

Integrated Coastal Planning and Management in Asian Tsunami Affected Countries*

Kay**, R.C., 2006

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*Workshop on Coastal Area Planning and Management in Asian tsunami-affected countries, Bangkok, Thailand, September 27th-29th 2006.

ABSTRACT

Integrated coastal management and planning are processes through which rational decisions are made concerning the conservation and sustainable use of coastal and ocean resources and space (Cicin-Sain and Knecht, 1998). The principles of Integrated Coastal Management (ICM) are well known and widely accepted throughout the world employing a suite of tools including marine protected areas (MPAs), land-use control, marine zoning and permit systems, conflict resolution, planning, and fisheries management (Christie, 2005).

In the aftermath of the 2004 Indian Ocean tsunami and its ensuing rehabilitation effort, the principles and objectives of ICM have been brought into stark relief. The clamour for quick action resulted, in many instances, in duplication and overlap of resources and effort. Poorly focused and uncoordinated initiatives meant that rehabilitation and reconstruction in affected areas were not always economically or environmentally sound. While principles of 'build back better' were advocated in the reconstruction process, this was not always possible due to the pressing need to rebuild and rehabilitate hundreds of kilometres of devastated coastline, and re-establish livelihoods for displaced people.

Very little forward thinking was adopted with regard to contingency risk planning and land and marine use planning in the Asia Pacific with a general absence of integrated long term responses (i.e. 10 year horizon). This highlights the pressing need for a co-ordinated integrated coastal area planning and management effort within the region. Well-formulated and implemented ICM plans may well have reduced the loss of lives and physical assets from the tsunami. For instance, had setback areas along the coast been subject to enforcement the mortality rate of marginalised fisherfolk would have been significantly reduced.

The application of integrated planning approaches and mechanisms could help to overcome previous constraints and avoid the mistakes that are currently being faced in the tsunami rehabilitation effort maximising economic, social and environmental benefits at a regional scale. However, it must be remembered that ICM planning strategies are designed to be long term pro active approaches. In light of this, their ability to respond rapidly in the face of sudden catastrophic disasters is somewhat problematic. In this context, while clearly valid for the long term, ICM processes require modification to cope with the requirement for immediate responses on short time frames resulting from sudden events.

In this context, the processes of short term action require integration with the disaster response practitioners and activities. Recent collaboration among national, provincial and local emergency management agencies and local communities under the Indian Ocean Tsunami Warning System (IOTWS) Program, has led to development of the concept of Coastal Community Resilience (CCR) towards this aim. It is suggested here that the principals of CCR be adopted into a broader ICM framework with a view to protecting against and preparing for coastal disasters as part of a holistic planning process.

1. Introduction

The 2004 Indian Ocean Tsunami resulted in the widespread devastation of coastal communities throughout the region from a social, environmental and economic perspective. The huge loss of life as a result of the tsunami waves was coupled with catastrophic destruction of the coastal zone in areas of Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand. Areas most affected were generally those where marginalised members of the population were concentrated and unsustainable management practices were endemic. In order for principals of 'build back better' to be achieved a focused and sustained coastal planning and management effort is required. In this context, the internationally recognised principles of Integrated Coastal Management will play a key role in the rehabilitation and reconstruction process. With this in mind, the aim of this paper is to provide a perspective on ICM and its role in the post-tsunami era within the Asia Pacific region.

The information presented here draws on perspectives from a series of country papers formulated for a workshop on Coastal Area Planning and Management in Asian tsunami-affected countries, (FAO, 2006). The workshop in question was held in Bangkok, Thailand, in September 2006 and forms one of a series of FAO run workshops in the region addressing the range of forestry, fisheries, aquaculture, and agriculture problems faced by Asian countries in the aftermath of the 2004 tsunami

Coastal planning and management policies and issues are considered in focus for each of the affected countries in the region with the exception of Myanmar for which limited information was available. In addition a review of initiatives taken in the post-tsunami period is carried out in conjunction with a critical analysis of broader principles of coastal management practice.

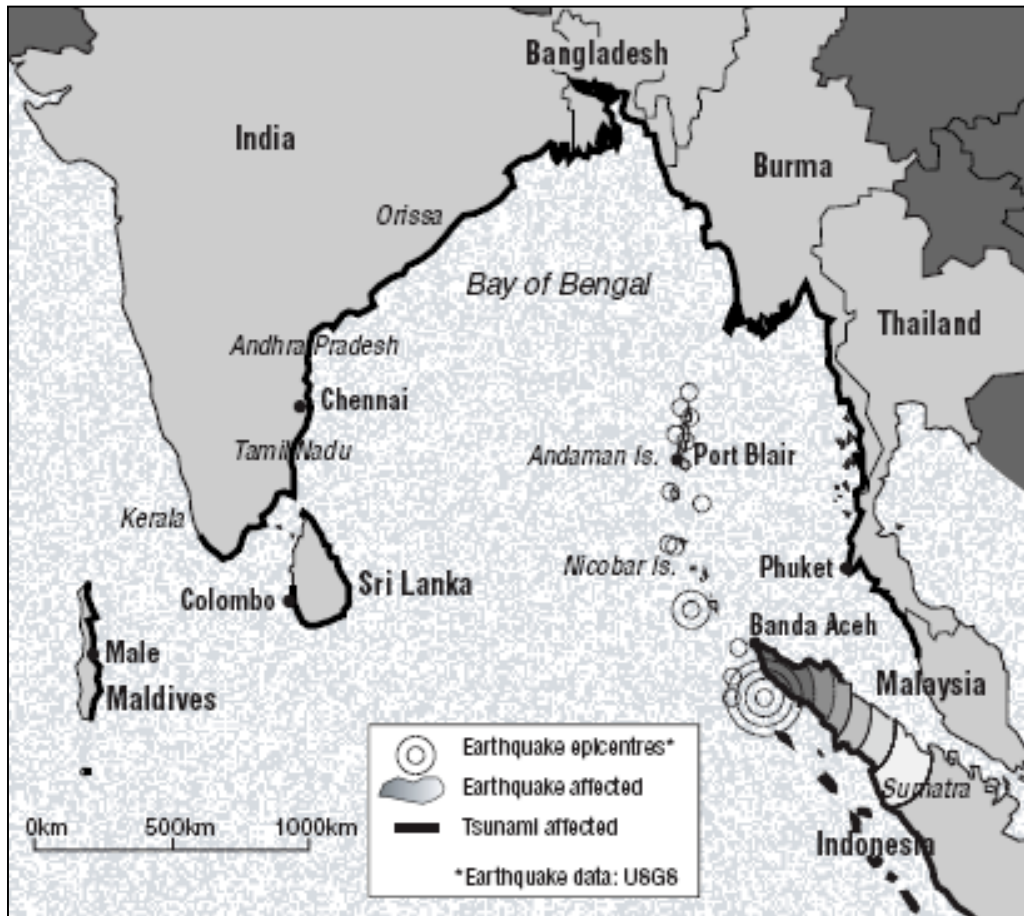


Figure 1 Extent of areas affected by the 26 December 2004 tsunami (Source: Adpated from AusAid, 2005)

2. Integrated Coastal Zone Planning and Management: Concept and Principles

The transitional region between the land and the ocean is commonly referred to as the 'coastal zone' or 'coastal area' (Kay and Alder, 2005). The variety of terms used internationally to refer to efforts to manage this coastal space include: Integrated Coastal Zone Management (ICZM); Integrated Coastal and Marine Area Management (ICMAM); Integrated Coastal Area Management (ICAM); Integrated Marine and Coastal Area Management (IMCAM) or even Integrated Management of Maritime Affairs (IMMA). While there a variety of such labels applied, it is generally accepted that they refer to the same over-riding set of principles (Cicin-Sain and Knecht, 1998).

The unique nature of coastal zones is widely understood to require a concerted, well thought-through and holistic coordinated integrated management and planning approach (Kay & Alder, 2005). This is most often referred to an ‘integrated’ management approach. Indeed, ‘integrated’ as a prefix to coastal management is now so widely adopted as a concept critical in striving for sustainable coastal environments that it is effectively turned into everyday language of decision-making and policy makers in many coastal nations. Integrated Coastal Management (ICM) explicitly defines its goal in terms of progress towards more sustainable forms of development seeking a balance between:

- economic development and use of the coastal region
- protection and preservation of the coastal areas
- minimization of losses of human life and property as well as
- public access at the coastal zones

Examples of principles and objectives advocated for successful ICM are listed in Table 1.

Principles of ICM	Objectives of ICM
<ul style="list-style-type: none"> • A long term view • A broad holistic approach • Adaptive management • Working with natural processes • Support and involvement of all relevant administrative bodies • Use of a combination of instruments • Participatory planning • Reflecting local characteristics 	<ul style="list-style-type: none"> • Strengthen sectoral management by improving training, legislation and staffing; • Preserve the biological diversity of coastal ecosystems by preventing habitat destruction, pollution and over-exploitation; and • Promote the rational development and sustainable use of coastal resources

Table 1 Example Principles and Objectives of ICM (after Clarke, 1992)

ICM is now widely viewed as a mainstream activity. At the international level, all key institutions with involvement in the management and planning of coastal zones have embraced the concept including FAO, UNEP, UNDP, World bank, IOC/UNESCO and IUCN. In addition, an estimated 142 national governments and semi-sovereign states are assessed to be actively engaged in ICM (Sorenson, 2002).

ICM is based on long-term consensus building and must be supported with a range of methods and techniques for the provision of sound information to aid the decision making process. Many coastal managers seek to adopt this approach through planning activities that are either stand alone ICM plans or include ICM approaches into other planning and policy instruments that influence or have an impact on coastal resource management. Plans used in the management of the coast can be classified according to a number of methods the most common of which are shown in **Error! Reference source not found.**

Classification Elements	Plan Types				
Scope					
Geographic coverage	International	Whole of jurisdiction	Regional	Local	Site
Focus	Operational	Strategic			
Degree of integration	Subject	Integrated			
Statutory basis	Statutory	Non-statutory			
Reason for plan	Required for funding	Require to clear statutory works	Legislation which requires management plans	Direct response to management problem	Create commercial value
Process					
Participation	Expert	Participatory			
Flexibility	Fixed goals	Adaptive learning			
Worldview	Rationalist	Values-based			
Acceptance	Consensus	Directed			
Goal setting	Single goal	Scenario-based			
Context					
Cycle	New Plan	Building on previous planning cycle			
Plan/programme	Stand-alone plan	Plan within programme			

Table 2 Coastal management plan classification methods and plan types (adapted from Kay and Alder, 2005)

In broad terms, all ICM programs are focused on seeking operational mechanisms for achieving sustainable development goals for the use and management of coastal resources. As with all such multi-disciplinary integrated approaches the resulting objectives for management must be locally appropriate to ensure a maximum up-take and therefore implementation effectiveness. An overarching principle of ICM is that it is able to be flexibly implemented according to both the coastal issues it is being focused on and the unique circumstances of a particular coastal nation. For example, the European Union (2002) outlines a clear set of objectives for member states to be

adhered to when formulating national strategies for coastal management which highlights the need to consider:

“local specificity and the great diversity of European coastal zones, which will make it possible to respond to their practical needs with specific solutions and flexible measures”.

Given the wide spread adoption of ICM, there is a significant pool of expertise to facilitate the design of tailored approaches to employing ICM concepts. Indeed, many coastal managers describe this as a ‘toolkit’ approach. For example, in Australia a recent initiative explicitly developed a set of capacity building fact sheets to provide such tools to local governments attempting to improve its coastal management efforts (Coastal CRC, 2006).

Once individual projects are evaluated and decisions are taken, implementation begins. Implementation of a project must be supported with policy tools. These may be supplemented with voluntary agreements between various parties to achieve environmental or conservation objectives (UNEP, 1995).

The policy cycle as applied to ICM is illustrated in Figure 2 below and is returned to later in the paper within the specific context of the Indian Ocean tsunami.

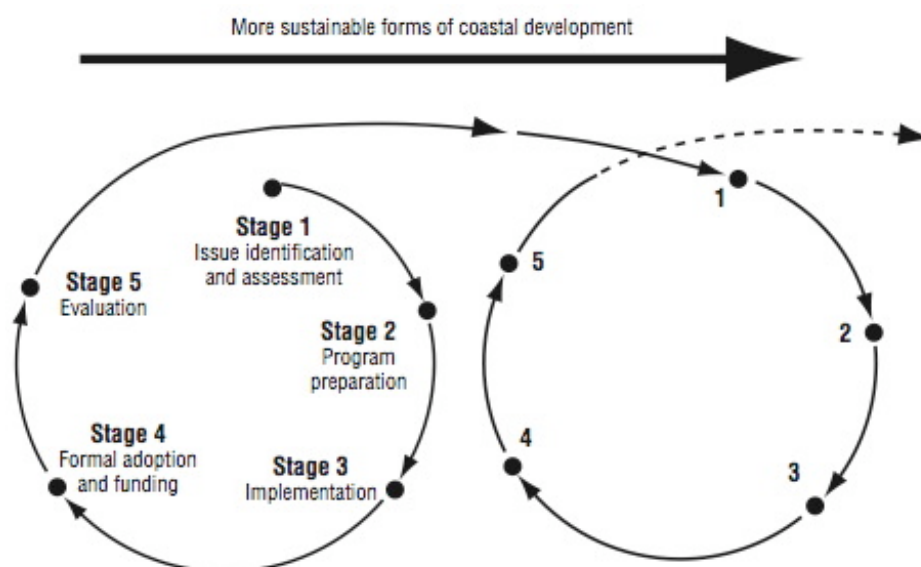


Figure 2 The ICM policy and planning cycle (GESAMP, 1996)

3. Competing uses of the coastal zone: costs and benefits of unplanned development and their contribution to challenges faced post-tsunami

Uses of the coastline are generally considered under four main categories: resource exploitation (including fisheries, forestry, gas and oil, and mining); infrastructure (including transportation, ports, harbours shoreline protection works and defence); tourism and recreation; and the conservation and protection of biodiversity (Kay and Alder, 2005). Of specific interest here are the major land uses in the coastal zones of tsunami affected countries which include agriculture, shrimp and fish farming, forestry, and human settlement (UNEP, 2005).

Resource based industries such as fisheries and tourism are particularly important within the Asia Pacific region. Fishing provides a basic source of food and income for up to 13 million people while the extensive tourist industry may directly account for as much as 20% of GDP (UNDP/IUCN, 2006). Mangroves and the coastal forest play a crucial role in coastline stabilisation and storm surge protection (
 Table ; Rutinbeek, 1991, 1994). In addition, mangroves act as important pollutant and nutrient sinks (Rutinbeek, 1991, 1994).

Sustainable Production Functions	Regulatory of Carrier Functions	Information Functions	Conversion Uses
<ul style="list-style-type: none"> • Timber • Firewood • Woodchips • Charcoal • Fish • Crustaceans • Shellfish • Tannins • Nipa • Medicine • Honey • Traditional hunting, fishing, • Genetic resources 	<ul style="list-style-type: none"> • Erosion prevention (shoreline) • Erosion prevention (riverbanks) • Storage & recycling of human waste/ pollutants • Biodiversity maintenance • migration habitat • nursery • breeding grounds • Nutrient supply • Nutrient regeneration • Habitat for indigenous people • Recreation sites 	<ul style="list-style-type: none"> • Spiritual & religious information • Cultural & artistic inspiration • Educational, historical & scientific information • Potential information 	<ul style="list-style-type: none"> • Industrial/urban land-use • Aquaculture • Salt ponds • Rice fields • Plantations • Mining • Dam sites

Table 3 Examples of uses and environmental functions of mangroves (adapted from Rutinbeek, 1991; 1994)

The links between fisheries production and mangrove forestry are also widely reported in the literature (Janssen and Padilla, 1999; Mumby et al., 2004; Murphy,

P.J., 2004,; Thampanva, 2006) as is the important income provided by traditional use of mangrove products to many of the poorest households within the region (e.g. Ruitenbeek, 1992; Sathirathai, 1998).

Within the Asia Pacific, healthy coastal ecosystems including mangroves, wetlands, estuaries, lagoons, sandy beaches, sand dunes, coral reefs and seagrass communities are fundamentally linked to human well-being (UNDP/IUCN, 2006). However, dramatic population growth has led to increased pressure on ecosystems throughout the coastal zone (UNEP, 2002) the effects of which are highlighted in detail through the Country Papers in this series and summarised in Table below.

In general, increased population pressure has resulted in unplanned and unregulated development throughout the coastal zone within the region. Here, ‘unplanned’ development is understood to mean development that has not occurred under the umbrella of community- or government-led plans or through an incomplete framework of plans and policies. The philosophy underpinning ICM and many of its tools and approaches focuses on planning for the long term sustainability of coastal resources and the people that depend on those resources for their livelihood. The fundamental mandate of planning (and plan production) is to harness and focus community desires in the broader sense; local communities, communities of users, communities of elected representatives to develop shared vision and practices for the use and allocation of coastal resources. This approach is most often articulated in some form of planning strategy. While there are numerous challenges in effectively implementing such documents in whatever form they take (see **Error! Reference source not found.** above) these are invariably better than either no plan at all or plans that have excluded key communities either through poorly conceived process or deliberate (and often malicious) choice.

TYPE OF THREAT	DRIVERS
Habitat Loss or Conversion	
Coastal Development (ports, urbanization, tourism-related development, industrial sites)	population growth, poor development policies for industry, and tourism, environmental refugees and internal migration
Destructive Fisheries (dynamite, cyanide, bottom trawling)	shift to market economies, demand for aquaria fish and live food fish, increasing competition in light of diminishing resources
Coastal Deforestation (esp. mangrove deforestation)	lack of alternative materials, poor national policies increased competition,
Mining (coral, sand, minerals, dredging)	lack of alternative materials, global commons perceptions
Civil engineering works	transport and energy demands, poor public policy, lack of knowledge about impacts and costs
Environmental change brought about by war and conflict	increased competition for scarce resources, political instability, inequality in wealth distribution
Aquaculture-related habitat conversion	demand for luxury items, regional food needs, declining wild stocks, loss of property rights in fisheries, inability to compete
Habitat Degradation	
Eutrophication from land-based sources (agricultural waste, sewage, fertilizers)	urbanization, lack of waste water and sewage treatment systems, poor agricultural practices, loss of wetlands and other natural controls.
Pollution: toxics and pathogens from land based sources	lack of awareness, increasing pesticide and fertilizer use (especially as soil quality diminishes), unregulated industry
Pollution: dumping and dredge spoils	lack of alternative disposal methods, increasing costs for land disposal, belief in unlimited assimilative capacities, waste as a commodity
Pollution: shipping-related	substandard shipping regulations, no investment in safety, policies promoting flags of convenience, increases in ship-based trade
Salinization of estuaries due to decreased freshwater inflow	demand for electricity and water, territorial disputes
Alien species invasions	ballast discharge regulations lacking, increased aquaculture-related escapes, lack of international agreements on deliberate introductions
global warming and sea level rise	emissions controls lacking, poorly planned development (vulnerable development), stressed ecosystems less able to cope
Over-exploitation	
Directed take of low value species at high volumes exceeding sustainable levels	subsistence and market demands (food and medicinal), industrialization of fisheries, improved fish-finding technology, poor regional agreements, lack of enforcement, breakdown of traditional regulation systems, subsidies.
Directed take for luxury markets (high value, low volume) exceeding sustainable levels	demand for specialty foods and medicines, aquarium fish, and curios, lack of awareness or concern about impacts, technological advances, commodification
Incidental take or by-catch	subsidies, by-catch has no cost

Table 4 Threats to coastal ecosystems and key drivers (adapted from Kay and Alder, 2005)

Within the Asia Pacific region, an ad-hoc approach, where no coherent planning strategy has been adhered to, has frequently provided greater short-term economic returns although sometimes at great social and environmental costs – and often these returns benefit only some sections of society. Single objective, single output land

management has resulted in the conversion of land from directly productive purposes, in many cases, leading to degradation and/or loss as a result of erosion, salinity, inundation and other interventions (FAO, 2005). For example, over the last 30 years the significance of the shrimp sector in particular has grown rapidly in tandem with increased demand and high prices for shrimp in international markets (Phillips and Budhiman, 2005). The increase in shrimp production has resulted in huge pressure on land in the coastal zone with agriculture and mangrove areas being converted for shrimp farming (IUCN, 2005).

While the eco-system value of mangroves and coastal forests is well known and widely accepted, their widespread clearance has subsequently become a common feature of coastal zones in all tsunami affected countries (IUCN, 2005). In the islands of Indonesia, Java alone had lost 70% of its mangroves by 1991 while Sumatra had lost 36% (www.earthisland.org). Mangrove reduction has led to a loss of biodiversity and a reduction in food production and cooking fuel which exacerbates the problem in other areas. In addition, a source of income is eliminated for marginalised communities who are already considered socially and economically worst off (Kay and Alder, 2005).

In this context, it is clear that the enormous contribution of healthy coastal ecosystems in safeguarding production and consumption, reducing vulnerability, strengthening resilience, and mitigating disasters has generally been undervalued, poorly understood and improperly safeguarded within the region (UNDP/IUCN, 2006). In fact, it has been suggested that unsustainable development activities and their associated degradation of the coastal zone led to exacerbated effects of the 2004 Indian Ocean tsunami in terms of eco-system destruction and loss of life (**Error! Reference source not found.**). For example, anecdotal evidence in the aftermath of the tsunami suggested that mangroves were effective in buffering its impacts (e.g. Dahdouh-Guebas et al., 2005; FAO, 2005, Wetland international, 2005). This was subsequently confirmed by systematic analysis of the effectiveness of mangrove buffering in tsunami waves was carried out by Chang et al., (in press). Their preliminary analysis suggested that villages that were behind substantial mangroves suffered relatively little damage in comparison to those not so protected. However, assessment of the

role of healthy ecosystems in reducing damage to coastal communities is ongoing and remains a matter for debate within the scientific community (Baird, 2006).

Biophysical impacts	socio-economic impacts
<ul style="list-style-type: none"> • Increased coastal erosion • siltation • Loss of biodiversity • extensive coastal inundation • Higher level flooding • Decline in water quality 	<ul style="list-style-type: none"> • loss of property and coastal habitats • loss of life • Damage to coastal protection works and other infrastructure • Loss of renewable and subsistence resources • Loss of amenity value • Loss of non-monetary cultural resources and values • Impacts on agriculture and aquaculture

Error! Reference source not found. **Exacerbation of biophysical and socio-economic impacts as a result of unplanned development in the coastal zone.**

In addition to the problems brought about by the effects of the tsunami, pressure on coastal land is expected to continue in step with increases in regional population. In light of this, the need for an integrated approach to the management and rehabilitation of the coastal zone has been brought into even starker relief.

4. Regional Coastal Planning and Management

It is now widely understood that tsunami waves undergo a complex set of interactions in conjunction with the varying landscape of the continental shelf and a suite of other physical variables (Skynolakis, 2002). However, the Indian Ocean tsunami in 2004 also interacted with another varying landscape; that is, the policy and practices under which coasts are managed. Coastal planning and management in the pre-tsunami period has been discussed in depth in the country papers accompanying this series. However, for the sake of completeness, a brief overview of coastal land use and management policies is provided in this section to set the scene for a regional discussion.

A broad spectrum of coastal management planning approaches was employed in the Asia Pacific region prior to the tsunami (Table 6).