation status and is recognized in the spatial plans of both districts. The establishment of a District Coastal and Marine Committee could be a great step forward for implementing Integrated Coastal Management in Ellembelle. It could provide a necessary forum for integration across sectors such as fisheries, oil and gas, land use planning and 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 Resource 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 the 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.



**P1: Form Working Groups to deal with specific coastal issues, for example the Cape Three Points Working Group**

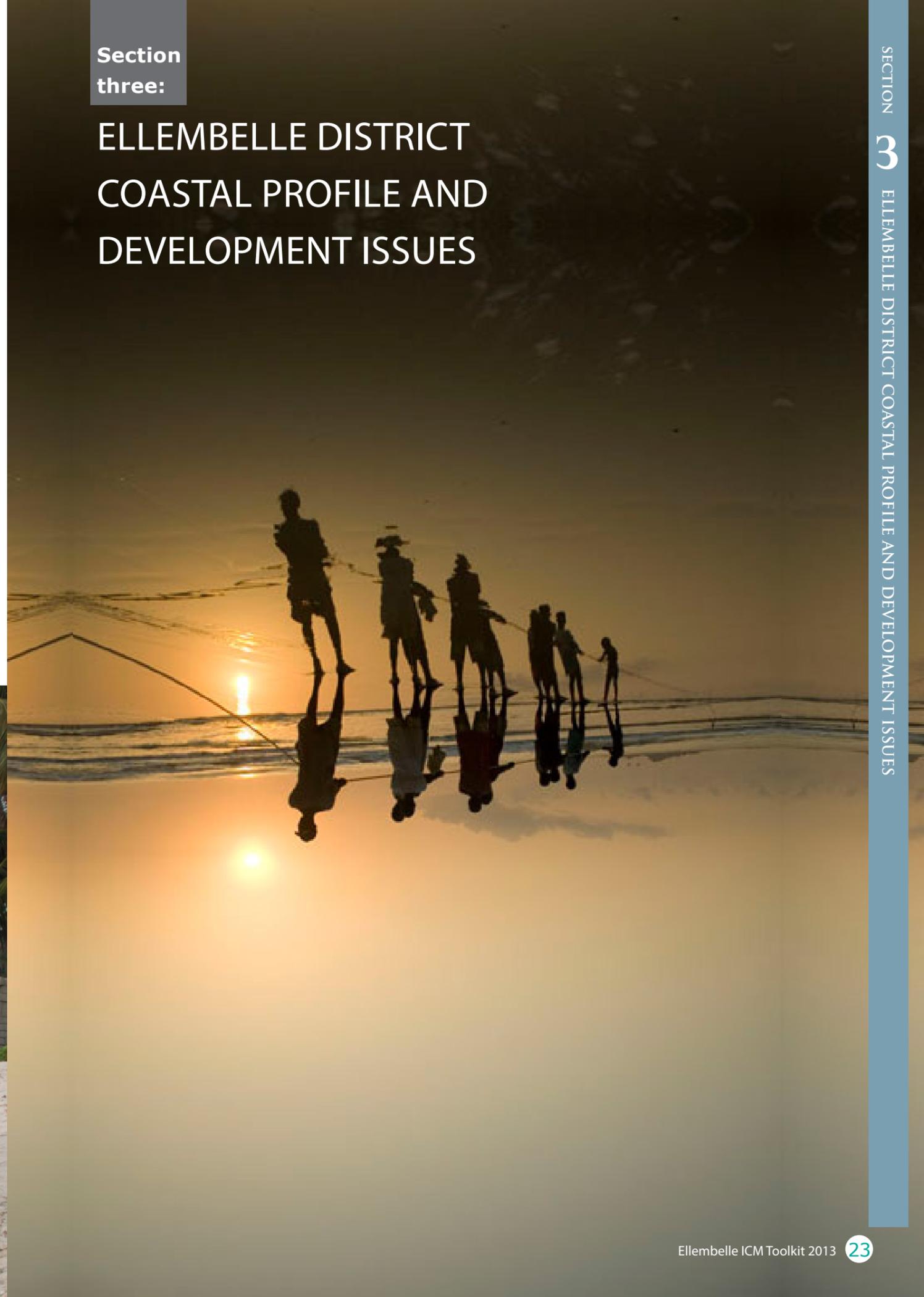
## 2.5 Opportunities to Implement Integrated Coastal Management

Use of the above physical and spatial planning processes and environmental assessment provides the foundation for Integrated Coastal Management. District Assemblies suffer from chronic underfunding, but many development partners (governments of the United States, Norway, France, Germany, Korea, Belgium, United Kingdom and others) are funding projects which provide essential parts of the process, including community linkages. The establishment of the Marine and Coastal Committee at Ahanta West District is a great step forward. These need to be made sustainable in the long term by improved 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, and national and international funds for infrastructure and investment.



### Section three:

## ELLEMBELLE DISTRICT COASTAL PROFILE AND DEVELOPMENT ISSUES



### 3.1 Characteristics of the Coastal Zone: overview

The Ellembelle District shoreline is relatively rural with a mix of land and water uses which underpin local cultures and livelihoods. The coast is characterized by gently sloped to generally flat sandy beaches patched with dune systems with elevation in most areas below 10 metres. The coast line is dotted with small fish landing sites and dense human settlements from Atuabo to Esiama which are hemmed between a receding shoreline and the vast Amanzule wetland. Sanwoma and Asanta are also "trapped" between a high embankment (on the NI Takoradi-Elubo highway) and the sea. Potentially, any massive flooding from the sea will pile up in the communities instead of rolling off onto the plains up north these communities. From Esiama eastwards up to the River Ankobra estuary, in places such as Bobrama, Asemkor and Kikam, one finds relatively high elevations which have hills to the northern portions of the community.

The coast between Anochie and Atuabo is being subjected to intense pressures as a result of the construction of a gas processing plant and pipeline, and further gas discoveries are likely to require more plants when exploited. The proposed Oil Services Terminal also at Atuabo will pose an additional challenge for the management of this stretch of coastal zone. This coast houses several highly impoverished fishing communities but has less landscape value.



#### R2: Adaptive Capacity for Resilient Coastal Communities: Climate Change and Natural Hazards Issues in Coastal Districts of Ghana's Western Region

In 2011 and 2012, Hen Mpoano assessed 77 Western Region coastal communities in the Districts of Jomoro, Ellembelle, Nzema East and Ahanta West to gain an understanding of their concerns and capacity. The findings indicated that adaptive capacity is limited in coastal communities. Some locations are faring better than others, but overall, coastal communities have weak ability to respond to emergencies generated by natural hazards, they suffer social and economic development challenges that are worsening, and they have a relatively low ability to manage coastal resources in a way that will ensure sustained productivity and environmental quality.

### 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.



#### R3: Nearshore Rocky Reefs of Western Ghana, West Africa: Baseline ecological research surveys.

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 Akatkyi, 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).

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



P2: Prepare Marine Spatial Plan  
P3: Continue with research on Algae Bloom leading to proposals for its management.

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

The coastal zone of Ellembelle is associated with wetlands, mangroves, lagoons, rivers and estuaries. Most of these resources are found to the west of Esiama, forming a network of natural areas which are a priority for conservation using Community Resource Management Area approaches. These ecosystems provide essential services and are also critical for maintaining a healthy fishery (see section 3.4.2 below).

Some of these ecosystems are already officially recognized and those that are of more local significance should also be differentiated.

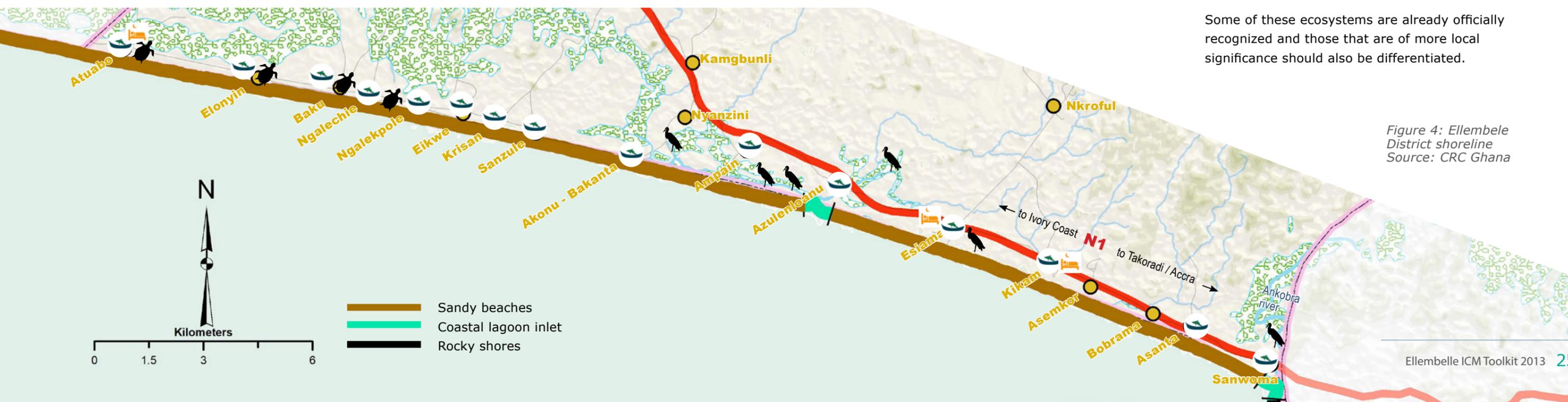


Figure 4: Ellembelle District shoreline  
Source: CRC Ghana



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

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.



**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 levels 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 (1). Erosion, sea level rise, and sand winning from the beach can all result in land loss and the inland movement of the shoreline. Coastal communities in the district are highly vulnerable to flooding and erosion since they are mostly hemmed between the wetlands to the immediate north and the sea to the south. Tidal waves regularly wash the communities whilst the lagoons also overflow into them periodically. In Sanwoma, the people experience floods on a weekly basis. Due to tidal waves, there was a massive flood and destruction of properties and houses in Bakanta in 2007. Despite this, the people continue to live there. In the case of Kikam and Anyanzinli however, sea erosion triggered the relocation from their former settlements, which are now in the sea, to their present



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



**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.



**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.

location. Besides the hazards posed to humans, sea erosion has resulted in the devastation of coconut plantations of several hectares in the district. Most stakeholders in the coastal communities perceive that sand winning, which is being carried out in some communities, contributes immensely to coastal erosion.

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.

### 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. From a hydrologic perspective, wetlands serve to dampen the effects of changing water levels, thereby providing protection from flooding. In the

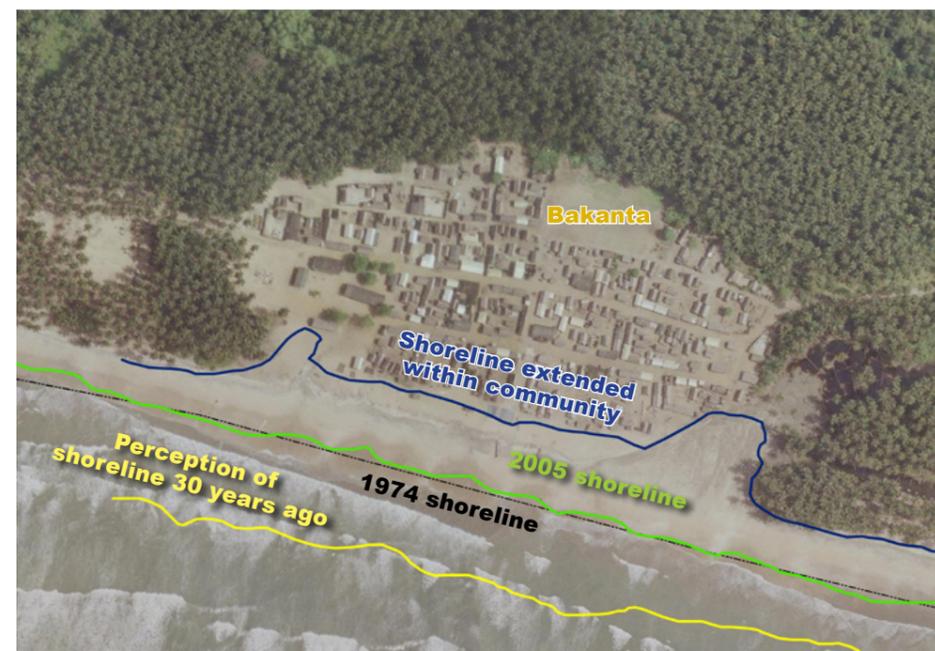


Figure 6: Community perception of coastal erosion - Bakanta.

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.

As wetlands in the district are inundated with mangroves and also serve as crocodile habitat, people since time immemorial have not considered such areas for farming activities. Mangrove wood is harvested for a variety of purposes, but this practice should be limited due to the damage to wetlands that overharvesting causes. Compared to other coastal districts in the Western region, Ellembele's wetlands are in good condition at the moment. This is due to limited intensity of development activities in the district. Mangroves are fairly intact due to the presence of conservation organizations in the local communities. However, oil and gas production and the associated development of infrastructure pose threats to these wetlands, and remediation/preservation works, and taking care over the boundaries between new development and the wetlands should be a condition of permitting for these(2).



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



**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**



**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 Ellembele 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: Assessment of Critical Coastal Habitats of the Western Region, Ghana**

This assessment of critical coastal habitats of the Western Region, Ghana ranks 20 coastal ecosystems and describes 10 of these in detail.

### 3.5 Vegetation, Flora, Tropical Foliage Forests, Wildlife

#### 3.5.1 Coastal Vegetation, farming, forest reserves.

The current majority land use in Ellemelle District is by the wetlands, subsistence farms, trees and forest. Of greatest significance in terms of carbon sequestration, freshwater supply, fish habitat and flood control is the Amanzule wetland which straddles Ellemelle, Jomoro and Nzema East and extends to the border with neighboring Côte d' Ivoire. Even with its close proximity to the coast, this wetland is largely a freshwater system. This ecosystem is comprised of several wetland categories including swamp and mangrove forests and holds Ghana's only known swamp forest and the country's largest intact swamp forest. A baseline land cover for the Amanzule area (see fig 7) has been defined to assist in change detection and analysis going forward.

Carbon sequestration capacities in Figure 8 illustrate the extent of different types of use because they broadly equate with urban areas (crimson); farm crop areas (yellow); tree cover including oil palm (light green), rubber and forest (dark green).

Coastal communities combine farming and fishing for their livelihoods, with a mixture of cash and subsistence food crops. Their farming has suffered from the severe decline of the formerly prosperous

coconut crop through Cape St Paul Wilt disease which slowly spread throughout the coast from 1932. This fed lucrative pig farming and coconut oil production. This has added to the pressure on livelihoods from declining fish stocks. Subsistence food crop areas suffer from over exploitation and subdivision among increasing number of family members.

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 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 which areas are suitable 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" will be a useful development planning tool for the District.

**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.**

Figure 7: Land cover classification for Amanzule wetland.

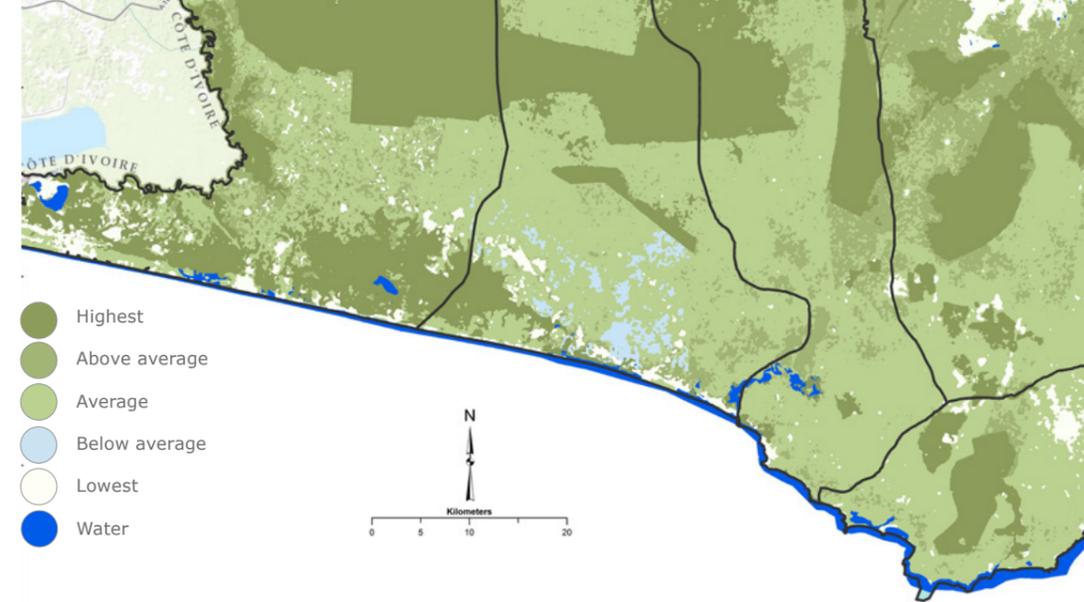
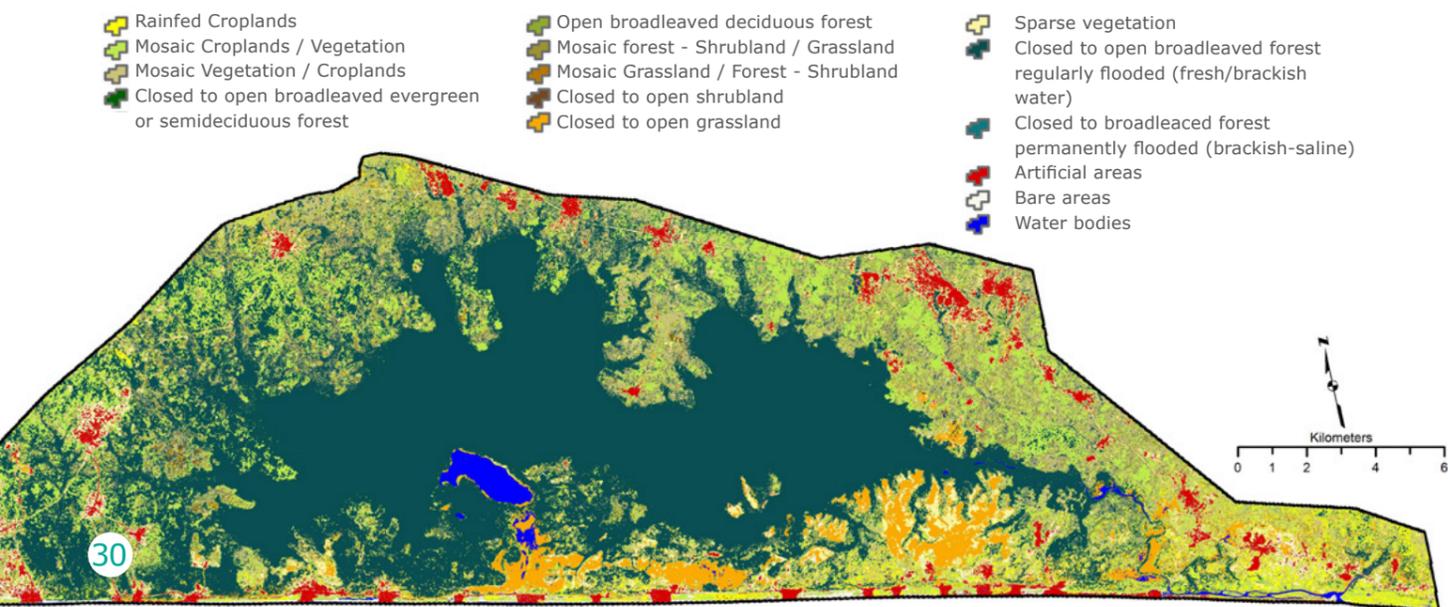


Figure 8: Satellite image of western part of Region, showing capacity of land cover to sequester carbon. Source: University of Rhode Island

**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.



## 3.6 Settlements, Spatial Analysis, Siting of Infrastructure

### 3.6.1 Growth of the Coastal and Fishing Settlements

The population of coastal settlements continues to increase strongly through natural growth from uncontrolled births, teenage pregnancy and high in-migration of fisher folks (4). The coastal communities experience an influx of itinerant boats and fishermen, particularly during the high fishing seasons between July and September.

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. Examples of the scale of urbanization can be seen in the scale of development which is emerging in Dixcove (see Dixcove case study)

### 3.6.2 Cultural context and traditions in Coastal Communities

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.

Nzema is the main ethnic group as well as the major language spoken in the district. The Kundum festival is a major unifying force because it brings together families and people from in and outside the District. During this festive occasion, citizens contribute financial and material and other resources towards development projects. The traditional authorities (chiefs and elders) are the land owners whose office and scope of authority go back into hundreds of years in history. They are also the custodians of the people's culture with the Omanhene - 'king of the nation' as the head. His authority is derived from the support and allegiance from his elders and people. The Ellembele District has one paramount chief with his palace at Atuabo.



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



**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. Where most land is not registered, there are frequent conflicts over its ownership. 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 dispossessed of their land by development. The land agencies currently operate as separate institutions. By resolving this element, the implementation of integrated coastal management will become easier.



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

### 3.6.4 Spatial Analysis: Coastal Settlements in Ellembele

There are 22 communities in the district on the coast. The most populated areas in the District are on the N1 highway leading west from Takoradi via Axim. The principal coastal settlements are, from east to west, Sanwoma, Asanta, Bobrama, Asemkor, Kikam, Esiana, Azulenoanu, Ampain, Anyanzinli, Akonu-Bakanta, Sanzule, Krisan, Eikwe, Ngalekpole, Ngalechie, Baku, Elonyin and Atuabo.

While a Structure Plan for the Atuabo area has been completed, that of Esiana and the area east of it which will be highly impacted by the energy-related enclave is urgently needed.

Working with the community at Dixcove in Ahanta West, for example, it quickly became apparent that the area of displacement and resettlement that had to be resolved with the existing fishing and farming community was only a small part of the area which is becoming earmarked for development. Dixcove and Busua are likely to become merged with Butre in the foreseeable future in one large conurbation. This expansion and merging of communities, particularly along the coast, may well create a coastal urban corridor in Ellembele which requires careful planning.

In order for this 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 the larger urban area which includes the existing area. This should easily be able to be financed by new investors if the planning and permitting process aims for high quality, high values and negotiates sharing of improved land values.

The input of major capital investment into leisure and other activities is exemplified by proposals for Princes Town, another example from Ahanta West, involving a high quality hotel, residential and golf course development around the lagoon and adjacent to the historic fort and fishing community. The issues arising from this are typical of any regeneration/investment project on this scale in the coastal zone. The points of integrated coastal management of such a project are noted in Princes Town Case Study.



Case study

**Good Management Practices to Support Manage Large-Scale Leisure Development to Benefit the Community, the Private Investor and the Ecosystem: Princes Town 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 Structure Plans and Local Plans for the industrial-tourism zone from Atuabo to Sanzule, and the coastal corridor from Esiana to Sanwoma.**

**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 any major leisure developments equivalent to that which is being proposed for Princes Town.**

### 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.

### 3.6.6 Social issues, water, waste, and sanitation

The improvement of water supply, collection and final disposal of waste are matters that affect the health and quality of life of all coastal residents in the district. Streams and small rivers which serve many communities are the traditional sources of water for drinking and domestic use. Most communities also rely on boreholes and wells for their water. As these become polluted and demands on them increase, the need for investment in protection and new supplies arises. Added to community needs are those of the major industrial and tourism and leisure projects. 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. At the moment there is no large scale water system for industrial use in the district. There are plans for future treatment plant on the Ankobra river. This river, however, is being polluted by the activities of illegal miners upstream.

Shoreline sanitation, especially at the densely populated fishing communities, requires more attention due to the implications on hygienic handling and processing of fish. It is common to find disposed fecal matter washed ashore directly to the fish landing sites and the beaches, contaminating the fish that is harvested. Efforts made by Zoomlion and Zoil have produced no significant change in the sanitation condition. Improving sanitary services in the coastal communities is necessary for the following reasons:

1. Eliminate the causative agents of those water and excreta-related diseases.
2. Convert waste into readily re-usable resources and so conserve both water and nutrients.
3. Prevent the pollution of any body of water

4. To reduce organic pollution of water for drinking and other domestic purposes
5. Safeguard aquatic life and maintain a healthy ecology of surrounding communities.
6. Increase tourist visitation to the coastlines.



**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

Agriculture accounts for 65% of the economic activities in the District. This includes crop farming, fishing (artisanal fishing), livestock and agro-processing. The rest of the population are in the buying and selling business and also in the public sector. Since the discovery of oil and gas and subsequent production, other elements of the economy such as tourism, hospitality and auxiliary services are increasing. Declining community livelihoods have been a major issue over the years, contributing to slow economic growth and rising poverty. Human Resource capacity development through improving the educational system as well as adult training for coastal communities will be essential if they are to diversify into new occupations and not to become more marginalized slums. Out migration of the youth for menial jobs in bigger towns like Abidjan, Takoradi, Sekondi, Tarkwa and others, which weakens communities in the long term, is on the increase.

Industry and associated services, incoming residential, tourism, and leisure and services



**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.**



**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

developments will increasingly be the basis of the economy and employment. But coastal communities can carry their existing fishing and farming activities through improving fish and agricultural value chains and development of associated small and medium scale enterprises that attract youth into agriculture.

### 3.7.2 Agriculture

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 fishi Farming in the district is both subsistence and commercial, but land for farming in the coastal zone is scarce. As wetlands in the district are inundated with mangroves and also serve as crocodile habitat, communities/ people since time immemorial have not considered such areas for farming activities. The major crops cultivated are maize, cassava, plantain, rice and other staples. Vegetables such as garden eggs, pepper and tomatoes are also cultivated. Coconut, oil-palm and cocoa are grown on mainly commercial scales.

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.

### 3.7.3 Fishing

Fishing activities occur in about 28 fish landing sites dotting the coast of Ellembele district. Fish landings have declined over the last 15-20 years, attributable in the first instance to simple increase in population leading to over-fishing. But more damaging methods have been used to catch up, such as light fishing, use of monofilament nets, dynamite, carbide, pair trawling and fishing with obnoxious substances. Illegal practices result in poor fish quality, with fishmongers and processors in particular expressing greater worry about the short shelf-life of processed fish. Added to this is the arrival of algae bloom which adversely affects artisanal marine fishing. Since 1993, marine algal blooms caused by the filamentous green alga *Enteromorpha flexuosa* - known locally as green-

**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**

green - have been occurring every year (December-February) from Newtown to Ankobra Estuary. It has also been reported in the rivers and wetlands of the Amanzule at Bakanta and Ankobra at Sanwoma respectively. The dramatic decline in fisheries can be reversed through significant reductions in fishing effort, best decided by co-management institutions including community-based. Management of pelagic, demersal and those small scale fish stocks found in estuaries, lagoons, rivers, lakes and near-shore marine areas will require different co-management approaches with expressions at the national, regional and community scales respectively.



#### 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 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. Fresh Approaches for promoting compliance and enforcement.

The Hen Mpoano Initiative discussed with the Fisheries Commission and the Ghana Police Service (GPS) 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 Police Officers 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: 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.

### 3.7.4 Industry and related services

The major projects are the Ghana Gas Company's 1bn USD processing plant between Atuabo and Anochie, with its pipelines, and the Oil Services Terminal at Atuabo. Further gas processing for the nearby oil field is also being planned. Such 'rapidly assembled developments' need to take due cognizance of the ecosystem goods and services and harmonize with existing livelihoods. The District Assembly has benefitted from support of the Jubilee Partners and the Norwegian Government under the "Oil for Development Programme" to carry out a Spatial Development Framework for the District, and Structure Plans and Local Plans for some of the affected areas. This has been complemented by Hen Mpoano training of District Physical Planners at the GIS Hub at the Regional Coordinating Council. The key points that need to be considered in major facility



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

siting 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 as noted above. 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 in the 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, 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 Oil and Gas Specialist Harbour, the impact can only be fully understood

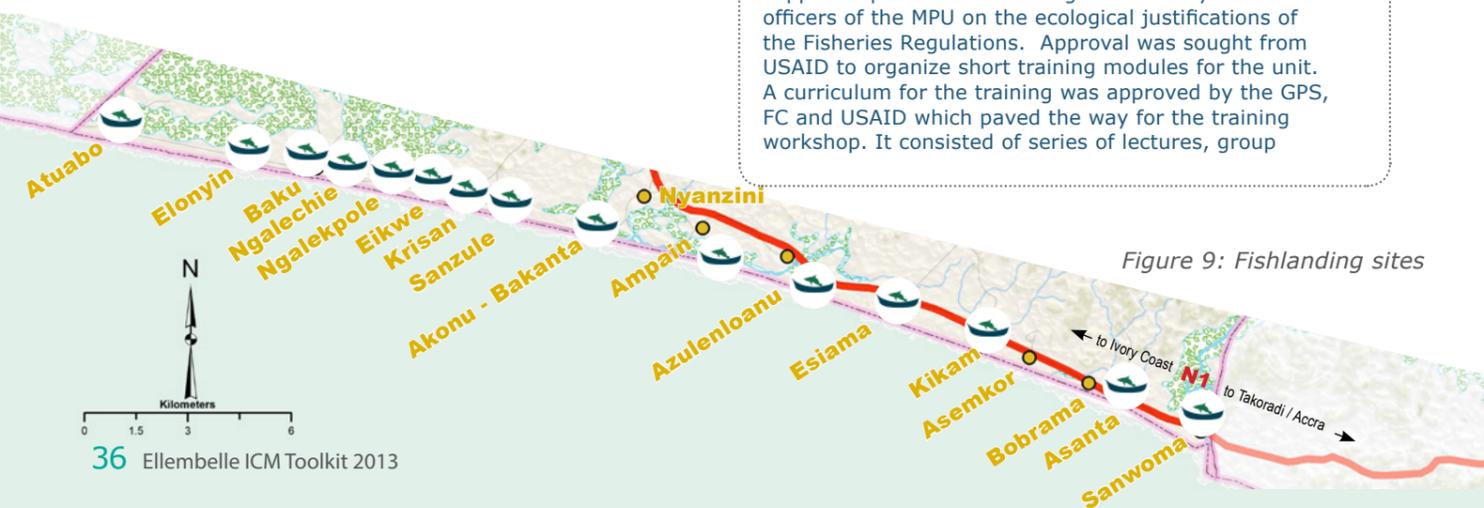


Figure 9: Fishlanding sites

and planned for at a sub-regional and even regional level, hence the need for joint planning across districts such as has been mentioned above

### 3.7.5 Tourism and Leisure

There are many places, which could draw tourists into the district if properly developed and packaged as attractions. There are beautiful sandy beaches, crocodile ponds, monkey sanctuaries and opportunities exist for canoe paddling, turtle and whales watching and hiking.

The Amanzule estuary in Ellebelle ("where two rivers meet") at Azuleloano is a transit point for migratory birds flying seasonally between Europe and its sister cold climate in the southern hemisphere. This is potentially a bird watchers paradise and should be raised to a good standard to meet the level of taste of a moderate clientele. Islands in the Amanzule lagoon between Akonu-Bakanta and Ampain which used to house settlements are of archaeological interest and are habitats for game like bushbuck and other endangered fauna.

Hen Mpoano has proposed creation of an ecological tourism area along the lines of Ankasa National Park to protect and develop these. The

establishment of such an area could develop ecotourism as a strong complementary asset to beach tourism. A partnership between the district assembly, the Wildlife Division, Ghana Wildlife Society and the resorts and hotels (notably Kikam Royal Beach Resort) to offer services in preserving natural ecological systems. New beach resorts under construction should be welcomed as partners in Integrated Coastal Management. Already plans are far advanced to construct hotel facilities at Anochie and Atuabo to cater for tourists coming to the area. There is one beach resort being developed between Sanzule and Ampain.

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 been described in above sections and other measures recommended in a recent report on Tourism (5) are pre-requisites for the tourism industry to take off and to become a desirable use of the coast in balance with other activities (6).



**P24: Prepare Structure Plans and Local Plans for the industrial-tourism zone from Atuabo to Sanzule and the coastal corridor from Esiam to Sanwoma.**

**P27: Ensure local monitoring/input to Environmental Impact Assessment process by a body such as a Coastal and Marine Committee.**

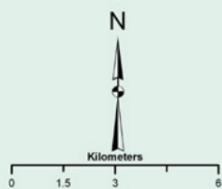


**P33: Support local festivals and educate/promote on retention of cultural identity of coastal and fishing communities**

**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.**



Tourism map

## 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 Ahanta West District, a pilot institutional mechanism was developed under the collaborative program with Hen Mpoano through the formation of, and the general assembly's endorsement of a special committee of the assembly known as the Marine and Coastal Management Committee (MCMC). This Committee has representation of Civil Society, Traditional Authorities, the Private Sector, and coastal communities. 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)



### 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 Planning 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.

for Joint Development Planning Area and associated Executive Instrument provides adequate institutional and legal framework for addressing specific challenges which faces two or more 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.	<p>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.</p> <p>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.</p>
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 Marine and Coastal Management Committee with representation by Civil Society, Traditional Authorities, the Private Sector, and Coastal Communities. This can be the vehicle for driving a strategy which can implement many of the proposals contained in this toolkit	<p>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 Coastal and Marine Committee has just been inaugurated and requires ongoing support to become effective.</p> <p>The Projects that have been identified which fit within the remit of this committee are noted in Table 2 below</p>
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	<p>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.</p> <p>The projects that have been identified which fit within the remit of this are noted in Table 2 below.</p> <p>In addition working across districts will assist with maintaining consistent policies for coastal management.</p>
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
<b>1.1 Sustainable use of coastal forests and wetlands</b>		
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
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	
<b>2.1 Develop a co-management framework for fisheries with explicit mandate for MMDAs and communities</b>		
P26: Develop co-management committees and management plans for small scale fish stocks adjacent nearshore marine areas.	X	X
<b>2.2 Promote fisheries development for food and livelihood security</b>		
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
<b>2.3 Improve access to coastal land for food crop farming</b>		
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	
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
<b>2.4 Create opportunities for generating wealth, jobs and diversified livelihoods from the oil and gas sector</b>		
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
<b>3.1 Designate areas for large facility siting in the coastal zone</b>		
P24: Prepare Structure Plans and Local Plans for the industrial-tourism zone from Atuabo to Sanzule and the coastal corridor from Esiama to Sanwoma.	X	
P27: Ensure local monitoring/input to Environmental Impact Assessment process by the Coastal and Marine Committee.	X	X
<b>3.2 Develop tourism and leisure potential of coastal areas</b>		
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 Greater Amanzule Wetlands.	X	X
P28: Continue and extend scheme to keep beaches clean to more remote beaches, and expand to include security measures for visitors	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
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 – e.g. whale watching, wildlife conservation and develop a sustainable eco-tourism development plan for the coastal zone.		
<b>4.1 Develop partnerships for waste management involving shorefront communities.</b>		
P20: Continue and extend coastal and shoreline waste management schemes	X	
<b>4.2 Improve access to water and sanitation facilities</b>		
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
<b>5.1 Reduce vulnerability of people, property and infrastructure to coastal hazards</b>		
P6: Increase collaboration with the Ministry of Water Resources, Works and Housing for regulating private development and installing publicly funded defenses.	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	X
P10: Prepare coherent shoreline management plans to regulate coastal land use.	X	
P16: Prepare Structure Plans and Local Plans for Esiama and areas west up to the Ankobra estuary.	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 major leisure developments similar to that at Princes Town.		
<b>Other Sections of the MTDF</b>		
P1: Form Working Groups to deal with specific coastal issues, for example the Greater Amanzule Working Group.	X	X
P33: Support local festivals and educate/promote retention of cultural identity of coastal and fishing communities.	X	X
P34: Work with Lands Commission at local level on land security and compensation.		

### 4.3 Regulation

The district's permitting and regulating 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 are the Community Resource Management Areas bye-laws that have been adopted and provided for expansion of these areas to include coastal wetlands in other districts. Ellebelle can also draw on examples from Shama District to formulate bye-laws for floodplain and shorefront management.

### 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. A Coastal and Marine Management Committee could 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 resource management. 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) Based on Boateng Isaac (2012) An Application of GIS and coastal geomorphology for large scale assessment of coastal erosion and management: a case study of Ghana.

(2) 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. 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 group of eco-tourism resorts is prominent in their joint initiative, as apparent at <http://www.ghanawestcoast.com/gwc/>

(6) 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.

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R21: Coastal Resources Center (2013). A Climate Change and Natural Hazards Vulnerability Assessment and Adaptation Plan for Akwidaa and Nzile Bay, Ahanta West District. Narragansett, RI: Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island. 23 pp.

### SECTION 3.6.6

R22: D'Agnes, L and Johnson, K. (2010). Opportunities for integrating family planning, health and nutrition interventions into coastal-fisheries governance agendas in Western Region, Ghana (2010) Trip report.

R23: Takyi, M. (2013). Facilitating Integrated Population Health Environment in Five Communities in the Shama District and Two Communities in the Ahanta West District: Achievements and Lessons Learned. Integrated Coastal and Fisheries Governance Initiative (ICFG) for the Western Region of Ghana. Coastal Resources Center of University of Rhode Island and Friends of the Nation. 33 Pages.

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: Asmah, G.B., Owusu, A., Kankam, S. (2013). Improving Livelihoods through Cleanliness in the Coastal Communities of the Western Region of Ghana: Achievements and Lessons Learned.

### SECTION 3.7.1

R26: Kruijssen F. and Asare C. (2013). Livelihoods and poverty reduction in coastal communities in the Western Region of Ghana: Analysis of livelihoods baseline data of the ICFG Program. Coastal Resources Center of University of Rhode Island and WorldFish. 44 pp.

R27: Gordon, A., Pulis, A. (2010) "Livelihood Diversification and fishing communities in Ghana's Western Region", WorldFish Center. USAID Integrated Coastal and Fisheries Governance Initiative for the Western Region, Ghana. 69pp.

### SECTION 3.7.3

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R31: Coastal Resources Center (2012) – Proceedings of the Marine Police Training Workshop on Fresh Approaches for Promoting Compliance and Enforcement in the Fisheries – 28th September to 4th October, 2012. Integrated Coastal and Fisheries Governance Initiative for the Western Region, Ghana.

R32: Mevuta, D. & Boachie-Yiadom, T. (2013), Joining Forces to Collaboratively Manage Ghana's Fisheries Resources; the role of a Fisheries Working Group, Friends of the Nation, USAID Integrated Coastal and Fisheries Governance Program for the Western Region of Ghana. 24pp.

R33: Finegold, C., Gordon, A., Mills, D., Curtis, L., Pulis, A. (2010) "Western Region Fisheries Sector Review", WorldFish Center. USAID Integrated Coastal and Fisheries Governance Initiative for the Western Region, Ghana. 84pp.

### SECTION 4.1

R34: Coastal Resources Center. (2013) Solving the Fisheries Crisis in Ghana: A Fresh Approach to Collaborative Fisheries Management. 2013. USAID-URI Integrated Coastal and Fisheries Governance (ICFG) Initiative. Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island. 20pp.

R35: Coastal Resources Center. (2012) A nested coastal and marine governance system. Issue Brief 1 in series Hen Mpoano: Our Coast, Our Future. Narragansett, RI: Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island.

R36: Coastal Resources Center. (2012) Managing our coastal wetlands: lessons from the Western Region. Issue Brief 2 in series Hen Mpoano: Our Coast, Our Future. Narragansett, RI: Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island.

## 5.2 List of data files

Theme	Feature	Description	Object	Source	Year
Coastal Resources	Beach Seine	Location of beach seine activities	Point	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	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	Reptiles and Lizards	Distribution of crocodiles, turtles and lizards along the coast	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
Boundary	Ellembelle District boundary	The boundary of Ellembelle district including the coastline.	Polygon	ICFG	2012
Boundary	Ellembelle District boundary (TCPD)	The boundary of Ellembelle district including the coastline.	Polygon	TCPD	2013
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 Ellembelle district.	Polygon	ICFG	2013
Focal Area Zone	Greater Cape Three Points Focal Area	Boundary of the Amanzule focal area.	Polygon	ICFG	2012
Hydrography	Water bodies	District-wide coastal water resource inventory	Polygon	EPA	2004
Hydrography	Coastal Wetlands	Water bodies, wetlands and adjoining ecosystems that promote aquatic life along the coastline of the district.	Polygon	EPA	2004
Hydrography	Rivers	River systems.	Line	ICFG	2010
Industrial	Industrial Development	Various industrial developments in the district.	Point	EPA	2004
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
Roads	Ellembelle Roads	Street center lines for the major transportation highways, roads, and streets.	Line	ICFG	2012
Settlement	Ellembelle Towns	Administrative names and the location of all the major settlements.	Point	ICFG	2012
Settlement	Ellembelle Coastal Towns	Names and locations of some selected coastal towns/communities in the district that fall within the Amanzule focal area.	Point	ICFG	2012
Vegetation	Forest Reserve	Forest Reserve.	Polygon	Forestry dpt.	
Vulnerability Assessment	Boreholes	Active and inactive sources for dugout water access	Point	ICFG	2013
Vulnerability Assessment	Flood Zones	Flood zones or areas that were constantly flooded.	Polygon	ICFG	2013
Vulnerability Assessment	Bridge	Location if bridges.	Point	ICFG	2013
Vulnerability Assessment	Previous Shoreline	The previous shoreline extent as mapped by community members.	Line	ICFG	2013
Vulnerability Assessment	Virtual Shoreline	The farthest extent of wave action as mapped by community members.	Line	ICFG	2013
Vulnerability Assessment	Community Assessment	Vulnerability assessment including socio-economic ranking and specific indicator values of all coastal communities.	Point	ICFG	2013
Land cover/Land use Imagery	Land use/Land cover Orthophotos	Land use / land cover from 2002 Landsat data Digital orthophotos of the coastal stretch of the district.	Raster	ICFG	2011
Imagery	Toposheets	Scanned topographic sheets of the district.	Raster	Survey dpt.	1986
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	District-wide 30-meter resolution DEM	Raster	ICFG	2011
Imagery	Landsat	30 meter resolution Landsat ETM data acquired from 2001 to 2002	Raster	ICFG	2011
Imagery	RapidEye	5 meter resolution RapidEye data captured in 2012-2013	Raster	ICFG	2011



Relocate vulnerable families to New Town, encouraged through providing homes, utilities and services

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

Establish a "no-build" buffer adjacent to lagoon, rivers and wetlands

Exclude permanent structures on undeveloped barrier beaches

Elevate and set back structures to reduce impacts of flooding and erosion

Minimize impacts to fishing businesses and assets

Develop programs to inform health, agriculture, and fisheries sectors on the impacts of climate change

Monitor beach and wetlands to understand changes and the implications for future

Map existing and future floodplains

Establish early warning system and disaster preparedness plans

Sea defenses should be the last option in dynamic beaches and inlet



# 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.**

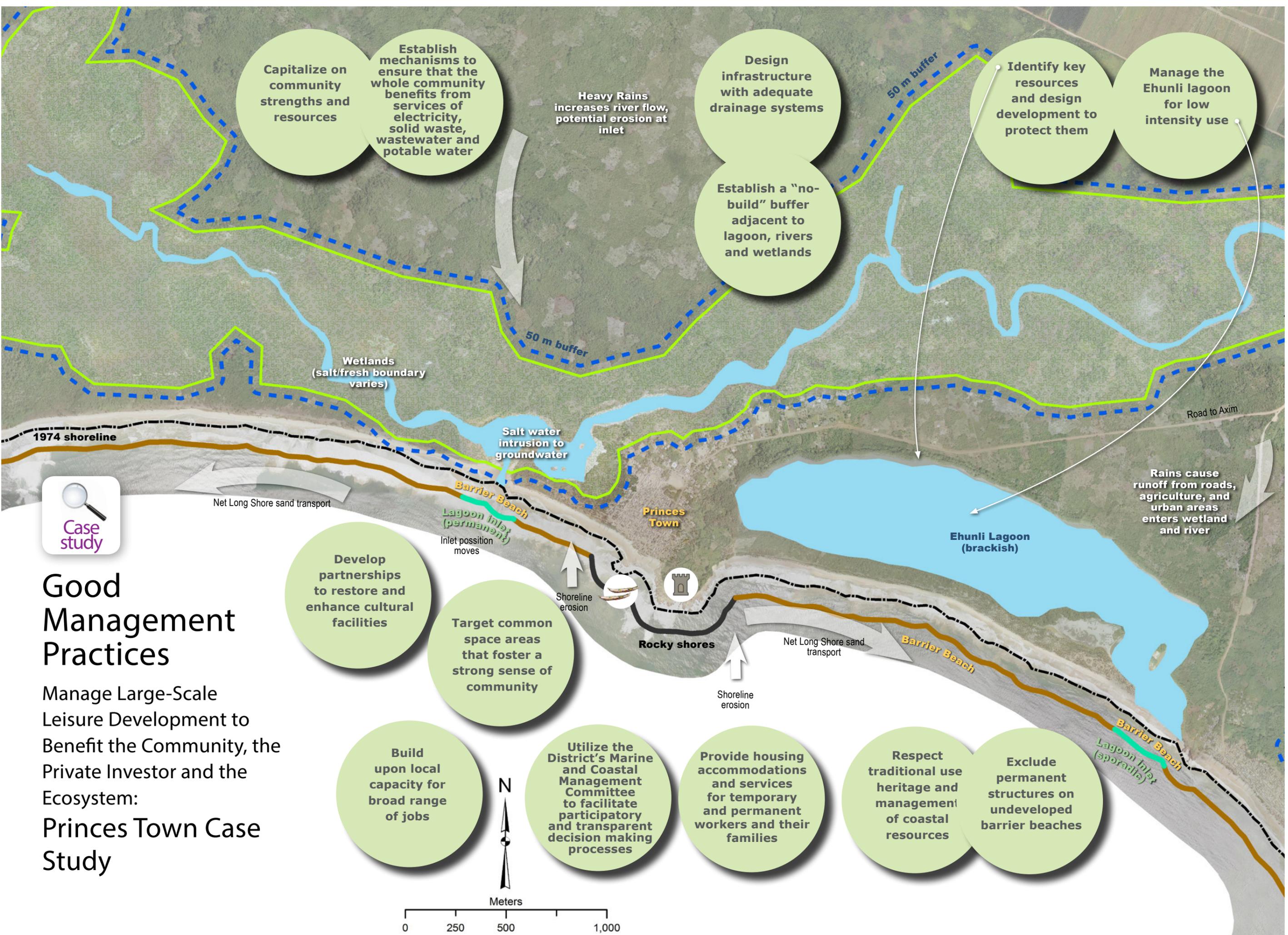
The dynamic processes of erosion and wave overwash keep the beach healthy. Temporary, low impact structures may be acceptable, but should be elevated to allow for beach movement. Sea defenses should be prohibited in these areas.

**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.



Capitalize on community strengths and resources

Establish mechanisms to ensure that the whole community benefits from services of electricity, solid waste, wastewater and potable water

Heavy Rains increases river flow, potential erosion at inlet

Design infrastructure with adequate drainage systems

Establish a "no-build" buffer adjacent to lagoon, rivers and wetlands

Identify key resources and design development to protect them

Manage the Ehunli lagoon for low intensity use

Develop partnerships to restore and enhance cultural facilities

Target common space areas that foster a strong sense of community

Build upon local capacity for broad range of jobs

Utilize the District's Marine and Coastal Management Committee to facilitate participatory and transparent decision making processes

Provide housing accommodations and services for temporary and permanent workers and their families

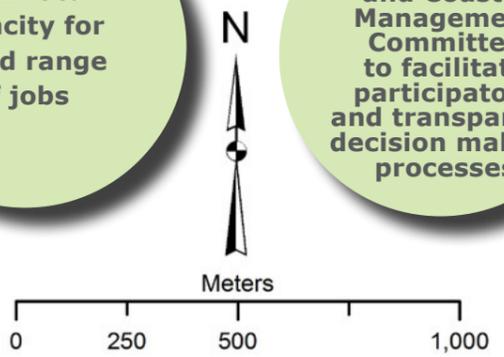
Respect traditional use heritage and management of coastal resources

Exclude permanent structures on undeveloped barrier beaches



# Good Management Practices

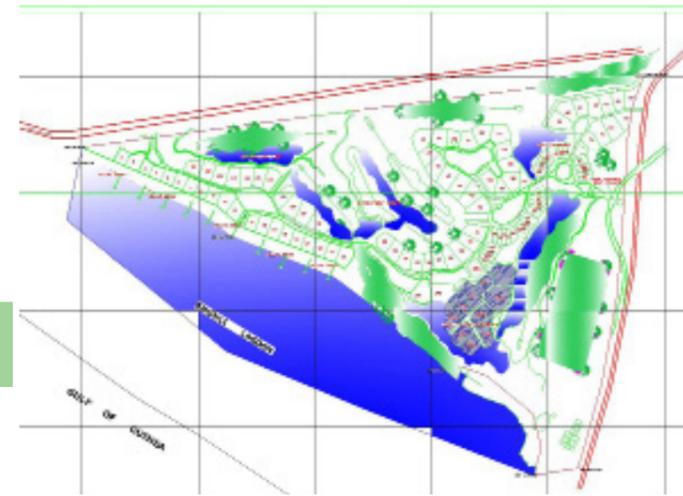
Manage Large-Scale Leisure Development to Benefit the Community, the Private Investor and the Ecosystem:  
Princes Town Case Study



## 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. **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. 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).

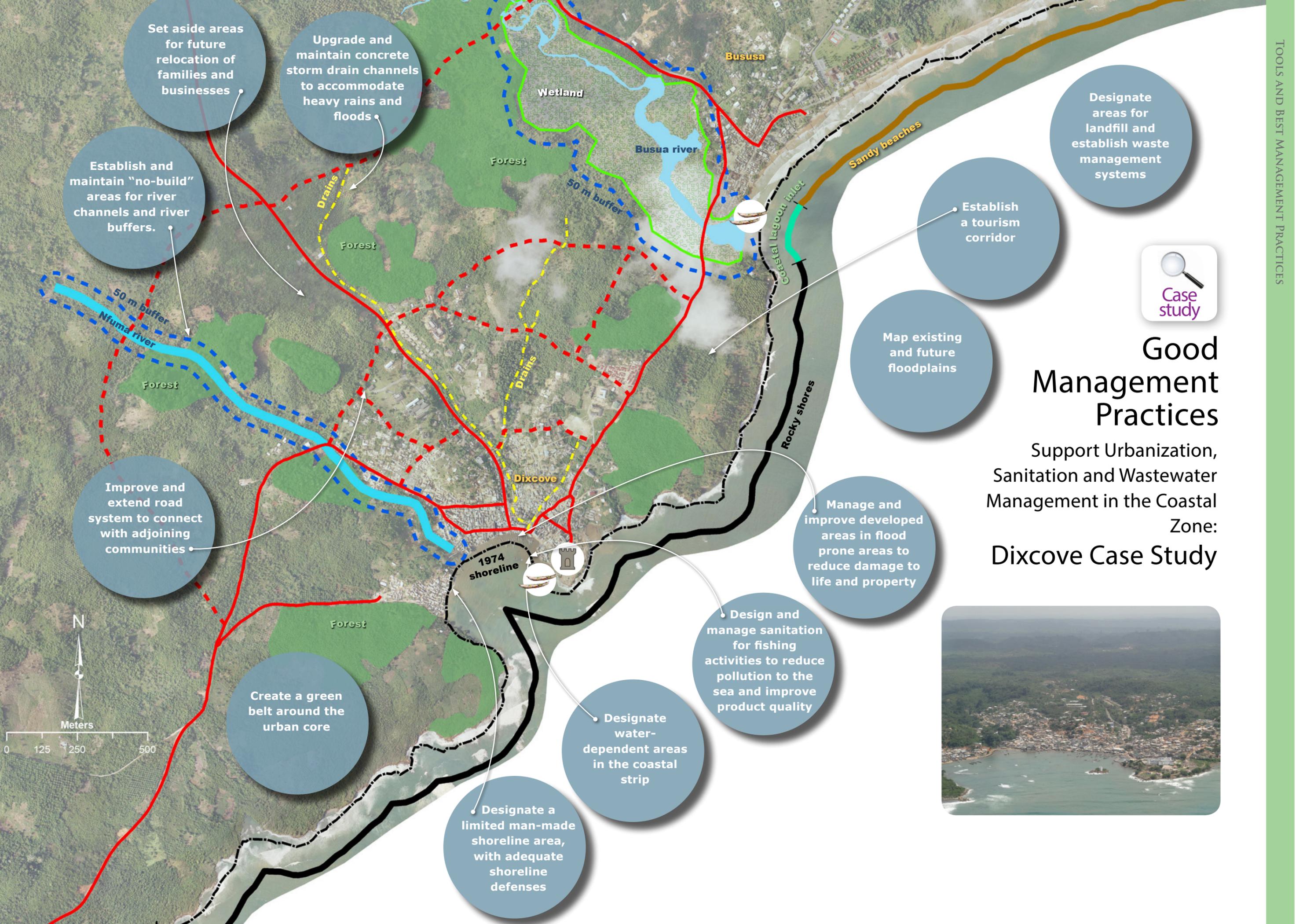
4. **Manage the Ehunli lagoon for low intensity use.** Identify areas for both traditional use and non-damaging new uses. Limit boating to vessels without motors. Minimize the number of piers and promote shared use of the water area to reduce disturbance of habitat.
5. **Identify key resources and design 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.



# Good Management Practices

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

## Dixcove Case Study



## 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 use other 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