

Like all coastal nations, each of the tsunami impacted countries implemented a wide range of coastal hazard management approaches. As with variations to the overall ICM landscape there are significant differences between countries regarding their coastal hazard management landscape in line with those provided in Table 7 below.

Options	Measures
Event Protection	<ul style="list-style-type: none"> • Hard' engineering (e.g. sea-walls, groynes) • 'Soft' engineering (e.g. beach nourishment, dune enhancement)
Damage Prevention	<ul style="list-style-type: none"> • Avoidance (e.g. prevent development) • Mitigation (e.g. relocatable or flood-proofed buildings, building codes)
Loss Distribution (transfer)	<ul style="list-style-type: none"> • Individual measures (e.g. insurance) • Community measures (e.g. insurance, cost pooling, disaster relief and rehabilitation)
Risk Acceptance	<ul style="list-style-type: none"> • Do nothing

Table 7 Example options and measures for coastal erosion hazard management (Kay et al., 1994)

Overall, while several countries instituted legal and planning instruments for the management of the coastal zone, these generally lacked adherence. This non-implementation of coastal laws often gave way to unregulated development along many stretches of the coast ultimately affected by the tsunami.

In Thailand, for example, Coastal Zone management was first attempted in the 1980s with the establishment of the Coastal Development Division under the Department of Land Development. Its broad objective was to provide guidelines for coastal development. However, a lack of guidance on how to integrate the work of the division with the other government agencies led to closure of the division. Meanwhile, major developments have taken place in the coastal areas, making coastal zone management more a tool for resolving land use conflicts than a tool for holistic planning that takes into account the needs of all stakeholders (UNEP, 2006)

In Sri Lanka the Coast Conservation Department (CCD) had adopted a measure whereby a permit was required for any development activity within a 300 m land buffer at the coastline. Fishing, cultivation of crops, planting of trees and other

vegetation was allowed within this zone without a permit. Also, nested within the coastal zone was a high-hazard exclusion zone, or 'setback' of 60 m from the mean waterline, where no construction is allowed (Khazai et al., 2006). However, these areas were often inhabited by marginalized fisherfolk and buffer zones were generally poorly enforced.

While legislation exists in many countries requiring EIA for development in wetland areas, this is not applicable to uncontrolled, unlicensed and illegal development, or rebuilding existing structures. In addition, EIA in many of the areas affected has traditionally served little purpose in terms of impact mitigation. Rather, it has generally been seen as a documentary hurdle to achieving development permissions despite of the feelings of local people (Teerakul, and Renshaw, 2005).

In Malaysia reasons cited for the lack of follow-up, implementation and adherence to coastal management plans include the fact that the existing structure of decision making would require considerable change to allow their incorporation (Ong, 2006). In addition, it has been suggested that early plans lacked sufficient understanding of the issues and were perhaps weak in terms of explanation of the changes that needed to be made to the governance structure in order to implement integrated coastal area management plans (Ong, 2006).

Recent analysis of ICM practice in Indonesia has also highlighted barriers to fully adopting the factors associated with sustained ICM by key levels of government (Christie et al., 2005). This research suggested that laws that encourage sustainable resource use are increasingly adopted and enforced at local levels, but remain underdeveloped at the national level (Christie et al., 2005). There are few clear incentives for networks of national institutions to adopt ICM as an overarching framework and to collaborate across sectoral lines (Lowry et al., 2005).

Fundamentally, managing coastal zones is a people-centred exercise and as a result the effective management resolves around the foibles of the individual and the institutions and practices built by the individuals. Practitioners understand that corruption, cronyism, individual egos, power and factors such as politics, familial relationships all play a part in every day life and consequently also play an important

role in managing the coast. In many ways the global spotlight brought to the region by the tsunami highlighted these issues and while both the government and donor community has made stringent efforts to mitigate these factors they will always play a role.

5. Post-tsunami management challenges and approaches for sustainable ICM

A major challenge in the post-tsunami rehabilitation process was how to avoid a knee-jerk reaction and control the investor led need for rapid, uncontrolled redevelopment (Teerakul, and Renshaw, 2005). As detailed in section 3 above, pre-existing forms of coastal development were generally unplanned and often inefficient, inequitable and unsustainable pushing the poor into the most unhealthy and hazardous corners of the coast (UNEP/GPA, 2005). The need to undertake some kind of coastal management planning process within the post-tsunami rehabilitation effort was widely acknowledged throughout the region in light of the significant potential long-term benefits afforded by an integrated and interdisciplinary approach. The goals of an integrated approach to coastal planning and management are to:

- minimize possible future tsunami and other coastal hazard impacts;
- maximize coastal resources use in a sustainable manner; and
- improve living conditions of the coastal inhabitants.

There are numerous well known examples in the Asia Pacific of long-term ICM programmes and extensive analysis of the factors that lead to and enhance the effectiveness of these programs as well barriers to their success. Case studies are outlined in several texts, for example the Coastal Zone Asia Pacific (CZAP) conference series, (e.g. 2002; 2006) and recent evaluative research carried out in the Philippines and Indonesia (e.g. Pollnac et al., 2005; Christie, 2005; White et al., 2005; Sievanen et al., 2005; Lowry et al., 2005; Pomerey et al., 2005; Patlis et al., 2005). This research has demonstrated that participative, rewarding ICM processes, conducted in a supportive legal-institutional context, are capable of improving environmental conditions while maintaining services to society (Christie et al., 2005). This work suggests that there is a need for:

“a renewed, and expanded, long-term commitment to ICM, and other forms of long-term planning and environmental management which will require careful implementation by cooperative efforts of national governments, NGOs, and civil society who have growing experience with ICM”.

The study by Christie et al., (2005) provided an overview of important considerations towards the improvement of ICM project design with a view to fostering long term sustainability (summarised in Table below).

Strategy	Rationale	References
Effective management of ICM-derived outcomes	<ul style="list-style-type: none"> • Improvement of economic and environmental conditions fosters ICM success and sustainability • Involvement and participation in ICM are influenced by initial project benefits and perceptions of benefits • Achievement of these benefits stimulates continuing involvement in the activities, sustaining the ICM process 	<p>Pomery et al., (2005)</p> <p>Pollnac et al., (2005)</p> <p>Oracion et al., (2005)</p>
Reaffirmation of participatory management	<ul style="list-style-type: none"> • Institutional structures to support large-scale interventions are often lacking • Sustaining large scale interventions over time will be exceedingly difficult and costly. 	<p>Pollnac et al., (2005)</p> <p>Oracion et al., (2005)</p>
Integration in difficult contexts	<ul style="list-style-type: none"> • ICM also depends on integration within and between multiple governance scales • Institutional and legal frameworks that mandate governance reform are lagging behind the pace of ICM project evolution 	<p>Eisma et al., (2005)</p> <p>Patlis, et al., (2005)</p> <p>White et al., (2005)</p>
Long-term commitment as essential to success and sustainability	<ul style="list-style-type: none"> • Short project time horizons are not conducive to sustained ICM processes beyond project termination • successes of individual ICM efforts can be traced directly to relatively small groups of committed individuals. Investment in capacity development in project staffs, local and national agencies, and NGOs are resources well spent 	<p>White et al., (2005)</p>
Continuation of the evaluative and adaptive process	<ul style="list-style-type: none"> • Research framed by multiple mandates, goals, and disciplines is essential to the improvement of ICM and coastal environments and societies • ICM projects investing in data management systems, and engaging local and national government agencies in self-monitoring exercises. • Help track the impacts of ICM efforts and are increasingly used to ensure that ICM projects result in tangible and measurable third-order impacts 	<p>Pollnac et al., (2005)</p> <p>White et al., (2005)</p> <p>Olsen and Christie, (2000)</p> <p>www.oneocean.org</p>

Table 8 Examples of strategies to improve ICZM project design to foster sustainability (adapted from Christie et al., 2005)

Table suggests that successful, sustainable ICM in the wake of the Indian Ocean tsunami should strive to:

- highlight the importance of the participatory management processes specifically those based at a community level over a long-term perspective (Pollnac et al., 2005); (Box 1)
- share the benefits from ICM within and between constituency groups with specific reference to potentially contentious relations different groups (Thiele et al., 2005; Sievanen et al., 2005) (Box 2);and
- carry out evaluative and adaptive processes to ensure that ICM projects result in tangible benefits to stakeholders involved (Olsen and Christie, 2000) (Box 3).

Box 1: Importance of Participatory management

Chang et al., (2006) found that there was considerable variation in the performance of local conservation efforts across villages. Performance appeared to be influenced by the design of external aid programs with higher levels of performance attributed to 'bottom-up' programs. In this respect, practitioners involved in coastal management should view the disaster as providing a window of opportunity to enable and build relationships with local people that allows them to become active participants in the process.

Source: Chang et al., 2006

Box 2: Effective management of ICM derived outcomes

Pollnac and Pomeroy (2005) found that early involvement and participation in ICM are influenced by initial project benefits and perceptions of benefits. This involvement enhances the chances that ultimate benefits will be those desired by the target population. Achievement of these benefits also stimulates continuing involvement in the activities, sustaining the ICM process. Their findings indicate that both community involvement and achievement of desired benefits will be necessary to impact ICM sustainability in the pre-tsunami era.

Source: Christie et al., 2005

Box 3: Evaluation and adaptive process

Monitoring is a significant predictor of ICM sustainability. Pollnac (2004) provides quantitative evidence that community monitoring is one of the principal predictors of both compliance and biological success of community based no-take areas in the Visayas, Philippines.

Source: Christie et al., 2005

While the objectives outlined above provide a sound framework for the long-term sustainability of ICM projects in the region, there were a number of barriers to effective employment of ICM principles in the immediate aftermath of the tsunami. Reasons for this included the fact that (updated from Kay, 2005):

- Pressure to re-build tsunami-affected areas as quickly as possible – both to re-house local people and to encourage tourists to return.
- Often competing agendas of donors to promote rapid re-development on one hand, while promoting sustainable development on the other (combined with the sheer complexity and scale of the international relief effort).
- Perception that CZM is about ecosystem management and not about land-use planning, tourism management, hazard management, urban development or sustainable livelihood promotion.
- Difficulties faced by donors and national governments in obtaining international CZM expertise quickly and effectively
- Procurement processes faced by tsunami affected countries that are tied to the many different needs and systems of releasing funds by donors.
- Problems with engaging with local-level coastal managers charged with making on-the-ground land-use planning decisions.

Requirements for quick action resulted in many instances, in duplication and overlap of resources and effort (Khazi et al., 2006). While the rebuilding process has strived to avoid needlessly repeating the mistakes of the past, uncoordinated initiatives have meant that rehabilitation and reconstruction in areas affected by the 2004 Indian Ocean tsunami were not always economically or environmentally sound (FAO, 2005). This was due, in large part, to immediate needs of post tsunami reconstruction that resulted in restoration and rehabilitation activities guided by short-term planning perspectives (UNDP/IUCN, 2006). Currently, many of these short-sighted projects remain incomplete, unfinished or have failed to achieve their intended impact (UNDP/IUCN, 2006).

It is important to recognize the trade-off between the need for rapid inputs to restore livelihoods in communities affected by the 2004 Indian Ocean tsunami versus good governance and sustainable management (UNESCO, 2005). In some instances the lack of good governance that builds on supporting institutions and policies, has hindered recovery and even resulted in a return to some of the undesirable pre-tsunami situations. That said it is also necessary to acknowledge that economic development has been, and still remains an important component of the coastal zone.

The potential impacts of unplanned coastal development may only be mitigated through established democratic and mature legislative processes. In the absence or

poor functioning of these legislative processes it is inevitable that there will be wide variations in management outcomes. These are clearly sensitive issues which are known by practitioners but not generally widely discussed.

Almost two years after the disaster there are still a large percentage of regional coastal populations who are highly vulnerable and ill equipped to deal with future disasters (UNDP/IUCN, 2006). The critical factor in this context is that ICM planning strategies are designed to be long term pro active approaches and that in the face of sudden catastrophic disasters their ability to respond rapidly to such events is problematic. Fundamentally, because they are long term processes they thus take a long time to develop with consensus building among the key stakeholder communities proving a painstaking process. 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.

Kay (2005) in reflecting on the role of ICM/CZM to date in tsunami response stated:

“By-and-large the potential central role of CZM in the regional tsunami response has not eventuated. This is not to say that CZM won’t play a critical role in long-term recovery efforts – it is that the potentially integrative role that CZM could have played has not occurred. Rather the response and recovery efforts have used mainstream disaster management approaches. The tsunami appears to have been viewed as a disaster that occurred on the coast; rather than a critical CZM issue that was a disaster.”

The fundamental question, then, is are the underlying principals of ICM at fault here? In response to this question, Professor Wong, in an eloquent summary of ICM effectiveness as of late 2005 wrote section of his paper entitled “Need for Paradigm Change in CZM” (Wong, 2005) wrote:

... if integration in CZM is to be carried out in the post-tsunami phase, it must first be an integration of livelihood restoration and habitat restoration. This would require a paradigm change or a change in the mindset of those implementing CZM. Too many of the principles expounded in various post-tsunami recovery programs may not offer practical solutions. To start, there should be a list of immediate tasks with which local communities can become involved, both to earn a livelihood and at the same time to restore coastal habitats. These are challenging

tasks for coastal managers in the affected areas and they need to understand the fundamental change in CZM wrought by the 26 December 2004 event. At the very least, tropical CZM in the post-tsunami phase will never be the same.

The author agrees with Professor Wong's assessment. ICM must be adapted to both manage the long-term response of the tsunami-affected coastlines and also to be able to deal more effectively to future coastal disasters.

Examples following the Asian tsunami illustrated the complete absence of methodologies and the outstanding need to formulate a potential disaster coastal response action plan. This highlighted the imperative for quick and robust ICM tools and techniques which are accepted as an approach by governments and donors alike. In this context, recent collaboration among national, provincial and local emergency management agencies and local communities under the USAID-funded U.S. Indian Ocean Tsunami Warning System (IOTWS) Program, has led to development of the concept of Coastal Community Resilience (CCR) (USAID, 2006) (Figure 3).

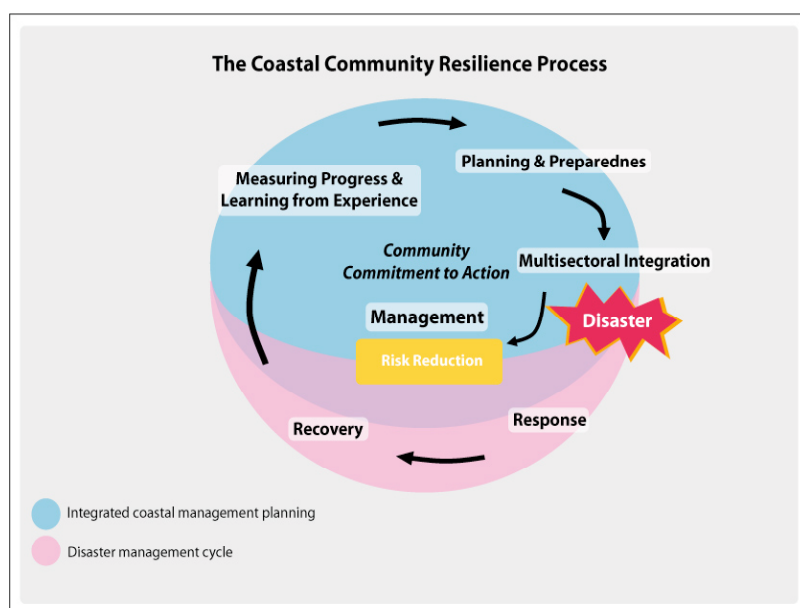


Figure 3 The Coastal Community Resilience Process (Source: White, 2006)

CCR promotes tsunami and other hazard readiness through better and more consistent tsunami awareness and mitigation efforts among communities at risk. The main goal is to improve of public safety during tsunami emergencies and to build resilience against recurring coastal events (USAID, 2006). To meet this goal, the following objectives need to be met:

- Create minimum standard guidelines for a community to follow to become tsunami resilient
- Encourage consistency in educational materials and response among communities and national emergency systems
- Recognize communities that have adopted CCR guidelines
- Increase public awareness and understanding of tsunamis and other hazards
- Improve community pre-planning for tsunami and other disasters impacts (USAID, 2006).

The concept of CCR blends elements of disaster management and ICM (

Figure 4). It provides a promising framework that has been tested through local scale workshops and bodes well for future efforts to minimize social disruption and mitigate the effects of events and impacts.

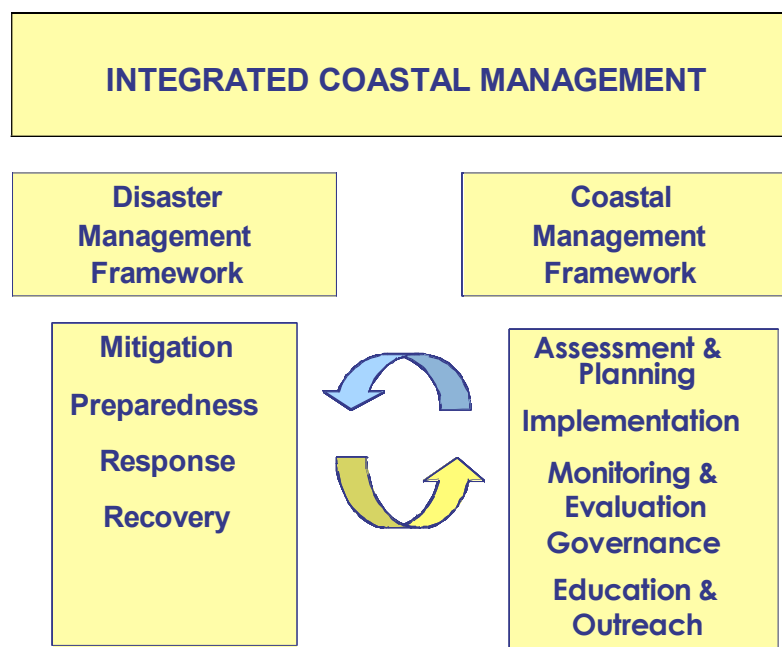


Figure 4 Integrating Disaster Management and ICM Frameworks through CCR (Source: Tobey, 2006)

While CCR is relevant to ICM it should not be viewed as a replacement. Rather, CCR appears to be a useful component to be adopted into a broader ICM framework - i.e. protecting against and preparing for coastal disasters is one component of the holistic planning process. Indeed, the CCR concept may become the conduit through which integration shortfalls have occurred to date in the ICM response to the tsunami as outlined in the next section.

6. Key findings and lessons learned relevant to post tsunami reconstruction

The 2004 Indian Ocean tsunami has brought into sharp relief the challenges faced by those responsible for managing Indian Ocean Coasts and has highlighted the need for improved and more systematic coastal management efforts. A lack of, or poor implementation or adherence to, policy and legislative frameworks that support coastal area management within the region have contributed to the unplanned development of coastal zone and the suite of problems with which it is associated. Impacts of the tsunami served to compound and exacerbate many of these pre-existing problems. Damage was reduced in areas with healthy coral reefs, mangrove forests, and coastal vegetation (Chang et al., in press). Likewise, had designated setback areas been enforced along the coastal zone it is likely that the mortality rate of marginalised fisherfolk and their families throughout the region would have been significantly reduced. Although, it is important to stress that while this is both intuitively correct, and supported by anecdotal evidence, rigorous examination of this issue is still ongoing and remains a matter for debate.

Equitable and sustainable reconstruction efforts have been an important focus of the post-tsunami response. However, effective ICM requires long term planning and implantation adherence. This may only be achieved through setting realistic objectives and timeframes for implementation and working steadily toward that goal (Hanley, 2006). In this context, it is evident that the aftermath of a disaster is not the appropriate time to attempt to use traditional ICM approaches alone owing to their reliance on long-term consensus building generally through community-driven

participatory techniques. The CCR approach by contrast combines philosophies of ICZM with contingency planning for the next disaster.

In the aftermath of the Indian Ocean tsunami it has become clear that we must ensure that long-term sustainable goals of ICM do not become compromised by short term responses. Although efforts to rebuild and reconstruct have been well intentioned, there are still a large percentage of regional coastal populations who are highly vulnerable and ill equipped to deal with future disasters (MFF). In this climate, the marriage of coastal disaster response plans, principals of CCR and traditional tools and techniques of ICM may represent the way forward towards a holistic planning process. This will protect against and prepare for future coastal disasters while at the same time adding considerable benefit to sustainable responses to the 26th December 2004 tsunami disaster.

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