

Case Studies: Environment in Recovery

A. Myanmar Experience in Integration of Environmental Concerns into Recovery

The Recovery Strategy for Environment and Disaster Risk Reduction

Although initially it appeared that a typical emergency response strategic framework would be adopted by the UN in Myanmar, the formulation of this strategic framework and its action plan was superseded by the decision to develop the Post-Nargis Response and Preparedness Plan (PONREPP). The PONREPP was prepared jointly by the international community and the Government of Myanmar under the auspices of the TCG and sets out a three year framework to guide recovery efforts following Cyclone Nargis.

Good Practice 1:

The Placement of Environment in the Strategic Framework (PONREPP)

The advantage of this alternative framework, which makes major considerations for future preparedness, in addition to emergency response, is that the PONREPP provides a platform for transition from emergency relief and early recovery towards medium-term recovery across eight operational sectors. These cover three themes: productive lives, healthy lives and protected lives.

It was a priority to ensure that environment is included effectively in the PONREPP, both within individual sectors, but also as a separate sector. As a cross-cutting issue, environment is now included as part of the theme on “protected lives.” This was a major achievement, because environment was previously seen as relating only to mangroves and was therefore classified as part of forestry only. Many interventions were made in each of the sectors, as a result of which environment is included in most sectors (livelihoods, disaster risk reduction, shelter and water, sanitation and hygiene). However, despite progress, some aspects of the cross-cutting nature of environment were still missing.



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After discussions with the PONREPP team, environment was also included as a separate section. The responses, particularly from donors, were positive, as they felt that the livelihoods chapters would not be sustainable without simultaneously addressing environmental concerns.

The new post-Nargis structure for the clusters (or technical working groups) proposed by OCHA and the office of the Resident Coordinator provides for a Working Group on Environment.

Beginning Implementation

The recovery strategy for environment focuses on ensuring sound management of the environment and natural resources through strengthened systems at the community, township and national levels. Initiatives include capacity building activities, institutional strengthening, systematic assessments of natural resources, strengthening of monitoring and surveillance systems for environment and natural resources, as well as support for livelihoods-related schemes based on sustainable management of natural resources.

Good Practice 2: Explicit “Environment for Disaster Risk Reduction” Capacity Building

One of the main objectives of UNEP’s assistance in Myanmar is to help build long-term capacity within the NCEA and relevant government agencies for integration of environmental considerations in disaster risk reduction and management.

A half-day session on “Environment and DRR” was given at a “training of trainers” event organised by Mingalar Myanmar, a local NGO, for the Ministry of Social Welfare, Relief and Resettlement (MSWRR). Participants came from townships within the Nargis-affected areas. This training for local authorities was very useful in demonstrating the connections between different sectors.

Technical assistance has also been substantial. Discussions have been held with the WASH Cluster to provide training of trainers and equipment for water quality and safety. Discussions are underway with the Department of Land-use Planning of the Ministry of Agriculture to provide equipment for their planned systematic surveys of soil salinity. In addition, discussions



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are under way with the Department of Forestry to provide technical assistance and equipment to enable them to complete the assessment of mangroves resources in the Ayeyarwady Delta.

Good Practice 3: Communicating Environmental Advice

Advice on environmental issues must be available, but should also be requested, to have maximum impact. Positively, questions raised by various UN agencies, including FAO, IOM, UNICEF and UNDP on environment issues have been answered as needed. Examples include advice to IOM on sourcing materials for rebuilding 300 dwellings and to UNICEF on environmental education for the curriculum that they are developing for the Nargis-affected areas. The government, however, should be further encouraged to request / accept advice on environmental matters when needed.

Long-term Disaster Risk Reduction

A project concept has been prepared on environmental vulnerability and risk reduction in cyclone affected areas, and for capacity building to formulate plans and policies for disaster risk management. An initial draft was prepared after consultation with government officials, UN agencies and NGOs. If funded, the project would contribute to long-term preparedness.

The overall goal of the proposed project is to promote sustainable livelihoods and disaster risk reduction in the Nargis-affected areas through strengthened systems for the sound management of environment and natural resources at community, local authority and national levels.

This goal would be achieved through the implementation of three inter-related objectives that focus on capacity building and institutional strengthening at the community level (Objective One) and local authorities and national government levels (Objective Two), supported by the strengthening of systems for assessment and monitoring of natural resources in the Nargis affected areas (Objective Three).

An integrated approach to the implementation of these project outputs would help to strengthen ownership of activities by communities and government agencies, thus helping to promote sustainability of the project outcomes at all levels.

On the Ground Challenges

Sectoral government plans that should incorporate an environmental element include: 1) Housing – with an emphasis on sustainable reconstruction; 2) Water – access to safe drinking water for communities; 3) Agriculture – restoration of livelihoods and food security; 4) Fisheries – restoration of incomes from fishing and subsistence fisheries; 5) Salt industry – rehabilitation of salt fields; 6) Forestry – rehabilitation of forests and mangroves (particularly in terms of their environmental benefits); and 7) Preparedness and protection from future natural disasters.

Lesson 1: Communicating the cross-cutting nature of environment

Initial work focused on an analysis of government recovery plans in terms of their incorporation of environmental concerns. This was hindered by the fact that many plans were in the Myanmar language and translations were not easily available. However, based on those that were available in English, an analytical framework was prepared and two government counterparts are analysing all available plans using this framework. Some government sectors, however, still see environment as exclusively part of their own sector and would prefer environment to fall fully under their projects.

Lesson 2: The Lack of Environment as an Initial Consideration

The forestry plan was the only one to take environment into consideration in a very systematic way, although the implementation of the plan would require further environmental assessment before execution. Unfortunately, other agency plans have not taken environment into consideration to any degree and further work is needed for this analysis to be completed by the NCEA, working with each of the agencies concerned.

Lesson 3: Funding and external review

It is often a challenge for government funding to be available for the implementation of the environment plans. When funds are allocated (e.g. for building of embankments), it would be beneficial to provide an opportunity for external technical review of the plans by international agencies.

B. Bangladesh Experience in Integration of Environmental Concerns into Recovery

Lesson 1: The Need to Go Beyond Basic Rebuilding

Environmental concerns for recovery and long-term risk reduction was still an area needing more substantial consideration following the 1998 floods. Housing construction was identified as needing improvement during recovery, particularly greater community participation and higher, environmentally sound standards for design.

Cyclone Sidr, a category 4 storm, hit Bangladesh's south-west coast on November 15, 2007. The storm generated 5 meter high tidal waves and coastal and river surges of up to 6 meters, breaching embankments and flooding low-lying areas. The cyclone affected 2.3 million households with 1 million seriously affected. The strong winds of up to 240 kilometres per hour and the flooding seriously damaged infrastructure such as housing, roads, bridges and sanitation. Water resources became contaminated or salinated. Casualties totalled around 3,406 with 1,001 still missing (March 2008) with over 55,000 people injured. These numbers are considered low for such an intense cyclone and is attributed to previous efforts improving disaster prevention measures: forecasting and warning, coastal afforestation projects, cyclone shelters and embankments (JDLNA March 2008).

Post-Sidr Recovery Strategy

Good Practice 1: Integrating Environment at the Earliest Stage Possible

Starting at the early recovery strategy, environment was given distinct importance in the Joint Damage, Loss, and Needs Assessment for Recovery and Reconstruction after Cyclone Sidr.

The JDLNA suggests environmental interventions to include an “awareness raising campaign with the objective to prevent further damage to the vulnerable environment; “activation of an effective GIS/RS based monitoring and evaluation system;” and reactive “environmental cleanup and rehabilitation, restoration of damaged environment and support for further protection, support for restoration of social forestry using local plant species” (JDLNA March 2008).



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Good Practice 2: Explicit “Building Back Greener and Better”

While the past saw only partial environmental integration into recovery, usually with a stronger priority on credit and infrastructure assistance, the post-Sidr recovery strategy prioritizes “building back better”: improving the local capacity and utilizing environmental management.

Rebuilding of houses, schools, shelters, rural roads, embankments and markets will provide local economic opportunities and “introduce and mainstream new standards and upgrading that will help protect them against future disasters” (JDLNA March 2008). This also includes rehabilitation of the Sundarbans coastal forests ecosystem, which is listed (although last) as one of the Medium-to Long-term Recovery and Reconstruction Interventions.

Based on the evidence that the coastal forests of the Sundarbans provided significant protection during cyclone Sidr and past events, the recovery strategy prescribes:

- Forestation along embankments, integrated with the recovery program;
- A long-term program of forestation along the coastal belt to reduce vulnerability to storms and surges;
- Large-scale rehabilitation of the Sunderbans;
- Restoration of the Gorai River system.

Along with this agenda, it is recognized that local capacity must be increased to maintain the afforestation and reforestation projects. In this way, environmental projects could help to build resilience against future storm surge, while also providing long-term income opportunities for local residents in the form of future management of forest areas. This in turn contributes to better management of the resource, which again mitigates future risk.

Local participation in projects not explicitly linked to environment, such as for rebuilding infrastructure, are also an advantage, because it allows ownership and local inputs into rebuilding needs. This can assist the environment in the long run through better long-term resource management, providing an understanding of why new types of building materials are more



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resilient. This would avoid a waste of building materials that the local populations would not themselves choose, without understanding the full benefits.

Risk Mitigation Through Exposure Reduction and National Planning

Good Practice 4: Disasters as Part of the Development Continuum

Flooding in Bangladesh is a natural hazard that cannot be prevented, but the vulnerability level can be lowered. The shift in approach from focusing on emergency response to long-term, sustainable livelihood protection is helping to alleviate the losses at each hazard event.

“Bangladesh is currently ranked as the most climate-vulnerable country in the world” (World Bank 2005). In order for Bangladesh to progress with sustainable development, disaster risk management and reduction simply cannot be left out of long-term planning, and any opportunities created during recovery to build back greener and better cannot be missed. The Draft National Plan for Disaster Management (NPDM, 2005-2015) is one good example of how Bangladesh’s plan incorporates the environment, mainly through its alignment with the priorities of the Hyogo Framework for Action and the United Nations Framework Convention on Climate Change. It is still awaiting final approval by the government.

Lesson 2: Environment Cannot Be the Only Answer

Risk management in Bangladesh, in particular due to its extreme vulnerability to climate hazards, must be realistic. While environmental considerations should not be excluded on any level, environmental protection is also not a stand-alone answer. The JDLNA points out that “absolute protection for all areas against all climate hazards is neither feasible nor economically defensible....Building resilience would involve a combination of ‘hard’ and ‘soft’ engineering solutions, zoning and planning, and an innovative use of economic instruments to protect assets and direct incentives toward investment in climate-resilient forms of economic activity”.

The Riverbank Protection Improvement Program (RBIP) and the Coastal Embankment Improvement Program (CEIP) are proposals that use both environmental measures for mitigating risk, as well as human-made structures.



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Lesson 3: Environment Not Recognized in All Sectors

It was recommended in the JDLNA that funding for environmental needs should come from the Forestry Department, because of its role in the preservation of the Sundarbans. While this is one very appropriate area for environment and disaster risk reduction, the recommendation risks losing a coherent and comprehensive environment recovery strategy. If other sectors do not receive allocations for environmental matters, they are less likely to move ahead with plans integrating environment.

The prescribed funding trend in Bangladesh for environmental protection starts at \$3.2 million for early recovery (4-8 months into recovery), which is less than 1% of the total recovery funding. The prescribed medium-term recovery funding for environmental protection increases to \$10 million - still only 1.7% of the total recovery budget of \$597 million. Long-term recovery receives \$5.4 million for environmental protection - 1.5% of the total prescribed for long-term recovery. “Embankments and Water Control” is listed as a separate funding intervention for medium and long-term recovery, which does show more significant funding - 11% out of the total for medium-term recovery and 11.2% of the total for long-term recovery. However, it is difficult to determine how much of that will go toward environmental measures.

C. Coastal Ecosystem Restoration: Lessons Learned in Aceh since the Tsunami

The recovery of tsunami-affected areas in Nanggröe Aceh Darussalam and Nias is being carried out in three stages: emergency response, rehabilitation, and reconstruction. The initial emergency response stage, which focused on rescuing survivors and providing for their basic needs, lasted from January 2005 to March 2005. The second stage, rehabilitation, began in April 2005 and is scheduled to end in December 2006. During this stage, a variety of rehabilitation activities have been carried out, including cleaning up tsunami debris and repairing mosques, hospitals and infrastructure.

This will be followed by the reconstruction stage, which is scheduled to start in July 2007 and finish in December 2009 (Bappenas, 2005). During the second stage, those parts of the coast

damaged by the tsunami are being reforested through the planting of mangrove and other coastal species. Most of the mangrove planting has been done in Banda Aceh, Aceh Besar, Pidie, a little in Aceh Jaya and other parts of Aceh's eastern coast that have muddy beaches. Meanwhile, the planting of other coastal species (generally sea pine *Casuarina equisetifolia*) has been mainly along the western coast, particularly in the districts of Aceh Besar, Aceh Barat, Nagan Raya and Aceh Selatan.

Actors in coastal rehabilitation

The rehabilitation of degraded coastal areas involves various stakeholders, each with their particular role and position. The main roles of all those involved in rehabilitating Aceh's coastal vegetation can be grouped into three simple categories: donor, facilitator, and implementer.

The role of donor is usually played by official agencies, foreign governments and international organizations having access to funds raised from the international community. These funds (part of which are also allocated to the emergency and reconstruction stages) are then dispersed to a number of stakeholders, primarily to international and national NGOs, to facilitate efforts towards the goals of rehabilitation. These NGOs then play the role of facilitator; they channel funds from the donors to the implementers in the field, and are responsible to the donors for the results of field activities (including the use of the funds).

Meanwhile, the implementers are those (usually the communities living on the coast) who undertake the actual physical work of rehabilitation activities in the field and who are responsible to the facilitator for the work and its results. Besides the main actors, other parties are involved as supporters.

Progress in implementation

The planting of mangroves and other coastal vegetation was first initiated by a number of International NGOs (Oxfam, Islamic Relief, Mercy Corps, etc.) through *Cash for work* programmes in April 2005 in several locations in Aceh Besar, and in Simeulue through a

programme of planting by community groups facilitated by Care International-Indonesia in cooperation with Wetlands International (from June 2005).

Subsequently, the Watershed Management Service (BP-DAS - *Badan Pengelolaan Daerah Aliran Sungai*) began the planting of mangroves in Lham Nga village in Aceh Besar, attended by Forestry Minister M.S. Kaban. It was not until 21 November that BRR officially launched the ‘Coastal Re-greening Project’ in collaboration with WI-IP and WWF-Indonesia. From then on, a variety of other institutions, both governmental and nongovernmental, have been quick to join in the coastal rehabilitation effort. Mangroves are usually planted in brackish aquaculture ponds, degraded mangrove habitat, and along river banks. Mangroves were also found to have been planted in unsuitable places, however, such as on deep sandy beaches and dry land. The seedlings’ survival rate differed widely between these two types of site, being much higher on muddy sites (ponds and river banks) than on sandy beaches. Almost all of the mangrove planting done on sandy sites totally failed.

The assessment conducted by the WI-IP team in September-October 2005, identified 25 true mangrove species in Aceh (including Simeulue island) and Nias, of which 20 were considered to have good potential for cultivation and planting in Aceh. In practice, however, no more than 5 species of mangrove have been planted and 95% consisted of *Rhizophora apiculata* and *R. mucronata*, the remaining 5% being Nipah *Nypa fruticans*, Tengar *Bruguiera* spp. and Api-api *Avicennia* spp. A wider variety of species was found to have been used for coastal dry land rehabilitation, however. Those most commonly planted included coconut *Cocos nucifera*, sea pine *Casuarina equisetifolia*, *Terminalia cattapa*, *Cerbera manghas*, *Hibiscus tiliaceus*, neem *Azadirachta indica*, *Callophyllum inophyllum*, *Jatropha curcas*, and *Pandanus tectorius*. Besides these, several multi-purpose and economic tree species were also planted, including Tamarind *Tamarindus indica*, Areca palm *Areca cathecu*, Breadfruit *Artocarpus* spp., Cocoa *Theobroma cacao*, and others in limited numbers.

According to WI-IP’s analysis of available data from various sources in Aceh, plans have been made for the rehabilitation of at least 56,502 hectares of coast. Of this, 27,532 ha is planned for mangroves and 28,969 ha for other species of coastal vegetation. Only a few of the



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implementers have reported the actual extent of their activities, and there is nothing to confirm that the others have in fact carried out any rehabilitation. Nevertheless, a total of 29.84 million seedlings were supposed to have been planted, of which 98.65% are mangroves and the rest other coastal species.

Level of success

To date, the degree of success achieved by rehabilitation work is not known with any certainty due to the lack of data on the percentage of seedlings that survived. Only a small proportion of the implementers possess data on the progress of their rehabilitation activities, including seedling survival rate in the field. Most do not do any monitoring, so do not know how many seedlings survive. This is one of the results of the fragmented nature of the activities, such that rehabilitation is considered to be finished as soon as the seedlings have been planted. Neither tending nor monitoring has been deemed necessary.

Rough calculations made during field observation suggest that the survival rate for mangrove (40%-60%) is considerably higher than for other coastal species (20%-50%).

As time goes on, however, this percentage is certain to decrease for the following reasons:

- Some mangroves were planted using the propagule which, for a period of 1- 2 months, gives the plant an excellent chance of living as the embryo is sustained by the nutrients contained in the hypocotyl. Only after this store is exhausted and the seedling has to depend upon nutrients in the soil can success or failure be determined.
- Seedlings still alive now will not necessarily continue to live. This will depend upon the conditions prevailing in the seedling's environment, such as drought, the action of the waves as tides ebb and flow, or being eaten by animals.
- The seedlings are not tended. Without proper maintenance, plants will be attacked by pests and diseases thus reducing the survival rate.
- Regional development involving the development of public facilities and infrastructure (such as roads) could destroy rehabilitation sites.
- Land owners may change their minds after their land has been planted with mangrove or coastal vegetation. Having initially agreed to the planting of these rehabilitation species, they subsequently pull them up because they want to use their land for another more



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economically advantageous purpose (e.g. aquaculture ponds, housing).

Recommendations

The obstacles, failures and experiences obtained from rehabilitation efforts during the two last years in Aceh and Nias have provided us with valuable lessons.

Selection of appropriate species and planting sites

The species selected should be those best suited to the conditions prevailing at the planting site, priority being given to local species. Avoid introducing alien species as this can seriously disturb the equilibrium of the ecosystem.

If the planting site is muddy beach, mangrove seedlings should be selected, though the decision on which particular species of mangrove to plant will depend on the specific characteristics of the substrate, in particular the depth of the mud, the condition of the tides, the distance from a river, etcetera. On the contrary, if the planting site is sandy beach, other species of coastal vegetation species must be chosen.

Use of biological indicators when selecting planting sites

A species of plant or animal found on the site can be used as a biological indicator of the site's suitability for the purposes of rehabilitation.

- **Biological indicator for mangrove planting site.** The mud skipper (locally known as Glodok or Tembukul, *Periophthalmus* spp.) is an animal indicator of sites suitable for planting mangrove. This creature likes a muddy substrate with periodic flooding.
- **Biological indicator for coastal species Planting site.** *Ipomoea pes-caprae* (locally known as Katang-katang or Galaran) is a herb that flourishes on sandy beaches. It is a pioneer species able to grow on open sandy substrate, and has high tolerance to salinity. Substrate (and also eventually the seedlings, such as sea pine) which is covered by this herb is protected from the sun's direct heat and does not become too hot. Moreover, it is also protected from the direct force of the wind, so is more stable and less susceptible to erosion.



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These conditions are usually accompanied by the appearance of micro-organisms and small creatures which slowly improve the carrying capacity of the substrate by, for example, enriching its organic and nutrient content. As a result, species such as sea pine and *Callophyllum inophyllum* can grow well.

- **Biological indicator for sites to avoid for mangrove planting.** Barnacles are a bad sign in a site planned for mangrove planting. Even though mud skippers are abundant, if barnacles are found, the site should not be used for mangrove. Just one single barnacle in the site will multiply very rapidly and become extremely difficult to exterminate.

Improving selection of rehabilitation sites

Mistakes in selecting the planting site are a major factor leading to the failure of rehabilitation work. They can be avoided by properly assessing a prospective site before deciding whether to use it for rehabilitation. A Decision Supporting System (DSS) is a tool which can be used to help make this decision. In this system, a number of parameters are used to assess the land's suitability and feasibility.

Although the land is bio-physically suitable, there may be other factors that make it an unfeasible site for rehabilitation. For example, it may be too remote from the community for rehabilitation work there to be effective or efficient.

Furthermore, all the potentials and constraints must be identified and analyzed to discover the possibility of success and the risk of failure. If the constraining factors are greater than the supporting factors, the activity should not be undertaken. If, on the contrary, the supporting factors outnumber the constraints, the activity has a good chance of succeeding and can therefore be undertaken.

Improving active community participation

The community is the spearhead in rehabilitation activity. Unfortunately, their role and participation is still very limited, appearing to be little more than a symbol that the rehabilitation

work has involved the community. In all the various rehabilitation activities in NAD and Nias, the community has so far been involved only as planters and porters, and their involvement has automatically ceased when the planting and carrying is finished. Through this mechanism, they have no sense of ownership towards the seedlings they have planted, nor care whether or not the seedlings will survive. This is one of the factors leading to the failure of rehabilitation.

For rehabilitation to be successful, the community must be involved actively in the whole spectrum of activities, from planning to planting and then the other activities after planting. In this way, the community not only gets involved but can also develop a sense of ownership and an attitude of caring about the rehabilitation. They will also have acquired the range of skills needed to undertake the whole process of rehabilitation on their own, as they will have been involved from the beginning to the end of the activity. If this mechanism is managed well, the community will also function as warden of the growing trees. Nevertheless, this must continue to be supported by raised public awareness of the importance of coastal vegetation to the environment and to the community.

Capacity building through technical manuals and training

Based on field observation, it is known that very few field implementers have either the experience or skills needed to undertake coastal rehabilitation activities. As a consequence, rehabilitation programmes are not carried out properly and thus end in failure. By providing simple, clear manuals, it is hoped that field operators can be helped to understand the procedure through every stage of the activity, leading to much better performance.

Other materials, such as posters and leaflets, can also help to improve the community's capacity. However, for some field operators, particularly those with little or no formal education, a manual is not enough on its own as they may not be able to understand it. It needs to be interpreted through hands on training and demonstration by field instructors.

Development of silvo-fishery

Currently, almost all of the rehabilitation programs in NAD Province and Nias have the same planting pattern, i.e. they plant on empty coastal land. Unfortunately, the understanding of ‘rehabilitation’ is limited to the physical act of ‘planting’, lacking a basic understanding of the concept of conserving the coastal ecosystem in its entirety. To overcome this, reforestation should also be carried out in aquaculture territory (not just on empty land) by planting mangroves along the dykes and in some of the ponds. This concept is known as ‘silvo-fishery’, i.e. the combination of forestry through planting mangrove and fishery through the cultivation of shrimps or fish.

Improving coordination among stakeholders

The poor coordination that prevails among stakeholders is in urgent need of improvement through better communication and information sharing. To do this, BRR should take the lead as both initiator and facilitator, by holding routine meetings that involve all the stakeholders and then distributing the results of each meeting to the various parties working in Aceh and Nias.

For this purpose, BRR could be assisted by other institutions, such as the local environmental impact management agency (BAPEDALDA), the Forestry Agency and BP-DAS.

Furthermore, all the other stakeholders (including international donors and NGOs) should proactively coordinate their activities with BRR and inform the other parties, so that all can learn from one another. In this way, the development of each stakeholder’s activities can be monitored and comprehensive data on their progress be made available. In addition, the stakeholders’ activities will run better as a result of sharing experience and lessons.

The need for sustained tending, monitoring and evaluation

One of the keys to successful rehabilitation is the tending of the seedlings after they have been planted. The main tasks involved in tending include: replacement planting, pest and disease control, and weeding. If repeated replacement planting still results in failure, further enrichment should be discontinued. This is likely to occur when the substrate is unsuitable, for example as a

result of tsunami deposits. Besides tending, both monitoring and evaluation need to be carried out.

BRR or government agencies should play a role in monitoring and evaluation so that all the activities carried out by all the various parties in Aceh are well looked after and properly documented. This step can also be an alternative way of solving problems when all the international NGOs and foreign donor agencies leave Indonesia.

The need for mangrove diversity

The current planting of mangroves in Aceh will, unawares, create a monoculture because almost all of the seedlings used are of only two species of a single genus, *Rhizophora*. Although these are local species, such homogeneity is not good for ecological balance. For this reason, enrichment planting is essential. This can be done by planting other species of mangrove, such as *Avicennia* spp., *Bruguiera* spp. and *Ceriops* spp. on sites which suit each particular species. Thus the quality of the mangrove stand will improve along with its protective function and other benefits.

Planting from the back of the beach towards the front

Beach vegetation should be planted starting from the land then moving towards the beach, so that the seedlings do not die as a result of inundation by sea water, nor wilt or die due to the hot sand substrate. In the field, however, it was frequently found that species such as casuarina and coconut had been planted starting from the sandy shore line then working inland. Perhaps this was done in the expectation that the shore line would quickly be protected from the action of the waves, but in fact many of these seedlings died from lack of water. To improve the success rate further, planting should be done from the back (land) towards the beach, and should stop at the line where the sand is deep and there is no vegetation growing on it. The herb *Katang-katang* *Ipomoea pes-caprae* can be used as an indicator of where this line occurs.

Improving awareness

Unless the community is environmentally aware, coastal rehabilitation runs a high risk of failure. One way of tackling this is through an environmental awareness campaign. This campaign can make use of a variety of methods, such as talks, discussions, documentary film shows, etc. It can include interactive events to attract the public, such as mangrove planting contests, environmental quiz competitions, etc., and the message can be consolidated through campaign materials like posters, leaflets, and billboards.

Environmental awareness must be instilled as early as possible in the community and must take into account the local culture and customs.

Exit strategies

Within the next few years, one by one the NGOs and donor agencies now working in Aceh will leave the province. At the end, only the residents and local government will remain. The withdrawal of the NGOs and donor agencies from Aceh will mean the end of their various programmes, the termination of employment they provided for local people, and the end of rehabilitation activities. This is certain to have a detrimental impact; there will be a large number of newly unemployed people, economic activity will decline, and there will be the question of the status of the activities that had been done (sustainability, maintenance, etc.).

As regards environmental rehabilitation, the end of the mission is certain to give rise to several problems for the future. One of these will be the abandonment of the mangroves and coastal vegetation planted; their status being unclear, there is a high risk that the rehabilitated sites could later be demolished. For these reasons, measures are needed to prevent these problems from arising. These should be packaged together in an ‘exit strategy’ specifically designed to anticipate all the problems that could arise after the rehabilitation and reconstruction, when the donors and NGOs have left Aceh and Nias. Through this ‘exit strategy’ the negative impacts from the cessation of these activities can be eliminated, prevented, or reduced.

D. Green Recovery Partnership – an example of good practice

In the context of recovery work following the 2004 South Asian Tsunami, the World Wildlife Fund (WWF) is working in partnership with the American Red Cross to ensure that recovery and reconstruction activities maintain and enhance healthy ecosystems. The infusion of large amounts of resources to rebuild communities and get people back to work, however well intentioned, can generate greater environmental degradation and increase community vulnerability to future disasters if not designed and implemented according to local environmental conditions. To mitigate these potential negative effects, the American Red Cross utilizes the technical expertise of WWF and World Conservation Union (IUCN)-Sri Lanka to evaluate the environmental impacts of tsunami recovery and reconstruction activities and provide alternative solutions.

The goals of the partnership are as follows:

1. Ensure that disaster recovery projects are as environmentally friendly as possible.
2. Train American Red Cross staff and partners in sound environmental practices to benefit people and preserve habitats.
3. Build mutual organizational learning, knowledge and experience by working with a wide range of organizations and communities

The partnership focuses on four major themes:

1. Livelihoods: Restoring jobs, economic opportunities, food sources and a sense of purpose within communities.
2. Construction: Rebuilding homes and other structures with sound spatial planning, while avoiding damage to local ecosystems, minimizing community exposure, and ensuring future generations have a sustainable supply of building materials.

3. Water and Sanitation: Helping communities restore their water systems to provide clean, safe water for agriculture, aquaculture, washing and cooking, while also protecting streams, rivers and marine environments.

4. Disaster Management: Preparing communities and their environment to deal with future disasters with a minimum of human suffering and environmental degradation.

(Source: Green Recovery Partnership: WWF/IFRC Information Brochure)

Importance of Recycling Waste Products that Result from Disasters

(Source: http://irp.onlinesolutionsltd.net/assets/publication/Lessons_Hanshin-Awaji_English.pdf)

In the areas affected by the Great Hanshin-Awaji Earthquake, a large amount of rubble was generated, a large volume of household goods that could no longer be used was thrown out, and many unnecessary daily items were thrown away as people moved from evacuation centers to emergency housing. While public funds were utilized for dismantling and disposing uninhabitable housing units in order to speed the process of reconstruction and recovery, it has been noted that this led to some buildings that could have been salvaged and repaired being torn down. At the same time, volunteers with technical knowledge in light carpentry work or repair of furniture and fixtures promoted reuse and encouraged people to not throw out all waste from the disaster, so there was also substantial activity on this front. Some of the emergency housing units constructed after the earthquake that were capable of being reused were provided to Turkey and Taiwan as temporary housing for victims of disasters. In recent years, the trend toward a recycling-based society has gathered momentum. With the promulgation and enactment of the Construction Waste Recycling Law, it has become mandatory to dismantle houses room by room. In addition, various recycling laws have been established, including the Home Appliance Recycling Law. We need to strive to take actions in our daily lives that do not excessively impact the environment, and even in times of disaster, it is important to throw out as little waste as possible.



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E. Pakistan 2005 Earthquake: Early Recovery Framework With Preliminary Costs of

Proposed Interventions (source: http://irp.onlinesolutionsltd.net/assets/publication/pak_2005_eq_framework_nov2005.pdf)

Early recovery needs include the development of an appropriate waste disposal system to handle the large amounts of debris; the provision of alternative sources of energy for mountain populations; debris removal and waste recycling including the salvaging of building materials from the rubble; watershed vulnerability mapping; water quality monitoring; and slope stabilization in watershed areas including reforestation.

A comprehensive environmental assessment is required in order to understand and respond to immediate, secondary and possible medium-term impacts of the earthquake. This will be instrumental in further identifying impacts as well as identifying appropriate measures for risk reduction and environmental conservation. In addition, effective mechanisms for the provision of environmental expertise are required to guide the planning and execution of the overall recovery activities in terms of institutions, policies and legislation.

F. Long Term Hazard Risk Reduction Issues

(Source: http://irp.onlinesolutionsltd.net/assets/publication/Preliminary_Damage_and_Loss_assessment_Srilanka2005.pdf)

Prior to the tsunami disaster, the risks from natural hazards to Sri Lanka were considered low. Sri Lanka experiences mostly weather-related hazards, resulting in localized and seasonal floods, landslides, cyclones and droughts. Monsoon-associated landslides also occur in the districts of Badulla, Nuwara liya, Ratnapura, Kegalle, Kalutara, Kandy, and Matale.

In Sri Lanka, vulnerability to hazards is related to physical, environmental and legal-institutional weaknesses. Land use patterns, human settlement developments and construction practices that are not sensitive to weather related hazards are the most significant contributors to creating unsafe conditions. Recurrent patterns include encroachments into flood plains and substandard



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construction on unstable slopes. Land use practices that do not respect natural resource protection, as well as environmental factors (such as depletion of forests and mangroves, coastal erosion, siltation, and inadequate water and water-shed management) may further exacerbate the impacts of natural hazards. It is anticipated that changes in demography and climate, and the continuation of unsound environmental practices and development patterns may increase frequency and losses from disasters.

G. Lessons in infrastructure management

Source:

http://irp.onlinesolutionsltd.net/assets/submissions/200909010909_japan_typhoon_environment.pdf

Dyke Management: This emerged as a critical aspect of disaster prevention and flood management, and is especially relevant to cities and areas located along rivers. Two issues came to the fore: a) need for regular inspection of dyke systems, and b) reconciliation of design values with unexpected rainfall values.

- *Urban and land-use management:* Many of the river banks are an integral part of the city's leisure areas, and are zoned as 'urbanization control areas' and as nature preserves - where building construction cannot take place in close proximity.
- *Forest Management:* One of the important aspects of disaster preparedness is proper forest management in mountain areas. Many of these areas are characterized by planted monoculture forests and shallow anchorage of trees. To enhance growth of stronger trees, some of the slow-growing trees are culled, but not cleared since these do not have any market value. During a typhoon, these wood debris are washed downstream, clogging the rivers. Proper forest management is a key to reducing the impacts of flooding during disasters.
- *River Basin Management:* Typhoon and flood management should be undertaken in an integrated way, looking at the river basin as a whole. Proper upstream management of forests



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also enhances disaster management efforts downstream, and similarly, downstream river management enhances upstream environmental management.

Lessons in policy, strategy and planning

- *Inter-linkages between disaster preparedness and environmental management:*

The first and the most important lesson that emerged from the Toyo-oka visit was the inter-linkages between disaster preparedness and environmental management in policies and plans at the local and national levels. Disaster management plans should incorporate environmental dimensions, and should anticipate the impact of disasters on the environment, as well as the impact of environmental practices (for example, forest and river management) on the impacts of disasters.

- *Plans and Programmes:*

While disaster and environmental management should be linked to development planning, broader river basin management should also be considered in disaster programmes, and should be linked to the overall city management strategy.

- *Dissemination, adaptation and implementation:*

Many of the lessons from the past disasters in the same country are relevant to other cities/ areas, but are often not disseminated properly. Cooperation of cities and prefectures in this regard is essential for adaptation and implementation of the lessons learnt.

- *Training and human resource development:*

Proper training and human resource development programmes should be undertaken not only for disaster managers, but also for high level decision makers such as city mayors. Training in decision-making systems is essential in this regard to integrate disaster preparedness and response into the larger development and management of cities in general.



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