

Living in the Coast Series 3

Living in the Coast
MEASURING QUALITY OF LIFE

**Government of the People's Republic of Bangladesh
Ministry of Water Resources
Water Resources Planning Organization (WARPO)**

**Living in the Coast
Measuring Quality Of Life**

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Living in the Coast
MEASURING QUALITY OF LIFE

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PDO-ICZMP project has initiated a series titled Living in the Coast to enhance knowledge base on communities, issues, development processes and dynamics of the coastal zone in Bangladesh. This document is the third in the series with focus on measuring tools for quality of life of the coastal dwellers - at the same time presenting a baseline situation.

Abu M Kamal Uddin has prepared the document. Other members who have reviewed and/or contributed to this document during long period of its drafting, are Rob Koudstaal, Danielle Hirsch and Dr. M. Rafiqul Islam. The research works have been pursued by Md. Sayed Iftekhar.

The document has been further improved through valuable comments and suggestions provided by the Knowledge Base Task Force members, PDO and WARPO professionals.

PREFACE

The coastal zone is ever dynamic and changes occur continually due to natural reasons, anthropogenic reasons and at the same time due to management interventions. What ever is the agent of changes have direct influence on the status and quality of coastal dweller's life and livelihood.

It is absolutely necessary to understand the development processes and dynamics in the coastal zone. Measurement of the conditions of the natural systems functionality, resource bases health, resources flow in one hand and at the same time access of the coastal dwellers to the services and resources are necessary to understand the well being of the coastal dwellers. This understanding is crucial to identify indicators that represent the coastal zone in a collective way.

This document is based on an analysis of existing data, information and experiences, including PDO working paper on indicator framework, indicators and indices used in PRSP, Bangladesh and a through review of indicators and indices used around the world. This document is intended to establish indicators of the coastal dwellers well being.

The document has been tried to keep short and simple. Planners and practitioners will find it convenient and useful in having a benchmark situation for reference.

Finally, this document has been used as a background document to support formulation of the Coastal Development Strategy (CDS)

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ACRONYMS

ADP	Annual Development Plan
ANDI	African Nutrition Database Initiative
BBS	Bangladesh Bureau of Statistics
BELA	Bangladesh Environmental Lawyers Association
BUET	Bangladesh University of Engineering and Technology
BWDB	Bangladesh Water Development Board
CBO	Community Based Organization
CDS	Coastal Development Strategy
CEGIS	Centre for Environment and Geographic Information Services
CFS	Committee on World Food Security
CN	Concept Notes
CPI	Consumer Price Index
CZ	Coastal Zone
CZPo	Coastal Zone Policy
DAE	Department of Agriculture Extension
DMB	Disaster Management Bureau
DoF	Department of Fisheries
DPE	Directorate of Primary Education
DPHE	Department of Public Health Engineering
DSI	Decision Support Indicator
EEZ	Exclusive Economic Zone
ESP	Essential Services Package
FAO	Food and Agricultural Organization, United Nations
FD	Forest Department
FIVIMS	Food Insecurity and Vulnerability Mapping System (launched by the heads of states of FAO-member countries during the World Food Summit in 1996)
GB	Grameen Bank
GDI	Gender-related development index
GDP	Gross Domestic Product
GEM	Gender Empowerment Measure
GO	Government Organization
GoB	Government of (the People's Republic of) Bangladesh
GR	Game Reserve
GRP	Gross Regional Product
HDI	Human Development Index
HH	Household
HYV	High Yielding Variety
ICRD	Integrated Coastal Resources Database
ICZM	Integrated Coastal Zone Management
ICZMP	Integrated Coastal Zone Management Plan
ILO	International Labor Organization
IMR	Infant Mortality Rate
IUCN	International Union for Conservation of Nature (The World Conservation Union)
IWFM	Institute of Water and Flood Modeling
IWM	Institute of Water Modeling (formerly SWMC)

LGED	Local Government Engineering Department
LRB	Local Resource Base
MDG	Millennium Development Goal
MII	Management Input Indicator
MMR	Maternal Mortality Rate
MoA	Ministry of Agriculture
MoF&DM	Ministry of Food & Disaster Management
MoEF	Ministry of Environment & Forest
MoF	Ministry of Finance
MoH&FW	Ministry of Health and Family Welfare
MoLGRD&C	Ministry of Local Government, Rural Development and Cooperatives
MoWCA	Ministry of Women and Children's Affairs
MoWR	Ministry of Water Resources
NCA	Net Cultivated Area
NGO	Non-governmental Organization
NIPORT	National Institute of Population Research and Training
OECD	Organization for Economic Cooperation and Development
PCU	Program Coordination Unit
PDO	Program Development Office (for ICZM)
PDO-ICZMP	Program Development Office for Integrated Coastal Zone Management Plan
PRSP	Poverty Reduction Strategy Paper (Now formally known as 'Unlocking the Potential: National Strategy for Accelerated Poverty Reduction')
RBI	Resource Base Indicator
RHD	Roads and Highways Department
SPARRSO	Space Research and Remote Sensing Organization
SRDI	Soil Resources Development Institute
UHC/THC	Upazila Health Complex / Thana Health Complex
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
VGD	Vulnerable Group Development
WARPO	Water Resources Planning Organization
WFP	World Food Programme
WHO	World Health Organization
WS	Wildlife Sanctuary
WWF	World Wildlife Fund

GLOSSARY

- Golpata:** Plant grown in Sundarban, used as housing material (*Nypa Fruticans*)
- Kantha:** Hand made blanket/quilt
- Khas land:** Indisposed government land
- Salish:** Informal institution comprising community leaders for conflict resolution
- Samaj:** Traditional social coalition
- Sundarbans:** Mangrove forest located in the south-west coast
- Thana:** administrative area within metropolitan city
- Union Parishad:** Local Government at the union level
- Upazila:** Administrative unit under a district comprising several unions

DEFINITION OF TERMS

- Absolute poverty:** Estimates the percentage of households consuming less than 2122 Kilo Calorie Per Person Per Day (BBS 1998)
- Agriculture labor household:** Main source of income is agriculture labor (BBS 1999)
- Ante-natal care visit:** Percentage of live births in the three years before the survey for which mother made at least one antenatal visit (NIPORT, 2003).
- Biomass as source of fuel energy:** Straw, bran, wood and bamboo as source of fuelwood (BBS, 2004)
- Births attended by skilled staffs:** The percentage of births in the last two years attended by skilled health personnel. Doctor, trained health worker and midwife are defined as skilled health personnel (BBS and UNICEF, 2001).
- Child mortality rate:** Child mortality rate is the ratio of number of deaths of children of age 1-4 years per thousand mid-year population of the same age 1-4 (BBS 2004).
- City Infrastructure Development Index:** The level of household connection to networked infrastructures is a major indicator of the level of city development. The index shows the level of infrastructure development in terms of water connection, sewerage facilities, electricity connection and telephone connection (UN-Habitat 1992).
- Extreme poverty:** Estimates the percentage of households consuming less than 1805 Kilo Calorie Per Person Per Day (BBS 1998)
- Functional landless:** holdings with cultivable land not exceeding one acre as “functional landless”. Some literature mentions households owning less than 0.5 acre of cultivable land as “functional landless” (BBS 1999).

Gender Development Index: A composite index measuring average achievement in the three basic dimensions captured in the human development index – a long and healthy life, knowledge and a decent standard of living – adjusted to account for inequalities between men and women. For details on how the index is calculated see UNDP 2002.

Gender Empowerment Measure: A composite index measuring gender inequality in three basic dimensions of empowerment – economic participation and decision making, political participation and decision making and power over economic resources. For details on how the index is calculated see UNDP 2002.

Gross enrollment rate: The number of students enrolled in a level of education, regardless of age, as a percentage of the population of official school age (6-10 years) for that level. The Gross Enrolment Rate can be greater than 100% as a result of grade repetition and entry at ages younger or older than the typical age at that grade level (UNDP 2002).

Human Development Index: A composite index measuring average achievement in three basic dimensions of human development – a long and healthy life, knowledge and decent standard of living. For details on how the index is calculated see UNDP 2002.

Infant mortality rate: The number of deaths during a given year of live-born infants who have not reached their first birth days, divided by the number of live births in the given year, and usually expressed per 1000 live births (BBS 2004).

Maternal Mortality Rate: The number of total deaths of women due to complications of pregnancy, childbirth and puerperal per 1000 live births during a year (BBS 2004).

Net cultivated land: Net Cultivated Area is the area actually cropped during the census year regardless of the number of crops grown and it includes the area under temporary crops, current fallow and permanent crops (fruit trees). In other words, it is the actual area or physical area occupying both perennial and non-perennial crops (BBS 1999).

Potable water source: Sources of water from tap, tube-well and deep tube-well

Protected area: A protected area is defined as the "a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives" (PDO-ICZMP 2004)

Severe child malnutrition: The percentage of children aged 12 to 59 months who have a mid-upper arm circumference of less than 12.5 cm. This figure represents the prevalence of severe malnutrition (BBS and UNICEF, 2001).

Small farmer: A farm holding having an operated area of 0.05 to 2.49 acres of land with a minimum of 0.05 acre as cultivated area (BBS 1999)

1. INTRODUCTION

What reveals the quality of life? May generate an interesting debate among the intellectuals! But for the common people that shall bring forward issues of availability and access to food, shelter, cloth, health and education. Availability of these basic needs to the dwellers depends on resources base (land, water etc.), various infrastructure (polders, industries, hospitals, markets, schools, roads and other communications means etc) and institutional setting and good governance. On the other hand the sociopolitical setting determines access. In addition natural hazards and national and international economic and political fluctuations influence life and livelihoods.

Means to availing basic needs are different for different social strata, different occupational and livelihood groups. It is also different for different locations. For example resources base in the Cox's bazaar and in Jessore is different. Similarly fisher, Mowelis or urban wage earners have different resource bases for earning their livelihoods.

The coastal zone policy endorsed the ICZM goal as "to create conditions in which the reduction of poverty, development of sustainable livelihoods and the integration of the coastal zone into national process can take place". In order to understand that this goal is addressed, we need to measure:

- Poverty in the coastal zone
- Sustainability of livelihoods
- Mainstreaming into national process

None of these are measurable straight way. What to measure to find out the poverty stricken people? What shall be the measures for determining sustainability of livelihoods? Again how to track the development of certain area compared to the national process?

However we can generate certain measurable data, which singly or in a group provides us the indication of poverty. Similarly there are measurable data for the sustainable livelihoods and others. These are the indicators. The indicators in a framework assist us to measure quality of life out there.

1.1 Context

ICZM process has been initiated in Bangladesh and an approach is being evolving. The process however, involves changes in mindset and attitudes of key stakeholders.

The process shall be embedding in the mainstream of the development persuasion in the country. Coastal zone policy been taken by Bangladesh Government (2005) is the milestone in the road to ICZM. Coastal Development Strategy (CDS) is under formulation that shall prioritize and concretize the policy intentions in to targeted actions within given time. Priority investment program of the initiative shall ground actions and intervene accordingly. It is mentioned that interventions in the coastal zone are taken by various Government agencies, NGOs and private sectors. These dedicated actions and the autonomous developments bring changes in the coastal conditions and ultimately influence the quality of life of the coastal dwellers. It is of crucial importance to record the changes, monitor, evaluate and accordingly adjust and or design new interventions. Certain interventions with specific objectives bring a change in to definite parameters and measurement is straightforward, e.g. project interventions for Aquaculture extension with an objective to increase fish production shall monitor fish production. Similarly different actors in the coastal zone shall play their role and try to monitor their performance. Cumulatively what is the development of the coastal zone and coastal dwellers? To track that it is necessary to gather performance record of the interventions and analyze in a holistic manner. Similarly degradation occurs due to man-made interventions as well as autonomous changes are also there.

The coastal zone management involves a number of stakeholders. To streamline monitoring mechanism and establish a structured formatted and versatile knowledge system an integrated knowledge base is under development. This shall facilitate and guide the monitoring mechanism both for the project performance, evaluation and also the development process of the coastal zone and its dwellers. To guide development of integrated knowledge base and monitoring and evaluation mechanism a framework of indicators (PDO-ICZMP, 2003a) has been developed through wide consultation and discussion with the Knowledge Base Task Force members, WARPO, CEGIS, IWFM, BUET, IWM and PDO professionals.

The indicator framework provides structures for monitoring investments (management input indicators), resources (resource base indicators) and well being of the coastal dwellers (well being indicators). A practical set of indicators for ICZM is a difficult and long-term task that needs continuous revision and updating/upgrading while being used. It has, however, the strong potential to become a key to an operational process of integration and harmonization, and provide a "language of communication" between the stakeholders of ICZM.

Indices allow for an easy representation of a group of indicators. Indices are particularly relevant in those cases in which an objective is complex, i.e. consists of

a combination of factors, whereas, indicators show any particular element of the policy impacts. In some cases, e.g. primary school enrolment or maternal mortality, an indicator suffices to describe the situation.

In order to allow decision makers a quick insight into the state of affairs of the Coastal Zone Policy (Economic growth, Sustainable environment and well being) implementation and the possible impacts of proposed measures and interventions in the coastal zone and quality of life of the coastal dwellers a combined set of indices and indicators would be monitored.

1.2 Purpose

The purpose and scope of this document is to provide a comprehensive understanding over the framework for monitoring and assessing the coastal development and quality of life of the coastal dwellers. The specific objectives of the paper are as follows -

- Provide a conceptual framework and an indicator framework structure to the development process
- Present selected indicators and indices to track and monitor the coastal development
- Establish a base line on the quality of life of the coastal dwellers recording values of the selected set of indicators and indices

1.3 Structure of the Report

This chapter introduces the document setting context and purpose. In order to get a sense of the coastal zone, its distinct characteristics have been summarized in Chapter 2 defining natural and social settings, institutional environment, infrastructure and economic and financial resources and a description of the people and their livelihood with diversification, vulnerabilities, poverty and gender perspectives. Chapter 3 brings in the indicator framework as measuring tool. Chapter 4 presents selected indicators and indices that represents overall coastal development. Chapter 5 depicts the state of quality of life of the coastal dwellers on the basis of selected indicators and indices. Chapter 6 proposes implementation mechanism of measuring quality of life and publishing results.

2. THE COASTAL ZONE

2.1 Location

Nineteen southern districts facing the Bay of Bengal or having proximity to the Bay and the exclusive economic zone (EEZ) in the Bay are grouped into the coastal zone in terms of three geo-physical characteristics that distinguish them from the rest of the country: interplay of tidal regime, salinity in soil and water and cyclone and storm surge. These districts are Bagerhat, Barguna, Barisal, Bhola, Chandpur, Chittagong, Cox's Bazar, Feni, Gopalganj, Jessore, Jhalkati, Khulna, Lakshmipur, Narail, Noakhali, Patuakhali, Pirojpur, Satkhira and Shariatpur (PDO-ICZMP, 2003b).

2.2 Natural Setting

Natural setting of the coastal zone is similar to the rest of the country in some respect and again it is also different to a considerable extent. Coastal zone covers both land and the sea; in fact, it is the zone of interface between land and the sea. Land area of the coastal zone has mud flat, sandy beach & sand dunes, flatlands and undulating terrain that houses different ecosystems with diverse and wide range of habitats. The coastal zone of Bangladesh has saline water, brackish water and fresh water arena and includes ecosystems like mangrove, marine, estuary, islands, coral, sea grass beds, and sand dunes. At least, 10 different agro ecological zones have been identified in the coastal zone and again contain various bio-ecological zones. These large number of ecosystems support wide range of flora and fauna including genetically rich varieties. Thus all level of biodiversity (genetic, species and ecosystem diversity) is very high in the coastal zone.

Coastal zone contains one of the most hydro-morphologically active estuary; diurnal tide, dynamic changes in land form due to erosion and accretion, more than 250 coastal islands, 'world heritage sites' and 'ecologically critical areas'; world's largest single tract of mangrove forest, Sundarban; and world's longest single stretch of sandy beach in Cox's Bazar. Several soil types occur in the coastal stretches of Bangladesh. Southwest and northeast monsoon influences Bangladesh climate.

2.2.1 Natural Hazards

The coast of Bangladesh is prone to severe natural disasters, such as cyclones, storm surges, and floods. There are other natural and man-made hazards, such as erosion, high arsenic contents of ground water, water logging, water and soil salinity, tectonic process and deteriorating coastal ecosystems and various forms of pollution. These hazards occur as shocks (sudden changes such as natural disasters, conflict or

collapsing market prices), seasonality (low demand for farm labor between plantation and harvesting periods) and trends (gradual environmental degradation, oppressive political systems or deteriorating terms of trade). The intensities and magnitudes of these hazards vary over space and time. In addition coastal zone faces extreme (possible) impact of climate change; and is the ultimate recipient of pollution load. Like elsewhere in the world, the coastal zone of Bangladesh has the highest concentration of natural hazards.

2.2.2 Opportunities

The coastal zone contains distinctive development opportunities like fisheries, forestry, livestock, port and related activities, industrial development, ship breaking, transport, gas and oil, other minerals, renewable energy, salt production, tourism, land accretion and coastal agriculture.

2.3 Coastal People and Livelihood

2.3.1 People

According to 2001 population census, the coastal zone has a population of 35.1 million. They are 28 percent of the total population. Average size of household is 5.1. The density of population is 743 per km². Women are 49 percent, while 23 percent are urban-dwellers. Size of the labor force (population of 15-59 year age group) is 18.6 million who are 53 percent of the population. Population in the coastal zone increased at an exponential rate of 1.36 percent annually during the inter-census period of 1991-2001. This is lower than the national rate (1.48%) and is indicative of net out-migration from the coastal zone to other areas (PDO-ICZMP, 2004a). Although Bangalees are the major ethnic community, there are 10 other ethnic communities who also live in the coastal zone. Among them are Chakma, Khyang, Marma, Munda, Murang, Rakhaine, Tanchangya, Tripura, Mahato and Pundra-Khatrion. Their total population was estimated at 0.2 million in 1991 (PDO-ICZMP, 2001).

2.3.2 Livelihood

Livelihood conditions of the people largely depend on what resources are available at the household level in terms of ownership and access. The population operate in a given local resource base that encompasses a host of open access natural resources (khas land, wetland, accreted land, forest, etc.), physical infrastructures (road, railways, ports, electricity, telecommunications, school, hospital, polder, cyclone shelter, embankment, tube well, etc.), social capital (formal institutions like Union Parishad, VGD committee, other service providers, legal regime, etc. and informal

institutions like samaj, salish, traditional laws and tenets, social sanctions, community regulations, etc.) and financial resources (safety net programs, micro-credit, relief, etc.). Access to these resources often influences livelihoods of the people to a significant extent (PDO-ICZMP, 2004a). Livelihood activities in the coastal zone may be clustered into some broad categories: These are:

- a. natural resource based activities, such as: agriculture, salt making, fishing, aquaculture, shrimp fry collection, fuel collection, extraction of forest products, etc; and
- b. human resource based activities, such as: livestock and poultry keeping, boat building (carpentry), net making, kantha making, fish processing, trading, etc.

These two categories broadly correspond to farm and non-farm activities. Both categories of activities may be based on self-employment and wage employment. It is also true that one engaged in self-employment is also available for wage employment and vice versa.

However, livelihood activities at the household level are diversified. Farmer along with farming also involved in fishing, animal husbandry and trading (selling crops or dairy products to buy other essentials). Increasingly the people are engaging themselves with a secondary occupation along with the primary one. The driving force behind opting for multiple occupations is to maximize household income and to minimize risk.

Certain activities are common everywhere and some are typical of the coastal zone. Coastal zone-specific activities are like: salt production; fishing; fish processing (drying); net making; fry collection; shrimp farming; crab/shell collection; extraction of forest products (wood, honey, golpata and wax collection from Sundarban); and boat building (boat carpentry) (PDO-ICZMP, 2004a).

Poverty & Vulnerability

Reduction of vulnerabilities and poverty is a predominant issue. The poverty in the present context has been taken on a wider context of human deprivations in the form of access to basic needs and services. Natural hazards affect the households and aggravate their hardship and poverty. The impact varies according to variation in the household and community resource base and the coping mechanism one adopt. Vulnerabilities affect life and livelihoods of coastal communities. Their significance, however, vary greatly between households, localities, occupational groups and sexes. Street children are considered as the poorest of the poor and perhaps the most vulnerable section of the society who suffers from human deprivations of all forms.

Many children are forced to live and earn on the street due to their vulnerable and distressed situation (PDO-ICZMP, 2004a).

Gender perspective

People's livelihoods are affected by a set of conditions or phenomena that prevail in their immediate environment. However, they do not affect all sections of the population in the same manner. Women are often degraded, deprived and discriminated by contemporary values and attitudes, social sanctions, norms and traditions, rules and regulations that together characterize a situation of patriarchy. The overall social environment makes women more vulnerable. However, there are some positive aspects too. Many women have been able to enhance their situation with support from NGOs, particularly micro-credit. Their attitude toward developing human capital is generally positive and they, with support from their husband, try to arrange education for their children, both girls and boys (PDO-ICZMP, 2004a).

2.4 Institutional Environment

The people have intricate relationship with government institutions. They are utilizing services provided by the government, like, physical infrastructures, health and educational services, water; sanitation, access to the national electricity grid, relief and rehabilitation services for the destitute and agricultural extension services for farmers. Similarly formal institutions like Union Parishad, VGD committee, other service providers, legal regime, etc. and informal institutions like samaj, salish, traditional laws and tenets, social sanctions, community regulations, etc have direct bearing on the quality of life of the coastal dwellers. NGOs are an important provider of certain services, particularly micro-credit. Their coverage has a direct correlation with the coping capacity of the people. Areas with higher NGO coverage enable the poor people to diversify their options. Accessing to the services provided by the institutions is influenced by many factors, like economic and social status of the people, relation with power brokers and rules and regulations (PDO-ICZMP, 2004a).

2.5 Infrastructure

Infrastructures for land and water management and disaster preparedness includes polders, cross dams, flood protection structures, erosion protection structures, cyclone shelters, infrastructure for emergency communication network, agricultural water supply and domestic water supply infrastructures

Infrastructure for economic activities: Agriculture, Fisheries and aquaculture, Forestry Industry, Tourism, Hotels and Other facilities

Infrastructure for health, education, services and transportation: Health infrastructure, Sanitation infrastructure, Education infrastructure, Electricity, Gas, Renewable energy, Telephone, Other communication infrastructure, Transportation Roads and railways, Railways, Ports and waterways, land ports and Airports.

2.6 Economic and Financial Resources

There are investments from the public and private sectors as well as direct foreign investment. Micro credit program is prevailing in the coastal zone to a lesser extent though this has been a major thrust in the interventions of the NGO sector and the government in the recent decades. The social safety nets is another instrument that has direct bearing on the development and maintenance of life and livelihood of the poorer section of the coastal community.

Savings and credit are two major financial assets in the perception of the people. There are no disaggregating data on savings. For credit, people depend on institutional (Government-sponsored special programs, banks and NGOs) and non-institutional (private money lenders) sources. Access to micro-credit largely depends on the availability of credit-disbursing outlets in a particular area. Grameen Bank (GB) and NGOs are two major sources of micro-credit for the poor people. An indicator for wealth of people is the amount of bank deposits, and especially their increase over time.

3. INDICATORS FRAMEWORK: MEASURING TOOL

3.1 Ever Dynamic Coast: Always Changes

Coastal zone is ever dynamic and changes occur continuously in all spheres of the natural system, physical setting, human interactions, and resource flow and also in management inputs (investments in interventions and legal/institutional regime). Increasing population thrives on the resources flow out of the resource bases and become demanding resulting in to over exploitation. Huge pressure on the natural system some time brings irreversible changes. The complex ecosystems and dynamic morphology also undergoes autonomous changes resulting in to changed outputs from the system. There are also dedicated interventions for development in the coastal zone that contributes bringing over all change in the coastal system. The well being of the costal dwellers depend on the resource flow and access arrangements and face changes in accordance with the changes in the resource bases potentiality followed by the changes in the management inputs and autonomous developments.

Changes in the morphological dynamism; erosion and accretion, sediment load and distribution, salinity intrusion, water logging, arsenic contamination, pollution, composition of the rural household, per capita availability of land, urbanization, fisheries and other marine resources, forest resource, Sundarbans-dependent households, income level, depletion of common property resources, intensities and magnitudes of natural hazards, law and order situation, infrastructure (education, health, cyclone shelters, telephones, electricity etc.) industrialization, commerce and trading, services from GO agencies, NGOs and private sectors, legal, institutional and policy/strategy regimes are few examples of the changes that occur in the coastal zone and impact livelihood of the coastal dwellers. These changes bring either positive or negative or mixed effects on the livelihood and well-being of the people. Again exogenous factor such as climate change, globalization and political regime has enormous impacts directly and indirectly to the coastal zone.

3.2 Capture Changes

Selection of measurement parameters to capture changes on the state and trend of resource flow is nothing new and a number of agencies, institutions, organizations and individuals are recording, analyzing, interpreting and archiving data and information from their own perspectives and aspirations.

A framework of indicators has been designed as a continual process of identification, preparation, decision-making, implementation and evaluation of

interventions. Indicators for ICZM would serve the purpose to structure and facilitate this process, to monitor it and make it accountable. Indicators should thus provide concrete and meaningful information of conditions and changes over time of input into the process of coastal development and their output and outcome.

In this context, input would refer, for example, to public expenditures, projects, training programs, or the Coastal Zone Policy (CZPo), the Coastal Development Strategy (CDS) and the set of Concept Notes (CN) on proposed concrete interventions. Output relate mainly to changes in the state or condition of the local resource base as a result of such input or autonomous development, while outcome measures performance of these changes in terms of specified policy objectives, such as the increase of literacy rate and the reduction of poverty.

Obviously, indicators simplify a complicated development process. A set of meaningful and representative indicators, however, would facilitate monitoring and assessment of developments with and without interventions and ranking of planned interventions in terms of policy and management objectives. As such they can provide a concrete contribution to a difficult communication among stakeholders in the rationalization of multi-purpose decision-making processes.

3.3 Developing the Indicator Framework

The development of the Indicator Framework took place during 2002-2003. The processes applied to develop the framework were as follows -

Extensive review and consultation of the existing international literatures including FIVIMS, CFS, FAO Secretariat, ANDI, Asia Kids, OECD, UN/CCA, HDI, PRSP Bangladesh, NR/E, WFP, UNDP, etc.

Series of discussion and consultation with agency representatives like BBS, CEGIS, IWM, BUET, etc. Discussion and review at the Knowledge Base Taskforce of the ICZMP (for detail PDO-ICZMP 2003a).

3.4 The Conceptual Framework

As mentioned, the framework consists of three sets of indicators:

- management input indicators (MIIs), which - in principle - represent different types of management inputs such as recurrent GoB expenditures, investments projects, plans, regulations focusing on the coastal zone, or training programs;
- resource base indicators (RBIs), which characterize the state of the local resource base; and

- decision support indicators (DSIs), which represent the objectives of ICZM.

Relations between these sets of indicators can be visualized through two cross-reference matrices (Figure 1). The first is an "objective" input-output matrix, showing the relation between the management inputs and the condition or state of the local resource base (LRB). The second matrix is referred to as a performance matrix, reflecting the value of changes in the LRB in terms of policy or decision-making criteria (DSIs).

INPUTS			OUTPUTS	OUTCOME		
Institutional arrangements	Policies/strategies and plans	Direct interventions		Economic growth	Improvement of livelihood and well-being	Sustainable natural environment
			Natural resources			
			Physical resources			
			Human resources			
			Social resources			
			Financial resources			
INPUT-OUTPUT MATRIX				PERFORMANCE MATRIX		

Figure 1: Schematic representation of the indicator framework

The indicator framework is closely related to the sustainable livelihood model (SL-model) and aims to be an operationalization of that model (PDO-ICZMP, 2002a).

The following general observations merit emphasis.

- Special attention has been given to indicators, which "measure" equity between and among different social groups and in particular gender.
- Two levels of indicators are distinguished:
 - aggregated indices, which broad-stroke reflect developments (examples are the internationally used human development index (HDI) or gender-related development index (GDI)); and
 - specific indicators, which reflect specific changes, for example in household income or area of wetlands.

Aggregated related indices are usually used for policy purposes at a national level, while more specific indicators are needed for the ranking procedures for interventions. Specific indicators are in fact the (weighted) constituents of the composed indices.

3.5 Applying the Framework

The framework conceptually differentiates between: Management Input Indicators (MIIs) that account how a certain strategy is translated into concrete actions or interventions; Resource Base Indicators (RBIs) that reflect the impacts of such interventions on the local resource base; and Decision Support Indicators (DSIs) that measure strategy-performance in terms of its objectives. However, in applying the framework, MIIs, RBIs and DSIs can be combined to support the multiple decision-making processes, e.g. Policy formulation, Strategy formulation, Specification of projects or interventions (concept notes). Indicators should cover standard measures to assess efficiency and effectiveness of environmental and social impacts. The framework considers scenarios following the exogenous developments. Scenarios potentially would affect indicators from all three sets. For example: Bangladesh' economic & political development would affect the allocation of GoB's development budget (MII indicators); climate change and consequent sea level rise would have their impacts on the LRB (RBI indicators); while world economic and food market developments would affect employment levels and food security (DSI indicators). The framework can also be used to help structuring and processing surveys, structuring databases (such as ICRD) and developing a computational framework to predict impacts of changes in the LRB on the DSIs. Finally a carefully selected set of indicators (combining MII, RBI and DSI) and indices shall indicate overall coastal developments and the quality of life of the coastal dwellers (Figure 2).

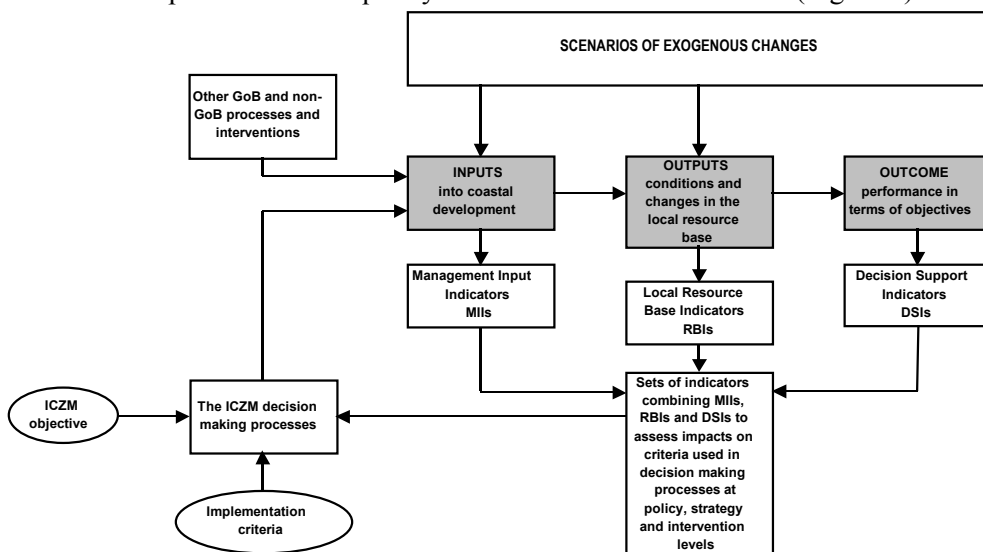


Figure 2: Schematic representation of the use of the indicator framework

As mentioned, sets of specific indicators could be designed for specific purposes; the framework provides a general structure of categories and components with dimensions specifying aspects of the components that are representative and relevant for ICZM purposes. In some cases components have been subdivided in sub-components.

Dimensions in fact, outline the type of indicators -- or data layers in database terms - - that would fit under the corresponding components/sub-components. This implies that the distinction between sub-component and dimension depending on the level of detail that is assumed to be required for ICZM. For example: wind, rainfall, humidity, etc., can be considered sub-components of the component: meteorological conditions for which detailed information is relevant on spatial and time distribution and extreme events (dimension). As an alternative they could be considered dimensions of the component meteorological conditions, when only average values are important.

In the subsequent sections, component/sub-component structures are developed for each of the three sets of indicators: MIIs, RBIs and DSIs. The sub-division of components into sub-components has been limited as much as possible, the reason being that this structure could well develop into a "generic" data structure suitable for further guiding the construction and linking of databases. Obviously, even such general structures include already choices that relate to the special context of the coastal zone and the ICZM process.

3.6 Types of Indicators

3.6.1 Management Input Indicators (MIIs)

MIIs' main purpose is to provide information on the GoB and non-GoB efforts into coastal zone development. MIIs would represent contributions to good governance, for example in the fields of sustainable resource management, empowering of local communities and public-private sector relationships (Table 1). Three categories of management inputs are distinguished.

- Institutional arrangements. These provide the "context or management infrastructure" within which management actions are taken. They consist of the total of organizations, laws and regulations, and mechanisms for participation and democratic control.
- Policies/strategies and plans through which management agencies express - at different levels of concretization - their intentions and commitments and makes themselves accountable towards the public at large.

- Direct interventions in the form of, e.g., annual budgets for operation and maintenance, investment projects, the introduction of user charges, or training and awareness building.
- MIIs would also serve the purpose to "measure" the efficiency of the ICZM process itself and are indicative for ICZM's objective to integrate the coastal zone into the process of national development.
- MIIs would consider annual GoB expenditures, private investments and NGO activities in the context of ICZM. As mentioned, also the CZPo and CDS can be considered an input into management of the coastal zone. Measurement of many of these inputs will be qualitative.

Table 1: Structure of the set of Management Input Indicators (MIIs)

Input category	Component / Subcomponent		Dimensions
Institutional arrangements (=context for management)	Institutional and organizational infrastructure (at national, regional and local level)		Structure of organizations and their mandates - Administrative boundaries Capacities; financial, personnel - Linking mechanisms (protocols) for harmonization and coordination
	Laws and regulations		- Environment related acts, ordinances - International treaties / conventions - Standards - Licenses - Special area declarations - Financial incentives
	Mechanisms for people's participation		- Representation of people in formally electoral bodies - Participation in the process of planning, decision making, design, implementation and control
Policies/strategies and plans (=intentions of management)	Policies (Overall and Sectoral)		- Objectives - Implementation arrangements - Reference to CZ
	Strategies and Plans (Overall and Sectoral)		- Objectives - Targets - Reference to CZ
Direct interventions (=implementation of management intentions within	Rural and urban infrastructure		- Investments (in roads, electricity, communication, cyclone shelter / flood protection, etc.) - Current expenditures (in roads, electricity, communication, cyclone shelter/flood protection, etc.)

Input category	Component / Subcomponent		Dimensions
the existing context)	Rural and urban social services		- Investments (in education, health, family planning, sanitation and water supply, etc.) - Current expenditures (in education, health, family planning, sanitation and water supply, etc.) - Awareness
	Natural resources management (water, land, fish, forest, etc.)		- Monitoring and assessment - Control and enforcement - Dissemination and awareness
	Safety nets	Food assisted program	- Volume (disbursements in national programs) - Effects (people reached)
		Housing	
		Disaster management	
	Public safety and well-being		- Efforts (public spending in law enforcing agencies) - Effects (rate of disposal of criminal cases)
Production and income generating activities	Extension services	- Volume (budgets allocated in different area) - Effects (people reached)	
	Micro-credit		

3.6.2 Resource Base Indicators (RBIs)

RBIs are output indicators that would measure the results of the management inputs and/or scenario developments in terms of (changes in) the state and the characteristics of the LRB (Table 2).

An important aspect of the LRB is that - in addition to offering opportunities for development - it poses risks to individual households and makes them vulnerable if they are not able to cope with the dynamics of these resources. RBIs should thus reflect:

- availability (or absence) and quality of the resources;
- normal variability and trends; and
- extreme events (shocks), due to natural hazards.

Table 2: Structure of the set of Resource Base Indicator (RBIs)

Category	Component / Sub-component		Dimensions
Natural resources	Land	Agricultural land	- Area - Quality
		Settlement area/Industrial area/Infrastructure	- Area - Quality (safety)
		Ponds and ghers	- Area - Physical condition - Productivity
	Surface Water	River	- Area - Water levels / flows
		Perennial water body	
		Floodplains	- Sediment quantity - Sediment quality - Connectivity - Productivity - Diversity
	Groundwater	Shallow aquifer	- Volume - Quality - Abstraction
		Deep aquifer	
	Sea	Estuary branches and coastal waters	- Area - Water levels / flows - Salinity - Pollution - Sediment quantity - Sediment quality - Productivity - Diversity
		Deep sea	
	Chars and inter-tidal areas		- Area and elevation - Erosion/accretion - Soil conditions
	Forests	Natural mangroves (Sundarban)	- Area
		Mangrove plantations	- Productivity
		Plain land forest	- Diversity
		Hill forest	
	Metrological conditions	Air	- Air quality
		Wind	- Distribution
Rain fall		- Variation	
Other (Humidity, Temperature, Sunshine, Evaporation)			
Fish and other aquatic resources (includes fresh water and marine fish, crab and shrimp)		- Productivity - Diversity	
Non-renewable	Gas and oil	- Availability (reserves)	

Category	Component / Sub-component		Dimensions
	resources	Sand and minerals	- Quality - Abstraction
Physical resources	Physical infrastructure	Protection (e.g. from flood, cyclone, warning systems)	- Number of different infrastructure provisions - Quality /capacity of the provisions
		Agriculture sector (irrigation, drainage)	
		Power sector (generation, distribution)	
		Transport sector (for example, roads, railway, airports, navigation routes)	
		Communication sector (wired and wireless)	
		Education sector (e.g. schools, colleges)	
		Health sector (hospitals, health centers)	
		Industrial sector	
	Recreational facilities		
	Technology		- Use of equipment (e.g., use of HYV, tractor) - Use of fertilizers, etc
Human resources	Demography		- Size of the population - Composition - Distribution - Migration
	Health		- Physical status - Diseases
	Education and skills		- Primary - Secondary & above - Vocational training
	Awareness		- Safety - Environment
Social/ institutional resources	Institutional structure	GoB organizations at different levels	- Availability and capacity - Access and quality - Violence
		NGOs at different levels	
		FMOs/ CBOs registered and non-registered	
		Informal organizations	
	Cultural and social networks		- Membership - Leadership - Contribution
Safety nets	Food assisted programs	- Availability	
	Housing	- Access	
	Disaster management		
Financial resources	Savings	Private sector	- Deposited funds
		Public sector	

Category	Component / Sub-component		Dimensions
	Revenues		- Collected funds (from LDT, IPTT)
	Wages		- Total amounts paid - Fluctuations
	Credit	Conventional banking system	- Amounts
		Micro Finance Institutions	- Available - Access
Remittances		- Quantity	

3.6.3 Decision Support Indicators (DSIs)

DSI are outcome indicators. Their purpose is mainly to attach values to changes in the LRB in terms of criteria used in preparing decisions on policies, strategies or interventions. Preferably, the whole indicator framework is thus "objective driven", implying that the need for information in support of decision-making, should "control" the information needed on the LRB and on the inputs that are relevant for changing the LRB (Table 3).

Decision support system has been structured and designed to be goal and objective driven. To avoid the complexities a more fundamental approach has been taken to give the DSIs the general structure of objectives related to sustainable development.

- Economic growth. These indicators should reflect regional economic conditions and developments.
- Improvement of livelihoods and well-being. Indicators should account for the reduction of poverty and vulnerability and safety against natural disasters, social and cultural conditions, equitable distribution (across social strata and gender) and access to basic needs.
- Sustained natural environment. Indicators would focus on the integrity of ecosystems and their wise use.

Table 3: Structure of the set of Decision Support Indicators (DSIs)

Category of development	Component / Subcomponent		Dimensions
Economic growth	Gross regional product		- Annual GRP
	Foreign currency earning		- Annual regional export earning
	Employment		- Employment rates - Rural/urban distribution - Fluctuations (seasonal) - Disguised unemployment

Category of development	Component / Subcomponent		Dimensions
	Marketable surplus in agriculture		- Volume - Value - Fluctuations (seasonal)
	Supply-demand conditions	Food items	- Value of CPI
Non-food items		- Fluctuations (seasonal)	
Improvement of livelihoods and well-being	Income and expenditure	Income	- Levels
		Expenditure	- Distribution (Gini)
	Assets	Natural	- Owned properties - Access to common properties
		Physical	- Owned properties (houses, household amenities such as radio, TV etc.) - Access to new technology (e.g. HYV, fertilizer etc.) - Access to utilities, local facilities
		Human	- Health - Education and skills - Knowledge & awareness
		Social	- Composition of HH - Level of empowerment - Cohesion and conflict resolution
		Financial	- Savings - Investments - Debts/loans
	Poverty		- Levels - Distribution
	Vulnerabilities	Food insecurity	- Availability - Access - Utilization
		Income insecurity	- Employment - Access to labor markets - Use of income
		Water insecurity	- Availability and access - Quality (Salinity and arsenic)
		Health and life insecurity	- Nutrition - Disasters - Law and order - Environmental hygiene - Availability and access to medical facilities
		Property and safety insecurity	- Disaster - Law and order - Social network
	Equities	Rural – Urban	- Income
Rich - Poor		- Health - Food security - Water security and access to sanitation	

Category of development	Component / Subcomponent		Dimensions
	Gender	Economic conditions	- Control of production means - Participation in labor force - Income and expenditures
		Health and nutrition	- Access to food - Access to health facilities - Maternal care
		Knowledge and skills	- Level of education and training - Applicability of education and training - Awareness
		Socio-cultural and political environment	- Security - Age of marriage - Mobility - Participation in decision making
Sustained natural environment	Estuarine dynamics		- Drainage conditions - Morphologic dynamics - Fresh/salt water balance
	Health of ecosystems	Mangroves	- Habitat area
		Marine	- Productivity
		Homestead gardens	- Biodiversity - Endangered species
		Wetlands	- Isolation

4. INDICATORS AND INDICES FOR ICZM

4.1 Selection Rational and Methods

An important part of any strategy is the mechanism to measure and evaluate the impacts of its implementation in terms of compliance with its goal and objectives. Findings could feed back in a reformulation of the program of actions or even the strategy itself.

The reference base for an assessment of the coastal development is the goal and objectives of the CZPo (MoWR, 2005) and the PRSP (GoB, 2004) and the strategic targets of the CDS. Of interest is not so much when and how the individual priority actions themselves are implemented, but whether the coastal zone develops in the desired direction.

A set of carefully selected indicators and indices in a collective way can tell about the coastal condition and well being of the coastal dwellers (policy objectives). In this instance selected indices and indicators would be applicable on a coastal level as well as on a country level, as the impact of the coastal zone policy on the coast and coastal dwellers have to be compared to the situation in the country as a whole; that data are available on Bangladesh as well as on the coastal zone, and that the index can be applicable in the framework of the coastal zone policy / coastal development strategy as well as in the further development and implementation of the PRSP.

Indices used in the international arena were primarily selected and specifically designed if no internationally used indices were available. Data has been collected screening books, reports, survey findings and websites of various projects, organizations and initiatives (e.g. BBS, NIPORT, WHO and others). In most of the cases data are available at district / region / division level and the coastal zone values have been calculated/extrapolated. Major sources for internationally used indices are the Human Development Report of UNDP and - to a lesser extent - the indicators developed in the framework of the Convention on Sustainable Development. Apart from these two sources, indices have been looked into more specialised institutions, such as IUCN, WWF, ILO etc.

The indices and indicators are chosen which

- reflects the policy objectives i.e. economic growth, sustainable environment and well being of the coastal dwellers ;
- instrumental in communicating the effectiveness and relevance of the coastal zone policy and Coastal Development Strategy (CDS) to policy makers at national level;

- allows for a direct linkage with the Poverty Reduction Strategy Paper (PRSP)
- and builds on the existing work of PDO-ICZM on Indicator Development; Proposal for a Framework of Indicators (PDO-ICZMP, 2003a)

4.2 Selected Indicators & Indices

Table 4 gives an overview of the selected indicators for an assessment of the coastal development processes in terms of compliance with the eight CZPo-objectives. Sources of information are specified for each of the categories under the CZPo objective headings.

Table 4: Selected indicators and indices for the assessment of coastal zone development

Input	Output	Outcome
Economic growth		
<ul style="list-style-type: none"> - No. of projects in CZ and Exp CZ - ADP allocation CZ and Exp CZ - ADP allocation and/or expenditures in Oil and gas sector - ADP allocation and/or expenditure in Industrial sector - Expenditure on cash incentives to exports of selected coastal trades (as % of total export) 	<ul style="list-style-type: none"> - Share of industrial sector in GDP - Share of agricultural sector in GDP - Growth of public investment - Growth of private investment - Growth of export earning (in selected coastal trades) 	<ul style="list-style-type: none"> - Per capita GDP - GDP growth rate - Sectoral GDP growth - Growth of employment (total and sectoral) - Rural household depending on non-farm activities
<p>Sources of information Annual Development Plan; Concerned departments / agencies; MoF</p>	BBS, MoF	BBS
Basic needs & opportunities for livelihood		
<ul style="list-style-type: none"> GoB expenditure on - rural development - health - general hospitals & clinics - primary education - rural water supply and sanitation 	<ul style="list-style-type: none"> - Primary school density - Medical services (hospital beds per 1000 person) - Births attended by skilled staff - Utilization rate of First Level Care Facilities (UHC/THCs) - Tube-well density (No. of persons per running tube-wells) 	<ul style="list-style-type: none"> - Human Development Index (HDI) - City Infrastructure Development Index - Primary enrollment rate - Severe child malnutrition - Infant mortality rate (IMR) - Child Mortality Rate - % of population using sanitary latrine - Per capita consumption of food grains, vegetables,

Input	Output	Outcome
		protein and other major items
Sources of information Ministry of Finance; MoLG, RD & C, MoWR	BBS, MoA, MoH&FW, DPHE, DPE	BBS, LGED, UNICEF, NIPORT, DPE
Reduction of vulnerabilities		
<ul style="list-style-type: none"> - GoB expenditure on arsenic mitigation - Food assisted program disbursement - Expenditure on poverty reducing sectors (as % of total expenditure & GDP) - Expenditure on rural roads and culverts - Expenditure on low cost housing - Expenditure on disaster management - Expenditure on rural electricity 	<ul style="list-style-type: none"> - No. of VGD cards per 1000 person - Number and capacity of cyclone shelter - Polder protected area - Road (RHD, FRD, rural roads) density 	<ul style="list-style-type: none"> - Extreme poverty - Head count ratio (HCR) of poverty - Absolute poverty - % of population with access to cyclone shelter - % of population with access to micro credit - % of households having access to radio - % of houses with durable walls and roofs (rural/urban) - % of households with access to electricity (rural/urban) - % of hhs with access to potable water (rural/urban)
Sources of information Ministry of Finance, WFP	NGOs, WFP, BBS, BWDB, R& HD, LGED, DMB	BBS, MoD, R & R, DMB, BRDB, NGOs
Sustainable management of natural resources		
<ul style="list-style-type: none"> - Share of water resource sector in ADP allocation - Expenditure on agriculture by sub-sectors 	<ul style="list-style-type: none"> - Net cultivated area and irrigated area - Soil salinity - Surface water salinity - Groundwater table - Extraction of groundwater - Groundwater salinity - Accretion rate (ha per year) - Erosion rate (ha per year) - Marine fish catch - Shrimp production 	<ul style="list-style-type: none"> - Cattle holding per rural household - Fish production - Rice production - No. of trees per household - Proportion of households dependent on biomass as source of fuel energy - Productivity of land
Sources of information MoF, MoA	SRDI, BWDB, DAE, BBS	BBS, DoF, DAE
Equitable distribution		
<ul style="list-style-type: none"> - # of thana CZ and exp CZ - # of union or wards CZ and exp CZ 	<ul style="list-style-type: none"> - Micro-credit disbursement per borrower - No. of poor households 	<ul style="list-style-type: none"> - Proportion of small farmer household - Proportion of functional

Input	Output	Outcome
<ul style="list-style-type: none"> - Micro-credit disbursement - Disbursement of agricultural credit by farm-size and purpose 	<ul style="list-style-type: none"> receiving remittances - Employment generation (by sector/sub-sector, male/female, rural/urban) - Person / thana - Sq km / thana - Person / union or ward - Sq km / union or ward 	<ul style="list-style-type: none"> landless - Proportion of agriculture labor household - Gini index of income
<p>Sources of information BBS, MoF, Krishi Bank</p>	<p>BBS, NGOs, BRDB</p>	<p>BBS</p>
Empowerment of communities		
<ul style="list-style-type: none"> - Expenditure on local government - Secondary education exp - Exp. on general universities/ colleges/ institutes - Exp. on professional/ technical universities/ colleges/ institutes - Exp. on teacher & vocational training 	<ul style="list-style-type: none"> - Density and capacity of professional/ technical universities/ colleges/ institutes - Density of secondary schools 	<ul style="list-style-type: none"> - Adult literacy rate - Literacy rate (15-24 years) - Percentage of households with a television - Rate & growth of wages for agricultural / manufacturing workers (formal/informal; male/female) - % of technical institutes / universities graduates who find job within one year
<p>Sources of information BBS, MoF, MoLG, RD & C</p>	<p>BBS, BANBEIS</p>	<p>BBS, BANBEIS</p>
Women's development and gender equity		
<ul style="list-style-type: none"> - Mother & child exp - Exp. on direct women's poverty reduction projects in agriculture /manufacturing & others / service sector - Expenditure on Essential Service 	<ul style="list-style-type: none"> - Proportion of population covered by ESP - DPT3 immunization coverage of children - Women employed as hired workers in agriculture, manufacturing & services - Coverage of ante-natal care (at least one visit) 	<ul style="list-style-type: none"> - Gender Development Index (GDI) - Gender Empowerment Measure (GEM) - Maternal Mortality Rate (MMR) - Female child mortality (1-4 years) rate as % of male - Female enrolment as % of male at different level (primary, secondary) - Female Infant Mortality Rate as % of male - Female severe child malnutrition rate as % of male - Wage rate of female labor (agriculture / manufacturing) as % of male

Input	Output	Outcome
		<ul style="list-style-type: none"> - Mean age at first marriage for girls - Female adult literacy as % of male
Sources of information BBS, MoF, MoA , MoH&FW, MoLG, RD & C	BBS, MoW&CA, NIPORT	BBS, UNICEF, MoW&CA, UNDP, NIPORT, DPE, BANBEIS
Conservation and enhancement of critical ecosystems		
<ul style="list-style-type: none"> - Expenditure on protected area management - Expenditure on improvement of environment - No. of legislation related to conservation of critical ecosystems and environment 	<ul style="list-style-type: none"> - Percentage of area covered by forest - Protected area as % of total area - Proportion of area under perennial water bodies 	<ul style="list-style-type: none"> - No. of wildlife species per 100 sq km of forest area - No. of common plant species per 100 sq km of forest area - No. of endangered species
Sources of information MoF, MoEF, BELA	MoEF, FD, SPARRSO, BBS	MoEF, FD, IUCN-Bangladesh

5. STATE OF QUALITY OF LIFE

5.1 Coastal Development and Quality of Life

What measures shall improve the quality of life of 35 million coastal dwellers of different social classes? Not only resource flow and tapping, service provision but also equity and equality of distribution. Keeping this in mind after long discussion, consultations and debate across the coastal zone and social strata the Government has declared Coastal Zone Policy to address the issue of coastal life and livelihood improvement. The goal of the integrated coastal zone management has been set in the Coastal Zone Policy (MoWR, 2005) as: to create conditions, in which the reduction of poverty, development of sustainable livelihoods and the integration of the coastal zone into national processes can take place. To meet the goal the development objectives set in the Coastal Zone Policy are -

- a. economic growth;*
- b. basic needs & opportunities for livelihood;*
- c. reduction of vulnerabilities;*
- d. sustainable management of natural resources;*
- e. equitable distribution;*
- f. empowerment of communities;*
- g. women's development and gender equity and*
- h. conservation and enhancement of critical ecosystems.*

The goal and the development objectives not only set the guideline for future interventions and development in the coastal zone it also provide a framework to describe the coastal life and choosing and developing appropriate indicators and indices to track the development of the coastal life and livelihood.

5.2 State of Coastal Development

This section defines the policy objectives in terms of selected indicators and indices and also portrays the state of coastal development establishing benchmark values. Table 5 provides selected set of indicators and indices to suffice individual policy objectives. Values of the indices/indicators on dates set the benchmark.

Table 5: Selected well-being and resources base indicators & indices with benchmark values¹

Indicator	Unit	Bench Mark Data		Reference Year
		CZ	BD	
Economic growth				
Per capita GDP	Taka	18,198	18,269	1999/2000
GDP growth rate (Over all)	% annual growth based on constant price	5.4	5.4	1995/96-1999/2000
Share of industrial sector in GDP	% of GDP	22	25	1999/2000
GDP Growth rate (industrial sector)	% annual growth based on constant price	9.2	9.3	1995/96-1999/2000
Share of agricultural sector in GDP	% of GDP	29	26	1999/2000
GDP Growth rate (agricultural sector)	% annual growth based on constant price	9.2	9.3	1995/96-1999/2000
Rural household depending on non-farm activities	% of rural households	30	34	1996
Basic needs & opportunities for livelihood				
Human Development Index (HDI)		0.61	0.59	2001
City Infrastructure Development Index		31.26	33.18	1998/99
Primary Enrollment rate	%	95	97	2001
Severe Child malnutrition	%	6	5	2000
Infant mortality rate (IMR)	Per 1000 live births	54	53	2002
Child Mortality Rate	Per 1000 population of 1-4 years	4.01	4.56	2002
Percentage of population using sanitary latrine	% of households	46	37	2001
Births attended by skilled staff	% last delivery assisted by skilled staffs	22	24	2000
Primary school density	No. / 1,000 children	4.56	4.31	2001
Medical services	Hospital beds per 1000 person	0.22	0.23	2001
Tube-well density	No. of persons per running tube-wells	110	114	2001
Reduction of vulnerabilities				
Extreme poverty	% of household	24	23	1998
Absolute poverty	% of household	52	49	1998
Percentage of households having access to radio	% of household	34	30	2001
Percentage of houses with durable walls and roofs	% of household	46	41	2001
Percentage of households with access to electricity (Rural)	% of rural household	21	20	2001
Percentage of households with access to electricity (Urban)	% of urban household	63	67	2001
Rural people's access to potable water	% of rural household	86	89	2001
Urban people's access to potable water	% of urban household	94	95	2001

Indicator	Unit	Bench Mark Data		Reference Year
		CZ	BD	
No. of VGD cards per 1000 person	No.	3.41	3.87	2003/04
% of population with access to cyclone shelter	%	14		2003/04
Polder protected area	% of total area	23		2000
Road (RHD, FRD, rural roads) density	Km. / Sq. Km.	0.76	0.72	2000
Sustainable management of natural resources				
Per capita net cultivated area	Ha	0.062	0.068	1996
Per capita rice production	Kg	189	203	2000/01
Per capita fish production	Kg	17	11	2001/02
Cattle holding per rural household	No.	2.61	2.65	1996
Coverage of irrigated area	% of net cultivated area	30	50	1999/2000
Proportion of households dependent on biomass as source of fuel energy	%	89	88	2002
Equitable distribution				
Proportion of small farmer household	% of rural household	58	53	1996
Proportion of functional landless	% of rural household	53.5	52.6	1996
Proportion of agriculture labor household	% of rural household	33	36	1996
Person / thana	Person	238,629	244,282	2001
Sq km / thana	Sq Km	321	291	2001
Person / union or ward	Person	16,752	17,981	2001
Sq km / union or ward	Sq Km	23	21	2001
Empowerment of communities				
Adult literacy rate	% of 15+ population	54	47	2001
Literacy rate (15-24 years)	% of 15-24 yrs. population	55	48	2001
Proportion of households with a television	% of household	17	12	2001
Density of secondary schools	No. per 1000 children	0.97	1.02	2002
Density of colleges	No. per 1000 person of 15-24 years of age	0.10	0.11	2002
Wage rate (without food) of agricultural labors	Taka	53	59	2001/02
Women's development and gender equity				
Gender Development Index (GDI)		1.84	1.80	2001
Gender Empowerment Measure (GEM)		0.156	0.157	2001
Maternal Mortality Rate (MMR)	Per thousand live birth	5.20	5.29	1998/99
Female child mortality (1-4 years) rate as % of male	%	105	92	2002
Mean age at first marriage for girls	Year	20.84	20.60	2002
Female primary enrolment as % of male	%	105	101	2001
Female Infant Mortality Rate as % of male	%	103	96	2002
Female severe child malnutrition	%	200	150	2000

Indicator	Unit	Bench Mark Data		Reference Year
		CZ	BD	
rate as % of male				
Wage rate of female agricultural labor as % of male	%	49	78	2001/02
Female adult literacy as % of male	%	80	76	2001
DPT3 immunization coverage of children	% between ages 12-23 months who are fully immunized	76	74	2000
Coverage of ante-natal care (at least one visit)	%	47	48	2001
Conservation and enhancement of critical ecosystems				
Protected area as % of total area	Area under WS, GR, NP	3.75	1.63	2004
Percentage of area covered by forest	%	21	15	1996-97
Proportion of area under perennial water bodies	%	0.43	1.26	1999
No. of wildlife species per 100 sq km of forest area	No. of Amphibians, Reptiles, Birds, Mammals	5	3	2000
No. of common plant species per 100 sq km of forest area	No.	3	2	2000

¹Source of data:

GDP (BBS 2002); City Infrastructure (LGED 2002); Primary Enrolment and School Density (DPE, 2003 in PDO-ICZMP, 2003c); Infant Mortality Rate, Marriage age, Proportion of households dependent on biomass, Child Mortality Rate (BBS 2004); Maternal Mortality Rate (Ahmed et al., 2000); Electricity, sanitary latrine and potable water (Population Census 2001 BBS 2003a); Births attended by skilled staffs (BBS and UNICEF 2001); Medical Services (BBS, 2003b); Tube-well density (DPHE, 2003 in PDO-ICZMP, 2003c); Extreme and absolute poverty (BBS 1998); Household wall and roof material, access to radio, television, coverage of pre-natal care (NIPORT 2003); VGD cards (WFP, 2003 in PDO-ICZMP, 2003e); Cyclone Shelter (DMB and LGED, 2004 in PDO-ICZMP, 2004c); Irrigated Area (DAE, 2001 in PDO-ICZMP, 2004c); Person and area of administrative units (BBS, 2003a in PDO-ICZMP, 2004c); Literacy Rate (Population Census 2001 BBS 2003a); Secondary school and colleges (BANBEIS, 2003 in PDO-ICZMP, 2004c); DPT3 immunization coverage (BBS & UNICEF, 2001); Perennial waterbodies (NWRD data layer); Net Cultivated area, functional landless, non-farm, small farm, agriculture labor households, rice production, , cattle holding (Agriculture Census 1996 BBS 1999); Fish production (DoF 2003 in PDO-ICZMP, 2004c); Severe Child Malnutrition (BBS and UNICEF 2001); Wage rate (PDO-ICZMP, 2003d); Protected area (Forest Department in PDO-ICZMP, 2004d); Forest Area (BBS in PDO-ICZMP, 2004c); Wildlife and common plant species (IUCN-Bangladesh; Nishat et al. 2002).

The state of coastal development has been described in the following paragraphs in terms of policy objectives.

Economic growth: The coastal zone is relatively income-poor compared to the rest of the country. Average per capita GDP (at current market price) in the coastal zone was Tk 18,198 in 1999-2000, compared to Tk 18,269 in the country on the average. The share of industrial sector in the GDP is 22%, which is, lower than the national level. But share of agriculture sector is much higher. These sectors are showing same rate of growth as like the overall GDP growth.

Basic needs & opportunities for livelihood: The high literacy rate and infrastructure density have contributed in the relatively high human development index in the coastal zone compared to the national level. Primary school and tube-well densities and use of sanitary latrine are high and availability of hospital beds almost same as the national level. But maternal health services are low. Infant and child mortality rate is high and children are more malnourished. The primary enrollment and City Infrastructure Development is low.

Reduction of vulnerabilities: The coastal zone of Bangladesh is prone to severe natural disasters that have made the people very vulnerable and slowed down the processes of social and economic development. Notable among them are cyclone, flood, salinity, river erosion, earthquake, drought, arsenic contamination, salinity, water logging, pollution, etc. The poverty and vulnerability are directly related and the coastal zone has higher concentration of poverty stricken households compared to the whole country. Only 23% of the coastal area is empoldered, which are protected from flood and erosion to some extent. But the cyclone shelters can provide shelter to 14% of the impacted area population, which is far below than the satisfactory level. The enhancement of coping capacities depends on many factors. The people in the coastal zone have greater access to durable houses, radio, road, electricity in the rural area which enhance coping capacities. But they have lesser access to potable water, VGD cards and electricity in the urban area, which undermines their coping capacities to disasters.

Sustainable management of natural resources: Sustainable management of resource refers to sensible use of renewable wealth and maintenance of ecosystems so that the resource base is sustained. The level of use of natural resources is reflected in the production of goods and services from them. Production of rice is lower in the coastal zone, which may be due to lower use of irrigation and modern technologies and lower level of per capita cultivated area. The rural households also have lower number of cattle. But due to abundance of water bodies fish production is much high in the coastal zone.

Equitable distribution: Poor people in the coastal zone largely depend on natural resource-based activities. Proportion of small farm households is high with too many farmers crowding on limited cultivable area. Small farmers account for 58 percent of coastal rural households, compared to 53 percent in Bangladesh. Proportion of functional landless is also high in the coastal zone. Access to the local resource base is constrained because of the prevailing institutional structures that often deprive and discriminate poor people. The concentration of local government and government services is relatively lower in the coastal zone. Average area per upazila / thana and

union/ward is much higher in the coastal zone, though average number of people living in those units is lower than the national average.

Empowerment of communities: Education is considered as an important factor of empowerment and human development. Adult literacy rate and secondary education completion rate are much high in the coastal zone, though concentration of secondary schools and colleges are lower in the coastal zone. Radio and television are important sources of information and the coastal people have a greater access to them. The services provided by the government and non-government institutions are very much important for the empowerment of the coastal people. But accessing the services provided by the institutions is influenced by many factors, like economic and social status of the people, relation with power brokers and, of course, many rules and regulations.

Women's development and gender equity: Analysis of development indicators like demographic, economic, social, political and health show that gender inequalities and gaps exist in the coastal zone. The gender development index and empowerment measures show slightly better condition. According to the gender disparity ranking (developed for 64 districts of Bangladesh) as many as 11 out of the 19 coastal districts fall under 'low gender disparity' category (Barisal, Bhola, Patuakhali, Jhalkati, Pirojpur, Barguna, Jessore, Magura, Narail, Bagerhat, Chittagong, and Noakhali), only 6 fall under 'medium disparity' (Khulna, Cox's Bazar, Chandpur, Gopalganj, Feni and Lakshmipur) and 2 fall under high disparity (Satkhira and Shariatpur). However, in some other important issues coastal women are lagging behind the country. Notable among them are child mortality, malnutrition, infant mortality, wage rate, etc. But in some aspect (like, maternal mortality rate, primary enrolment, adult literacy, mean age of first marriage) women in the coastal zone are in better position than the rest of the country.

Conservation and enhancement of critical ecosystems: The coastal zone of Bangladesh encompasses a highly diverse and robust ecosystem like coast and shoreline, estuaries, islands and coral reef, char lands, deltaic plain, mangroves, marine ecosystem, etc. The aquatic systems include saline water, brackish water and fresh water while the land area of the zone includes mud flat, sandy beach, sand dunes, tablelands and undulating terrain. A large number of flora and fauna including their genetic varieties supports this coastal ecosystem, which in turn contributes to the livelihoods of a large number of people. The proportion of area covered by forest and flora and fauna thriving in the coastal zone is higher. The area declared as protected is also higher.

6. MEASURING QUALITY OF LIFE

6.1 The Program Co-ordination Unit (PCU)

The PCU is a coordinating & facilitating unit for ICZM program in Bangladesh. It is a multi-ministerial and multi-agency setup with MoWR as the lead ministry and WARPO as the lead agency. The PCU is perceived to be the central body for coordination, harmonization and operationalization of ICZM process and to serve as a service setup for relevant government and non-government agencies, NGOs, LGIs, private sectors active in the coastal zone.

PCU will use indicator framework as a measuring tool for quality of life. Indicator framework will be the main conceptual and guiding document to facilitate the ICZM process and uphold the ICZM policy and strategy implementation, monitoring and evaluation. PCU will promote the frame to the wide range of ICZM stakeholders so that the information on the development of the coastal zone could be measured structurally.

6.2 Tracking Coastal Zone Development

- The framework of indicators shall be disseminated among the users with explanations and possible use to assess and monitor performances at various levels. The policy-making levels shall be addressed and attracted with the selected sets of indicators and indices that shall be able to portray not only the state of development but in a computational mode shall find out the sectors that need more attention to reach over all goal of any single and or sets of interventions. And accordingly interventions could be designed and or adjusted accordingly. For example, on the basis of selected set of indicators and indices for ICZM shall develop state of coastal development on a periodic basis that shall allow not only portray the state but ultimately also the trends. Thus through appropriate and focused use this shall allow the policy makers of various sector to draw decisions on the interventions. It shall be promoted to the policy makers
- The framework of indicators helps the development agencies and monitoring organizations to pick suitable indicators for their own use. They shall be in a position to monitor the performance of various activities under taken to develop the sector and design the specific activities accordingly. The indicator framework shall be promoted to the agency level users

- This framework shall be instrumental in formulating strategies by various agencies and or the strategy making bodies. The frame shall also be used to specify projects or interventions (concept notes).
- The framework shall be used to help structuring and processing surveys, structuring databases (such as ICRD), knowledge bases and thus could bring versatility in the knowledge arena for ICZM shared by different stakeholders.
- The framework shall be used for periodic revision of CDS and the PIP
- The framework shall guide formulation of rules, regulations, guidelines, manuals supporting the CDS; and
- This will ultimately help in mainstreaming the coastal development in an equitable way.

6.3 Reporting

The indicators and indices presented in this document will be useful to the PCU to effectively measure the performance and implementation of the coastal zone policy and the coastal development strategy. Indicator framework and the selected set of indicators and indices shall able PCU to document and publish 'state of coastal development'. This will also help to portray development trends and changes.

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PDO-ICZMP

Integrated Coastal Zone Management Plan (ICZMP) project is a multi-sectoral and multi-agency initiative. In support of this initiative, a Program Development Office (PDO) has been established, which is guided by an inter-ministerial Steering Committee and a Technical Committee. The Ministry of Water Resources is the lead ministry, while the Water Resources Planning Organization (WARPO) is the lead agency.

ICZMP aims to establish a framework that defines and directs the development of the coastal zone. Its goal is to create conditions, in which the reduction of poverty, development of sustainable livelihoods and the integration of the coastal zone into national processes can take place.

The project period is from February 2002 to December 2005.

Activities of PDO-ICZMP are structured through six outputs.

These are:

- Coastal zone policy
- Coastal development strategy
- Priority investment program
- Enhancing livelihood capacity
- Enabling institutional environment
- Integrated knowledge base