Environmental Information System INDIA

coast track

Issues and Challenges in Coastal Management

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ENVIS - MoEF Newsletter on Coastal Zone Management and Coastal Shelterbelts

Vol.8 (1) June 2009
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Prof. Dr. P. Mannar Jawahar, Vice-Chancellor, Anna University Chennai inaugurating the DANA BERGH Hall and the ENVIS library at the Institute for Ocean Management, Anna University Chennai.

Coast track
Issues and Challenges in Coastal Management

Oceans are warming in the 0 – 300m layer, which is the zone where most of world's fisheries exist. It is well recognized that the world's most vulnerable nations such as India, will bear the brunt of escalating greenhouse gas emissions, primarily through reduced food and water availability. While agriculture and water resources seem to be the central focus of climate change specialists, the effects of climate change on marine fisheries resources — and the implications for health and livelihoods in the developing world — have been largely ignored or understudied.

We are aware that climate change is expected to drive most marine species ranges toward the poles, expanding the range of warmer water species and contracting that of colder-water species, and deepening of assemblages. Fisheries are already under tremendous pressure from over fishing, habitat loss, pollution and a range of other factors. Such precipitation increases in the equatorial and high latitude oceans would make the water fresher and a decrease in precipitation across the subtropical oceans would increase the seawater salinity. Thus the physical, biological and ecological impacts of climate change in marine ecosystems are becoming increasingly apparent.

This issue of Coast Track provides readers an insight into the impacts of climate change on global fisheries. Based on these articles and on short news clippings provided in this issue, one realizes that predicting the impact of climate change on fisheries presents a formidable challenge!

Editor...

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Important websites

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2. www.iomenvis.nic.in
3. www.annauniv.edu
4. www.annauniv.edu/iom/home.htm

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Fisheries and Climate Change

Ahana Lakshmi and R.Ramya

Image source: http://www.conservefish.org/storage/marinefish3/images/fl_keys.jpg

Introduction

Fisheries, till recently, was not considered of major importance in the discussions about climate change though the IPCC reports have talked about the impact of climate change on Fisheries. The impacts and threats posed by climate change for fisheries were first raised at the 27th Session of the Committee on Fisheries (COFI) of the Food and Agriculture Organization (FAO) of the United Nations in 2007. In the short time since then, a number of reports have become available on the various aspects of fisheries and climate change and the subject has received sufficient importance that the FAO along with other international organizations released a policy brief on 2nd June 2009 to ensure that "decision makers and Climate Change negotiators consider aquatic ecosystems, fisheries and aquaculture at the UNFCCC COP-15 in Copenhagen in December 2009.

IPCC on Fisheries

What are the ways in which climate change is expected to impact fisheries? The answer is it is expected at both the level of the fish stocks and at the level of the communities who are dependent on fisheries for food and livelihood. What do the IPCC reports have to say about this? A quick summary :

- Globally, saltwater fisheries production is hypothesized to be about the same, or significantly higher, if resource management deficiencies are corrected. Also, globally, freshwater fisheries and aquaculture at mid-to-higher latitudes could benefit from climate change. Medium Confidence
- Local shifts in production centres and mixes of species in marine and fresh waters are expected as ecosystems are displaced geographically and changed internally. High Confidence
- Positive effects such as longer growing seasons, lower natural winter mortality and faster growth rates in higher latitudes may be offset by negative factors such as a changing climate that alters established reproductive patterns, migration routes, and ecosystem relationships. High Confidence
- Changes in abundance are likely to be more pronounced near major ecosystem boundaries. The rate of climate change may prove a major determinant of the abundance and distribution of new populations. Rapid change due to physical forcing will usually favour production of smaller, low-priced, opportunistic species that discharge large numbers of eggs over long periods. High Confidence
- Marine stocks that reproduce in freshwater (e.g. salmon) or require reduced estuarine salinity will be affected by changes in temperatures and the amount and timing of precipitation and on species tolerances. High Confidence
- Where ecosystem dominances are changing, economic values can be expected to fall until long-term stability (i.e. at about present amounts

Photo by IOM Staff

of variability) is reached. Medium Confidence

- Subsistence and other small-scale fishers who lack mobility and alternatives, and are often the most dependent on specific fisheries, will suffer disproportionately from changes. Medium Confidence
- Because natural variability is so greatly relative to global change, and the time horizon on capital replacement (e.g. ships and plants) is so short, impacts on fisheries can be easily overstated, and there will likely be relatively small economic and food supply consequences so long as no major fish stocks collapse. Medium Confidence

When we talk of fisheries, there is the need to differentiate between 'capture' and 'culture' fisheries as well as 'marine' and 'inland' fisheries. In this paper, the focus is on looking at climate change impacts on marine capture fisheries.

Over three quarters of the global aquatic production is from marine fisheries and about sixty four percent of the total production of fish, crustaceans and molluscs come from capture fisheries in 2006. At least seventy per cent of the world's fish stocks are estimated to be fully exploited, overexploited or recovering from a period of depletion. It must also be pointed out that more than 60 per cent of the capture fisheries operate in nearshore coastal waters. The annual production of fish has been falling in general mainly because of over fishing and the use of trawlers in nearshore waters, destruction of habitat (e.g. coral reefs, mangroves) which serve as spawning grounds and nurseries for a number of commercially important fish and shellfish. To these pressures, we need to add the issue of climate change.

Impacts of climate change on fisheries

The impact of climate change on fisheries is very complex and needs to be looked at under two major categories:

a) Impact on fish stocks i.e. the impact of physical variables on ecosystem processes and
b) Impact on communities i.e. the social and economic dynamics of fishing fleets and communities and their capacity to adapt to change

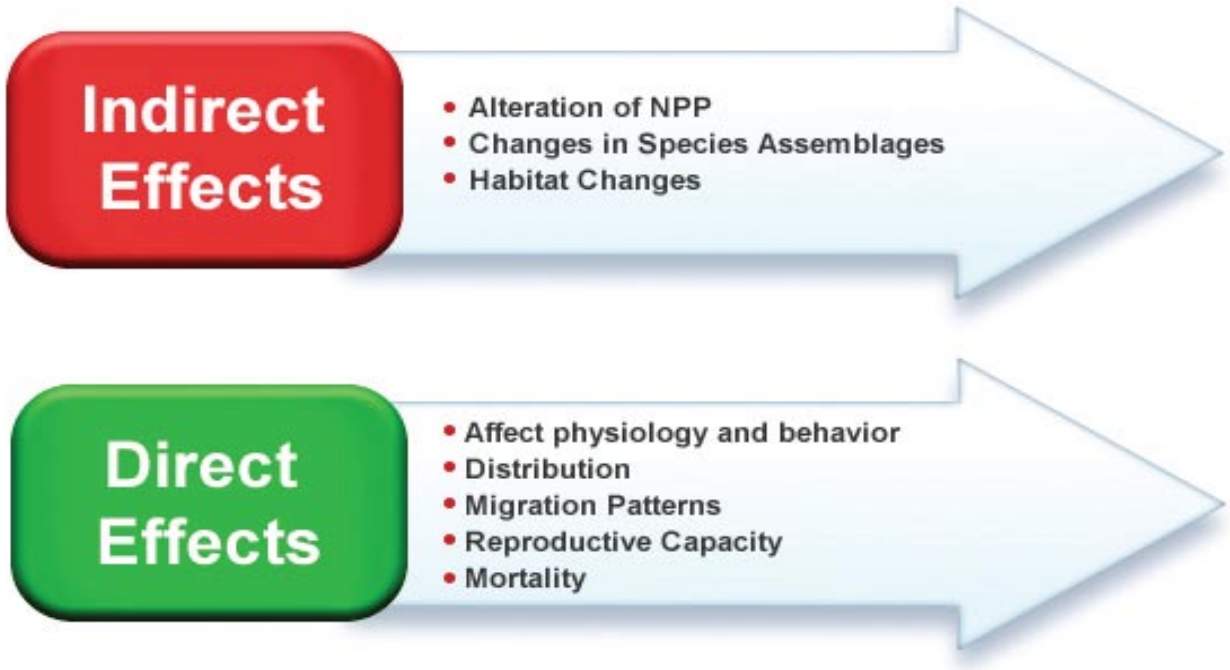
Impact on fish stocks

Impacts could be direct or indirect as indicated in the graphic below:

Indirect Effects

Alteration of NPP (Net Primary Productivity)

The key physical drivers in the coastal/marine ecosystems are air and water temperature, precipitation, evaporation rates, salinity, ocean circulation and mixing, river flow, and nutrient levels. Phytoplankton are the primary producers in aquatic ecosystems. The productivity of ocean waters depends on phytoplankton blooms which depend on nutrient availability which in turn depend on the upwellings which are controlled by the temperature



changes of the various water layers. Increase in ocean temperature can thus change the timing of the blooms. This in turn could result in a mismatch between prey (phytoplankton) and predators (including larvae, juveniles and herbivorous fish) resulting in a cascading effect on the food web of the area with unpredictable consequences for fish production. It is already reported in both the Pacific and Atlantic Oceans that nutrient supply to the upper productive layer of the ocean is declining because of reduced meriodional overturning circulation, increased thermal stratification, and changes in wind borne nutrients.

Changes in species assemblages

Alteration in the food chain and food web could eventually result in alteration of species assemblages because of changes in food availability, species specific differences in thermal tolerances, disease susceptibility and shifts in the competitive advantage of species. The IPCC Assessment Report IV (2007) says that there is high confidence that there would be shifts in ranges and changes in algal, plankton and fish abundance in high latitude oceans.

Habitat Changes

Direct physical alteration of coastal habitats such as sea grass beds, coral reefs, mangroves and estuaries has been extensive in many areas due to human interference. Recovery of such systems can be delayed because of additional stresses due climate change factors such as temperature, salinity and water levels. For example, coral bleaching is a well known phenomenon due to the rise in sea surface temperature and has resulted in the death of coral reefs and the loss of fish species supported by them. In places where such events have occurred, the recovery of the ecosystem has been slower because of additional stress such as pollution due to sewage out falls leading to slime layers covering the reefs, invasive alien species etc. In addition, climate change is also expected to increase the number of extreme events such as tropical cyclones. For example, tropical cyclone Nargis reportedly caused the destruction of some 17,000ha of natural forest. Sea level rise and the increased penetration of seawater is believed to be preferentially increasing the halo-tolerant mangroves in the Sunderban. This could result in an increase in the brackish water fish and a decrease in the freshwater fish.

Direct effects

Direct effects of climate change affect the physiology and behavior of fish. The distribution of fish is controlled by water temperature as fish are cold blooded *(poikilotherms)*, unable to maintain their body temperature. Therefore, increasing water temperatures make the fish move to waters more suitable to them. This has been observed with many species making a pole ward shift. In India, for example, Dr. E. Vivekanandan, Senior Scientist, Central Marine Fisheries Research Institute, highlighted that some of the common fish species such as Indian Mackerel and Oil Sardines, have been moving towards the northern waters of Maharashtra and Orissa, where the temperature is cooler than those in the Arabian

Source: http://bluejakarta.wordpress.com/2009/05/13/friday-cant-come-soon-enough/

Source: www.thehinduonline.com

Sea and the Bay of Bengal near Kerala and Tamil Nadu .

It is also believed that there are likely to be outbreaks of fish and shellfish diseases. Mass mortalities of certain species have been associated with the spread of certain pathogens, earlier kept in check because of average lower winter temperatures. With the increasing few episodes of the low temperatures because of warming oceans, it is expected that many of the diseases will exhibit a pole ward shift. Similarly, metabolic stresses have been found to result in excess mortality when summer temperatures reached and stayed at higher than normal levels. Other direct effects could be changes in salinity patterns – for example, the intrusion of seawater further inland due to sea level rise could result in increase in brackish or saline tolerant species whereas increased glacial snow melt and larger quantities of freshwater due to this or due to higher precipitation levels could favour freshwater species.

Impact on Communities

Fishing communities that are highly dependent on aquatic resources may face increased vulnerability in terms of less stable livelihoods in two major ways:

Decrease in availability of quality/quantity of fish for food: Considering that Fish (including shellfish) provides essential nutrition for 3 billion people and at least 50% of animal protein and minerals to 400 million people from the poorest countries, this is a major food-security concern.

Higher fishing risk: With dropping catch per unit effort (CPUE), many fishers, especially small scale/ artisanal fishers, are having to fish further away from their usual areas. This could translate directly into higher risk. In addition, increase in sudden storms and bad weather due to climate change effects could also increase risk because of the need to fish under harsher environmental conditions.

Most marine fishing communities are located at the edge of the sea and hence are vulnerable to sea level rise and coastal flooding. Of these, those at high risk live in deltas (e.g. Sunderban) and coral atolls. Many fisheries-dependent communities already live a precarious and vulnerable existence because of poverty, lack of social services and essential infrastructure. Allison et al. (2009) used an indicator based approach to compare the vulnerabilities of 132 nations to potential climate change impacts on their capture fisheries. They found that countries in central and western Africa as well as some in Asia were most vulnerable. Many of the vulnerable countries were also ranked amongst the world's LDCs, among the world's poorest and twice as reliant on fish.

Another point that is also coming up for review is the carbon footprint of marine capture fisheries. With fish stocks moving away from their usual grounds, fishers are forced to spend more fuel to reach the new fishing grounds apart from having to invest more in post harvest processes such as refrigeration.

Conclusions

Oceans play a crucial role in climate change because of their ability to absorb radiation and carbon dioxide and also the role they play in the water cycle. The impact of climate change on fisheries has not been given much importance till recently because of the slower showing-up of climate change effects on coastal and marine ecosystems and the fact that climate change is a stress in addition to pollution and habitat degradation. The ocean ecosystem is complex and we have only patchy information regarding the world's fisheries are likely to be impacted by climate change. Capture fisheries harvest wild populations which have large ranges and are part of natural ecosystems and are therefore difficult to monitor and understand because their population depends on environmental processes governing the supply of young stock as well as feeding and predation conditions through the life cycle. Many fish also migrate long distances across territorial waters and EEZ of different countries

through multiple territorial waters. However, it is clear that climate change can have direct as well as indirect effects on fish populations in the wild. In addition to impact on fish stocks, climate change can affect communities highly dependent on these fish stock for livelihood and food security. It is clear that policies and actions that involve ecosystem approach to management only can help in mitigation of adverse impacts of climate change apart from awareness, preparedness and promoting Disaster Risk Reduction (DRR) systems in fishing communities.

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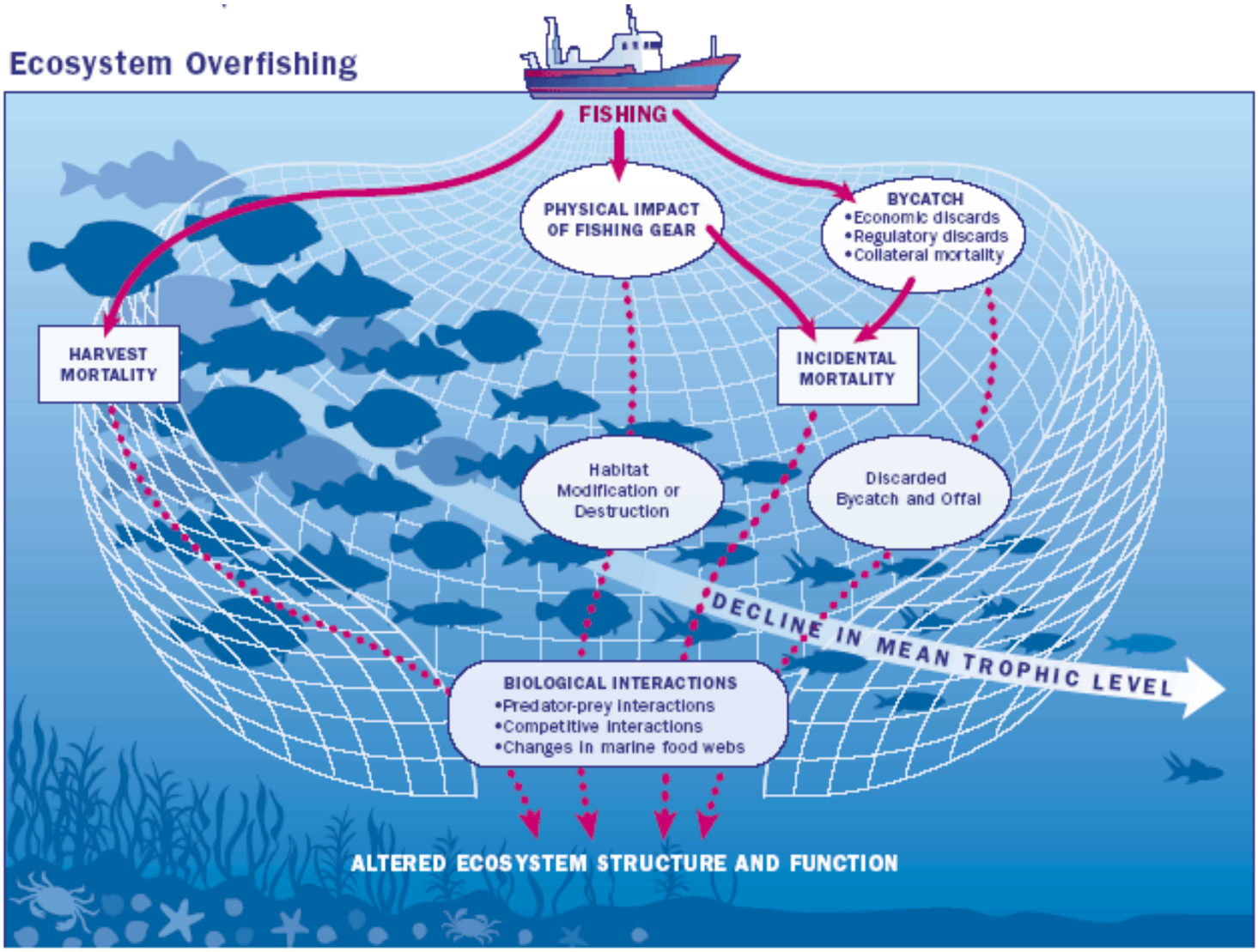

Source: Adapted from Pauly et al., 1998; Goñi, 2000.

Art: John Michael Yanson

Global Warming and its impact on Marine Fisheries in India

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Introduction

Global warming and the resulting climate change are among the most serious environmental problems facing the World Community. Climate is the description of the long term pattern of weather in a particular area. Climate change does not take place overnight. It takes a large time for the climate to change. Changing climate will affect people around the world. Rising global temperature is expected to raise sea levels and change precipitation and other local climate conditions. Since preindustrial times increasing emissions of Green House Gases, (GHGs') due to human activities have led to marked increase in atmospheric GHG concentrations. Recently concluded Intergovernmental Panel on Climate Change (IPCC) has projected some impacts due to climate change in different parts of the world.

The seas around us dictate terms in deciding the climate and weather. They cover around 70 % of the global surface and play a vital role in sustaining biodiversity. They also provide protein rich sea food to the humans and offer very valuable medicines through their diversified immense resources from their surface to the floor. The seas also offer employment opportunities to millions of people through fishing and coastal aquaculture activities. Such an important marine ecosystem is jeopardized due to global warming. The fisheries are more depended on climatic conditions. Information on the likely impacts of climate change for marine fisheries is limited. Moreover, the inherent and predictability

of climate change and its mechanisms of impacts on marine fishery resources are complex. Efforts should be made to increase the understanding of how and why climate change may affect marine fisheries and coastal aquaculture. The climate scientists are expecting an average temperature increase of 1.4° C and 5.8° C over the next 100 years. This will also wide spread impacts on climate condition all over the world.

Fisheries and Fishing Community

The impact of temperature rise on fish populations is not adequately known because of lack of long-term research monitoring on the subject. But with coastal fishery resources under pressure because of over fishing, pollution, tourism and urbanization and other anthropogenic factors, climate changes will likely aggravate the situation to the stage of no recovery.
Large scale marine fisheries production is not under immediate threat due to climatic changes. The fisheries most sensitive to climate change are among those most affect by the human interventions - such as those in dams, wetland, coastal areas, manipulated habitats and areas affected by population growth. The majority of coastal community particularly fisher folk depended on fishing activities will be affected. The effort would entail identifying ways to support their livelihoods, relocation and rehabilitation.

Climate Change impact on Fisheries

The effects of climate change on fisheries are likely, therefore, to be more severe. One reason could be that the effects of global warming on fish stocks and their migrations are extremely difficult to predict. There are two main uncertainties in the casual chain form global warming to the fisheries. First, the impact on ocean temperature and currents is uncertain, not just in magnitude but possibly also with respect to direction. Second, even if we knew the change in temperature and ocean currents, we would not necessarily know the effect on abundance and migrations of fish stocks. Nevertheless, it appears that little research has been done on the possible consequences of climate change for fisheries.

Most fish species have a fairly narrow range of optimum temperatures related to both their basic metabolism and the availability of food organism that have their own optimum temperature ranges. Depending on the species, the area it occupies may

Source: http://endoftheline.com/files/38211232614319diver-fish-shoal-555.jpg

expand, shrink, or be relocated with changes in ocean conditions.

Marine ecosystems are not in a steady state, but instead are in a constant state of change that varies on many spatial and temporal scales. Fish populations respond to this variability in different ways. For example, during short-term weather changes such as storms, fish may refuge from rough conditions through minor changes in distribution. Inter-annual changes in the ocean environment, on the other hand, may result in changes in the distribution patterns of migratory fishes and affect reproduction and recruitment in other species. Moreover, decadal and longer-scale variations may have others impacts, including cyclic changes in the production level of marine ecosystems in ways that may favour one species or group over another.

Long-term records of the abundance for most species are limited to historical commercial and recreational landings. These records are often influenced by economic factors such as the relative price paid for different types of fishes, and changes in fishing methods and fishing efforts. The non-climatic factors often obscure climate–related trends in fish abundance. Most studies of variations in ocean climate and their relationships with fish abundance have been on inter-year time scales.

Changes in fish distribution and abundance

For fishes, climate change may strongly influence distribution and abundance through changes in growth, survival, reproduction, or responses to changes at other trophic levels. Changing seawater temperature and current flows will likely bring increases, decreases and shifts in the distribution of marine fish stocks, with some areas benefiting while other lose. These changes may have impacts on the nature and value of commercial fisheries. Species-specific responses are likely to vary according to rates of population turnover. Fish species will more rapid turnover of generations may show the most rapid demographic responses to temperature changes, resulting in stronger distributional responses to warming.

Indian seas

In the Indian Seas, similar trend has been noticed on the distribution of the oil sardine *(Sardinella longiceps*) and the Indian mackerel (*Rastrelliger kanagurta*) as a consequence of seawater warming. These small pelagics, which were predominant along the southwest coast of India, have extended (not shifted) their northern boundary up to Gujarat in the Northwest coast and West Bengal in the Northeast coast. The Indian mackerel is noticed to descend to depths to avoid higher sea surface temperatures. These are a few strategies adopted by fishes to migrate seawater warming.

Climatic Sensitivity of migratory species

Tuna, in general, are fast swimming top predator species whose high metabolic requirements must be supported by ready access to rich food sources. Their migratory patterns are closely governed by ocean processes that create a conjunction between suitable physical habitat (in terms of temperatures and adequate oxygen) and adequate food sources. The tunas are constantly swimming in search of food – in some circumstances needing to consume as much as 15 % of their body weight per day. As a result, the areas of tuna concentration are by low means casual, and migration take place according to hydrological routes; in which each species finds the optimum environment for survival in every stage of its existence. As they are so energy-consuming, they are dependent on ocean processes and features which promote the aggregation of the prey resources which they must find within finite time periods, or die. These are the fronts, thermoclines and productive shoal regions of the ocean. Climate plays a large role in determining short-term, seasonal and multi-year patterns of variability in the location and productivity of these optimal tuna habitat zones.

Tropical tunas, including skipjack *(Katsuwonus pelamis)*, yellowfin *(Thunnus albacares)* and bigeye *(Thunnus obesus)* tend to be fast growing and relatively short lived. Climate variability has demonstrable impacts on the abundance, concentration, location, and catchability of tropical tuna stocks. Climate variability drives seasonal changes in the location of the most productive fishing grounds. It also leads to changes in abundance and catchability that are not properly understood. There is evidence that

operators of modern tuna fleets are actively using the available information on climatic/ oceanographic impacts on tuna stocks to guide their harvesting operations. Furthermore, intensive scientific research efforts are underway seeking to further clarify these relationships, with the goal of improving predictability. For example, a major international collaborative research effort is now being organized as the Climatic Impacts on Oceanic Top Predators (CLIOTOP) Project under the auspices of the International Geosphere-Biosphere Programme-Global Ocean Ecosystem Dynamics (IGPB-GLOBEC) Program. The effects of changed fish migrations and distribution caused by climate variability and climate change are likely to be most difficult to deal with for highly migratory species, such as tuna.

Impact on Coastal Aquaculture

Climate changes predicted as a result of increases in green house gases are likely to impact farming systems. The changes are sea level rise, higher tropical surface temperature, increased tropical cyclone frequency and severity and changes in cloud cover precipitation. Rising sea level inundate coastal aquaculture farm lands enhance salt water intrusion make coastline retreat and force shift to more salt tolerant activities like shrimp farming. Changes in precipitation reduce on returns on existing water resources, reduce plant propagation and aggravate plant disease patterns.

Mean sea level is predicted to rise by 10-90 centimeters during this century, with most predictions in the range of 30-50 centimeters. Towards the end of 21st century, projected sea level rise will affect low-lying coastal areas with large population. This will damage many coastal ecosystems such as mangroves and salt marshes, which are essential for maintaining many wild fish stocks, as well as supplying seed to aquaculture. Mangroves and other coastal vegetation defend the shore from storm surges that can damage fish ponds and other coastal infrastructure and may become more frequent and intense under climate change. A number of studies have identified possible adaptation strategies for mangrove systems that include raising awareness of the importance of these areas among local communities and leaders, identifying critical areas, minimizing stress unrelated to climate, maintaining ecosystem connectivity, coastal planning that facilitates retreat inland, developing alternative livelihoods, and restoring coastal ecosystems. Research to develop these strategies and the means to implement them is desperately needed.

Higher sea levels may make groundwater more saline, harming freshwater fisheries, aquaculture and agriculture and limiting industrial and domestic water uses. Increased inland groundwater salinity has been observed in Bangladesh in recent decades. Along with the negative consequences, however, there may be benefits in the form of increased areas suitable for brackish water culture of high-value species such as shrimps and mud crab. This situation demonstrates the importance of maintaining people's capacity to recognize and take advantage of opportunities and how aquaculture can play an important role in diversifying livelihoods. Coastal planning should take into account the impact of climate change especially on sea level rise, higher temperatures, prolonged droughts, severe rainfall, cyclones and storm surges. Integrated coastal zone management is essential for coastal zone regulation and planning, monitoring and evaluation.

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Towards a Shared Environmental System - The ENVIS Context

S.A.Swamynathan, Prof. R. Ramesh &

Purvaja Ramachandran

Environmental Information System plays an important role in decision making, helping policy makers to frame regulation for sustainable use of environmental resources. Shared Environmental Information System plays a vital role in integrating environmental information from various sources thus providing a common area for exchange of information.

Reliable, accessible, timing and structured data on the environment is a key factor in decision making and formulating effective polices. The effects caused by forest fires, floods, droughts and failed monsoons demands timely information to address the issues. Tackling today's environmental challenges such as global warming, Climate change, managing ecosystems and natural resources in a sustainable manner, protecting biodiversity, preventing and managing environmental crisis such as floods, forest fires and water scarcity depend on the assessment of data from a variety of sectors and sources.

A vast range of environmental data is collected across and India, providing valuable information for policy makers, researches, and to the public. The importance of Shared Environmental Information System is now shaping up for every nation that has to utilize the latest information and communication technology that will provide decision makers at all levels with real time environmental data, thus allowing them to make immediate and life saving decisions.

About ENVIS Program

ENVIS is a decentralized system with a network of distributed subject oriented Centers ensuring integration of national efforts in environmental information collection, collation, storage, retrieval and dissemination to all concerned. Presently the ENVIS network consists of Focal Point at the Ministry of Environment and Forest and ENVIS Centres setup in different organizations / establishments in the country in selected areas of environment. These Centers have been set up in the areas of pollution control, toxic chemicals, central and offshore ecology, environmentally sound and appropriate technology, biodegradation of wastes and environment management, etc.

ENVIS is a structured programme formulated by Ministry of Environment & Forest (MoEF), Govt. of India. This programme has various thematic areas like which are represented by an ENVIS mode. ENVIS nodes are generally a Academic Institute, Government Departments and research organizations. Each code represents one of the themes listed below.

To strengthen ENVIS in disseminating information pertaining to environment and sustainable development, ENVIS India is in the process of establishing Eighty Five ENVIS Nodes by involving Organizations, institutions, Universities and Government departments working in diverse areas of environment.

The ENVIS Nodes are classified under seven major thematic areas which includes

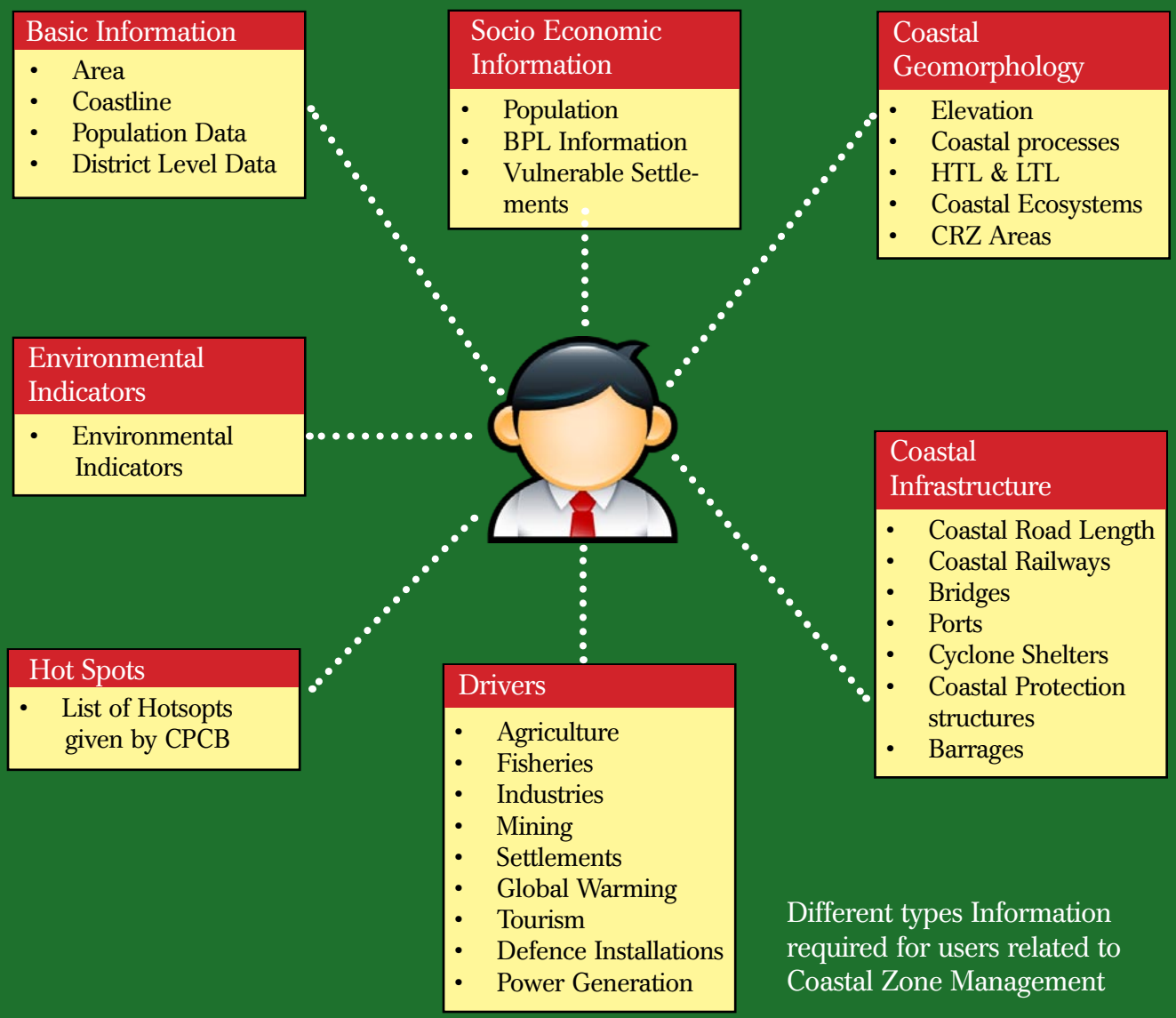
- Ecology and Ecosystem
- Status of Environment
- Chemicals, Wastes and Technology

- Trade and Law
- Media, Environment Education & Sustainable Development
- Flora, Fauna and Conservation
- Environment and Energy Management

Each node maintains an Information System based on their thematic area which includes a static / dynamic database. The database includes real time data of their respective subject area, Abstracts, Experts Information, and Articles etc. As every ENVIS centre maintains a separate Information system, very little integration is seen among the different information systems maintained by ENVIS Centers. A user may have to visit different web sites to access information at one central location, where environmental facts of all nature are available. A user most importantly would like to relate available environmental data. For example a coastal manager would like to access information about agriculture, pollution, hazards and climate change, mangroves and coral reefs, Land use land cover details etc. All these information may come from different sources and it's very important for a user to access all these information on a shared area. A possible framework of Shared Information system for the ENVIS network could be developed thus ensuring easy accessibility to various environmental data.

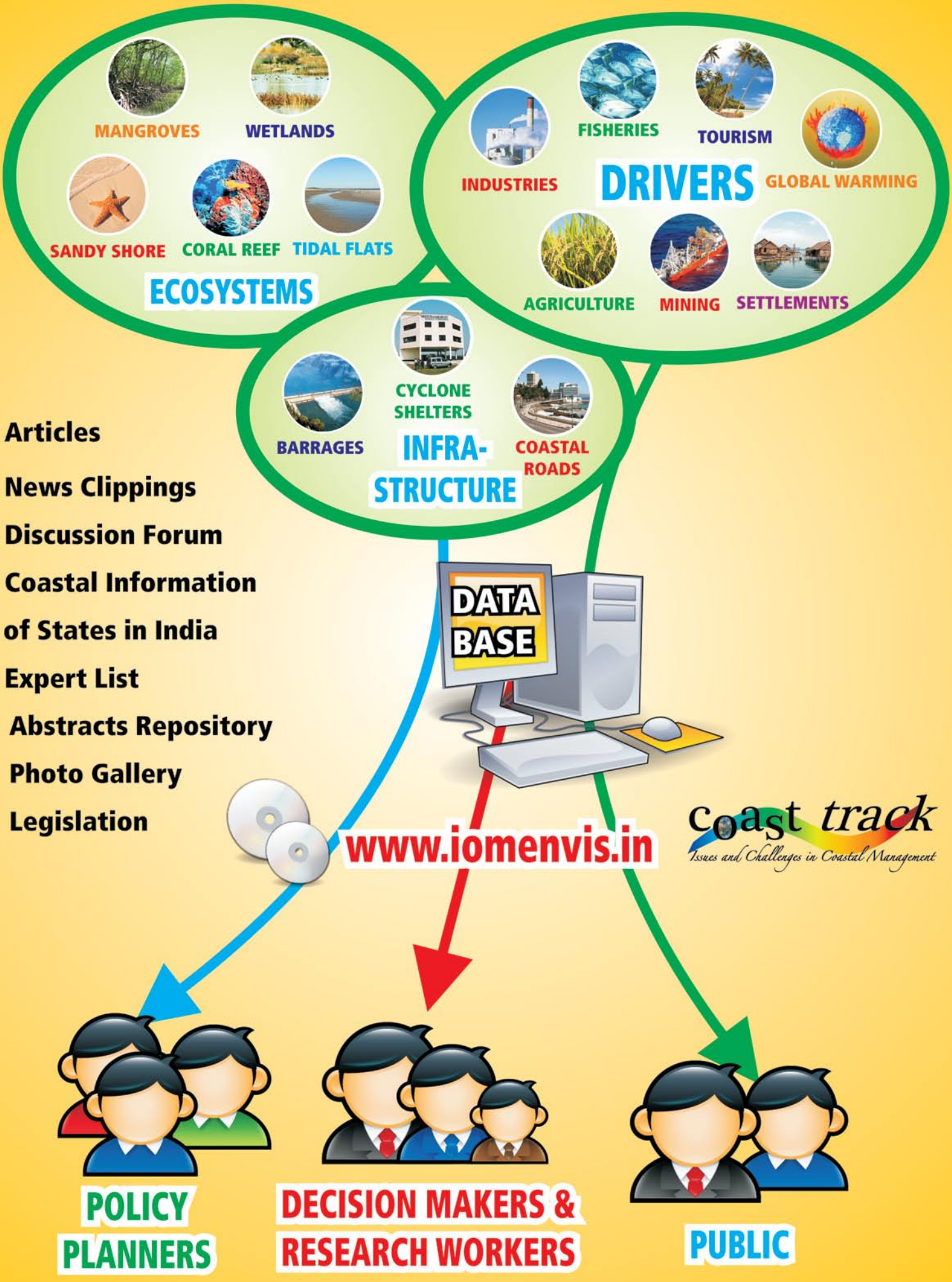
What is Shared Information System?

Shared Information System is a data sharing process with the support of latest information and communication technology (ICT) on the various available environmental data pertaining to various elements of environment. Shared Environmental Information System is popular among the European Union and is widely used by them. It will be based on technologies such as the internet and Satellite system and thus make environmental information more readily available and easy to understand to policy makers and the public.

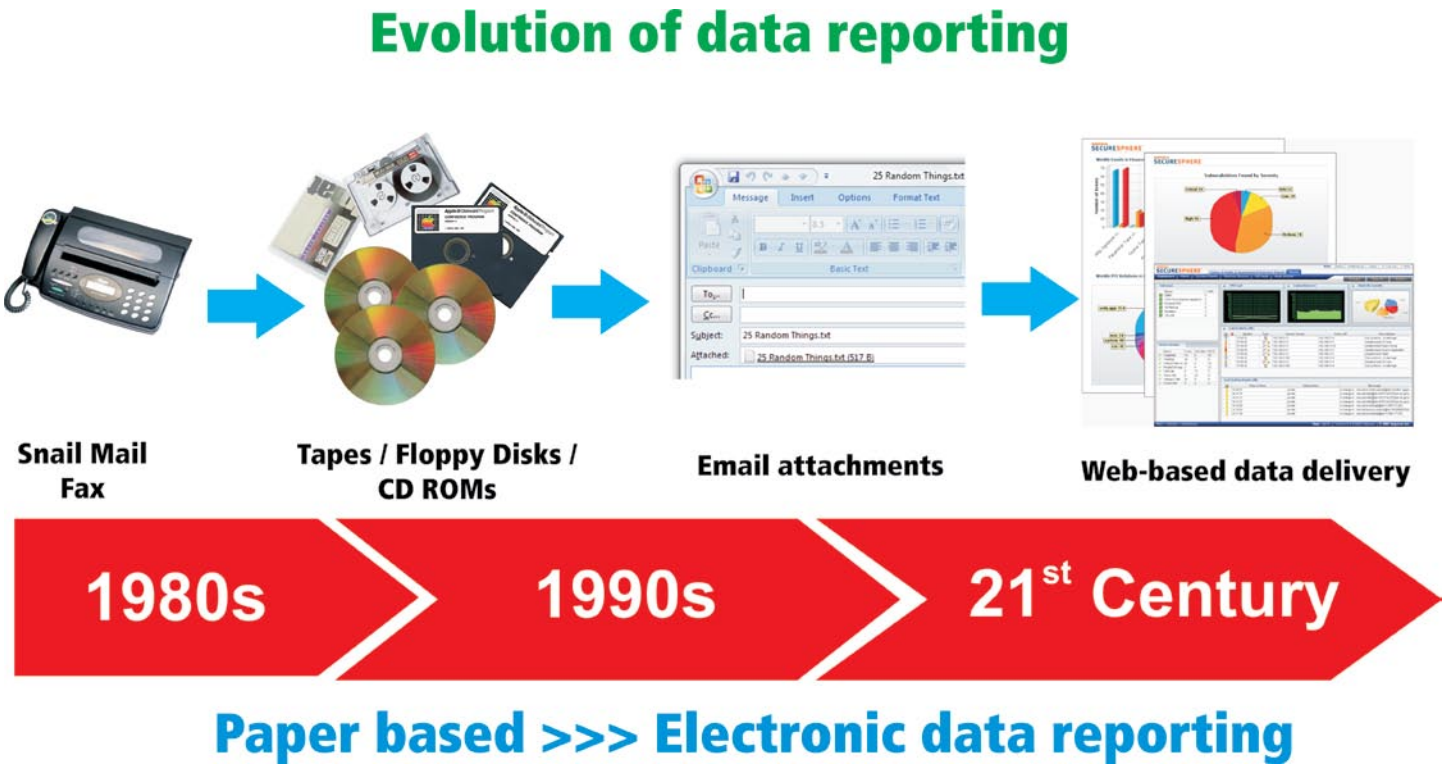


Different types Information required for users related to Coastal Zone Management

Diagram showing the flow of information in a system maintained by a ENVIS Centre for Coastal Zone Management and Coastal Shelterbelt



- Articles
- News Clippings
- Discussion Forum
- Coastal Information of States in India
- Expert List
- Abstracts Repository
- Photo Gallery
- Legislation



The diagram show low information systems have evolved from the basics right from paper based reporting system to the latest technology embracing Shared Environmental Information System.

Why Shared Environmental Information System?

Sound Policy making is the result of best utilization of timely and reliable information on the state of environment. Policy makers and the public need to know in a timely manner the following details

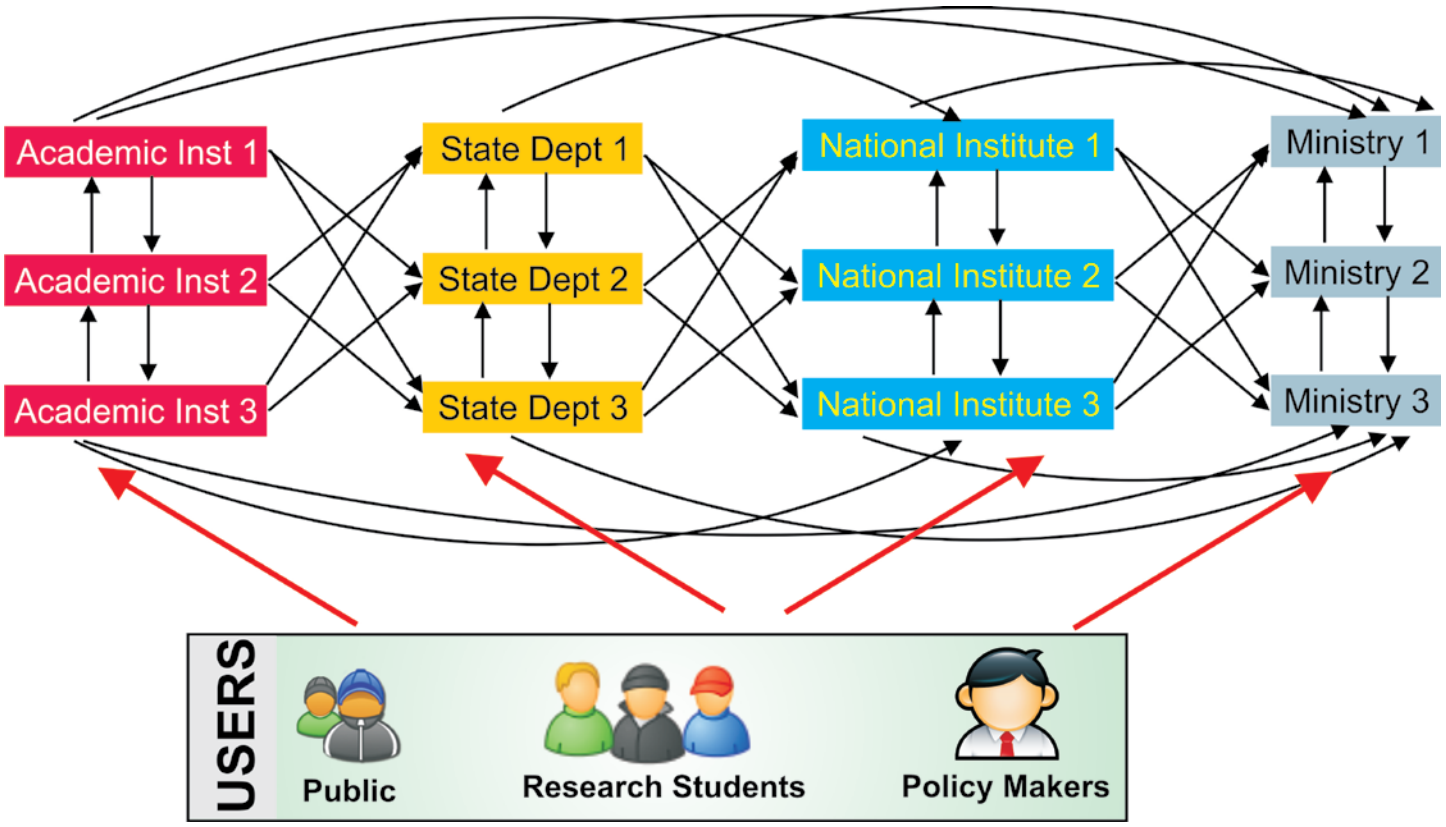
1. How is our city becoming polluted?
2. What is the severity of the pollution?
3. What are the safer levels of pollution?
4. Are there enough policies and regulation to control pollution in our city?

The environment Information should be made available to all in a way that everyone can understand the changes to the environment and their impact. Sound information on the state of the environment and on key trends, pressures and drivers for environmental change is essential for the development of effective policy and its implementation and for empowering citizens more generally. As the environment is a public good that belongs to everyone, it is equally essential that this information be widely shared and available. A large amount of environmental data is collected by various levels of government authorities throughout India. This information is used to analyze trends and pressures on the environment and is vital when drawing up policy or assessing whether policy is effective or being properly implemented. At present, this wealth of information is neither made available in a timely manner nor in a format that policy makers and the public can readily understand and use. This is due to a range of obstacles of a legal, financial, technical or procedural nature.

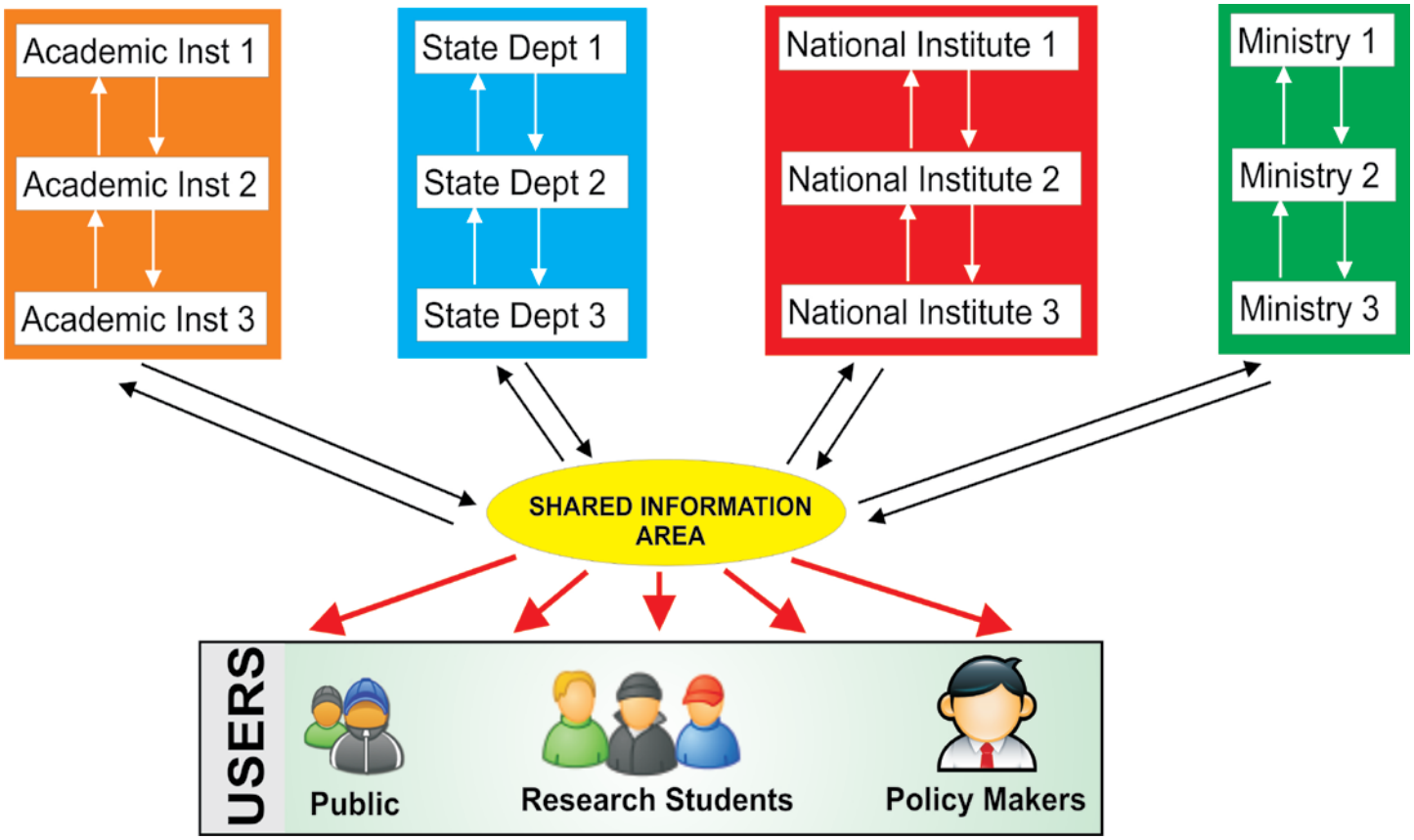
Shared Information System - The ENVIS context

Shared Environmental Information system will take advantage of the possibilities provided by information and communication technology to put into practice the principle 'monitor once for timely and multi-purpose uses' . This will enable real-time data to be made available to decision-makers and allow them to make immediate and life-saving decisions. Shared Environmental Information System will allow data to be seamlessly combined with information from various sources and thus quickly perform cross thematic and cross-sector analyses that environmental policy requires. For example, the health effects of air pollution can be evaluated if statistics on air quality, population concentrations and health statistics are overlapped for a specific region or geographical area and analysed collectively. Action can then follow based on the results.

Current flow and exchange of information across the ENVIS Network



Flow and exchange of information on a Shared Environmental Information System adapted for ENVIS Network



Benefits of Shared Environmental Information System

Better regulation, better policy

Shared Environmental Information System will simplify the reporting and accessing of environmental information. While simplification is an essential element of drafting better legislation, better policy does depend on high quality, relevant and timely information . Reducing the administrative burden must indeed lead to an improvement and not a deterioration in the quality of public policy and regulation.

Environmental data and information can be used by many players for a number of purposes. Improving the mechanisms for collecting, exchanging and using the data can significantly increase the use of environmentally-relevant data at least cost to users. This will improve the effectiveness of environmental policy and lead to better-informed policy discussions and decisions on pressing environmental challenges such as adapting to climate change, managing ecosystems and natural resources in a sustainable manner, protecting biodiversity, managing water resources, and preventing and managing environmental crises such as floods and forest fires.

Empowering citizens

Shared Environmental Information System will also empower the citizens. It will provide them with useful environmental information in their language, thus enabling them to make informed decisions on their environment, including in cases of emergency and to influence public policy.

Simplification and Efficiency

The benefits of Shared Environmental Information System as a decentralised information system based on data-sharing are compelling. It will offer States and institutions a modern and efficient electronic system to fulfil their reporting obligations related to environmental policies. By doing away with paper reporting, the process through which environmental information is made available will be simpler, more flexible and more efficient. Shared Environmental Iinformation System will also allow the information requirements currently contained in thematic environmental legislation to be streamlined. In terms of cost it is estimated that great savings can be made by improving the efficiency of data-gathering conducted by States. Greater harmonisation and prioritisation of monitoring activities organised at national and regional level is likely to be particularly effective in improving the cost-efficiency of current investments.

Boosting Innovation and Intelligent eServices: eGovernment, eEnvironment

Shared Environmental Information System will also boost the development of intelligent e-services (e-Government, e-Environment, e-Reporting) by taking advantage of data sharing infrastructures. These include services such as:

- 'what is in your backyard' ;
- alert-broadcast systems;
- decision support systems based on integrated assessment and geographic information services to assist the decision making on:

1. pressing environmental issues,
2. the prevention and management of environmental crises and,
3. the implementation and effectiveness of environmental legislation in particular those that require holistic, integrated approaches such as the Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA).

Information is the currency of democracy". Effective public participation in the taking of decisions enables the public to express, and the decision-maker to take account of opinions and concerns which may be relevant to those decisions, thereby increasing the accountability and transparency of the decision-making process and contributing to public awareness of environmental issues and support for the decisions taken. To achieve effective public participation in the decision-making affecting the environment, the public must have access to environmental information, data and knowledge.

Websites referred to:

1. www.ec.europa.eu
2. www.iomenvis.in
3. www.envis.nic.in
4. www.envfor.nic.in

TITBITS

International Group of Scientists Warn Coasts in Crisis

More than 40 international economic, social science and natural science experts are warning that coastal systems across the globe are at risk due to the loss of coastal sea grass ecosystems. The scientists recently concluded a five-day workshop, near Oslo, Norway to review the impacts of development in the coastal zones across the globe, and to identify gaps in knowledge and define priorities for future research. While the group outlined several issues harming coastal areas, scientists cited were most concerned that the combination of globalization and climate change are the greatest risk to the long-term health of the coasts. "There are problems of scale" said Dennis Swanney , but coasts are now in the "frontline of the battleground of global and climate change", said Peter Burbridge.

Courtesy: Google Images

"Globalization comes at a price to the inhabitants of the coastal zone," said Denis Bailly. "The resources of the coastal environments and the opportunities for the sustainable utilization of coastal ecosystems are being squandered by over exploitation. Innovation is needed to solve the widespread problems if we are to turn the tide of losses," said Micheal Orbach.

Alice Newton diagnosed that our coasts are suffering from a "global coastal syndrome," where artificially growing mega cities and the addition of hardened shorelines and contributing to the loss of natural resources. "The treatment and cure of coastal syndrome includes renewable energy, recycled water and solid waste, sourcing locally grown foods and attention to social equity issues, especially in education and health care," said Bill Dennison . "By investing in 'soft' engineering for coastal defense, spatial planning and managed realignment, we can give our coastal ecosystems a fighting chance," said Kerry Turner.

"Coastal squeeze is trapping inhabitants between the Devil and the deep blue sea," said Laurence Mee". "With 45 percent of the world's population living on the 5 percent of land adjacent to the coast, pressures on remaining coastal sea grass meadows are extremely intense. As more and more people move to coastal areas, conditions only get tougher for mangroves, salt marshes and sea grass meadows that remain."

"Governments at all scales, from local to international have failed to seriously implement integrated coastal zone management. This has placed people at risk of disasters such as hurricane Katrina and the Banda Aceh tsunami," said Nancy Rabalais. "We must enable governance at all scales from intergovernmental engagement to the individual, personal choices that may counteract the tyranny of small decisions " said Stephen Olsen.

For more information please visit www.loicz.org

Land - Ocean Interactions in the Coastal Zone

Halting destruction of natural sea defenses could protect millions of people

An international gathering of coastal experts warns that the global loss of underwater coastal "meadows" and mangroves must be halted to reduce hurricane impact.

The world's sea grass meadows, salt marshes and mangroves – vital components of a healthy coastline – have shrunk say the marine researchers at a five-day workshop in Oslo, Norway. With 45 percent of the world's population living on the 5 percent of land adjacent to the coast, pressures on remaining coastal sea grass meadows are extremely intense.

These large ecosystems – that make up of the world's coasts (or some such figure) – protect homes and businesses from the worst ravages of hurricanes and tsunamis. As more and more people move to coastal areas, conditions get tougher for mangroves, salt marshes and sea grass meadows that remain. Governments and international organizations have failed to implement integrated coastal zone management, claim the scientists. "This puts people at risk from disasters such as hurricane Katrina and the Indian Ocean tsunami," said Nancy Rabalais, from Louisiana Universities Marine Consortium. The warning comes at the conclusion of a workshop organized by the international Land-Ocean Interactions in the Coastal Zone (LOICZ) project to review the impacts of development in the coastal zones across the globe. Scientists were most concerned that the combination of globalization and climate change are the greatest risk to the long-term health of the coasts. "Human accelerated environmental change is affecting all scales of coastal waters, from small lagoons to the continental shelf," said Dennis Swaney, a researcher in biogeochemistry at Cornell University. "Watersheds which formerly provided nutrients to coastal waters only from within their boundaries now see additional sources from outside their boundaries, due to trade of fertilizer, food and feedstocks. These increased nutrient loads may affect coastal waters differently at different scales, because the mixing and flushing of coastal waters depends to some degree on their spatial extent. The ecological responses of coastal waters also depend on physical and chemical properties which are related to their size: deep, dark, cold, and nutrient-poor waters respond differently than shallow, warm, nutrient-rich waters."

Coasts are now in the "frontline of the battleground of global and climate change", said Professor Peter Burbridge, a coastal management specialist at the University of Newcastle Upon Tyne in the UK.

"The resources of the coastal environments and the opportunities for the sustainable use of coastal ecosystems are being squandered by overexploitation. Innovation is needed to solve the widespread problems if we are to turn the tide of losses," said Professor Micheal Orbach, Duke University in the US.

Professor Alice Newton , the Chairperson of LOICZ, diagnosed that our coasts are suffering from a "global coastal syndrome," where growing megacities and the addition of hardened shorelines are destroying natural resources.

Newton's colleague, Professor Bill Dennison from the University of Maryland in the US, agrees: "The treatment and cure of coastal syndrome includes renewable energy, recycled water and solid waste, sourcing locally grown foods and attention to social equity issues, especially in education and health care."

Source: http://www.seacology.org/news/images/JG_dispatch_images/Mangrove_swamp.jpg

"By investing in 'soft' engineering for coastal defense, spatial planning and managed realignment, we can give our coastal ecosystems a fighting chance," said Professor Kerry Turner of the School of Environmental Sciences at the University of East Anglia. "Coastal squeeze is trapping inhabitants between the Devil and the deep blue sea," said Professor Laurence Mee of the Scottish Association for Marine Science.

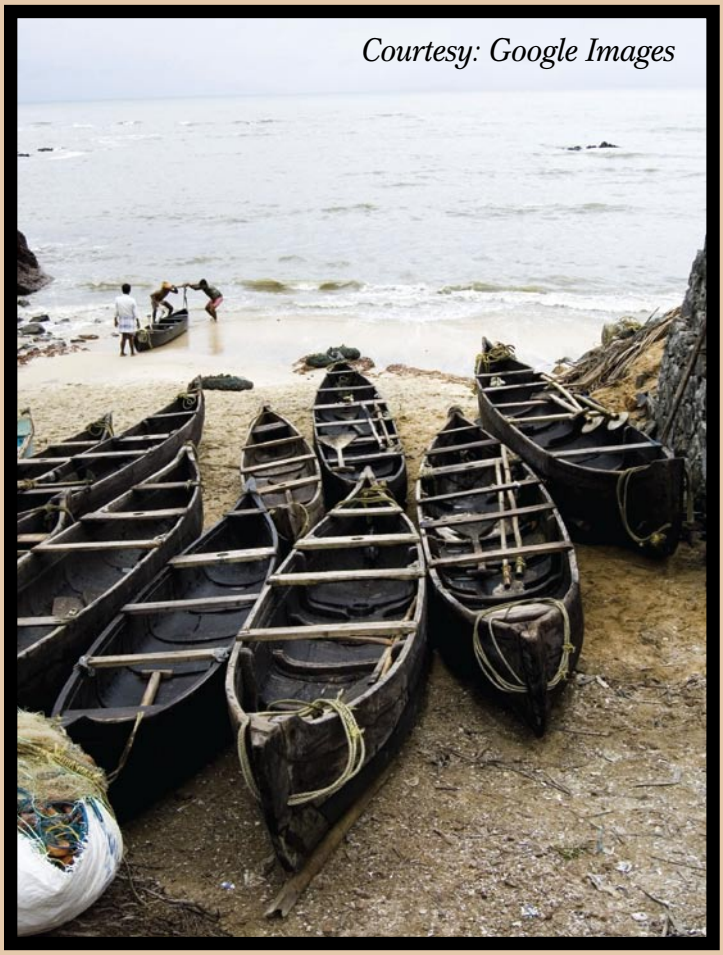
Changing the Tide of Losses

In a "Water-Frontline" of Global Change coastal people and nature face the biggest future challenges. Harboring almost half of the global population coasts worldwide are the hotspot of global change, a mirror of globalization and in risk to face huge future losses.

Sustainable development is in the hand of society to create the enabling conditions for good and forward looking governance in a rapidly changing Earth System. "We don't exactly know what's at stake in terms of money and assets at risk of rapid change and natural hazards along our coasts, but its definitely in the order of trillions of and billions of people" This is one of the key conclusions of 50 international global change experts who met in Oslo recently invited by the global LOICZ project to explore the future of coastal zones and how research can escape the traditional trap of dead end single cause, single fix thinking. Climate change is just one of many drivers affecting the coasts; globalization in general, water management upstream, rapid urbanization and coastal land and sea use are others and regionally still show the even stronger signals e.g. in subsiding mega cities in Asia. "It's a game between the Devil and the deep blue Sea" quote the LOICZ scientists looking back to 16 years of experience and learning in this topic. And finding the right dimension of change and options to respond and adapt is a major challenge to science and society.

This cocktail of driving forces places the coastal people worldwide in the frontline of a battlefield to survive. Globalization comes at a price to them and us. The resources of the coastal environments, the goods and services the provide and which are likely more than from any other earth system domain and the opportunities for the sustainable utilization of coastal ecosystems are being squandered by overexploitation.

Innovation is needed to solve the widespread problems if we are to turn the tide of losses. Research needs to inform a joined up thinking which addresses the multiple scales in time and space that characterize coastal zone changes, risks and opportunities and their consequences. We need to recognize that the processes affecting coasts and coastal people operate from source to sea – along a water continuum -and its people. Local or regional options for good governance and management are often rendered meaningless by teleconnected affects and interests of globalization. "It's all in our hands to make the right choice if we want to change the tide of losses". These are some key conclusions of 40 international experts from wide ranging disciplines including economics, social sciences and natural sciences who met for an intensive, 5day workshop near Oslo, Norway. The scientists followed an invitation of global LOICZ (Land-Ocean Interactions in the Coastal Zone), which is a core project of the International Geosphere-Bioshphere Programme and the International Human Dimensions Programme on Global Environmental Change. They came from 6 continents to review the development of coastal zones worldwide in the past decades.



Courtesy: Google Images

"Between the Devil and the Deep blue Sea"

Coastal "squeeze" traps coastal people between the "Devil and the Deep blue sea", around 45% of the world population now lives in coastal zones that represent only 5% of the land surface. We are suffering from a "global, coastal syndrome" is the conclusion of an international and interdisciplinary group of coastal scientists invited recently to Oslo by the global LOICZ project.

Expansion of coastal cities is accompanied by a decline in the quality of life of the people, which was the reason they moved to the coastal zone instead of bringing growing welfare to the inhabitants. Many Megacities such as Tokyo (pop. 36 000 000), New York (22 000 000) and London (12 000 000) are found in the coastal zone. Coastal protection measures give a sense of false security and require increasingly expensive infrastructure.

The treatment and cure of these coastal syndromes includes renewable energy, recycled water and solid waste, sourcing locally grown foods and attention to social equity issues, especially in education and health care. We also need innovation in "soft" engineering for coastal defense, spatial planning and managed realignment and there are successful show cases for this.

Up to now, governments at all scales, from local to international, have largely failed to seriously implement integrated management in coastal zones. This has placed people at risk of disasters such as hurricane Katrina and the Banda Aceh tsunami. The interconnection of coastal processes with upstream management in river catchment has widely been ignored, causing coastal erosion, lack of runoff, nutrient shortage and subsiding deltas.

The pace of change in general is increasing and regionally we are already seeing both economic and climate-change refugees. In parallel, we see climate entrepreneurs eager to exploit Arctic resources. Climate change is exposing the fragile Arctic coasts and ecosystems as well as their vulnerable inhabitants, who subsist on traditional lifestyles, to increasing risks.

Innovation is needed to solve the widespread problems, if we are to turn the tide of losses. We must enable governance at all scales from intergovernmental engagement to the individual, personal choices that may counteract the tyranny of "small and short sighted decisions".

These are the conclusions of 40 international experts from wide ranging disciplines including economics, social sciences and natural sciences who met for an intensive, 5 day workshop near Oslo, Norway. They came from 6 continents to review the development of coastal zones and society worldwide.

The workshop was organized by LOICZ (Land-Ocean Interactions in the Coastal Zone), a core project of the International Geosphere-Bioshphere Programme and the International Human Dimensions Programme on Global Environmental Change.

LOICZ is based and supported by the GKSS Research Centre, Geesthacht, Germany and the workshop was supported by the Norwegian Institute for Air Research, NILU, and the Research Council of Norway.

Land - Ocean Interactions in the Coastal Zone

The workshop was organized by Land-Ocean Interactions in the Coastal Zone (LOICZ) which is a core project of the International Geosphere - Biosphere Programme and the Internation Human Dimension Programme.

LOICZ is based and supported by the GKSS Research Centre, Geesthacht, Germany and the workshop was supported by the Norwegian Institute for Air Research, NILU and the Research Council of Norway.

Coasts in the Frontline of Global Change

Our coasts are a hotspot of global change. The driving forces of globalization, coupled with climate change, place the inhabitants of our coasts in the frontline of a battlefield to survive. Globalization comes at a price to the inhabitants of the coastal zone. The resources of the coastal environments and the opportunities for the sustainable utilization of coastal ecosytems are being squandered by overexploitation. Innovation is needed to solve the widespread problems if we are to turn the tide of losses.

Scientists have diagnosed that our coasts are suffering from a global, "coastal syndrome". Symptoms include artificially growing megacities, artificially hardened shorelines, and declining natural resources. The treatment and cure of the coastal syndrome includes renewable energy, recycled water and solid waste, sourcing locally grown foods and attention to social equity issues, especially in education and healthcare. We also need innovation in "soft" engineering for coastal defense, spatial planning and managed realignment.

Coastal "squeeze" traps the inhabitants between the Devil and the deep blue sea: 45% of the world population now lives in coastal zones that represent only 5% of the land surface. The growth of coastal cities is accompanied by a decline in the quality of life of the people, which was the reason they moved to the coastal zone. Coastal protection measures give a sense of false security and require increasingly expensive infrastructure.

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Courtesy: Google Images

Climate change eroding global fishery reserves

Fish which forms an important component of diet and income of millions across the world is under severe threat caused by climate change. A new study ranks Bangladesh and Pakistan among countries where warmer ocean temperatures and loss of habitat are depleting the stock of this protein-rich marine species.
Thirty-three nations in Africa, Asia and South America are highly vulnerable to the impact of climate change on fisheries, says a new study. Together the countries produce 20% of the word's fish exports by value.

"From a strictly environmental perspective, countries in the higher latitudes will see the most pronounced impact from climate change on fishing," said Edward Allison, director of policy, economics and social science at World Fish. "But economically, people in the tropics and sub tropics likely will suffer most, because fish are so important in their diets and because they have limited capacity to develop other sources of income and food."

Of the 33 nations deemed most vulnerable 19 were already classified by the United Nations as "least developed" because of their particularly poor socioeconomic conditions.

Researchers from the World Fish Center, the University of East Anglia, UK, Simon Fraser University, the Centre for Environment, Fisheries and Aquaculture Science, the University of Bremen, Germany, and the intergovernmental Mekong River Commission looked at 132 national economies.

They analyzed environmental, fisheries, dietary and economic factors, reporting their work in Fish and Fisheries.

Diet threat

The countries that will experience the largest environmental impact of climate change were not necessarily the most vulnerable. In vulnerable nations, fish plays a large role in diet, income and trade but there's not much capacity to adapt to problems caused by climate change, such as loss of coral reef due to warmer ocean temperatures and lakes becoming parched by temperature and precipitation changes. For example in the most vulnerable countries fish makes up at least 27% of daily protein intake, compared to 13% in non-vulnerable countries, and there are scant resources for alternative protein sources.

Climate change can affect factors such as the upwelling of nutrient-rich water along coastlines, coral reef health, and water levels and temperatures in inland lakes
The 33 highly vulnerable nations were Malawi, Guinea, Senegal and Uganda in Africa, Bangladesh, Cambodia, Pakistan and Yemen in Asia, and Peru and Colombia in South America.

The researchers say that these countries should be a priority for adaptation efforts that will allow them to endure the effects of climate change and maintain or enhance the contribution that fisheries can make to poverty reduction.

"We believe it is urgent to start identifying these vulnerable countries, because the damage will be greatly compounded unless national governments and international institutions like the World Bank act now to include the fish sector in plans for helping the poor cope with climate change," said Allison.

Climate change can affect factors such as the upwelling of nutrient-rich water along coastlines, coral reef health, and water levels and temperatures in inland lakes. Inland freshwater habitats could also be damaged by intrusions of salt water as sea levels rise.

Loss of livelihoods

"Fisheries are already under tremendous pressure from over fishing, habitat loss, pollution and a range of other factors," said Steve Hall, director general of World Fish. "Climate adaptation measures must go hand in hand with efforts to confront other threats if these countries are to succeed in building sustainable livelihoods for fish-dependent people."

Now the researchers will continue to "refine their ability to link climate change to fish productivity and to social and economic conditions".

This study found a scarcity of data on the social and economic impacts of fisheries at the country level, particularly for subsistence fishing and small island

states. In fact, 60 countries were excluded from the study's final listing because of insufficient data but many of these – such as Kiribati, Myanmar, Somalia and the Solomon Islands – are likely to be highly vulnerable to the effects of climate change.

Source: Environmental Resource Web

Global fisheries begin to show signs of recovery where management is strong

New research reveals hopeful signs that over fished marine ecosystems can recover provided adequate protections.

The two-year study, publish in the journal Science, found that efforts to reduce over fishing are beginning to succeed in five of the ten large marine ecosystems examined, suggesting that "sound management can contribute to the rebuilding of fisheries."

"Highly managed ecosystems are improving" said co-lead author Ray Hilborn of the University of Washington. "Yet there is still a long way to go: of all fish stocks that we examined sixty-three percent remained below target and still needed to be rebuilt."

"Across all regions we are still seeing a troubling trend of increasing stock collapse," added co-lead author Boris Worm of Dalhousie University. "But this paper shows that our oceans are not a lost cause. The encouraging result is that exploitation rate – the ultimate driver of depletion and collapse – is decreasing in half of the ten systems we examined in detail. This means that management in those areas is setting the stage for ecological and economic recovery. It's only a start – but it gives me hope that we have the ability to bring over fishing under control."

The study focused mostly on intensively managed fisheries in developed countries, where there is solid scientific data on fish abundance, although they find positive signs in some developing countries like Kenya, where marine closures to fishing and restrictions on certain types of fishing gear have lead to an increase in the size and amount of fish available, boosting local incomes. "These successes are local - but they are inspiring others to follow suit," said Tim McClanahan of the Wildlife Conservation Society in Kenya.

"We know that more fish can be harvested with less fishing effort and less impact on the environment, if we first slow down and allow over fished populations to rebuild," said the University of Rhode Island's Jeremy Collie, one of other 19 coauthors on the study. "Scientists and managers in places as different as Iceland and Kenya have been able to reduce over fishing and rebuild fish populations despite serious challenges." The study found that while a range of approaches including catch quotas, community management, closure to fishing of strategic zones, ocean zoning, restrictions on fishing gear and economic incentives — are useful in rebuilding fish stocks, solutions need to be tailored to local conditions.

"There are no single silver bullet solutions," said coauthor Beth Fulton of the CSIRO Wealth from Oceans Flagship in Australia. "Management efforts must be customized to the place and the people."

The best results were seen in areas where controls have been implemented prior to collapse of fisheries. Recovery was particularly marked in Alaska, New Zealand, Iceland, the Northeast U.S. Shelf and the California Current — areas where there is strong management. The researchers didn't have reliable data for some of the less-governed parts of the world. They caution that some fishing practices are displaced to countries with weaker laws and enforcement capacity (e.g. off West Africa and the Horn of Africa).

The study also notes that while there are long-term benefits to improved management, there are short-term costs to fishers.

"Some places have chosen to end over fishing," said Trevor Branch, a coauthor from the University of Washington. "That choice can be painful for fishermen in the short term, but in the long term it benefits fish, fishermen, and our ocean ecosystems as a whole." The authors conclude by making a series of recommendations, including fishing at rates lower than those producing maximum sustainable yield (MSY), a long-standing catch target for the fishing industry. Instead the researchers support the U.N.'s suggestion that MSY be "reinterpreted as an absolute upper limit rather than a target."

Source: B. Worm et al. "Rebuilding Global Fisheries." Science 31 July 2009

Proposal for the establishment of a National Institute for Sustainable Coastal Zone Management

Prof.P.Mannar Jawahar, Vice-Chancellor, Anna University Chennai welcoming Hon'ble Minister of State for Environment and Forests Mr.Jairam Ramesh at Anna University

Prof.P.Mannar Jawahar, Vice-Chancellor, Anna University Chennai welcoming Prof.M.S.Swaminathan, Chairman, MSSRF at Anna University

Hon'ble Minister of State, Mr.Jairam Ramesh interacting during the discussion at Anna University Chennai

Left to right: **Prof.R.Ramesh**, Director, Institute for Ocean Management, Anna University Chennai, **Prof.M.S.Swaminathan**, Chairman, MSSRF, Chennai, **Prof.P.Mannar Jawahar**, Vice-Chancellor Anna University Chennai, **Mr.Jairam Ramesh**, Hon'ble Minister of State for Environment and Forests, **Ms.Nalini Bhat**, Advisor MoEF and **Dr.Senthil Vel**, Deputy Director, MoEF