STRATEGIES FOR THE IMPROVED MANAGEMENT OF COASTAL ZONE OF SRI LANKA

By.Miss.U.A.P.K.Dissanayake

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Research Work supervised
By
Prof.S.S.L.Hettiarachchi and Dr.S.P.Samarawickrama

Department of Civil Engineering
University of Moratuwa
Moratuwa
Sri Lanka

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Declaration

I certify that this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any university and to the best my knowledge and belief it does not contain any material previously published or written or orally communicated by another person except where due reference is made in the text.

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Signature of the candidate

To the best of my knowledge the above particulars are correct

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Prof.S.S.L.Hettiarachchi

UOM Verified Signature

.....
Dr.S.P.Samarawickrama

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Abstract

Sri Lanka has a fully operative Coastal Zone Management Plan (CZMP), which is periodically updated. The 2003 Coastal Zone Management Plan has followed and built upon the 1997 Coastal Zone Management Plan with additional components introduced to address the current requirements. However, some areas have not been addressed in great detail even in CZMP 2003. The Costal Erosion Management Plan does not include green engineering measures and the Conservation Plan does not include the Estuary and Lagoon management in depth .It has been emphasized that a national recommendation regarding policy design is inappropriate and site specific policy design is required. Fisheries concerns, which were not addressed earlier, are included in CZMP 2003. Extending the SAM process to all areas requiring site specific and integrated sustainable resource management are key objectives in the CZMP 2003.

Sea level rise is one of the more certain responses to global warming and presents a major challenge to human kind. The average global sea level rise estimated by IPCC is at 31cm to 110cm by the year 2100 with a best estimate of 66cm. The land loss estimated using the simple drowning concept on the southwest coast is 6.0 to 11.5 km^2 when the low and high scenarios of sea level rise are concerned respectively. In assessing the vulnerability to sea level rise the new techniques such as GIS, Remote Sensing and Aerial Video Tape assisted analysis should be used. Brunn Rule is another very widely used technique to assess the land loss. It has been estimated that the Coastline of Sri Lanka will recede by as much as 50 to 500m within the next century purely due to rise in sea level. Therefore, it is extremely important to pay attention to sea level rise in the future in the design, planning and implementation stages of coastal development, coastal protection and coastal management activities.

The estuary management plans should be consistent with the tenets of total catchment management and ecologically sustainable development. It is important to realize that basic methods to understand the distribution of pollutants in estuaries can be a management tool and an aid in decision-making but nothing more. The recommended ratios of nutrients in estuaries are given by Redfield Ratios, however, a review of the literature indicates that optimum N: P ratio can vary between seven and eighty-seven. The greatest uncertainty with estuary nitrogen budgets concerns the contribution of atmospheric deposition. The principal management objective identified for Sri Lanka is conserving lagoons and estuaries to sustain and enhance environmental functions of and promote socio-economic activities connected with them.

Three budgets were created for Negombo estuarine system using CABARET. The one layer 1 box budget indicates that the system is net heterotrophic and denitrification is dominant. The 2 box 1 layer budget indicates that the estuary is net heterotrophic in the wet season. In the dry season the system box 1 is net autotrophic while system box 2 is net heterotrophic. In 2 box 1 layer system too denitrification is dominant in the estuary both in wet and dry seasons. In the 3 box 1 layer model there are some regions in the estuary, which are autotrophic while rest of the regions, are heterotrophic. And in some region nitrogen fixation is the dominant process. Therefore, it is more suitable to use a

multiple box model to understand the nutrient pollution problems and biogeochemical processes in the estuary.

From the types of management programmes, which have been adopted globally, the use of an effective Integrated Coastal Zone Management Framework is most relevant to the management of Coastal zone of Sri Lanka. When compared to applications of management frameworks from different countries, legal, institutional and organizational requirements are not a serious problem in Sri Lanka. Community based approach which is already in use should be extended and management tools such as GIS and Vulnerability Assessments should be incorporated into the ICMF.

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Abbrevations

ADB	- Asian Development Bank ADB
ANZECC	- Australian and New Zealand Environment and Conservation Council
APC	- Area of Particular Concern
AVA	- Aerial Video-tape Assisted vulnerability analysis
BAU	- Business as Usual
BMP	- Best Management Practices
BOD	- Biochemical Oxygen Demand
CABARET	- Computer Assisted Budget Analysis for Research, Education, and Training
CCA	- Coast Conservation Act
CCAC	- Coast Conservation Advisory Council
CCD	- Coast Conservation Department
CEA	- Central Environmental Authority
Chl a	- Chlorophyll a
COD	- Chemical Oxygen Demand
CRM	- Coastal Resources Management
CRMP	- Coastal Resources Management Project
CZM	- Coastal Zone Management
CZMP	- Coastal Zone Management Plan
CZMS	- Coastal Zone Management Strategy
DFAR	- Department of Fisheries and Aquatic Resources
DIC	- Dissolved Inorganic Carbon

DIN	- Dissolved Inorganic Nitrogen
DIP	- Dissolved Inorganic Phosphorous
DO	- Dissolved Oxygen
DON	-Dissolved Organic Nitrogen
DOP	-Dissolved Organic Phosphorous
DRP	-Dissolved Reactive Phosphorous
EEZ	- Exclusive Economic Zone
EIA	- Environmental Impact Assessment
EPA	- Environmental Protection Agency
ESID	- Ecologically Sustainable Industrial Development
FAO	- Food and Agricultural Organization
GIS	- Geographic Information System
ICZM	- Integrated Coastal Zone Management
ICZMF	- Integrated Coastal Zone Management Framework
IGBP	- International Geosphere- Biosphere Program
IPCC	- Intergovernmental Panel on Climate Change
IRMP	- Integrated Resource Management Project
IUCN	- International Union for Conservation of Nature
LHI	- Lanka Hydraulic Institute
LOICZ	- Land Ocean Interaction in the Coastal Zone
MFARD	- Ministry of Fisheries and Aquatic Resources Development
MHWS	- Mean High Water Spring Tide level
MICOA	-Ministry for the Coordination of Environmental Affairs

NARA	- National Aquatic Research Agency
NAQDA	-National Aquaculture Development Agency
NEA	- National Environmental Act
NEM	- Net Ecosystem Metabolism
NEP	- Net Ecosystem Productivity
NGO	- Non Governmental Organization
NORAD	- Norwegian Agency for Development Cooperation
PAR	- Photosynthetically Active Radiation
PP	- ParticulatePhosporous
SAM	- Special Area Management
SAMP	- Special Area Management Plan
SCOPE	- Scientific Committee on Problems of the Environment
SIDS	- Small Island Developing States
SLR	- Sea Level Rise
SSSI	- Sites of Special Scientific Interests
SW	-South West
TA	-Total Alkalinity
TMDL	- Total Maximum Daily Load
TN	- Total Nitrogen
TP	- Total Phosphorous
TOR	- Terms of Reference
UDA	- Urban Development Authority
UN	- United Nations
UNCED	- United Nations Conference on Environment and Development
UNCSP	- United Nations Committee to Stabilize the Population

UNFCC	- United Nations Framework Convention on Climate Change
UNEP	- United Nations Environmental Program
US	- United States
WMO	- World Meteorological Organization