

---

# CHAPTER 7

## CONCLUSIONS AND RECOMMENDATIONS

---

- 7.1 Two days Regional Workshop demonstrated country's presentations, expert deliberations on the critical issues and challenges facing the coastal countries of South Asia; orchestrated the best practices as well as lessons learnt especially during the recent coastal disasters like cyclone, tsunami, coastal pollution and erosion; led to information and knowledge sharing/exchange among the professionals of the region; and boiled down to the outcomes, which are divided into two components.
- One is the general recommendations based on the synthesis of presentations, brainstorming discussions and information sharing.
  - The second is the development of a template for coastal and marine risk mitigation plan for South Asia, as envisaged before organizing the workshop.
- 7.2 The workshop also brought out certain issues for national action and regional cooperation such as:
- Aggregation of mitigation plan for marine hazards and risks at regional level;
  - Integrated coastal zone management based on the broad parameters of Indian Ocean basin as a whole;
  - Enhancing the scope and effectiveness of Early Warning Systems for coastal hazards such as Cyclone, Storm Surge and Tsunami;
  - Development of Oil Spill Contingency Plans at national as well as regional levels;
  - Capacity building needs in R&D, training and networking of knowledge institutions in areas of coastal and marine risk;
  - Institutionalization of Regional Cooperation through SAARC Disaster Management Centre (SDMC) especially in the areas of coastal and marine risks.

---

## KEY RECOMMENDATIONS

7.3 The key recommendations evolved through the discussions and exchange of information and knowledge are listed below:

### **Areas for Regional Cooperation**

- The coastal countries of South Asia share the common Indian Ocean basins of Bay of Bengal and Arabian Sea and it is necessary that a common protocol should be developed at regional level addressing the coastal and marine risks;
- Integrated Coastal Zone Management does provide a common ground for several issues viz., sustainable development of the coasts, climate change mitigation and adaptation, and also coastal & marine risk reduction. It is therefore necessary to promote integrated coastal zone management strategies with regional perspectives;
- Establish a compatible and interoperable national and regional integrated coastal zone management system along the Indian Ocean coast;
- Internalize strategically coastal and marine risk reduction strategies in the coastal zone management plans;
- Develop the Regional Oil Spill Contingency Plan engaging the stakeholders and enhance national capacities for preparation of National Oil Spill Contingency Plan;
- Engage stakeholders and secure the commitment and political support from the respective governments on regional cooperation towards addressing coastal and marine risks;
- Develop, pass and enforce national legislation to provide an institutional and legal basis for coastal management with the regional perspectives;
- Establish a network of SAARC knowledge institutions involved in coastal and marine hazards for sharing of data, expertise and knowledge;
- Regional and cross-border agreements on sharing the data along the coasts, scaling up the scope of India's National Tsunami and Storm Surge Warning System; similarly for the cyclone and storm surge warning systems along the coast.

### **Enhancing the Capacities as well as Effectiveness of Early Warning Systems of Coastal Disasters**

- Put in place the mechanisms for regional cooperation to enhance the quality of the forecast of storms, tsunami, coastal floods and storm surge in line with the best practices forecast capacities in the region and the rest of the world.
- Regional efforts on mapping coastal risks in areas, provinces, districts and critical zones for proactive prevention, disaster risk assessment and policy formulation. Preference is given to most vulnerable coastal areas.

## Mitigation

[A] *Structural and non-structural measures (shelters, Coastal Resource Management etc)*

- Sustainable and integrated land use planning to minimize exposure to risks
- Identifying evacuation zones and protecting evacuation routes to identified safe areas
- Identifying buildings for approved vertical evacuation
- Reduce exposure of critical infrastructure to risk including possible relocation
- Siting, design and construction of building and infrastructure considers risks from coastal hazards and protects sensitive coastal habitats
- Management of sensitive coastal resources and natural protective features to reduce risk (eg. Mangroves, coral reefs, etc...)
- Redevelopment policies and systems in place to guide post reconstruction away from high risk areas

[B] *Enforcement of construction guidelines and building codes*

- Commitment to promote best practice guidelines and adoption of model building codes
- Land use planning and building codes

## Information sharing regionally

- Establish structure and mechanisms for information sharing on coastal and marine risk reduction,
- Development and testing of tools to exchange information e.g. internet links, knowledge portals etc,
- Promote and encourage – (i) scientist to scientist interactions & information sharing; (ii) institution to institution partnerships, and (iii) government to government cooperation both on bilateral as well as regional level facilitating R&D, better operational strategies, more effective S&T products and services in support of reducing marine and coastal risks along the coast of Indian ocean;
- Organize the working groups on risk assessment, inundation modeling and interoperable warning system issues through regional cooperation.

## Knowledge and awareness

- Develop knowledge and awareness outreach materials
- Establish system for knowledge management and advocacy programmes
- Incorporate awareness and education about coastal hazards into school curricula from primary to tertiary levels, formal and non-formal (local, religious, social)

- Identify target groups and partners
- Collect and share best practice examples
- Establish regional coastal hazard education programmes
- Promote research to support improved Mitigation, Preparation and Response addressing the coastal and marine risks.

---

## DEVELOPMENT OF A TEMPLATE FOR COASTAL AND MARINE RISK MITIGATION PLAN FOR SOUTH ASIA

7.3 The key recommendations on development of a template for coastal and marine risk mitigation plan for South Asia evolved through the discussions and exchange of information and knowledge on both the parts:

- i. **Part-I** - Coastal and Marine Risk Mitigation Plan for each Coastal country on the basis of which each country shall develop its own Plan, and
- ii. **Part-II** - Coastal and Marine Risk Mitigation Plan for the region.

Essentially, the outlines for Part I & II (Annexure --) are designed in a way that facilitates and leads to the following outcomes:

- a) To enable the coastal countries of the region to develop its own Mitigation Plan with the regional perspectives;
- b) To bring in synergy and convergence among the SAARC countries on their Mitigation Planning efforts – in terms of common, uniform and inter-operable parameters/indicators with regards to the coastal and marine risks;
- c) To harmonize with on-going international protocols and conventions with regards to coastal protection;
- d) To aggregate the Nationwide Mitigation Plans and efforts enabling more effective and inclusive strategies at regional level; and
- e) Coupling the Coastal Zone Management strategies with risk reduction at regional level.

---

## TEMPLATE CONTENT OF

### **[A] NATIONAL COASTAL AND MARINE MITIGATION PLAN**

- I. Country with per cent of coastal population (gender wise/age wise classifications), their density and coastline

The information is required for profiling the overall coastal vulnerability at national level;

Economic and social status of the population is defined in terms of income and literacy levels to assess layers of vulnerability;

The population within 5 km from the coast will bring uniformity in terms of classifying the coastal population.

- II. Major Coastal Disasters in terms of frequency, per cent of affected population, geographical areas, perceived vulnerability to the climate change impact especially – sea level rise, adaptation issues provide vulnerability levels. This information is essentially for vulnerability indexing.
- III. Status of pre-disaster preparedness is to highlight the institutional, policy and networking issues (at various levels – International, national, state, district and further down the line community level) that illustrates the overall framework a country has to address the coastal hazards.
- IV. Status of Early Detection and Warning Systems – (i) cyclone, (ii) storm surge, (iii) tsunami, (iv) coastal flooding, & (v) Coastal erosion will illustrate the status of preparedness.
- V. Whether a country is the part of international enabling mechanisms of Early Warning Systems like IOC, WMO will also indicate the levels of preparedness and linkages to the global/regional Early Warning Systems.
- VI. Status of monitoring mechanisms for each disaster explains the existing gaps in the existing systems.
- VII. Status of response mechanisms includes specialized agencies like coastal guards, trained search and rescue teams etc in the event of emergencies/coastal disasters.

- VIII. Hazard Zonation/Vulnerability Mapping in terms of availability of maps, if yes then what is scale of the mapping or whether they are in digital or analog forms. This information will explain the needs as well as the gaps with regards to vulnerability mapping, which is also crucial for positioning Early Warning Systems.
- IX. Institutional framework for coastal and marine risk assessment that includes status of S&T agencies/establishments, operational set-up including training and education networks will bring out the knowledge infrastructure in the respective country. For example, India and Pakistan have specialized National Institute of Oceanography (NIO) dedicated for specialized R&D and also training. It is important to list out such agencies for networking at various levels.
- X. Legal and legislative framework in terms of having a coastal zone management plan, structural/non-structural measures etc indicates the level of preparedness.
- XI. Critical needs based on the assessment of existing national programmes in terms of having the optimal level of densification of Early Warning Systems, Hazard Zonation/Risk Assessment, Mitigation Plans, Policy/institutional and training needs are required for regional cooperation.
- XII. Elements of National Mitigation Plans taking into account national priorities towards conservation, development, coastal zone management as well as conceived structural/non-structural measures and scale of vulnerability mapping bring out the specific need matrix, which could be addressed by various means including regional cooperation.
- XIII. Assessment of synergy between the Coastal Zone Management Plan and Coastal Hazard Mitigation strategy is to bring out the convergence between the two. It is essentially to address the cross-sectoral issue.
- XIV. Major issues for regional cooperation for a particular country could be felt in terms of the priority matrix involving networking, Early Warning, Capacity Building and by having joint projects at regional level. It is important to spell out such issues to initiate dialogues and follow-up actions at various levels.
- XV. For the preparation of National Mitigation Plan what could be the expectations from SAARC Disaster Management Centre. For example, whether they could be:
- (i) to assess the capacity building needs of different national agencies through consultation,
  - (ii) to design user oriented need based capacity building programmes, and
  - (iii) to facilitate in executing capacity building programmes.
- XVI. Any Specific Issues of Priorities – like National Oil Spill Contingency Plan is the issue of high priority for Maldives

---

## TEMPLATE CONTENT OF

### **[B] REGIONAL COASTAL AND MARINE MITIGATION PLAN**

- I. Specific Areas (or problems/ issues) for Regional Cooperation – It is important to spell out those areas [for example coastal vulnerability to the cyclone along the Bay of Bengal coastline beyond the political boundaries etc] so that suitable strategies could be formulated.
- II. Outline the strategies/ solutions addressing the critical areas in National Mitigation Plans through Regional Cooperation  
  
It's in way suggesting a strategy based on the country's perspectives.
- III. Elements of Regional Coastal and Marine Risk Mitigation Plan  
  
What could be the elements, for example, the levels of information about vulnerability, terrain, ecological features etc.
- IV. Scale of Mapping for Regional Mitigation Plans
  - (1:>1 Million, 1: 250K or better)
  - Sources of data/info for aggregation at regional level
  - Whether it will be seamless to National Mitigation Plans;
  - What could be the possible layers for vulnerability assessment
    - geo-physical, climatic, socio-economic & ecological?
  - Name the best practices suiting to the approach of the regional mitigation plans.
- V. Approach to encourage participatory efforts on preparing Regional Mitigation Plan
- VI. Suggested Work Plan for SDMC in Preparation of Regional Mitigation Plan for Reducing Coastal and Marine Risks
- VI. Any other point