

**REPORT OF THE REGIONAL WORKSHOP  
ON  
REHABILITATION OF AGRICULTURE IN TSUNAMI  
AFFECTED AREAS: ONE AND A HALF YEARS LATER**

**29-30 June 2006  
Bangkok, Thailand**



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## Foreword

This workshop is a follow-up to the regional workshop on strategies for rehabilitation and management of salt-affected soil from seawater intrusion, held from 31 March to 1 April 2005, which provided an excellent opportunity for participants to share expertise and exchange information on rehabilitation efforts to support affected farming communities impacted upon by the devastating tsunami. Various approaches for reclamation and management of salt-affected soils for resumption of agricultural production applicable to the specific local conditions were discussed. Based on the findings and conclusions of the workshop, a “Regional Strategic Framework for the Reclamation of Salt-affected Soils and Agriculture Recovery in Tsunami affected Areas” was formulated and widely disseminated for use by various actors involved in the rehabilitation of the agricultural sector.

Immediately following the tsunami, FAO was actively involved in various ways in assisting the tsunami affected countries resume agricultural activities. In particular, a number of emergency assistance projects were launched to support farming communities who had lost their production capacity, assets and subsequently the means to support their livelihood. While such short-term emergency assistance was crucial, it is our conviction that a long-term, sustainable development approach is essential for “building back better” the affected rural communities. In this regard, one of the main challenges now is to identify suitable interventions for longer-term rehabilitation and reconstruction of the agriculture sector. Such interventions should be carried out in a sustainable manner best suited to the local agro-ecological and socio-economic conditions. And for that an integrated and participatory approach is needed to identify promising technologies that could easily be adopted or adapted by local farmers.

In this context, FAO continues to collaborate with a number of national and international organizations such as related UN agencies, CGIAR centres, donor agencies, academic institutions and non-governmental organizations (NGOs) to provide policy advice and technical support to national efforts for development of long-term rehabilitation plans and development strategies for the agriculture sector.

The overarching objective of this workshop was to assess the progress made so far in addressing the emergency needs for resumption of agricultural activities and ongoing rehabilitation activities so that policies and strategies could be developed to support strategizing longer-term rehabilitation efforts.



He Changchui  
Assistant Director-General and  
Regional Representative for Asia and the Pacific  
Food and Agriculture Organization of the United Nations



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## **1. BACKGROUND**

Following the devastating tsunami on 26 December 2004, numerous international and national institutions and organizations were involved in assisting affected countries in resumption of agricultural activities and restoration of shattered livelihoods. Three months after the disaster, a regional workshop on salt-affected soils from seawater intrusion was organized by the FAO Regional Office for Asia and the Pacific, which provided an excellent opportunity for participants to share information, collectively assess initial findings related to rehabilitation needs and opportunities, share plans and proposals for future rehabilitation work, and develop mechanisms for collaboration and joint activities. Several projects were initiated to assess the damages to agricultural lands and to plan appropriate interventions which included activities such as rehabilitation of damaged agricultural lands and infrastructures, and reclamation of salt-affected soils for resumption of crop production. Moreover, FAO supported agriculture workshops at the country level in Indonesia and Sri Lanka to address country-specific issues and identify policies and strategies for future rehabilitation activities. One of the main challenges now is to identify suitable interventions for longer-term rehabilitation and reconstruction of the agriculture sector in a sustainable manner best suited to the local agro-ecological and socio-economic conditions. In this context, an integrated and participatory approach is needed to identify promising technologies that could be easily adopted by the farmers.

With these issues in focus, the FAO Regional Office for Asia and the Pacific convened this second regional workshop to bring together relevant national and international institutions and organizations to assess the present status of the rehabilitation activities, share experience and knowledge for development of future plans and strategies for the longer-term rehabilitation and development of the agriculture sector.

### **Goal and objectives of the workshop**

The overall goal of the workshop was to examine the present status of rehabilitation activities in the agriculture sector as well as to identify future interventions for sustainable development of the affected agriculture sector.

The specific objectives of the workshop were to:

- collect information on all past and ongoing rehabilitation efforts and identify overall gaps in the agriculture subsectors and rehabilitation intervention;
- review and discuss national strategies with emphasis on mid- to long-term rehabilitation of the agriculture sector;
- explore possibilities of strengthening national programmes/activities related to the rehabilitation of the agriculture sector; and
- develop mechanisms for coordination and exchange of information on the various initiatives being undertaken.

## **2. OVERVIEW OF WORKSHOP PROCEEDINGS**

The workshop was opened by He Changchui, Assistant Director-General and FAO Regional Representative for Asia and the Pacific (Annex 1). This follow-up workshop to the initial meeting in March/April 2005, where various approaches to the rehabilitation of affected agricultural lands were



discussed and proposed and a Regional Strategic Framework was formulated, had as its focus: a review of progress to date with the objective of identifying gaps that may have arisen; an assessment of long-term strategic plans for each of the countries, moving from an initial emergency response phase to structured long-term plans for the rehabilitation of the agricultural sector; and development of coordination strategies and linkages for current and future interventions. Immediately after the tsunami, FAO, along with a wide range of humanitarian aid agencies, initiated a programme of emergency aid to agricultural communities. Whilst this has had its desired affect, there is a need to now focus on the long-term rehabilitation and realigning of the agricultural sectors in each of the affected countries. Valuable input and experiences from those persons on the ground will assist in the development of sustainable strategies for the long-term development of the agricultural sector. As this process moves forward there is a need to identify suitable interventions that have the elements for improving livelihoods and securing ecological integrity and that are developed in a participatory framework.

Gamini Keerthisingh, Senior Plant Production Officer, FAO Regional Office for Asia and the Pacific provided a comprehensive overview of the objectives and background to the workshop. He highlighted the immediate response of FAO to the crisis that focused on facilitating the resumption of agricultural activities as a means of restoring the shattered livelihoods of thousands of communities that are dependent on agriculture. The main challenges for the workshop were to identify interventions and strategies for the long-term reconstruction of the agricultural sector. In order to achieve this will require an integrated and participatory approach. He reiterated the goals and objectives of the workshop along with the expected outputs.

The remainder of the day was comprised of formal presentations on the agricultural recovery programmes from each of the affected countries by representatives of governments and non-government organizations (Annex 2). At the end of the day working groups were established to review the following topics:

WG1: Present status and lessons learnt.

WG2: Priorities for long-term rehabilitation and development.

WG3: Mechanisms for coordination and exchange of information.

The working groups met on the following day. This report contains an overview of the country reports along with comprehensive reports (Annex 2) and detailed outcomes of each of the working groups.

### **3. COUNTRY OVERVIEWS**

Representatives of the governments of each of the five countries affected by the tsunami, along with NGOs and FAO staff, reported on the progress to date with respect to the rehabilitation of the agricultural sector. Presentations were augmented by scientific reports on studies initiated to assist in the rehabilitation process. The focus of the majority of the presentations was on FAO funded initiatives. A synopsis of each of the country presentations, reports and FAO reports is presented below. Full reports are presented in Annex 2 of this document.

#### **India**

Significant progress has been achieved towards the rehabilitation of the agricultural sectors, details of which were presented by representatives of the Government of India and the Tamil Nadu Tsunami Resource Centre (TNTRC – a joint initiative of UN and international NGOs). The full reports by

these representatives are presented in Annex 2.1 and 2.2. A synopsis of these reports is presented below.

The tsunami of 26 December 2004 caused extensive and significant devastation to communities in the island states of Andaman and Nicobar, Tamil Nadu, Andhra Pradesh and Kerala. The island states of Andaman and Nicobar were severely impacted by the tsunami. Due to their remoteness and limited logistical infrastructure, getting relief services to affected communities was a major challenge. The coastal agricultural sectors in all of the states incurred major damage and suffered significant crop losses that included losses of standing rice; destruction of vegetable and plantation crops; the destruction of aqua farms; and the loss of livestock. Due to the inundation of crop lands, soils were salinized, water sources contaminated and irrigation infrastructure destroyed. Large areas were permanently inundated by saline water that has affected the rate of rehabilitation and recovery.

The immediate response to the crisis by the Government of India and NGOs was to take care of the large number of displaced persons. Furthermore, extensive surveys were conducted by central and state government teams within the affected areas to quantify the impact of the tsunami on the agricultural sector. The outcome of these activities was the development of short- and long-term plans to restore the agricultural sector and livelihoods of thousands of displaced farmers. Monitoring of progress with respect to the implementation of the plans is being undertaken by the central and state governments. It is of note that initially several NGOs active in the rehabilitation programme did not view agriculture as an important sector in the overall recovery programme, notwithstanding its important role in the re-establishment of livelihoods for several coastal communities.

Immediate responses by both the Government and NGOs included the repair of dykes, spillways and irrigation canals; the analysis of soil samples to assess the extent of salinization; the clearing of debris from fields; scraping of surface salt from rice fields and plantation lands; the application of organic amendments to affected fields; the application gypsum to selected fields; the construction of check dams, ponds and the supply of pumps; the provision of farm implements and equipment to affected farmers; provision of emergency cash payouts to affected persons; the establishment of self-help groups within affected areas as a means of effecting the rehabilitation process; creation of awareness amongst farmers in the management of salinity; and the distribution of salt tolerant crop varieties.

The rehabilitation process has had a major impact in returning the agricultural sector to its previous level of productivity. Whilst this sector was initially neglected in the overall recovery process, it has become evident that the agricultural sector is critical to the livelihoods of numerous coastal communities. Subsequently focused efforts by NGOs and the government, coupled with natural leaching and flushing of salts facilitated by abnormally high post-tsunami rainfall in some of the eastern states (i.e. Tamil Nadu) of the mainland, have helped crop lands return to pre-tsunami production levels. Whilst there are no data that can be used to make comparisons between pre- and post-tsunami rice yields, the yields obtained post-tsunami are reasonable and clearly indicate a return to normality. The growing of crops such as sunhemp and sesbania have been shown to be effective green-manures that can assist in the rehabilitation of salt-affected lands along with traditional salt tolerant crop/vegetable varieties. Seeds of a number of varieties and crops have been distributed to affected farmers. Water sources are returning to normal in most cases and are suitable for human consumption and irrigation. The use of gypsum as a soil amendment should be targeted to specific situations where the reclamation process warrants the use of these materials to enhance structural stability of soils and to correct nutrient imbalances.

Whilst the rehabilitation and relief process has progressed at a realistic pace, there have been gaps that have been identified and lessons learnt by government agencies and NGOs. A major constraint

immediately after the disaster was the procurement of sufficient quantities of quality seed and planting material to reestablish crops and plantation, the availability of appropriate varieties of seed and planting material suited to the prevailing soil conditions and, in the case of the Andaman and Nicobar Islands, the availability of local organic composts/manures and inorganic fertilizers. Poor road infrastructure affected transportation of relief supplies and impeded the rehabilitation process. In addition, the inadequate availability of suitable earth moving equipment to remove debris from affected fields as the first phase in the rehabilitation process and to assist in the construction of dykes, water storage structures and roads hindered progress. Problems of attracting suitably trained and experienced persons to go to the islands to assist in the rehabilitation process were experienced due to fear that further earthquakes and tsunamis would occur. In several cases the compensation package awarded to agriculturists was perceived as low and inappropriate and the assessment process for compensation was perceived to be non-rigorous and not scientifically based. The reason for this was that uniform input subsidies were prescribed. Lease farmers and farmers on temple lands were not eligible to receive these compensation packages. Farm lands that belonged to larger farmers were left untreated by NGOs leading to loss of livelihoods opportunities. The tribal plantation owners in Nicobar – a very close-knit community with strong democratic leadership – saw power shifts and conflicts occur in some villages. The Nicobarese are unable to maximize their returns from their plantation crops and are not open to new and innovative ways of managing plantation crops.

Some of the lessons learnt by the Government through the crisis include the following: sea frontage or areas immediately adjacent to the sea need to be protected from the impact of future waves or storm surges through the establishment of mangroves and other vegetation barriers; human activities along the sea frontage should be restricted to only notified areas; an ecological balance should be maintained within the coastal area that would temper the impacts of human activities; the development of artificial water bodies and other water reservoirs should be confined to areas away from sea frontage; there is a need for the development of an early warning system in order to avoid human causality and loss of property from future tsunami's and storm surges.

Further, the Tamil Nadu Tsunami Resource Centre (TNTRC) tabled the following lessons learnt from its experiences in the rehabilitation process:

*Assessment of damage:* A participatory needs assessment should be undertaken with the full involvement of farming communities before making decisions associated with the rehabilitation process. Parameters for assessment of damage that have been incurred and the proposed rehabilitation programmes need to be based on a transparent and scientific basis.

*Variation in damages and intensity:* The impact of the tsunami was not uniform throughout the affected areas. Differences in the extent of damages and the contrasting soil types that were affected call for different rehabilitation techniques and approaches. Hence a blanket approach should not be encouraged.

*Technical expertise:* Mixed messages regarding the rehabilitation process were often experienced by farmers. Operational guidelines for rehabilitation need to be in local languages and made simple.

*Targeting and policy:* The rehabilitation programmes need to focus on the farmer working on the land who may not always be the owner of the land. Programmes need to be gender sensitive and provide opportunities for women to earn an income. Policies/programmes need to consider the food security requirements of the farmers' families in order to ensure adequate dietary intake, enhanced health and reduced vulnerability.

*Comprehensive approach:* Since lands affected by the tsunami are contiguous, a comprehensive approach to reclamation from salinity should be undertaken that includes lands of larger farmers. Reclamation should be part of an integrated farming practice to include diversification, value addition, capacity building and linkages for more sustainable agriculture.

*Need for coordination:* In the context of several actors involved in rehabilitation, each with differing priorities, there is a possibility for gaps and overlaps. Geographical coordination, coupled with a consensual approach, helps to effect uniform reclamation.

*Role of information collection, trends analysis and dissemination:* There is a need for the collection of information, trends analysis and dissemination as a means of influencing stakeholders.

*Focus on traditional wisdom:* There is a need to integrate indigenous traditional wisdom and practices into the rehabilitation process and to adapt them to the current situation.

In addition, challenges specific to Tamil Nadu were identified by the TNTRC that will have to be addressed as the rehabilitation process moves forward. While these issues specifically pertain to experiences in Tamil Nadu, they can be viewed as generic to other areas and include the following:

- Maintaining stakeholder interest in the reclamation process and support for integrated farming practices. In Nagapattinam, out of 175 NGOs, initially only 22 were involved in reclamation activities. One and a half years later this number has been reduced to 12, clearly indicating the perceived low priority that agriculture has amongst these organizations.
- Capacity building is still seen as a challenge. Pre-tsunami production levels have yet to be attained in several places, bringing into question the viability of the agricultural sector as a whole.
- Clearance of irrigation/drainage canals has occurred to a limited extent but needs to be completed in order to normalize the situation. The operations of most NGOs are rather small and limited and several inland affected areas have not yet seen the presence of an NGO in their area. Desalination of indirectly affected villages more than 3 km from sea where water entered through canals has yet to be undertaken. In areas where leaching is not feasible due to a lack of adequate drainage, it is estimated that it will take more than three years before reclamation is completed, hence there is a need to provide ongoing support to these communities.

## Indonesia

Presentations were made by representatives of the Government and FAO. Full reports are presented in Annex 2.3 and 2.4.

The impact of the 26 December 2004 tsunami was felt in ten districts in Nanggroe Aceh Darussalam Province and two districts in North Sumatra (Nias Islands). It is estimated that hundreds of thousands of people were killed and injured and 400000 persons displaced. Of all the countries affected by the tsunami in the region, Indonesia bore the brunt of the devastation. In the agricultural sector, significant losses and negative impacts were incurred with respect to human resources, loss of land, livestock, office buildings, laboratories, housing complexes, and infrastructure. The estimated loss of productivity in the agriculture sector amounts to US\$270 million with the quake and tsunami resulting in salinization and sedimentation of crop and plantation lands.

The recovery process in the agricultural sector is being undertaken by the Ministry of Agriculture and has been termed the R3MAS (Rehabilitation and Reconstruction for the People of Aceh and

North Sumatra), which will be executed over a five year period (2005-2009). The estimated budget required for this programme amounts to US\$397.6 million. The programme consists of three main areas of focus:

- The rehabilitation of land in order to facilitate the recovery of economic activities for rural communities.
- Rehabilitation of the capacity of agricultural support services (physical and human resources).
- People empowerment and institutional development through technical and organizational support.

The overall focus of the R3MAS programme is to develop the agricultural sector with a focus on addressing food security, the development of agribusiness, and enhancing the social welfare of farming communities. The R3MAS activities for the 2005-2006 that are currently being undertaken include the following:

- the rehabilitation of drainage, irrigation, and land (12961 ha);
- a commitment to inject working capital into agribusiness activities (on-farm and off-farm) totaling US\$1.61 million;
- the rehabilitation of 15000 m<sup>3</sup> of farm-roads;
- food crops and horticulture production to be effected on 25800 ha;
- compensation for losses of livestock totaling 7745 animals;
- replanting the estate crops to cover 5331 ha;
- replanting the palm oil on 4 950 ha;
- the procurement of agricultural machinery and tools (1 256 units);
- a total of 4000 food security packages to be distributed; and
- development of the agriculture office facility, capacity building of agriculture organizations, farmer groups, and agricultural personnel.

To date progress has been made in meeting these targets with the establishment/rehabilitation of more than 36081 ha of crop, horticulture and plantation lands. Limited progress has been made in restoring the livestock sector.

Needless to say, the rehabilitation programme has been beset by challenges that include the lack of technical expertise in the reclamation and rehabilitation of saline affected soils. This has affected the rehabilitation process and is restricting the normalization of productivity levels that were achieved prior to the tsunami. Low farm incomes due to reduced productivity and poor commodity prices are having a significant impact on household income levels and the viability of farming enterprises. There is a low level of farmer motivation; insufficient agribusiness skills amongst farmers; and limited agricultural extension services due to a lack of manpower to deal with farmer demands. In general, farmer groups and organizations are poorly organized with limited institutional structure. Finally, there have been recent changes in the organizational structure with respect to executing agencies. In this respect the newly established Rehabilitation and Reconstruction Board (BRR) has taken over the role of coordination and execution of the agricultural sector from the Ministry of Agriculture.

The long-term R3MAS rehabilitation programme set to go beyond 2009, will focus on the rehabilitation of heavily affected paddy fields with an emphasis on the rebuilding of new paddy fields; the establishment of new farms to produce coconut and palm oil; the development of workshops for the servicing of agricultural machinery; the rebuilding of market facilities for livestock; the redevelopment of farmers organizations and extension workers; the redevelopment of agricultural education and training; the development of new suitable technologies appropriate for agro-industries; the development of market oriented activities through the establishment of agribusiness terminals; and establishing of business partners.

In the discussion that followed, clarification was made with respect to the role of the newly formed BRR and its mandate. Key roles of BRR are the development of rehabilitation programmes and the coordination and monitoring of the rehabilitation programme. In addition, it has the added responsibility of raising further funds to support the rehabilitation programme and, through the support of international partners, providing overall transparency with respect to the expenditure of these funds.

The key focus of the BRR is to restore the livelihoods of communities affected by the tsunami. In this respect the first stage in this process is attaining community agreement on the rehabilitation of livelihoods at the village level. As significant human resource capacity was lost from these communities, it has become a challenge for the rehabilitation effort to overcome this limitation. Added to this there is little funding being pledged towards the rehabilitation of the agricultural sector by donors.

There has been a need to build trust amongst communities, particularly in Aceh. With the establishment of new agricultural enterprises such as plantation cropping systems, significant training is required because there is generally a lack of expertise amongst farmers in this form of agriculture.

A comprehensive presentation on three FAO coordinated agricultural recovery projects implemented in Indonesia was presented. The overall objective of the projects was to assist the Indonesian Government's efforts to safeguard the livelihoods of the earthquake and tsunami affected coastal communities and to enable them to resume their occupations and produce food crops for nutrition and income. The assistance was meant to rapidly kick-start basic agricultural activities through the supply of urgent agricultural inputs and the rehabilitation of basic farm infrastructure, thereby reducing dependency on food aid for some of the most vulnerable farmers. The programme focused on the distribution of agricultural kits that included seeds, fertilizers and implements. In total, 23000 farmers benefited from the distribution of seed. However, only 50 and 69 percent of the rice seed distributed was cultivated by the farmers in the east and west coast, respectively, due to the lateness in distribution. More than 15500 farmers received vegetables and secondary crop seeds. In addition, estate crops were distributed to more than 5000 beneficiaries. The tsunami had a negative impact on these crops since they died due to salt toxicity. Twenty thousand farmers benefited from the distribution of agricultural machinery. The machines have been used in land preparation, watering and harvesting. However, the newly introduced paddy reaper used for harvesting is still relatively unfamiliar to farmers and is taking a greater than anticipated period for its adoption. Around 500 people have participated in a cash-for-work project for a total of 24500 worker days.

To complement the distribution of seeds and fertilizer, FAO distributed motorized cultivators, including hand tractors and threshers to farmer groups. Some 147 community representatives were trained by FAO in the use and maintenance of the hand tractors. Thus, complementary projects helped increase the impact of the overall programme as some of the farmers were able to utilize the distributed seeds and fertilizer more efficiently through distribution of and training in farm equipment.

Constraints were experienced in the implementation of the projects. These constraints included the following:

- Inputs such as seed, fertilizers and hand tractors were sold off to generate cash.
- An excessively long time was needed in the distribution of packages in the first phase of the project that caused the seed to become non-viable and reduced its germination ability. There were mitigating factors that contributed to the delay, including the signing of the peace agreement between the Free Aceh Movement (Gerakan Aceh Merdeka-GAM) and the Indonesian Government. Damage to infrastructure due to the tsunami made the distribution of these assistance packages extremely difficult.
- Incomplete agricultural packages delayed the cultivation of secondary crops and vegetables and predisposed crops to serious damage from livestock. It is recommended that, in the future, packages to be distributed should include fencing materials to protect plants from animals and wild pigs.
- Some implementing partners did provide farmers with fencing materials so that crops could be planted.
- On the west coast, farmers have paid greater attention to the shelter programme than livelihood programme. As they still receive daily food allocations from the WFP, activities, including agriculture, become a secondary priority. Moreover, farmers were also targeted by the many activities of NGOs thereby reducing their time to pursue agricultural activities.
- Coordination at the field level was very low with the same inputs as provided by the project being distributed by other agencies without coordination. Duplication often occurred, with the BRR also taking on the role of implementer. Strengthening the BRR function as a coordinator in rehabilitation activities is a priority in the future and would enhance the effectiveness of the rehabilitation process.

There is a need to harmonize coordination between implementation agencies to avoid overlap of service provision, enhance the impact of these activities and improve the effectiveness of the rehabilitation process. Improved systems and mechanisms of coordination must be developed at the sub-district or village level to avoid overlapping of programmes or duplication of the same inputs.

## **Maldives**

The full presentations from the Ministry of Fisheries, Agriculture and Marine Resources (MFAMR) and FAO Representative can be found in Annex 2.5 and 2.6. The tsunami which struck on 26 December 2004 had a dramatic and nation-wide impact. Thirty-nine islands were damaged and nearly a third of the population, or 100000 people, were affected. Fourteen islands were completely destroyed and had to be evacuated. Approximately 12000 people were displaced from their islands, and another 8500 temporarily relocated within their home island. The water supply was disrupted in about 15 percent of the islands and 25 percent had major damage to the essential infrastructure such as jetties and harbours. Employment was adversely affected by low hotel occupancy rates and loss of assets in the fisheries, agricultural and other productive sectors. The relief and reconstruction effort encountered constraints of insufficient and untimely financing, inadequate human resource capacity (quantity and quality) and high costs and logistical difficulties of internal inter-island transport.

Agricultural and rural livelihoods were particularly hard hit by the tsunami. It was estimated that the tsunami damaged field crops in 2100 farms; destroyed home gardens and agricultural tools in 11700 homesteads; and damaged more than 700 000 fruit trees and 840000 timber trees in inhabited

islands. The damage to land and groundwater resources was severe in 35 agricultural islands, and saline water intrusion affected 112 inhabited islands. The geographical dispersion of the islands severely constrained the collection, collation and analysis of reliable data in a timely manner to inform the required immediate intervention responses of the Government and its supportive international development partners. The situation was further compounded by the lack of baseline data on the agricultural sector prior to the tsunami.

In an effort to rehabilitate the agricultural sector and provide assistance, eight major programmes were drafted, out of which three programmes are currently progressing with the aid of the Asian Development Bank (ADB), Food and Agriculture Organization of the United Nations (FAO), United Nations Development Programme (UNDP), World Bank, International Fund for Agricultural Development (IFAD) and Japan International Cooperation Systems (JICS). The programmes effectively focused on the replacement of basic production inputs to tsunami affected farmers and home gardeners; the strengthening of agricultural extension to facilitate the re-establishment of agriculture and horticulture; and the strengthening of agricultural institutional capacity. In addition, progress has been made in the establishment and re-instatement of markets through the opening of a market in the capital and further openings planned for regional goods' markets over the next two months. In the implementation of these programmes several constraints were encountered and included the following:

- There are no clear records of farmers and farm fields within communities affected by the tsunami making the verification of beneficiaries of assistance difficult.
- Lack of trust among the communities has contributed to difficulties in identifying accurate numbers of beneficiaries prior to the distribution of assistance packages, thereby increasing costs due to a second phase of implementation.
- Travel and transportation between the islands has been difficult due to their geographical distribution. The islands are separated by large areas of sea and there is a scarcity of adequately sized vessels that have the capacity to carry large amounts of material to the islands. Thus transportation costs are very high.
- There is a distinct lack of trained and specialized field staff in the Ministry. This is hampering the overall task of providing effective and functional extension services.
- Seedlings, seed and agriculture equipment all have to be imported to the Maldives as they are not available locally. The costs of importing these items are extremely high. In addition, imported seedlings and young plants are required to remain in quarantine for several months before they can be distributed to farmers for planting, resulting in significant delays in delivery to recipients.
- There is a lack of technical expertise in the field of agriculture.

FAO responded swiftly and decisively to the crisis by immediately mounting a mission, coordinated by the Representation in Colombo, to assist MFAMR (Ministry of Fisheries, Agriculture and Marine Resources) in the initial agricultural and fisheries damage assessment surveys, thereby establishing a basis for determining the requirements for immediate support. Prior to the tsunami, FAO was not physically present in the Maldives.

The post-tsunami relief/recovery activities in the agricultural and forestry sectors were a key focus of FAO Maldives operations. The main activities include the provision of a package of technical assistance through short-term consultants/experts, capacity building for farmers and MFAMR staff effected through training workshops and the distribution of replacement packages of agricultural assets (start-up agricultural kits comprising a range of selected inputs: seeds, seedlings, cuttings,



fertilizer, compost and assorted implements). To date, 3376 farming families in 45 islands (13 atolls) have been assisted, 1 879 receiving the complete agricultural kit composed of 16 different items valued at US\$260 per beneficiary. These included vegetable seeds, seedlings/cuttings, compost, organic manure, inorganic fertilizer and agricultural tools/implements (hoe, rake, shovel, sprayer, bush knife, watering can and wheel barrow); for the remaining 1 397 only the seedlings are pending. So far, 250000 seedlings have been distributed. These distribution activities are continuing.

The period immediately after 26 December 2004 witnessed an explosion in the number of external development agencies in the country. This has severely stretched the limited human resources in public sector agencies in terms of their capacity for coordination and implementation. What may have been a manageable problem before the tsunami has turned into a crisis following the influx of significant financial resources and the multiplicity of external partners and activities within a constrained time period. MFAMR has found it difficult and challenging to cope satisfactorily with the sudden expansion and intensification of activity and especially with linking the emergency/relief response to its regular agricultural development work. Consequently, implementation of some approved donor-funded, post-tsunami relief activities got off to a slow start. The Ministry continues to look to FAO for assistance and support in strengthening planning, organizing and implementing capacity.

Furthermore, several key constraints associated with the relief effort have been identified both within the country and within FAO. These are as follows:

**In-country:** Significant in-country constraints impeded progress and extended timelines for implementation of the agricultural activities, thereby delaying responses to the needs of beneficiaries including inadequate human resources within MFAMR, especially outside the capital; deficiencies in database and planning; inadequate coordination systems as the MFAMR has had limited experience in coordinating so many activities and partners; complex logistics due to dispersed beneficiaries and islands which made organizing and maintaining distribution/delivery schedules difficult; high internal transport costs that significantly limited internal travel, field monitoring and eroded budgets; and distribution by sea over long distances due to inclement weather and vessels not designed to move plants.

**FAO:** From an institutional perspective, constraints were identified that impeded or delayed the delivery of emergency aid. These included unsuitable/inadequate procurement and administrative mechanisms for emergency operations; unpredictable delivery schedules of procured supplies which created difficulties in planning and organizing delivery to beneficiaries; insufficient delegation and cumbersome bureaucracy which led to costly delays; a lack of FAO in-country presence prior to the tsunami; lack of a coherent integrated organization-wide approach for dealing with emergencies; inability to access locally available funds; and potential difficulties in maintaining effective in-country partnerships from Sri Lanka.

FAO relief to affected communities is considered a precursor to more sustainable agricultural and rural development. The FAO Emergency Rehabilitation and Coordination Unit (ERCU) Maldives, using the relief activities as a point of departure, has been catalytic in managing and implementing in-country FAO development assistance in a coordinated and integrated manner.

## **Myanmar**

The tsunami had a limited impact and was confined to areas of the Myanmar coastal zone. The most severely affected townships in Myanmar were: Labutta and Ngaputaw Townships in Ayeyarwaddy

Division, Kawthaung Township in Tanintharyi Division, and Kyaukphyu Township in Rakhine State. The Pyinsalu sub-township of Labutta Township was the worst affected area with 25 people losing their lives, more than one thousand people left homeless and 289 houses totally destroyed. Four villages, namely Khar Pyat Thaug, Lay Yin Kwin, Kaingthaung and Aung Hlaing in the Pyinsalu sub-township were severely affected.

As part of the rehabilitation effort a project (MYA/05/001) that addressed fishing communities, fisher-farmers and homestead gardeners was launched and implemented in accordance with the Letter of Agreement that was signed by FAO with UNDP. The main goal of the project was to provide necessary assistance so as to resume the livelihoods of tsunami affected fishers and farmers with a focus on both the immediate and long-term. The project was designed to support small-scale fishers and farmers living in the worst affected tsunami areas of Pyinsalu Sub-township in Labutta Township, Ayeyarwaddy Division. Farmers who lost their crops, livestock assets and home gardens to the tsunami were provided with fertilizers, HYV seeds, OPV seeds of various crops including paddy, pulses (peas and beans), oilseed crops (sunflower) and different kinds of vegetable seeds (gourd, melon, squash, watercress, roselle, chilies, tomato, egg plants). Agricultural hand tools comprising sickles, hoes, machetes, shovels and spades were also provided. A detailed breakdown of the aid distributed to both farmers and fisher beneficiaries is presented in Annex 2.7. In addition, training activities that included home gardening and harvest management; field crop production and management technology; crop protection; and salinity mitigation approaches were undertaken. A total of 516 participants were trained.

During the implementation of the project the constraints encountered included the following:

- Remoteness – the tsunami affected areas are situated along the coastline of Pyinsalu Sub-township in Ayeyarwaddy Division. This is a remote part of the coast taking between 12 and 24 hours to reach from Yangon.
- Reconfirmation of the beneficiaries took a longer time than expected as the approval of the Chairman of the District Peace and Development Council of Myaung Mya District was required. Later, the approval of the beneficiaries was made by a committee formed by the District Chairman.
- During June 2005 there were restrictions associated with visits to the area by international and national consultants which caused some delays in implementing the project activities.
- Due to the remote location of the affected area, the logistics of moving resources to the project area was difficult and time consuming.
- The approval at the sub-township level, township level, and district level was required before the distribution of inputs could be made, thereby causing delays in distribution. Recently, there has been a new ruling that all the inputs have to be sent to Labutta and registered with the customs department before being sent on to Pyinsalu for distribution. This additional procedure will increase the cost of providing assistance and add further delays.
- Handing over of boats – due to the high value of the boats, the authorities from Myaung Mya District requested that ceremonial hand-over be conducted in the presence of authorities. Consequently there was a 1<sup>1</sup>/<sub>2</sub>-2 months delay in the handing over to facilitate this request.
- Inflation – during the procurement of inputs the exchange rate of kyats per US\$ changed significantly, for example, the exchange rate was 930 kyats in May 2005, 985 kyats in July 2005, 1153 kyats in September 2005, 1250 kyats in October 2005 and 1 123 kyats in

April 2006. Therefore, bidders were reluctant to give the valid dates of quotes. This caused difficulties in the procurement process.

Specific lessons learnt pertaining to agriculture include the following:

- It has been noted that cowpea, sunflower, and watermelon appear to grow better on soils that have been affected by seawater intrusion when compared to black gram and mung bean. The soil fertility in most of the affected areas is poor as the farmers cannot afford to use chemical fertilizers and the availability of organic fertilizers is limited.
- Farmers in the affected areas were not familiar with the growing of a second crop such as pulses and vegetables after paddy. The introduction of cowpea, sunflower, and vegetables has been viewed as a very effective strategy in enhancing existing production systems. Watermelon grown using the seeds provided by the project has proved to be popular amongst farmers as it enhances their incomes. This approach to further enhancing current agricultural production should be encouraged and promoted along with the use of composted waste, particularly fish waste.
- There is a general lack of seed technology expertise amongst farmers. Training and assistance in this area would be of great benefit.

## **Sri Lanka**

Four presentations were made by representatives from Sri Lanka that included an overview of the assistance coordinated by the Ministry of Agriculture, progress with respect to rehabilitation activities in the northeast of the country, FAO programmes and an overview of the recently formed Reconstruction and Development Agency (RADA) whose mandate is to carry out reconstruction and development work in districts affected by man-made or natural disasters. Presentations can be found in Annex 2.8-2.11.

It is widely acknowledged that the tsunami is the most devastating natural catastrophe in the history of the country with the poorest sectors of the community being impacted upon that necessitated the mobilization of external support to assist in the recovery process. Within the agricultural sector 7843 families were affected by the tsunami with 3646 ha of paddy and a further 488 ha of food crops/vegetables destroyed. More importantly, from a livelihoods and household food security perspective 27710 home gardens were destroyed with significant loss to livestock. Land and groundwater bodies were affected by salinity and a number of water storage facilities lost.

The first priority of the relief effort led by the Ministry of Agriculture, FAO and NGOs focused on supporting farmers to resume their livelihoods. Activities in this respect included the provision of conductivity and pH metres to monitor the degree of salinization in soils and waters; the distribution of seeds and fertilizers to farmers; establishment of vegetable, fruit and ornamental nurseries at the community level; distribution of hand tools and water pumps; the allocation of livestock to farmers that included poultry, cattle and goats; monitoring and rehabilitation of land affected by salt; and training workshops on improved farming techniques; animal husbandry; and food processing techniques and nutrition. A total of 13298 individuals benefited from the distribution of paddy, vegetable seeds and orchard seedlings over the Yala and Maha seasons since the tsunami. In addition, 2 044 individuals benefited from the allocation of cattle, goats and poultry with the highest number of beneficiaries being in the Trincomalee district. Further, a total of 14420 individuals received training in improved farming techniques, animal husbandry and food processing and nutrition. In addition to the Government's common recovery package, funds have been provided to farmers for land preparation and loans provided to self-employed farmers to enable them to restart

their enterprises. Seedlings (i.e. coconuts) and animals have been distributed to farmers (i.e. cattle and goats) in some of the badly affected districts.

In addition to the distribution of aid to beneficiaries, the FAO programme has been responsible for the successful introduction of salt tolerant varieties of paddy to salt-affected areas as an interim stage in the rehabilitation of these production systems; the introduction of improved agricultural practices; achievement of high crop yields even in the presence of elevated saline levels; promotion of water savings technologies; support to post-harvest technology; improved nutrition practices; introducing various approaches for the management of salinity issues; strengthening of laboratory facilities with respect to salinity assessment and monitoring; and the establishment of coordination mechanisms with other organizations and, of greatest importance, the return of farmers back to their lands. Constraints were identified that negatively impacted on the implementation process and included the lack of available labour and access to mechanization which constrained the return of lands back to full-scale production; low profit margins common to agriculture which acted as a disincentive to individuals in resuming agricultural livelihoods; limited access to markets; the lack of timely delivery of inputs; logistic issues associated with the movement of aid to the Jaffna Peninsula; cumbersome administration procedures; and the overall security situation in the country.

With respect to future recommendations for the island as a whole, there is a need to establish an early warning system and to undertake an awareness campaign that targets communities that are most vulnerable to such disasters. The campaign should focus on training communities in disaster awareness and steps to avoid/mitigate potential negative impacts associated with such disasters. The creation of buffer zones within beach areas through the establishment of shelter belts, thereby reducing the negative impact of waves, was deemed to be important although the concept has been considered controversial. Issues associated with land tenure and access to these zones has resulted in resistance to their establishment. A cautious approach should be taken and consultation with all actors needs to be undertaken as the establishment of these zones will have an impact on the livelihoods of those who are dependent on these areas. Farmers should be encouraged to grow salt tolerant crop varieties in coastal regions wherever this is feasible. Finally, proper and effective drainage networks should be maintained to allow seawater to immediately drain from fields.

In the northeast of Sri Lanka a significant area of crop land was completely destroyed with approximately 2000 homesteads with crop gardens washed away. In terms of livestock losses, the overall damage was not significant at the provincial level. A number of activities and initiatives have been undertaken and implemented in the northeast to restore the agricultural sector. These initiatives include:

- Soil samples were collected to assess the degree of salinization and permanent monitoring sites established to assess the degree of remediation associated with the monsoon. There is clear evidence to indicate that significant leaching and flushing of salts have occurred associated with natural rainfall.
- Field demonstration plots have been established that evaluate different strategies and crop species that could be grown during the rehabilitation process. In addition, crop recommendations based on soil salinity levels have been made to farmers.
- The reconstruction of damaged wells has been undertaken. This has included the pumping out of saline waters.
- Capacity building in salinity reclamation has taken the form of field and institutional training activities along with the establishment of crop demonstration plots in the field.

Some of the lessons learnt are the following: the degree of soil salinization is contingent on the period of inundation; dug wells remain saline even after the soil has been flushed of salts; land productivity as indicative of crop production has increased by 75 percent, but has still not reached the levels of productivity that were achieved prior to the tsunami; and the cultivation of sunhemp and its incorporation into the soil as a green manure has been shown to be an effective tool in reducing salinity. In addition, the application of large quantities of organic matter has been demonstrated to improve the productivity of saline affected soils that has occurred.

In the northeast, constraints in the recovery process have been encountered. There has, in general, been little participation by people in community action activities; a reluctance to resettle away from ones domicile; delays in infrastructure rehabilitation; and problems with land adjudication and titling. Moreover, service institutions in the affected areas have not been adequately re-equipped to provide the required level of service to clients. There has been a general lack of coordination and transparency that has hindered the rehabilitation process. There is disinterest in crop diversification to species that are more salt tolerant and adapted to the prevailing environment.

The immediate recovery programmes in the northeast focused on helping affected families to regain their livelihoods through the provision of micro-credit facilities based on a “community-based revolving fund” mechanism. The rehabilitation of damaged structures and agriculture/livestock services has in general been inadequately addressed. By addressing these aspects in the rehabilitation process one could reduce adverse environmental impacts and also provide immediate employment opportunities in affected villages. It is important when undertaking farmer capacity building activities in soil reclamation and productivity improvement that this should be implemented in a participatory manner. As one moves beyond the initial phase of the rehabilitation process, the recovery strategy should focus on medium- and long-term needs of the victims. This will require enhanced and meaningful consultation with local affected communities and stakeholders. Local communities should be empowered to make their own decisions in the recovery process. The principle of subsidization should be applied in rehabilitation interventions.

The Government of Sri Lanka, having evaluated the relatively slow progress of recovery, decided that improvements needed to be made in the delivery, progress and quality of the interventions provided by a wide range of service providers, ranging from national government departments to international and local development agencies. To this effect the Reconstruction and Development Agency (RADA) was established in November 2005 by a directive of His Excellency the President through the merging of the Taskforce For Rebuilding the Nation (TAFREN) with other agencies. The mandate of RADA is to carry out reconstruction and development work in districts affected by man-made or natural disasters in a cost effective and expeditious manner. More specifically, the mission of RADA is to accelerate and coordinate the reconstruction and the development of areas affected by man-made and natural disasters and ensure sustainable recovery of properties, livelihoods, industries and infrastructure to mitigate the effect of such disasters in the future.

RADA consists of four major programmes that cover housing, social infrastructure, physical infrastructure and livelihoods, and also supports the following supporting divisions: management and IT support; aid coordination and monitoring; operations and regional support; strategic planning and policy; and communication/public relations. The Livelihood Unit of RADA has developed the Income Recovery Programme (IRP), with the assistance of the World Bank, United Nations Development Programme (UNDP) and the International Labour Organization (ILO). This is also known as the “Back to Work” component of a wider strategy of the Government to “Build Back Better”. A full discussion and detailed account of the Income Recovery Programme is presented in Annex 2.11.

## **Thailand**

Two presentations were made by representatives from Thailand (Annex 2.12 and 2.13). The effects of the tsunami in Thailand were confined to coastal communities along the Andaman Sea. A total of 5800 people died with 2900 declared missing; 3600 houses were destroyed and 412 communities were affected. The worst affected Province was Phang-Nga where 4225 people lost their lives and 4394 households were affected by the disaster. Within the Province 957 ha of agricultural land was lost and 412 farmers were affected. Along with this, livestock were destroyed and natural resources (i.e. mangroves, beaches, corals and fresh water) were all negatively impacted upon. The Royal Thai Government's response with respect to farmers was to compensate farmers with a one-off cash payment equivalent to 10 percent of their production costs. In addition, external agencies such as FAO provided coconut, oil palm and cashew nut seedlings for the establishment of 94 ha. Similarly, gypsum, inorganic and organic fertilizers and vegetable seeds were supplied to farmers for rehabilitation purposes and the establishment of crops. Selected farmers were provided with inexpensive vegetable hydroponic kits and associated training. Land and houses were provided to 152 farmer families and various alternative career options were promoted.

Overall, there was a strong willingness to cooperate with national and international organizations in providing humanitarian aid to affected communities. However, with the many actors involved in the relief effort there were problems with coordination of the relief efforts, particularly at the local government level; a mismatch in aid, with the real needs of individuals and communities often being overlooked; and a dependency of people on the aid provided. A key element in moving forward is the promotion of diversified production systems along with the establishment of markets.

The second presentation focused on the outcomes of a research project on the assessment of agricultural damage associated with the tsunami (Annex 2.13). A classification system was developed of tsunami affected land based on high resolution satellite imageries and aerial photos; and attributes including present land use, type and extent of damage, salinity level, soil texture, and water table depth were developed. Sedimentation was a significant factor in the damage afflicting agricultural lands. Using a weighed scoring index based on the importance of the aforementioned attributes, affected fields were classified into zones and guidelines for the proposed rehabilitation of these lands. Findings from this study have also indicated that most of the areas affected by salinity have decreased considerably compared to the initial assessment made immediately after the event. GIS based maps of the damaged areas along the Thailand coast have been produced and are being used to target rehabilitation efforts.

## **4. GENERAL PAPERS**

Following the country reports, a series of related presentations was made on a range of related topics pertaining to the recovery efforts. These presentations included a comprehensive discussion of the Australian Centre for International Agricultural Research (ACIAR) activities in Indonesia and some of the lessons learnt and challenges that were encountered (Annex 2.14).

The livelihoods of communities in the fisheries and agriculture sectors were the hardest hit as a result of the devastating tsunami in December 2004. The need to re-establish food production and livelihoods remains an urgent priority as initial food and other aid is withdrawn from affected areas. Many issues require technical inputs or training. In this respect ACIAR's mandate effectively means that it has a greater role to play now rather than in the immediate phase after the event.

The post-tsunami assistance programme of ACIAR only covers Indonesia. The basis for this decision was as follows:

- Indonesia suffered the greatest losses – in terms of farming population and agriculture and other infrastructure – of all tsunami affected countries. There was significant deposition of marine sediments and intrusion of saline water on formerly productive fields in both East and West Aceh.
- In West Aceh, earthquake alterations to land profiles and heights above sea level hindered attempts to drain inundated areas. Agricultural damage in Western Aceh was much more severe than on the east coast due in part to the power of the tsunami wave.

The post-tsunami response consisted of four overlapping phases, namely in-country training activities (in fisheries, soil management and crop production); short scoping studies, to provide and identify specific needs/technical information to underpin agriculture and fisheries reconstruction; collaborative two to three year R&D projects between Australian and Indonesian partners addressing these needs; and technical inputs to activities managed by AusAID and by international agencies in areas relevant to ACIAR's expertise.

In the post-tsunami rehabilitation phase there are several challenges that are common to donor and government agencies involved in re-establishing the livelihoods of communities. These include:

### **Constraints to collaboration**

- There is limited real cooperation between the Government and NGOs.
- Formal involvement of government/private sector in rehabilitation does not just mean hiring local short-term consultants.
- Donor cooperation is always a challenge in that it is often hard to move from goodwill statements at formal meetings to real cooperation “on the ground”.
- Understandable focus by commercial contractors on “getting the job done” can run counter to establishing wider networks.
- Turnover of in-country staff and short-term appointments challenges the development of relationships and the continuity of programmes/activities.

### **Limited use of technical information**

- Only some NGOs in Aceh base livelihood activities on solid technical analysis or information.
- The challenge of getting technical information out in a timely fashion versus testing the robustness of field research over several seasons is a factor that needs to be addressed.

### **Challenges to the sustainability of technical improvements to agriculture**

- Absorptive capacity of counterparts who are still trying to rebuild their family situations.
- Incentives for good government officers to leave for better-paid positions consulting for international agencies.
- Need to plan for “contraction” of the local economy once the international donors and NGOs leave.

The importance of coordination and information management as it relates to programme management was highlighted as an essential element in operations similar to those mobilized as a result of the tsunami (Annex 2.15). Clearly the lack of or inappropriate coordination was a major flaw in several post-tsunami programmes in each of the affected countries. The more parties involved in an operation, the more important it becomes to coordinate their programmes and activities. Coordination is deemed to be such an important component that in several countries organizations have been created and institutionalized whose principal role and mission is to ensure coordination. The importance of coordinating bodies is evidenced through the recent establishment of RADA in Sri Lanka, the newly established BRR in Indonesia and the Disaster Management Center in the Maldives. The benefits of successful coordination outweigh the difficulties that are often incurred in establishing effective coordination mechanisms. Coordination makes the most efficient and effective use of staff; equipment, supplies, and physical facilities; funding; services/assistance provided; knowledge, experience, and skills; research and evaluation results; and access to beneficiaries. A fundamental advantage of improved coordination is that it improves service delivery. A comprehensive discussion on coordination activities within organizations and difficulties associated with coordination is presented in Annex 2.15. In short, coordination is the key to a successful operation. In order to achieve this, there is a need for information and, more importantly, there is a need to manage this information. Information management enables timely and appropriate dissemination.

As an immediate response to the tsunami catastrophe several organizations, including governments and NGOs, undertook environmental assessments in affected areas. A rapid assessment of resources was undertaken by the Ministry of Environment and Natural Resources (MENR) in close cooperation with the Central Environmental Authority (CEA) in Sri Lanka. It consisted of two parts, focusing on the “green” environment (ecosystems, biodiversity, protected areas and farmlands) and the “brown” environment (pollution, debris and impacts on human settlements and infrastructure). One year after the devastating tsunami, a study was commissioned by FAO with the objective of scientifically assessing the nature of the damage of the tsunami to coastal vegetation and to understand the way nature had reacted to the devastation. The mitigating functions of natural ecosystems were also assessed. Guidelines were developed for integrated coastal management with special reference to the establishment of a “Green Belt” (Annex 2.16). As an outcome of this rapid assessment of tsunami affected coastal areas several recommendations were proposed. These recommendations included the establishment of green belts, bioshields and biovillages within close proximity of the coastline. A comprehensive discussion of the aforementioned is presented in Annex 2.16.

The final presentation of the day presented the results of studies undertaken in Aceh, where the impact of the tsunami on soil properties has been determined and monitored since the tsunami, and a comprehensive mapping exercise undertaken to delineate the extent and degree of impact that agricultural lands have undergone (Annex 2.17). Extensive use of EM38 electromagnetic induction technology was used in the mapping exercise and has been found to be extremely effective. Through the establishment of permanent monitoring sites, quantification of the remediation process has been achieved. Guidelines for farmers and extension workers have been developed for the remediation of salt-affected lands and field demonstration plots have been established using salt tolerant varieties.



## **5. CONCLUSIONS AND RECOMMENDATIONS**

### **Present status and lessons learnt**

The workshop identified a number of positive outcomes in the rehabilitation process as indicated in the country presentations that have strongly influenced the process of returning the agricultural sector back to some normalcy. However, there are weaknesses that have been identified and were discussed. A synopsis of these factors is presented below:

- It was generally agreed that within the overall rehabilitation process, less attention had been paid towards the rehabilitation of the agricultural sector. This may in part have been due to priorities and the relatively limited physical impact that the tsunami had on this sector when compared to the overall damage sustained. The importance of this sector on the livelihoods of significant numbers of people and the external impact of a functional agricultural sector on the economy were thought to be legitimate arguments for raising the profile of this sector.
- From a socio-economic perspective there is very little data available that would allow a comprehensive assessment of the impact of the rehabilitation efforts on communities and their livelihoods. In a number of cases victims of the tsunami are still housed in Internally Displaced Person (IDP) camps and are dependent on distributed aid. This dependence on aid is a concern to authorities in that it effectively hinders the process of transition between aid dependence and independent livelihood strategies for returning communities and individuals.
- There is still considerable infrastructure rehabilitation that is required before fully functional agricultural pursuits can be implemented. This factor was considered as a hindrance to the initiation of agricultural endeavours in some areas.
- The effect of the tsunami on extension services and related knowledge-based agencies was enormous. Shortly after the tsunami, individuals in the country with the required skills to offer assistance were reluctant to work in affected areas due to fear of further tremors and possible injury. There is a dire need for capacity building in this area and the development and implementation of effective technology transfer strategies to facilitate the re-establishment of new and improved farming systems.
- Weak coordination amongst a range of stakeholders active in the rehabilitation process was identified as a factor impacting on progress towards normalizing agriculture except in a few places such as Nagapattinam (India).
- Soil salinity is recognized as a significant problem in the affected areas, although there has been noteworthy progress with respect to its mitigation. This has largely been due to the positive impact of natural rainfall on leaching/flushing salts from the effective root zone. However, there is a need to continue monitoring this process as there is evidence to suggest that sodicity and crop nutritional imbalances are posing a problem in some areas of Indonesia.
- Not enough attention has been paid to the empowerment of farmer organizations and self-help groups in building coherent communities and enabling community members to revive their communities and build capabilities to undertake the recovery process with community participation.
- The provision of inputs to farmers as they return to agriculture has not been well organized/ coordinated and in some cases sufficient materials were not made available and/or there has not been any follow-up in the supply of further assistance after the initial input.

Some of the lessons learnt in this process were identified as follows:

- Overlapping of programmes, inputs and beneficiaries was clearly evident in some areas.
- There is a need to utilize/work through local institutions in effecting input distribution and rehabilitation efforts.
- Difficulties in the assessment of the extent of damage and poor coordination between actors resulted in challenges associated with targeting immediate response initiatives. There is still a problem of reliability of data and poor coordination between different parties and data sharing.
- Lack of local expertise and support, and consequently a dependency on outside assistance.
- Difficulties in finding a reliable supplier/implementing partners in the affected areas and within the countries.
- The slow pace of the recovery process is attributed to the complexity of the problem that not only addresses the physical agricultural issue associated with the impact of the wave but also the socio-economic parameters. These two components are inseparably linked.
- A lack of information, feedback and appropriate timeframes were experienced. For example, poor data management resulted in inconsistencies between data sets collected on the same parameters.
- In general, there was a lack of a strategic vision for agriculture, this being exacerbated by the paucity of technological interventions or mixed and confusing approaches to address the prevailing complex situation.

Recommendations as to how to move forward in the rehabilitation of the agricultural sector were made. These included:

- A concerted effort in building capacity at all levels from farmers through to institutions. This should be undertaken within a planned timeframe.
- The establishment of some pilot projects that address the issues confronting the return of affected lands to full production that would incorporate elements of monitoring and evaluation.
- Strengthening of empowerment processes among farmer organizations.
- Development of data processing capacity and interpretation within government institutions that would enable sound future planning.

Strategies effecting the overall development of a sustainable agricultural sector were deemed to include:

- A systematic recovery process should be implemented. This would require a greater degree of cooperation between all parties.
- Monitoring of feedback and follow-up activities.
- Improvement of service capacity and identification of service providers and beneficiaries for the long term.
- Sustainable solutions should include vulnerability reduction of people dependent on agriculture, risk transfer and disaster preparedness.
- Income generation through integrated agriculture systems, agribusiness and agro-industry.
- Marketing network arrangement and provision of market information.

## **General comments**

Agriculture did not receive the priority it should have been afforded. There were several reasons for this, including:

- In the aftermath of the tsunami the focus by most aid agencies and donors was on the physical damage caused to infrastructure that was most visible. This was at the expense of a somewhat less visible, but equally important, agriculture sector.
- The logistics of moving large quantities of inputs (i.e. seed, fertilizer) required to re-establish agriculture was seen as a further hurdle to overcome in the process of rehabilitating the sector.
- The availability of technical experts and individuals who were prepared to go to affected areas limited progress.
- The initial focus on rehabilitation was on salinity and the reclamation of salt-affected lands at the expense of livelihoods.
- It is impossible to implement an agricultural project within the time frame that donors and aid agencies work within. In general it takes between three and five years to implement a successful agricultural programme. Hence there is a need to educate donors and aid agencies on the benefits of investing for the long term.
- There is a need to focus on an integrated approach to natural resources management of which agriculture is just one of the components.
- Our ability to quantify the extent of damage and the long-term impacts on livelihoods was not well articulated to donors, except in a few places such as Nagapattinam (India). There is a need to address this.

There is a need to strengthen the coordination function at the operational level. Several NGOs established partnerships without local government consultation, making the coordination process extremely difficult. Along with this there is a need to strengthen the acquisition, assessment and evaluation of data within the national governments in order to target more specific interventions. This could be facilitated by appointing a single body within the government as a central hub/depository of information. In addition, there is a need to strengthen the capacity with such organizations in data evaluation and interpretation.

In some cases there was inequity in compensation payouts to farmers that caused considerable dissatisfaction. In this respect, farmers that leased land in India were not eligible for compensation packages or assistance, but some farmers received coverage through the efforts of NGOs.

There is a need for designing rehabilitation activities to suit the specific location and circumstances that prevail in the different countries affected by the tsunami.

Farm labourers who were dependent on the agricultural sector for their livelihoods seem to have been neglected in the overall approach to re-establishing the agricultural sector. There is a need to consider the plight of this sector of the community.

Challenges that are posed over the long term were discussed and identified as follows:

- The problems associated with heavily damaged/impacted agricultural areas has, to date, been avoided. There is a need to now consider approaches and interventions that would address these more difficult or recalcitrant affected areas.

- Technology transfer and capacity building is required at all levels.
- High unemployment rates in tsunami affected areas needs addressing. The agricultural sector may assist in providing job opportunities, particularly where there may be significant changes in this sector, i.e. establishment of plantation crops.
- Keeping the momentum with donors and other stakeholders.
- There are policy restrictions in some cases that are hindering the rehabilitation process. These need to be addressed.
- Acknowledgement of the role of traditional agricultural systems in the rehabilitation process and its incorporation into such programmes needs to be recognized.

## Priorities for long-term rehabilitation and development

The overarching priorities for long-term rehabilitation and development need to incorporate these four elements:

- *Integrated coastal area management plans:* All countries affected by the tsunami are encouraged to develop policies and strategies to incorporate coastal buffer zones. This would include the establishment of Green Belts. Further, the concept of a coastal management plan would incorporate coastal water management; waste management; sustainable livelihoods development; research and information sharing; and the mainstreaming of traditional knowledge into development plans.
- *Mainstreaming disaster management into national planning and strategies:* The events of 26 December clearly demonstrate an inadequacy within this area that needs urgent addressing when developing medium- and long-terms plans in the rehabilitation process.
- *Development of an effective monitoring and evaluation system:* To facilitate the process of ongoing learning, there is a need for monitoring and evaluation in order to adjust plans and strategies as progress in the implementation of rehabilitation programmes takes effect.
- *Long-term priorities in meeting rehabilitation of the agricultural sector:* The overall long-term goal in the rehabilitation of the agricultural sector is to build a better and more robust agriculture that is environmentally sustainable. In order to achieve this, four key criteria need to be addressed. These include the following:
  - *Address land use and land tenure issues:* Land use changes are inevitable with the redevelopment of these coastal areas. This includes the re-zoning of land for specific purposes that may not coincide with that prior to the tsunami, i.e. establishment of Green Belts. Hence there is a need for effective planning and consultation at all levels to effect these changes in land use. In addition, issues over land tenure and rights need to be resolved.
  - *Capacity building:* There is a need for ongoing and long-term commitment to capacity building at all levels, i.e. from farmers to institutions. The tsunami had a devastating impact on human resources that will take considerable resources and time to reinstate.
  - *Holistic approach to agricultural development:* In order to effect the development of the agricultural sector that will meet the aforementioned criteria, there is a need to develop agribusinesses that incorporate micro-credit schemes, focus on markets and market development, and promote the development of agricultural enterprises, such as livestock, in areas that may not have undertaken such activities in the past. There is

a need to revitalize the sector and the concept of agribusiness where seen as a possible mechanism that could incorporate the active participation of governments and the private sector in the rehabilitation process. It is important that social equity and gender sensitivity be given high priority in this process.

- *Support to state-of-the-art and traditional agricultural technologies:* The development of a revitalized agricultural sector should be framed within the context of introducing new and innovative technologies along with the incorporation of traditional practices. In the latter case there are numerous examples of traditional agriculture practices that would assist in the rehabilitation process as well as enhance the productivity of these changed agricultural environments. For example, traditional or commonly grown crop and vegetable varieties that are suited to saline soil conditions should be promoted and encouraged.

### **Medium-term priorities and strategies**

In order to achieve the long-term objectives for the agricultural sector, there is a need to address some immediate constraints. These constraints are outlined below:

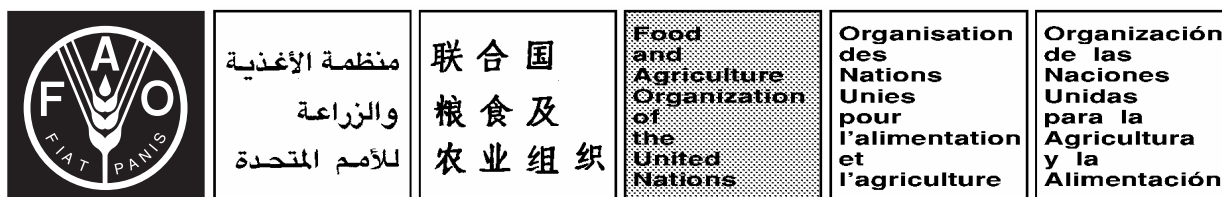
- Land rights – securing land rights and titles for individuals would facilitate the initiation of farming activities in some areas.
- Infrastructure development and rehabilitation – there is still considerable restoration work to be completed that includes the construction and rehabilitation of rural roads, building of dykes and the construction of markets, to name a few.
- Irrigation and drainage – the rehabilitation of irrigation and drainage canals would facilitate the reclamation of tsunami affected lands and water bodies.
- Alternative crops and the breeding of salt tolerant varieties.
- Ecosystem management – covering soil erosion control and management and incorporating a holistic approach to managing watersheds.
- Capacity building.
- Research, development and information sharing – documentation and data collection of the impact on and recovery of tsunami affected agriculture and ecosystems, with a strong focus on sustainable livelihoods development.
- Facilitating upstream-downstream linkages that incorporate local knowledge into planning and encouraging greater participation of all actors including local community groups.
- Development of sustainable livelihoods – the focus would be on the development of income generating activities, micro-credit schemes, establishing market chain linkages, and community empowerment.
- Development of an effective monitoring and evaluation systems.
- Ensuring a smooth transition of affected individuals from the emergency phase to the mid-term rehabilitation phase with a focus on agricultural livelihood activities.
- Agricultural development – this includes the production and distribution of seed and planting materials; crop diversification that includes or incorporates cash cropping options; plant protection; livestock; and improved agricultural practices that incorporate local knowledge.

In order to achieve these outcomes, there is a need to put into place policies and a legal framework governing the management of coastal buffer zones.

## Mechanisms for coordination and exchange of information

Several issues were identified and recommendations in overcoming these impediments were suggested. The issues highlighted were as follows:

- *Full-fledged coordination mechanisms for disaster events such as the tsunami were not in place prior to the event.* The lack of an overarching coordination body in each of the affected countries negatively impacted upon the initial relief efforts. Coordination has predominantly been on a sectorial basis with some sectors performing this role effectively. Coordination is not mandatory and hence even though an organization may require registration with the government there is no mechanism or requirement for the organization to coordinate its activities with other stakeholders. In addition, cross-sectorial activities often escape coordination. In order to overcome this limitation there is a need to establish a permanent disaster management and coordination authority (which is in process in a few countries) in each of the countries whose role would be to take charge of the coordination of relief/aid during disasters. In this respect it would be mandatory for all international and national NGOs to sign a memorandum of understanding with the coordination body. This would assist in the coordination efforts and assist in the regulation of these actors. Experience had shown that some NGOs were unscrupulous in their activities and hence by making registration compulsory the coordination body would be in a position to regulate and assess their activities thereby “black marking” organizations that did not meet specific criteria in their relief efforts.
- *Coordination needs to be decentralized.* For effective coordination to occur there is a need to decentralize the coordination effort down to the district/local level. This will require the establishment of such bodies that will facilitate an effective communications linkage between the community at the lowest level and top level decision-makers at the highest level.
- *Lack of capacity and leadership to coordinate.* There is a need to strengthen the capacity of coordination bodies to effectively manage such disasters as the tsunami. In addition, it was clearly evident during the initial stages of the relief effort that there was a lack of leadership and authority to make decisions at various levels. There is a need to strengthen leadership skills and devolve the decision-making process to lower levels in the chain of command.
- *Coordination is not mandatory.* To date there is no requirement for relief organizations to coordinate their activities with other stakeholders. It was recommended that it should become mandatory for all organizations to coordinate their activities through a single national disaster management and coordination authority.



## OPENING STATEMENT

By

**He Changchui**

**Assistant Director-General and Regional Representative for Asia and the Pacific**

delivered at the

**Regional workshop on rehabilitation of agriculture in tsunami affected areas:  
One and a half years later**

**29 to 30 June 2006  
Bangkok, Thailand**

Distinguished delegates  
Representatives from partners, donors and NGOs  
FAO colleagues  
Ladies and gentlemen,

It is my pleasure to welcome all participants to this regional workshop on rehabilitation of agriculture in tsunami affected areas: one and a half years later.

This workshop is a follow-up to the regional workshop on strategies for rehabilitation and management of salt-affected soil from seawater intrusion, held from 31 March to 1 April 2005. Many of you may recall that the workshop provided an excellent opportunity for participants to share expertise and exchange information on rehabilitation efforts to support the affected farming communities. Various approaches for reclamation and management of salt-affected soils for resumption of agricultural production applicable to the specific local conditions were discussed. Based on the findings and conclusions of the workshop, a “Regional Strategic Framework for the Reclamation of Salt-affected Soils and Agriculture Recovery in Tsunami affected Areas” was formulated and widely disseminated for use by various actors involved in the rehabilitation of the agricultural sector.

Immediately following the tsunami, FAO was actively involved in various ways in assisting the tsunami affected countries resume agricultural activities. In particular, a number of emergency assistance projects were launched to support farming communities in the affected regions who lost their production, assets and subsequently the means to support their livelihood. While such short-term emergency assistance was crucial, it is our conviction that a long-term, sustainable development approach is essential for “building back better” the affected rural communities. In this regard, one of the main challenges now is to identify suitable interventions for longer-term rehabilitation and reconstruction of the agriculture sector. Such interventions should be carried out in a sustainable manner best suited to the local agro-ecological and socio-economic conditions. And

for that an integrated and participatory approach is needed to identify promising technologies that could easily be adopted or adapted by local farmers.

In this context, FAO continues to collaborate with a number of national and international organizations such as related UN agencies, CGIAR centres, donor agencies, academic institutions and NGOs to provide policy advice and technical support to national efforts for development of long-term rehabilitation plans and development strategies for the agriculture sector.

The overarching objective of this workshop is to assess the progress made so far in addressing the emergency needs for resumption of agricultural activities and ongoing rehabilitation activities so that policies and strategies can be developed to support strategizing longer-term rehabilitation efforts. The main objectives of this workshop are to:

- collect information on all past and ongoing rehabilitation efforts and identify overall gaps in the agriculture subsectors and rehabilitation interventions;
- review and discuss national strategies with emphasis on mid- to long-term rehabilitation of the agriculture sector;
- explore possibilities of strengthening national programmes/activities related to the rehabilitation of the agriculture sector; and
- develop mechanisms for coordination and exchange of information on the various initiatives being undertaken.

I am pleased to see so many participants from all the affected countries, and representatives from a large number of international and regional organizations at this workshop. This is indeed not only a reflection of your continued commitment to help the affected people move towards long-term, sustainable development, but also of the importance you have attached to partnership as we move our efforts to a new phase in rehabilitation of the agricultural sector. All of you possess practical experiences from the real world. Your active participation and inputs will be highly valuable in identifying action plans towards achieving the above objectives.

I wish you well in your endeavours and look forward to seeing the output of this workshop.

I hereby declare the workshop open.

Thank you.



## COUNTRY REPORTS

### 2.1. Rehabilitation of agriculture in tsunami affected areas in India: one and a half years later<sup>1</sup>

*N.B. Singh, Agriculture Commissioner, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India*

#### Background

The severe earthquake of 26 December 2004 followed by the tsunami struck the Indian coast line causing extensive damage to property, crops and significant loss of life to communities in the island states of Andaman and Nicobar, Tamil Nadu, Andhra Pradesh and Kerala. The greatest degree of damage occurred in Nicobar districts and in Little Andaman of Andaman district. Extensive damage also occurred in the South Andaman Islands and the intensity of the damage gradually declined towards the North Andaman.

Within the Andaman and Nicobar Island chain there are three clearly defined land use patterns associated with agriculture that include:

Areca nut, coconut and banana are established on slopes and highlands. The areca nut and coconut plantations are inter-cropped with spices that include black pepper, clove and *jaiphal*. This system has a high income potential and offers regular employment to the farmers. Vegetables (cowpea, cabbage, okra, cauliflower, bitter guard, cucumber, ridge guard etc.) and maize are grown in areas immediately below the foothills; and summer vegetables in the midlands and rice in the lowlands.

On the gentle sloping hills and foothills, the farmers practice a rice-vegetables, rice-cereal and rice-fallow systems. These areas are at a relatively higher elevation and are established on predominantly terraces. In the lowlands and valleys in close proximity to sea front, the farmers follow rice-fallow production system.

#### Extent of damage to Agriculture, Horticultural and Plantation Crops in Affected areas

In all four states the standing rice and plantation crops were significantly impacted upon. Among the plantation crops areca nut, coconut and banana stands were severely affected. Seawater intrusion not only affected the standing crop but also resulted in the salinization of soils and water bodies. In some areas in the Andaman and Nicobar Islands land was permanently inundated and cannot be reclaimed. The extent of damage incurred due to the tsunami in the Andaman and Nicobar Islands and the mainland states of Kerala and Tamil Nadu were as follows:

*Andaman and Nicobar:* In the Andaman and Nicobar Island some islands were completely destroyed with significant loss of life and property. Of the standing/harvested rice crop, approximately 2/3 area the total area (4 000 ha) was lost or severely affected in the island chain (Table 1.1). Other crops including vegetables, pulses and oilseeds were completely destroyed. Approximately 10000 ha of plantation crops (i.e. coconut, banana) crops were severely damaged or completely destroyed along with root crops on selected islands of the chain (Table 1.2). All coconut seedlings in the nurseries were completely destroyed. The total estimated cost of these losses was estimated to be US\$149.58 million.

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<sup>1</sup> This country report has not been formally edited and the designations and terminology used are those of the author.

**Table 1.1. Estimated area of rice and monetary value of the crop lost on the islands of the Andaman and Nicobar**

Name of the Island	Cropped area affected (ha)	Monetary value (million US\$)*
South Andaman	1 750	1.31
Havelock	200	0.15
Baratang	400	0.30
Middle Andaman	1 000	0.75
Little Andaman	100	0.07
Car Nicobar	–	
Nan Cowry Group of Islands (10 Islands)	–	
Campbell Bay	500	0.37
<b>Total</b>	<b>3 950</b>	<b>2.96</b>

\* Assuming Rs.40 to 1 US\$

**Table 1.2. Area and estimated monetary value of plantation and root crops destroyed in the island chains of the Andaman's and Nicobar's**

Island/Crop	Cropped area affected (ha)	Monetary value (million US\$)*
<b>A. Plantation crops</b>		
South Andaman	10	0.22
Little Andaman	450	9.84
Car Nicobar	2 000	43.75
Nan Cowry Group of Islands (10 Islands)	3 000	65.56
Campbell Bay	1 200	26.25
<b>Total A</b>	<b>6 640</b>	<b>145.62</b>
<b>B. Root crops</b>	<b>400</b>	<b>1.00</b>
<b>Total</b>	<b>7 060</b>	<b>146.62</b>

*Kerala:* In the coastal districts of Kerala more than 7 051 ha of rice 282 ha of coconut, some areas of areca nut, vegetables and other crops were either loss or damaged. In addition, 68744 seedlings of coconut were completely destroyed.

*Tamil Nadu:* The greatest impact of the tsunami was to 250 ha aqua farms that were owned by small and marginal farmers. The destruction wreaked by the tsunami included the loss of important breeding fish stocks and fingerlings. In the state of Andhra Pradesh losses to field crops was relatively small. In addition, there were extensive losses incurred in the livestock sector with cattle, goats, fish, poultry and other animals in all four states.

In general three distinct impacts on soil and topography could be identified:

- In those areas that were initially inundated by the seawater in which the waters receded immediately (those areas at a higher elevation) resulted in the deposition of salt in the upper surface horizons resulting in salinization of these surface layers.

- Areas that were initially inundated by the tsunami and since are routinely subject to inundation during high tides resulting in the soils becoming permanently saline.
- Some areas in close proximity to the sea have become permanently inundated and cannot be brought back into cultivation.

### Action Plans to Rehabilitate Tsunami Affected Areas and Progress

The Government of India's immediate response to the crisis was to take care of the large numbers of displaced persons. Furthermore extensive surveys were conducted by central and state government teams within the affected areas to quantify the impact of the tsunami on the agricultural sector. The outcome of these activities was the development of short- and long-term plans in order to restore the agricultural sector and livelihoods of thousands of displaced farmers. Monitoring of progress with respect to the implementation of the plans is being undertaken by the central and state governments.

Immediate steps taken in meeting the short-term plan for the Andaman and Nicobar Islands are described in Table 1.3. In the Nicobar district 5000 m of protective dykes were constructed to prevent seawater intrusion to rice fields. Debris was cleared from 1600 ha This included the clearing of debris from affected agricultural land, the scraping of surface deposits of salt and the application of organic manures and gypsum to salt-affected lands. In addition, equipment and implements were provided to affected farmers to assist in the establishment of agronomic, horticultural and plantation crops. Progress as of the 31 March 2006 in achieving the short-term goals are presented in Table 1.3.

**Table 1.3. Progress as of 31 March 2006 with respect to meeting the short-term plan objectives for the Andaman and Nicobar Islands**

Action plan targets	Achievements
Repair and reconstruction of 5 000 m of dykes and 100 drop spillways with sluice gate	5000 m of earthen dykes constructed by Zila Parishad
Cleaning of deposited debris from 6660 ha	A total of 1 616.65 ha have been cleared of debris
Scraping of surface salt from 1320 ha of rice and 2220 ha of plantation crop (Total 3540 ha)	45.5 ha were scraped. However this was found to be time consuming hence surface flushing and leaching has been adopted through the building on bunds in affected fields
Application of organic matter to 6660 ha of plantation crops	4 660 tonnes of organic manure procured
Application of gypsum to 1320 ha of rice, 2 220 ha of plantation crop and 460 ha of other crop land (Total 4 000 ha)	Further assessment of the extent of damage has indicated that in most cases the application of gypsum is not required
Construction of 1000 check dams for rainwater harvesting	The design and estimate for the construction of structures have been finalized
Construction of 5000 ponds and wells	151 ponds and 2 ring wells completed
The supply of 5000 pump sets	2 300 pump sets procured and distributed to farmers
Establishment of 2 640 ha of rice and 6 660 ha of plantation crops	1 376.02 ha under plantation; 320.26 ha under paddy; and 361.05 ha under vegetables have been brought back into cultivation
Creation of drainage canals	820 m drains have been constructed
Provisions of farm implements equipment (1000 power tillers)	6 500 sets of farm implements have been distributed to farmers

In Tamil Nadu and Kerala there was a significant effort to collect soil samples and make recommendations based on these tests for the application of gypsum and green manures. Major activities to restore agricultural production and livelihoods in Tamil Nadu and Kerala included the following:

- One of the major hurdles was identification of affected farmers and establishing the extent of damage to each farmer. It was therefore decided by the local officials to encourage farmers to form self-help groups. In all 478 tsunami farmer self-help groups (TFSHG) were established and formed the focus of the relief effort in the state.
- Lists of affected farmers were prepared and displayed on notice boards for public security in order to create awareness and facilitate transparency.
- A total of 25531 soil sample were collected and assessed for salinity levels.
- Scraping of salt from affected land and leveling was undertaken through the TFSHG.
- Gypsum was made available free of charge to affected farmers based on soil test results.
- Seed of green manure (sesbania, sunhemp) crops known to tolerate salinity were distributed to farmers as a first step before the rainy season started.
- A further bottleneck was the creation of awareness among farmers about the long-term impact of seawater at the farm level. It was, therefore, decided to train farmers in reclamation of land. More than 13000 farmers were trained in land reclamation approaches.
- Seeds of salt tolerant varieties of different crops were distributed to affected farmers.

A positive impact of these interventions has been observed in rice yields in affected districts (Table 1.4). Whilst there are no data that can be used to make comparisons between pre- and post-tsunami rice yields, the yields obtained post-tsunami are reasonable and clearly indicate a return to normality.

**Table 1.4. Rice yields in tsunami affected areas after reclamation in Tamil Nadu**

Districts	Yield (after reclamation) (kg ha <sup>-1</sup> )		
	Max	Min	Average
Kancheipuram	2 610	2 012	2 311
Cuddalore	4 816	680	2 748
Villupuram	5 610	2 967	4 319
Nagapattinam	686	136	411

A long-term action plan for the rehabilitation of affected coastal areas of the Andaman and Nicobar Islands has been drawn up and include the following activities:

- The management of sea front that will include the establishment of strips 15 m wide of mangroves along a 100 km coastal strip.
- In those areas that have been permanently inundated (1320 ha) mangroves will be established and farmers compensated for their loss of land.
- The provision of stable and strong dykes for a further 20 km with 40 sluice gates.
- The creation of brackish water ponds.

- Infrastructure development that includes the construction and procurement of office buildings, laboratory buildings, workshops, sub-depot staff waters, go downs, vehicles, farm machinery, etc.
- The development of aquaculture enterprises on 100 ha.

Similar activities associated with infrastructure rehabilitation and the sustainable management of the immediate coastal region are planned for Tamil Nadu, Andhra Pradesh and Kerala.

### **Constraints faced in Rehabilitation of Agriculture**

A major constraint immediately after the disaster was the procurement of sufficient quantities of quality seed and planting material to reestablish crops and plantation; the availability of appropriate varieties of seed and planting material suited to the prevailing soil conditions and in the case of the Andaman and Nicobar Islands the availability of local organic composts/manures and inorganic fertilizers. Care was taken to avoid the transportation of coconut seedlings source from the plains of India to the Andaman and Nicobar Islands to prevent possible insect pest and diseases being introduced to the islands. Poor road infrastructure affected transportation of relief supplies and impeded the rehabilitation process. In addition, the inadequate availability of suitable earth moving equipment to remove debris from affected fields as the first phase in the rehabilitation process and to assist in the construction of dykes, water storage structures and roads hindered progress. Problems of attracting suitably trained and experienced persons to go to the Islands to assist in the rehabilitation process were experienced due to fear that further earthquakes and tsunamis would occur.

### **Lessons Learnt**

The following lessons learnt have been identified and for the focus of future developments along the coast:

- The sea frontage or area immediately adjacent to the sea will be protected from the impact of future waves or storm surges through the establishment of mangroves.
- Human activities along the sea frontage will be restricted to only notified areas.
- An ecological balance should be maintained within the coastal area that would temper the impacts of human activities.
- The development of artificial water bodies and other water reservoirs will be confined to areas away from sea frontage.
- There is a need for the development of an early warning system in order to avoid human causality and loss of property from future tsunami's and storm surges.

## 2.2. Agricultural rehabilitation scenario in India<sup>2</sup>

Prepared by Tamil Nadu Tsunami Resource Centre (TNTRC)

### Background

Farmers and agriculture workers in India and in particular those in the states and territories of Tamil Nadu and Andaman Nicobar Islands were shaken and traumatized by the destruction wreaked by tsunami of December 26, 2004. Crops were destroyed and fields contaminated with saline salts and deposited sediments. India had not experienced such destruction of this kind in the recent years.

The following provides a situational analysis of the agricultural sector one and a half years later, and covers to a large extent, the rehabilitation constraints, gaps, challenges and lessons learnt mostly from Tamil Nadu. This is based on feedback and the experiences of core group members of the livelihoods sector facilitated by the *TNTRC* at the state level, coordination efforts of *NGO Coordination and Resource Centre* (Nagapattinam), Government information on progress and has drawn upon reports and discussions with farmer networks affected by the disaster and field visits to affected areas.

### Limited understanding of agricultur – little focus on agriculture

Efforts of some organizations and work of the coordination centres and groups succeeded in bringing the focus of some of the international organizations and the national and community based organizations, involved in rehabilitation to the role of the agricultural sector on which the livelihoods of significant numbers of persons depend. This resulted in organizations prioritizing agriculture land reclamation as an important area to address. Collaboration, knowledge networking of different stakeholders was initiated by the coordination and resource centres both at the state and district level. The government assessed the damage and announced their *Rehabilitation of Tsunami Affected Agricultural Lands (ROTAAL)* plans. The coordination effort at the district level by the *NGO Nagapattinam Coordination and Resource Centre (NCRC)* brought large areas of agricultural land into the reclamation process and successful livelihoods restoration to a large extent. Details of government package and implementation are presented in Annex 2.2.1.

### Opportunities to build better and secure agricultural communities

The aftermath of the tsunami disaster offered an opportunity to build better and securer agricultural production systems and communities. A comprehensive approach to rehabilitation was required. In this respect the process did not stop with land reclamation activities but encompassed long-term sustainability through improving the fertility of the soil, improving the yield and income of farmers. Besides, the disaster has provided an excellent opportunity to revisit traditional knowledge and to incorporate it into the concepts of sustainable agricultural practices through organic farming, the growing of traditional species, and traditional practices.

Long-term approaches required include an integrated approach to farming systems development, diversification and value adding through various activities (promotion of horticulture and tree crops, food processing, agro-based enterprises), integrated disaster preparedness and proofing from floods/drought and other disasters, aimed at improved capacities and to provide institutional linkages to assist in the transfer of knowledge.

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<sup>2</sup> This country report has not been formally edited and the designations and terminology used are those of the author.

## **A second disaster – Consequent rains and flooding that ravaged Tamil Nadu**

Close on the heels of tsunami, Tamil Nadu was hit by a second disaster – the floods, which inundated the fields, brought great losses to the farmers, both inland as well as the coastal. In Nagapattinam alone the total damages estimated from field reports were 80000 hectares of paddy crops, 300 ha of horticultural crops, were either lost or lower yields were experienced. Only a few NGOs and government participated in flood relief. The positive side of this disaster is that the lands that had become salinized due to the tsunami were leached/flushed of soluble salts to a large extent thereby reducing/eliminating the saline affects.

## **Progress of Activities of the Government/NGOs in Tamil Nadu**

The Government of Tamil Nadu provided a package under the Rehabilitation of Tsunami Affected Agricultural Lands (ROTAAL). Through this, the government announced compensation packages for crop and livestock loss. Tamil Nadu Government implemented a package of Rs.12500/ha for land reclamation for 3 years initially, which was increased to Rs.15000/per ha subsequently. This includes soil testing, removal of salt, land leveling, gypsum application, green manures, sowing of seeds, ploughing and cultivation, subsistence allowance every season in the second and third years, and insurance premium for two years.

NGOs Packages ranged from Rs.4000 to Rs.50000/ha. NCRC initiated coordinated action and evolved a package with NGOs for land reclamation. TNTRC ensured state level information sharing and dissemination.

## **Coordination at state level (Tamil Nadu)**

At the state level the *Tamil Nadu Tsunami Resource Centre (TNTRC)* ensured information dissemination, knowledge networking, and provided a platform for sharing of issues and good practices with regard to livelihoods rehabilitation with a focus primarily on agriculture. The strategy consisted of bringing different stakeholders together to form a ‘core group’ that facilitated the sharing of concerns and identified matters that needed attention.

## **Coordination at District level**

NGO Coordination and Resource Centre, Nagapattinam (NCRC) coordinated the agricultural rehabilitation scenario at the district level (Nagapattinam). The various activities taken up by them included assessment of damages through a survey of 42 panchayats, disseminating the findings, developing a comprehensive package in a participatory manner with NGOs to address immediate, short-term as well as long-term needs for desalination of affected production systems. Geographical land allocations were made the responsibility of 22 NGOs who were involved in the reclamation of 5500 ha of land. This allowed for bridging gaps and avoiding overlaps. The focus of the reclamation efforts were on individual farmer’s lands as well as common lands on which the establishment of green manure crops, the growing of salt tolerant crop varieties and the application of organic manure were encouraged. An ensured common understanding among NGOs, created linkages and partnerships, capacity building of NGOs and coordination through review and planning meetings. In the second year the feasibility of integrating disaster preparedness into agriculture is being planned. The outcomes of these efforts in Tamil Nadu have resulted in the following progress:

- The majority of the affected lands are now fit for cultivation.
- 5880.96 ha have been sown with salt tolerant paddy crops and the balance of the land to oilseeds.

- 669.82 ha of horticultural land have been recovered.
- Water samples across Tamil Nadu are mostly fit for irrigation except in few places.
- In Nagapattinam, except in a few places, most water sources are largely unfit for irrigation. This is ascribed to the lack of visibility of the agriculture sector in this area where rehabilitation of the feeder canals/drainages needs to take place in a comprehensive manner.

*(Source: GoTN status report, Feb 06)*

### **Gaps Identified**

- The compensation package awarded to agriculturists has been perceived to be low.
- Assessments made in compensation process were not perceived to be rigorous and scientifically based as uniform input subsidies were prescribed throughout the ROTAAL package. Lease farmers and farmers on temple lands were not eligible to receive these compensation packages.
- Most farmers were not well versed in reclamation procedures for saline land.
- Farmer associations and groups were not very active hence it became difficult for them to advocate for change.
- Farm lands that belong to larger farmers were left untreated by NGOs leading to loss of livelihoods opportunities.
- The tribal plantation owners in Nicobar – a very close knit community with strong democratic leadership, saw power shifts and conflicts occur in some villages.
- The Nicobarese are unable to maximize their returns from their plantation crops and are not open to new and innovative ways of managing plantation crops.

### **Challenges**

There are several challenges that will confront the rehabilitation process as it moves into the medium- to long-term. These include the following:

1. Maintaining stakeholder interest in the reclamation process and support for integrated farming practices. In Nagapattinam out of 175 NGOs, initially only 23 were involved in reclamation activities. Now one and a half years later this number has been reduced to six clearly indicating the perceived low priority that agriculture has amongst these organizations.
2. Capacity building is still seen as a challenge.
3. Pre-tsunami production levels have yet to be attained in many places.
4. Clearance of irrigation/drainage canals has occurred to a limited extent but needs to be completed in order to normalize the situation.
5. The operations of most NGOs are rather small and limited and several inland affected areas have not yet seen the presence of an NGO in their area.
6. Desalination of indirectly affected villages more than 3 km from sea where water entered through canals has yet to be undertaken.
7. In areas where leaching is not feasible due to a lack of adequate drainage, it is estimated that it will take more than 3 years before reclamation is completed.



## Pre-tsunami – Long-Term Issues

Certain pre-tsunami long-term issues need to be addressed in order to build a stronger, sustainable and viable agricultural sector. Issues to be addressed include:

*Viability of Farming:* Farming is fast becoming a non-viable livelihoods option due to increased costs of production, lack of affordable credit, and low productivity of the land. This is a serious issue as farmer debt levels increase resulting in elevated levels of suicides in several Indian states.

*Water management:* There is a need to enhance effective water management at the farm level. This can be achieved through the promotion of water harvesting techniques; de-silting irrigation canals; restoration and maintenance of drainage canals; building bunds and check dams; the construction of rainwater storage ponds/tanks through community participation and local government linkages. All of these efforts would assist in promoting and improving water management.

*Post-harvest losses:* Inadequate storage, preservation and transportation facilities pointing to a need to address the issue of post-harvest losses through improved infrastructure development.

*Salinization of agricultural lands due to aquaculture:* Agriculture in the coastal areas is increasingly under threat from aquaculture farms that are being developed along the coastline. These farms lead to increased salinity of soil and water, thus directly affecting the productivity of agricultural lands. In the post-tsunami period there are instances of salinized agricultural lands being converted to aquaculture farms.

## Lessons learnt

1. *Assessment of damages:* A participatory needs assessment is required to be undertaken with the full involvement of farming communities before making decisions associated with the rehabilitation process. Parameters for assessment of damage that have been incurred and the proposed rehabilitation programmes need to be based on transparent and a scientific basis.
2. *Variation in damages and intensity:* The impact of the tsunami was not uniform throughout the affected areas. Differences in the extent of damages and the contrasting soil types that were affected call for different rehabilitation techniques and approaches. Hence a blanket approach should not be encouraged.
3. *Technical expertise:* Mixed messages regarding the rehabilitation process was often experienced by farmers. Operational guidelines for rehabilitation need to be in local languages and made simple. Farmers were often confused by the different recommendations made by expert's. For example farmers were told to plough the marine sediments into their top soils along with removing the sand/clay deposits; the ploughing in of the green manure crops as well as the burning of the green manure crops. Such recommendations resulted in significant confusion amongst farmers.
4. *Targeting and policy:* The rehabilitation programmes need to focus on the farmer working the land who may not always be the owner of the land. Programmes need to be gender sensitive and provide opportunities for women to earn an income. Policies/programmes need to consider the food security needs of the farmers' families in order to ensure adequate dietary intake, enhanced health and reduced vulnerability.
5. *Comprehensive approach:* Since lands affected by the tsunami are contiguous, a comprehensive approach to reclamation from salinity should be undertaken that includes lands of larger farmers. Reclamation should be part of an integrated farming practice to

include diversification, value addition, capacity building and linkages for more sustainable agriculture and vulnerability reduction.

6. *Need for coordination:* In the context of several actors involved in rehabilitation, each with differing priorities, there is a possibility for gaps and overlaps. The geographical coordination, coupled with consensual approach helps to effect uniform reclamation. The need to compliment and supplement the activities of each of the actors is important as has been demonstrated in Nagapattinam. A coordination committee should consist of all the stakeholders such as the members of the farming community/leaders, government representatives, NGOs/civil society and agricultural scientists. Evidences have shown time and again that initiatives with good participation of the communities have more chances for success.
7. *Role of information collection, trends analysis and dissemination:* There is the need for the collection of information, trends analysis and dissemination as a means of influencing stakeholders. This was effectively achieved in the case of NGO coordination centre in Nagapattinam NCRC. The NCRC was influential in persuading NGOs to focus on agriculture reclamation activities. TNTRC's role at the state level complemented those efforts.
8. *Focus on traditional wisdom:* There is a need to integrate indigenous traditional wisdom and practices into the rehabilitation process and to adapt them to the current situation. Organic methods were used to reclaim lands. The traditional varieties of salt tolerant and tall varieties of paddy used earlier in Nagapattinam have been found to be well suited in tsunami rehabilitation context.

**Convergence between different activities in the rehabilitation process:** In the post-tsunami development programme new facilities are being created through the construction of houses with the incorporation of associated sanitation infrastructure. There is the opportunity to incorporate the sanitation objectives into the agricultural rehabilitation programme. Currently these two sectors are viewed independently. The benefit of bringing these two sectors together will result in the development of ecologically sustainable waste disposal. Ecological sanitation is considered as an appropriate sanitation practice where there are high water tables and sandy soils as is common to coastal areas. There is a need to change the mindset of farmers towards using 'Golden manure' which will enhance and add value to both sectors leading to a sustainable environment.

#### **Annex 2.2.1. Counting losses**

Overall, 897 villages across 27 districts in 3 states and 2 Union Territories were affected by the 26 December 2004 tsunami. Farmers and fisher were the main groups affected by the tsunami. More than 600000 agriculturists and agricultural workers were affected (According to the Tamil Nadu unit of the All India Kisan Sabha).

Approximately 25000 hectares of farmland was affected across the states. Other than farm land damages which were in terms of crop loss, erosion of soil, salination of soil, accumulation of silt/sand and significant amounts of sea bed organic deposits of a sodic nature characterized the damages. Fresh water ponds were salinated and contaminated, were rendered unfit for irrigation, Irrigation/drainage infrastructure was damaged and livestock washed away. Intensity and type of damage varied across regions. Over 85 percent of the damage was in Tamil Nadu and Andaman's.

**Losses across India (Tsunami Impact study, CII)**

Category	Tamil Nadu (TN)	Andaman and Nicobar Islands	Pondicherry	Kerala
<b>Farm land (ha)</b>	8 460*	10 837	1 633	949
<b>Types of crop damaged</b>	Paddy Gingelly Black gram Groundnut Coconut Horticultural	Coconut Paddy fruits Areca nut Vegetables spices	Paddy Groundnut Banana Coconut Vegetables	Paddy banana Coconut
<b>Severely affected areas</b>	Nagapattinam Cuddalore	South Andaman Middle Andaman & Great Nicobar Nancowry group of islands Car Nicobar Little Andaman	Karaikal Kottuchery T.R. Pattinam	Alappuzha Kuttanadu

\* Govt. of TN Record for damages of farm land.

The worst affected districts within Tamil Nadu were Nagapattinam and Cuddalore and in the Andamans region: South Andaman, Middle Andaman, Little Andaman, Car Nicobar, Great Nicobar and Nancowry group of islands. Tamil Nadu and Pondicherry have a coastal length of 1025 kms. Tsunami water ingress was recorded to occur up to 1-3 km inland from the coast. Average height of tsunami was 7-10 m. The total number of villages affected was 376 and 33 in Tamil Nadu and Pondicherry respectively. Largely, soil testing across the region showed that there were no changes in pH but there were considerable differences in the Electric Conductivity (EC).

**Government package for the state of Tamil Nadu implementation details**

Sno	Details	Total in Tamil Nadu	Beneficiaries
1.	Formation of tsunami farmers self-help groups	478	13 511
2.	Supply of gypsum (tonne)	8 794.84	
3.	Supply of green manure seeds (tonne)	491.4	
4.	Distribution of crop seeds (tonne) Paddy, pulse, millet (salt tolerant)	417.6	
5.	Soil testing (samples collected)	25 531	
6.	Training to farmers through KVK (no.)	13 511	

**Source:** GoTN status report, Feb 06.

### **Box 1. Tamil Nadu Organic Farmers Movement (TOFARM)**

*A case study of successful organic reclamation of land*



In the aftermath of tsunami, Tamil Nadu Organic Farmers Movement (TOFARM), a network of farmer's associations based in Trichy, decided to assist people to reclaim the lands through the use of organic methods. The activities of the organization were successful in the reclamation of more than 1600 hectares of land through the application organic based approaches in 25 Panchayats, desalination of 1024 ponds, de-silting of 19 km of drainage canals and establishment of 3200 vermicomposting pits directly and influencing the reclamation process of agricultural lands in Nagapattinam.

In Nagapattinam most families own less than 2.0 hectares of land. A handful of farmers in each village own more than 4.0 hectares of land. The land was degraded and saline due to the earlier cyclones and the tsunami rendered the land uncultivable. TOFARM was quick to rise to the occasion and worked with the district coordination centre in assessing the damaged lands, it took up *South Poigai Nallur* in Nagapattinam to demonstrate the effects of organic reclamation work which proved to be successful and in influencing the others in the district to adopt the same approach. Their understanding and focused work helped the farmers to regain their confidence and hope.

ASB – Germany, CII, Care India, India today and OXFAM provided financial support and the moral and institutional support was extended by the Government Departments headed by the District Collector. The activities included removal of the clay/sand deposit by ploughing, constructing trenches along the bunds to facilitate lateral leaching of salts, the planting of green manure plants i.e. *Sesbania maculata* and the application of compost. The organization was instrumental in teaching and training of farmers vermicomposting techniques and helped to establish vermicomposting units. Trainings to farmers in organic methods of reclamation, vermicomposting and farming helped in capacity building of farmers.

TOFARM is continuing with its work and in the short term is planning to train 800 labourers to take up economic – on farm and off farm activities such as honey bee rearing; mushroom cultivation; nursery raising; grafting and layering; compost and vermicompost preparation; goat rearing; poultry and dairy production; preparation and selling of bio-inputs; value-adding of farm products; leasing of lands and vegetable cultivation; native seeds production; herbal cultivation; and animal husbandry. TOFARM also plans to provide financial support for start up and also help with market linkages.

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**Table 3.1. Estimated losses in the agricultural sector associated with the impact of the tsunami on Aceh and Northern Sumatra**

Attribute	Quantity
Crop lands (includes both wetland (paddy) and rainfed)	61 400 ha
Plantation estate lands	22 000 ha
Livestock losses includes cattle, buffalo, goats and poultry	1.944 million
Farm implements and machinery	3 120 units

### The recovery programme (R3MAS)

The recovery process in Agricultural Sectors undertaken by the Ministry of Agriculture has been termed the R3MAS (Rehabilitation and Reconstruction for the People of Aceh and North Sumatra) which will be executed over a 5 year period (2005-2009). The estimated budget required for this programme amounts to US\$397.6 million. The programme consists of 3 main areas of focus:

- The rehabilitation of land in order to facilitate the recovery of economic activities for rural communities.
- Rehabilitation of the capacity of agricultural support services (physical and human resources).
- People empowerment and institutional development through technical and organizational supports.

The overall focus of the R3MAS programme is to develop the agricultural sector with a focus on addressing food security, the development of agribusiness, and enhancing the social welfare of farming communities.

The budget for the year 2005-2006 is US\$69.4 million. The R3MAS activities for the 2005-2006 that are currently being undertaken include the following:

- The rehabilitation of drainage, irrigation, and land (12961 ha);
- A commitment to inject working capital into on agribusiness activities (on farm-off farm) totaling US\$1.61 million;
- The rehabilitation of 15000 m<sup>3</sup> of farm-roads;
- Food crops and horticulture production to be effected on 25800 ha;
- Compensation for losses of livestock totaling 7745 animals;
- Replanting the estate crops to cover 5331 ha;
- Replanting the palm oil on 4950 ha;
- The procurement of agricultural machinery and tools (1256 units);
- A total of 4000 food security packages to be distributed;
- Development of the agriculture office facility, capacity building of agriculture organization, farmer groups, and agricultural personnel.

Progress has been made with respect to achieving targets within the rehabilitation of the agricultural sector. Estimates of the progress to restoring agronomic production systems, plantation crops and livestock production systems for Aceh and Northern Sumatra are presented in Table 3.2.

**Table 3.2. Estimates of progress to date in rehabilitating the land and livestock production systems in Aceh and Northern Sumatra**

Activity	Damaged/Lost	Achieved	Still to be completed
<b>Cropping systems (ha)</b>			
Food crops and horticulture	61 400	25 800	35 600
Estate crops	22 000	10 281	11 719
<b>Animal husbandry</b>			
a. Cows	40 000	745	39 255
b. Buffalos	39 000	–	39 000
c. Goats	65 000	2 000	63 000
d. Poultry	1 800 000	5 000	1 795 000

### Challenges currently being encountered in the implementation of R3MAS

In the implementation of the R3MAS programme some challenges have been encountered that can be grouped into the following:

*Technical* – The reclamation of soils with high salinity levels; the low productivity of food crops and livestock, there are some problems such as, the high salinity, low food crops and livestock productivity; and limited technological inputs.

*Economic, social and human resource limitations* – low farm incomes due to reduced productivity and poor commodity prices; a low level of farmer motivation; insufficient agribusiness skills amongst farmers; and limited agricultural extension services due to a lack of manpower.

*Organizational structure* – in general farmer groups and organizations are poorly organized with limited institutional structure; the lack of adequate extension services to cope with demand; and changes in the organizational structure with respect to executing agency from Ministry of Agriculture to Rehabilitation and Reconstruction Board (BRR).

### Short- and long-term rehabilitation plans

Within the short-term plan (2005-2009) of the R3MAS programme the focus will be on the rehabilitation of the tsunami affected paddy fields that are classified as suffering from light and medium damages; optimization of the land used for dry land food and horticulture commodities; the establishment of new paddy fields; the replanting of green crops and fruit crops in backyards; procurement of facilities and agriculture inputs such as seeds, fertilizers, and machinery; the evaluation of crops variety for tolerance to salinity; capacity building of the rural communities/farmers/and extension workers; rehabilitation of peoples farms that include coconut, palm oil, coffee, rubber, cacao, and nutmeg; education and farmers training; the development of livestock processing facilities and local disease control; and distribution of livestock (goats, cows, buffalos, and poultry) to farmers. It is estimated that for the completion of the R3MAS short-term programme in 2009 a further US\$328.2 million is required.

The long-term R3MAS rehabilitation programme set to go beyond 2009, will focus on the rehabilitation of heavily affected paddy fields with an emphasis on the rebuilding of new paddy fields; the establishment of new farms to produce coconut and palm oil; the development of workshops for the servicing of agricultural machinery; the rebuilding the market facilities for

livestock; redevelopment of farmers organization and extension workers; redevelopment of the agricultural education and training; development of the new suitable technologies appropriate for agro-industries; the development of market oriented activities through the establishment of agribusiness terminals; and establishing of business partners.

## **2.4. Rehabilitation of agriculture in tsunami affected areas: Aceh and Nias after one and a half years<sup>4</sup>**

*Muhammad Ikhsan Sulaiman, National consultant for monitoring and evaluation at the UNFAO*

### **Background**

On 26 December 2004, Indonesia was severely hit by a powerful earthquake, followed by a series of aftershocks that triggered a tsunami that various coastal communities. The most affected areas in Indonesia were the provinces of Nanggroe Aceh Darussalam (NAD) and Northern Sumatra. In Indonesia alone, more than 131000 people were killed, another 37000 classified as missing<sup>5</sup>, and over 400000 survivors lost their homes and livelihoods. According to the initial damage assessments of the agriculture sector carried out by FAO together with Indonesia's Ministry of Agriculture (MoA), it was estimated that about 37500 ha of wet land and 29000 ha of dry land agricultural lands were inundated by the tsunami, causing erosion of bunds, salinization of soil, siltation of lands and irrigation and drainage canals. About one-third of the affected land was situated along the north-east coast and two-thirds on the west coast of Aceh. The earthquake damaged irrigation networks and canals rendering irrigation schemes inoperative. A significant amount of livestock in affected areas were lost to the tsunami. Survivors of the disaster found themselves without a means of livelihood and lacking the tools and capital to restart productive activities. Moreover, key infrastructure was destroyed and the Government's local capacity to rebound was severely compromised, as several district and provincial level staff and extension workers lost their lives in the disaster.

Given the scale of the disaster, and the need to restore normality to the lives of coastal communities and internally displaced persons (IDPs) as soon as possible, the Ministry of Agriculture and Development (MoA) and the Ministry of Marine Affairs and Fisheries (MMAF) of the Republic of Indonesia officially requested emergency assistance from the international community on 30 December 2004.

### **Projects**

Three projects in agriculture recovery have been completed 1.5 years after the tsunami. Support came from the government of Belgium, Japan and the European Community through the projects OSRO/INS/501/BEL, OSRO/INS/503/JPN, and OSRO/INS/509/EC. One project OSRO/INS/513/BEL is still going on through time extension until October 2006 with the title "Support to farmers in tsunami affected areas through the provision of agricultural and livestock inputs".

The overall objective of the projects was to assist the Indonesian Government's efforts to safeguard the livelihoods of the earthquake and tsunami affected coastal communities and to enable them to resume their occupations and produce food crops for nutrition and income earning. The assistance was meant to rapidly kick-start basic agricultural activities through the supply of urgent agricultural

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<sup>4</sup> This country report has not been formally edited and the designations and terminology used are those of the author.

<sup>5</sup> Ref.1003/10/3/BRR6MonthInfoSheet, Badan Rehabilitasi dan Rekonstruksi (BRR).



inputs and the rehabilitation of basic farm infrastructure, thereby reducing dependency on food aid for some of the most vulnerable farmers.

## Projects Implementation

### *i. Procurement*

For the first phase of its overall agricultural relief programme, FAO procured 286 tonnes of rice seed, 119 tonnes of secondary crops, 8000 packages of vegetables, 373000 seedlings of estate crops, 2833.5 tonnes of fertilizer, 38000 pieces of tools, 770 hand tractors, 250 threshers, 50 paddy reapers, and 300 water pumps with a total value of US\$2782217. Table 4.1 provides details on the procurement for the first phase of the overall agricultural relief programme.

**Table 4.1. Procurement for the first phase of the overall agricultural relief programme**

Input	Unit	Project			Total
		501/BEL	503/JPN	509/EC	
Rice seed	Tonnes		174	112	286
Urea	Tonnes		653	420	1 073
SP-36	Tonnes		435	280	715
KCl	Tonnes		218	143	361
Groundnut	Tonnes			60	60
Soybean	Tonnes			45	45
Maize	Tonnes			14	14
Vegetables	Kits			8 000	8 000
NPK	Tonnes			685	685
Hoe & rake	Pieces			38 000	38 000
Cocoa	Seedling			200 000	200 000
Oil Palm	Seedling			130 000	130 000
Areca nut	Seedling			25 000	25 000
Coconut	Seedling			10 000	10 000
Manggo	Seedling			4 000	4 000
Rambutan	Seedling			4 000	4 000
Hand tractor	Units	695		75	770
Thresher	Units	100		150	250
Reaper	Units			50	50
Water pump	Units			300	300
<b>Value of inputs</b>	<b>US\$</b>	<b>887 399</b>	<b>394 851</b>	<b>1 499 967</b>	<b>2 782 217</b>

### *ii. Selection of Beneficiaries*

The primary targeted beneficiaries were the poor farming communities in the tsunami affected areas that, having lost their production assets and consequently the means to support their livelihoods, were unlikely to meet the immediate food needs of their families without assistance. Priority was to be given to the most vulnerable households and poorest farming families who had sufficient experience in agriculture and had access to at least 0.5 ha (5000 m<sup>2</sup>) of land.

### *iii. Agricultural package*

There were four agricultural packages that were offered to each farmer/family, while the agricultural machineries were addressed to farmers group. Agricultural packages were distributed to farmers who had access to secure land. The rice package consisted of 20 kg rice seed, 75 kg urea, 50 kg SP-36 and 25 kg KCl. Secondary crop packages were distributed to farmers who had access to dry land areas. It consists of either 30 kg groundnut, 10 kg soybean or 5 kg maize seed along with 50 kg NPK and a hoe and rake. Vegetable packages consisted of 5 types of seed (kangkung, chilly, tomato, long bean, and lettuce) along with 20 kg NPK and a hoe and rake. Moreover, twenty to thirty farmers in a group could receive agricultural machinery such as a hand tractor, thresher, paddy reaper or water pump.

### *iv. Distribution of agricultural package*

The distribution of agricultural kits to beneficiaries was undertaken through NGO partners. In 2005 and early 2006, FAO has signed Letter of Agreements (LoA) with 27 NGOs consisting of 10 local NGOs and 17 international NGOs. NGO partners undertook the selection of beneficiaries according to FAO's criteria, distribution of agricultural inputs in their working area as part of livelihood programme, and monitoring and evaluation during plant growth and harvest. The agricultural inputs were distributed in 742 villages in 8 districts of Nanggroe Aceh Darussalam province (NAD).

Almost 23000 farmers received benefit from the distributed rice seed. However, only 50 and 69 percent of the rice seed was cultivated by the farmers in the east and west coast, respectively, due to the lateness in distribution. In total more than 10000 ha of rice fields have been re-cultivated and harvested and only 36 percent of the rehabilitated area in west coast. Table 4.2 provides a breakdown of the distributed rice seed. The rice seed was used in the first planting season after the tsunami as the traditional planting season of May/June and September/October were was changed.

**Table 4.2. Distribution and planted area of rice seed and percentage of cultivated rice seed**

District	Number of beneficiaries	Allocation (tonne)	Planted Area (ha)	Planted Seed (percent)
Aceh Utara	8 879	40	2 052	100
Bireuen	2 757	42	1 886	44
Pidie	3 042	42	1 583	11
Aceh Besar	350	7	1 260	36
<b>Total East Coast</b>	<b>15 028</b>	<b>130</b>	<b>6 780</b>	<b>50</b>
Aceh Jaya	4 129	78	1 298	61
Aceh Barat	2 588	53	1 984	78
Nagan Raya	275	6	110	80
Semeulu Island	1 231	19	372	80
<b>Total West Coast</b>	<b>8 223</b>	<b>155</b>	<b>3 764</b>	<b>69</b>
<b>Grand Total</b>	<b>23 251</b>	<b>286</b>	<b>10 545</b>	<b>61</b>

More than 15500 farmers received vegetables and secondary crop seed. Most of the seed have been planted in dry land areas or as share crops below coconut, cocoa, or banana trees. In addition, estate crops have been distributed to more than 5000 beneficiaries since the tsunami had a negative impact on these crops since they died due to salt toxicity.

20000 farmers have benefited from the distributed agricultural machinery. The machineries have been used in land preparation, watering and harvesting. However, the newly introduced paddy reaper used for harvesting is still relatively unfamiliar with farmers and is taking a greater than anticipated period for its adoption.

#### v. *Cash-for-Work Programme*

Beside distribution of agricultural inputs, FAO has two projects associated with the land clearing and rehabilitation of 240 ha of paddy fields in two districts, Aceh Besar and Aceh Barat. After tsunami, the fields were covered with debris and marine sediments preventing the establishment of crops. Communities have participated in the clearing of their own land. Around 500 people have participated in project with a total of 24500 worker days being consumed.

#### vi. *Training*

To complement the distribution of seeds and fertilizer, FAO also distributed motorized cultivators, including hand tractors and threshers to farmer groups (see Table 1). Some 147 community representatives were trained by FAO in the use and maintenance of the hand tractors. Thus, complementary projects helped increase the impact of the overall programme, as some of the farmers were able to utilize the distributed seeds and fertilizer more efficiently, through distribution of, and training in farm equipment.

### Impact

It is difficult to quantify the impact of these interventions on the overall livelihoods and incomes of recipient farmers. Key indicators for measuring impact in the short, middle and long term in Aceh and Nias are being developed together with BRR, UNDP and other agencies.

However, agricultural activities in NAD are returning to normalcy after a break of one planting season in the east coast and one to two or even three seasons in the west coast. Agriculture can be viewed as a supplementary income generating enterprise since the effect of salinity are still clearly evident through the low productivity of rice (Table 4.3). Net income per farmer with an average area of 0.5 ha is low compared to income from other activities in the tsunami affected areas such as paid labour, fishing, etc.

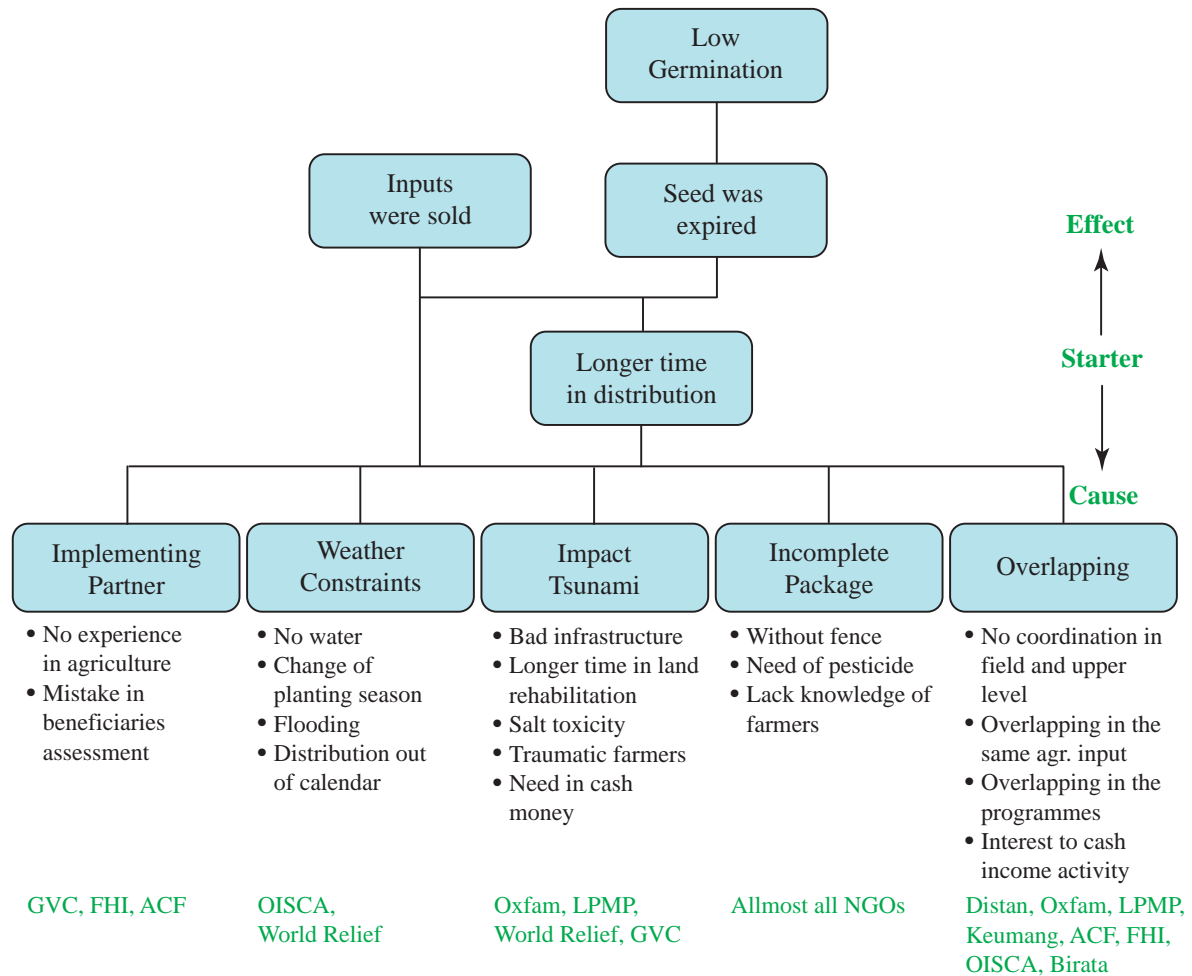
**Table 4.3. Productivity and price of rice, as well as net income from the rice cultivation of 0.5 ha land**

District	Productivity (tonne/ha)	Rice price US\$/kg	Net income* US\$
<b>East Coast</b>			
Aceh Utara	3.2-4.5	0.13	111-116
Bireuen	3.2-3.4	0.13	111-178
Pidie	4.3	0.14	117-167
Aceh Besar	3-4	0.14	161
<b>West Coast</b>			
Aceh Jaya	4.5-8	0.19	178
Aceh Barat	4-5	0.17	84-167
Nagan Raya	3.3	0.17	
Semeulu Island	3-4	0.18	111-167

\* 2005 1 US\$ = 9 000 IDR

## Constraints

In the implementation of the projects, some problems were encountered as summarized in the Figure 4.1. Inputs such as seed, fertilizers and hand tractors were sold off to generate cash. An excessively long time was needed in distribution of packages in the first phase of the project that caused the seed to become non-viable and reduced its germination ability.



**Figure 4.1. Problem analysis in the distribution of agricultural inputs in NAD, Indonesia**

There were several factors that contributed to these excessive delays in the distribution of agricultural inputs. Initially, the peace agreement between the GAM and the Indonesian government were not in place. Damage to infrastructure due to the tsunami made the distribution of these assistance packages extremely difficult.

Incomplete agricultural packages delayed the cultivation of secondary crops and vegetable and predisposed crops to serious damage from livestock. It is suggested that in future packages to be distribute the inclusion of materials for the construction of a fence to protect the plants from animals and wild pig should be considered. Some implementing partners did provide farmers with the fence so that the crops could be planted.

In many locations especially the west coast, farmers have paid greater attention to the shelter programme than livelihood programme. As they still receive daily food allocations from the WFP, activities including agriculture, become a secondary priority. Moreover, farmers were also targeted

by the many activities of NGOs thereby reducing their time to pursue agricultural activities. In this respect coordination at the field level was very low. For example the same inputs as provided by the project were found also to be distributed by other agencies without coordination. Duplication often occurred with the BRR also taking on the role of implementer. Strengthening the BRR function as a coordinator in rehabilitation activities is a priority in the future and would enhance the effectiveness of the rehabilitation process.

### **Conclusion and recommendation**

The FAO has been successfully reactivating agriculture activities in the 8 tsunami affected districts of NAD, Indonesia. More than 44000 farmers have received agricultural inputs in terms of seed, fertilizer, and machineries. More than 10000 ha paddy field has been re-established and harvested with productivity levels of 3-8 tonne/ha being achieved. Each farmer earned between US\$84-178 in their first crop after the tsunami, thereby reducing their dependence on external food aid.

The capacity of farmers to increase crop productivity should be enhanced. This may take the form of growing high value products that would significantly enhance farmer incomes from agricultural activities. The development of agro-industry units in individual districts that promote specific products should be accelerated in order to enhance the value of agricultural products.

Finally, there is a need to harmonize coordination between implementation agencies to avoid overlap of service provision, enhance the impact of these activities and improve the effectiveness of the rehabilitation process. Improved systems and mechanisms of coordination must be developed at the sub-district or village level to avoid overlapping of programmes or duplication of the same inputs.

## **2.5. FAO post-tsunami agricultural support: Maldives<sup>6</sup>**

*Winston R. Rudder, OIC FAO Office, Maldives*

### **Background**

The Republic of Maldives is an archipelago of 1190 small coral islands grouped into 26 atolls, widely dispersed over a distance of some 800 kilometres in the Indian Ocean, and located between latitude 7 degrees north to slightly south of the equator. The population of about 300000 inhabited 199 islands prior to the tsunami. Only 28 islands have a land area greater than one square kilometre. One third of the inhabited islands have a population of less than 500 and 70 percent have a population of less than 1000. The extremely low population density raises the cost of delivering social services and of public administration, since there is hardly any scope to generate economies of scale. The altitude of most islands is very low, just above sea level. As a result, rising sea levels cause many islands to disappear and new ones to appear. This has rendered some inhabited islands ecologically vulnerable, while others have become too densely populated to sustain their communities.

The tsunami which struck on December 26, 2004 had dramatic and nation-wide impact. Tidal waves ranging from just over one to about four metres inundated many islands. 83 people were confirmed dead and another 25 missing and feared dead and more than 1300 were injured. Thirty-nine islands were damaged and nearly a third of the population or 100000 people were affected. Fourteen islands were completely destroyed and had to be evacuated. Approximately 12000 people were displaced from their islands, and another 8500 temporarily relocated within their home island; thus

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<sup>6</sup> This country report has not been formally edited and the designations and terminology used are those of the author.

7 percent of the population was displaced. The force of the waves caused widespread infrastructure devastation in the tolls. Flooding wiped out electricity on many islands, also destroying vital communication links. Water supply was disrupted in about 15 percent of the islands and 25 percent had major damage to the essential infrastructure such as jetties and harbours.

Economic loss was estimated at 62 percent of GDP; the latter recording a 5 percent decline in 2005. Employment was adversely affected by low hotel occupancy rates and loss of assets in the fisheries, agricultural and other productive sectors. Livelihoods needed to be restored. The relief and reconstruction effort encountered constraints of insufficient and untimely financing, inadequate human resource capacity (quantity and quality) and high costs and logistical difficulties of internal inter-island transport.

Notwithstanding, impressive gains were recorded in the months following the tsunami in terms of shelter, food, health, water and sanitation and education. This bore testimony to the strong coordination between Government, the UN system, the IFIs and international humanitarian partners. However, many challenges remain: approximately one-third of Internally Displaced Persons (IDPs) are in temporary shelters or with relatives; a growing problem of waste management and groundwater pollution (with attendant health risks); inadequate information/communication/participation involving the affected communities. This latter aspect has led to uncertainty and resulted in unrest in some communities.

### **Impact of the tsunami on Agriculture**

Agricultural and rural livelihoods were particularly hard hit by the tsunami. It was estimated that the tsunami damaged field crops in 2100 farms; destroyed home gardens and agricultural tools in 11700 homesteads; and damaged more than 700000 fruit trees and 840000 timber trees in inhabited islands. The damage to land and groundwater resources was severe in 35 agricultural islands, and saline water intrusion has affected 112 inhabited islands. Damage was estimated at US\$11.1 million. A further US\$11 million are required for the re-establishment of the agricultural crops, for improving soils, forestry, and water resources, for importation of planting material and for strengthening institutional capacities and providing support services.

The geographical dispersion of the islands severely constrained the collection, collation and analysis of reliable data in a timely manner to inform the required immediate intervention responses of the Government and its supportive international development partners. The situation was further compounded by the lack of baseline data on the agricultural sector prior to the tsunami.

### **The FAO response**

FAO responded swiftly and decisively to the crisis by immediately mounting a mission, coordinated by the Representation in Colombo, to assist MFAMR (Ministry of Fisheries, Agriculture and Marine Resources) in the initial agricultural and fisheries damage assessment surveys thereby establishing a basis for determining the requirements for immediate support. Prior to the tsunami, FAO was not physically present in the Maldives. This changed with the deployment an FAOR a.i. (subsequently designated Officer-in-Charge) who arrived in the country on January 29, 2005. An Operations and Programme Officer (OPO) was out-posted on February 5.

The establishment of the embryonic FAO ERCU Maldives was warmly received by the Minister and senior officers of MFAMR. However from the very outset, the Minister expressed his dissatisfaction with the dual accreditation modality according to which the Maldives falls under the FAOR Sri Lanka. It was claimed that distance and relative inaccessibility for continual interaction worked to the country's disadvantage and there was need for a permanent FAO presence in the country.

The foregoing constituted the socio-political context in which the ERCU was established and demanded the application of considerable tact and diplomacy to create a credible working relationship with the Ministry's hierarchy. Notwithstanding, MFAMR generously hosted and provided administrative support for the FAOR a.i./OiC and OPO in its already cramped facilities for five weeks until office accommodation could be arranged. This facilitated the development of excellent working relationships with the Minister and key counterparts; an introduction to the Maldivian bureaucracy; an understanding of the operations of the Ministry – its strengths and weaknesses; and contributed significantly to building trust and credibility between FAO and MFAMR. This first-hand appreciation of the Ministry's human resources capacity provided an informed context in which to design meaningful support interventions and modalities.

FAO ERCU Maldives opened its office on March 1 and local support staff was recruited in early March. A two-week AFFC mission provided invaluable assistance in setting up the financial management system and training in the related FAO procedures. A 3-day ITO mission from the Regional Office assisted with advice on interconnection arrangements, installing the ICT system, provision of hands-on training and selection of a local IT support service provider. By mid-April the office was fully operational and able to communicate with the rest of the FAO system.

The establishment of the ERCU ensured that attention was focused on working more closely with MFAMR counterparts on the urgent task of collating and refining data re: quantities and specifications (including verification of damage assessment surveys). This was a priority for accelerating procurement of needed supplies for the agricultural relief activities. In addition, considerable time was spent (up to April/May 2005) before eventually convincing the authorities that FAO procedures and arrangements should govern the procurement process. As a result, after much delay the outstanding issue of government signing the relevant project documents was resolved.

With the out-posting of the ERC in July, procurement on track and in-country activities taking off, there was a surge in the volume of transactions, with expenditure levels increasing almost ten-fold between the second and fourth quarters of 2005 and into 2006. Changing expenditure patterns, contract administration and the logistics and coordination tasks associated with procurement, delivery and distribution in this multi-island archipelagic state made heavy demands on the oversight, management and implementation capacity of the ERCU.

The blend of skills and competences of the OiC and ERC, their common vision on the modalities of office operations and their willingness to share roles and responsibilities resulted in the unique situation (and an unwritten agreement) where everything was discussed and communicated – whether emergency/relief or rehabilitation/recovery/development. In effect, this facilitated the ERCU to function both as a *de facto* FAOR, undertaking regular programme-related tasks and an emergency coordinating unit, delivering on the post-tsunami commitments; with the OiC and ERC sharing responsibilities across this divide as circumstances dictated. As an example, with respect to regular programme TCPs and hosting of missions, the OiC functions as an FAOR and the ERC as a Programme Officer; in emergency tasks they equally serve as coordinators whether for agriculture, fisheries or forestry activities linking with the relevant headquarters and regional office technical units. This obviated the need for long-term coordinators in these technical areas.

This culture of work infused the entire staff of the ERCU so that office functions and responsibilities were seen as cross-cutting tasks, involving all, to be achieved irrespective of being regular programme type or emergency. In this way, Maldives was more comprehensively served by the FAO in-country presence. Importantly too, the Organization could more effectively interact and coordinate with the other key stakeholders, its modest personnel complement notwithstanding.

Current core staff of the ERCU comprise:

- i. Officer-in-Charge
- ii. Emergency Rehabilitation Coordinator
- iii. Secretary/Administrative Assistant
- iv. Finance/Administrative Assistant
- v. Logistics Assistant

The services of an FAO Volunteer were available from 3 May to 5 December 2005. An Information/Reporting Assistant was recruited over the period 20 November 2005 to 20 May 2006.

## **FAO activities and achievements in the agricultural sector**

### *Tsunami-related Agricultural Activities*

The post-tsunami relief/recovery activities in the agricultural and forestry sectors were a key focus of FAO Maldives operations. Much effort was expended during the first four months in detailing and refining needs, including specifications for procurement of goods and services. The delay in finalizing agreement with Government on acceptance of FAO procurement procedures adversely affected delivery and inhibited progress in field activities. Notwithstanding, FAO was the first agency whose implementation and delivery activities actually reached beneficiaries in the affected agricultural communities of the Maldives.

FAO assistance to victims of the tsunami in the agricultural sector will impact approximately 4200 households comprising just about 21000 inhabitants of 50 islands in 13 atolls across the archipelago. An important feature of this intervention is the FAO collaboration with UNDP Maldives in the replacement of lost assets including tools and other inputs.

Main activities include the provision of a package of technical assistance through short-term consultants/experts, capacity building for farmers and MFAMR staff effected through training workshops and the distribution of replacement of agricultural assets (start-up agricultural kits comprising a range of selected inputs seeds, seedlings, cuttings, fertilizer, compost and assorted implements). Details on these are highlighted as follows:

- i) **Technical assistance:** farmers and relevant Ministry staff benefited from 6 man-months of technical assistance. A **soil salinity control expert** undertook a soil assessment mission, developed guidelines for action in dealing with salinity and facilitated staff training. A **water resources consultant** surveyed the water table, analyzed the fresh water lenses in selected tsunami-afflicted islands and advised on follow up action. A **plant pathologist** assessed the pest/disease status of the nurseries contracted for supplying planting material, advised on the establishment of a plant quarantine/plant protection system and conducted basic awareness training to selected staff of relevant government institutions;
- ii) **Capacity building/training:** MFAMR staff were trained to use and interpret results from **salinity metres**. Two Customs and one MFAMR staff benefited from a **one-week training attachment** to the Sri Lanka Quarantine authorities to observe passenger/goods handling procedures at ports and airports. A **two-week training workshop on plant quarantine/plant protection** was conducted for 20 persons drawn from staff of MFAMR, Customs, Ports Authority, Port Health, Airports and Immigration. A **soil fertility expert** conducted a **two-day workshop on composting** for 17 persons including Ministry staff and farmers,



preparing guidelines and manuals for compost production. A technical consultant conducted a **two-day workshop on the operation and maintenance of mist blowers** and provided related hands-on technical assistance to staff of MFAMR. An intensive **two-day training workshop on improved nursery preparation and plant propagation techniques** was held for 20 extension staff of MFAMR;

- iii) **Provision of agricultural inputs:** The initial distribution of procured agricultural inputs to beneficiaries was launched in a formal ceremony attended by the Minister and the FAOR Sri Lanka and the Maldives in one of the affected island communities. So far 3376 farming families in 45 islands (13 atolls) have been assisted; 1,879 receiving the complete agricultural kit composed of 16 different items valued at US\$260 per beneficiary. These included vegetable seed, seedlings/cuttings, compost, organic manure, inorganic fertilizer and agricultural tools/implements (hoe, rake, shovel, sprayer, bush knife, watering can and wheel barrow); for the remaining 1397 only the seedlings are pending. 250000 seedlings have been distributed so far. The distribution is continuing.

### ***Development Assistance***

FAO ERCU Maldives functions as more than a focal point for implementing the Organization's tsunami-related activities. The advice of the Unit is canvassed by the Minister and senior officers of MFAMR on matters pertaining to agricultural development generally. Field trips to outlying islands and attending meetings and interacting with farmers and island/atoll officials by both the OiC and ERC provide invaluable insights on the demand for, and state of, agricultural administrative and technical support services outside the capital. They also deepen understanding of the development challenges posed by the transportation logistics and the institutional distance of rural folk from centres of decision-making in the Ministry and government.

The ERCU briefs and makes arrangements for Ministry delegations attending FAO meetings, including the biennial FAO and Regional Conferences and also serves on one of the consultative committees for the preparation of the 7<sup>th</sup> National Development Plan 2006-2010. In addition, visiting missions of the IFI's (WB and ADB), IFAD and UN system and other development agencies call on the Unit for briefings on the agricultural sector and on overall development. There is particular interest in understanding how ongoing relief activities fit or may integrate into a broader rehabilitation and recovery framework and within a medium- to longer-term development framework and strategy.

The Unit anticipates and ensures it is prepared to cope, as far as practicable, with the full range of demands made of a regular representation. This is the expectation of our counterparts and partners in the external development community. The OiC and ERC continue to remain sufficiently flexible and agile to respond to these demands.

Main regular programme agricultural activities for which FAO Maldives provided/continues to provide oversight are highlighted hereunder:

- **TCP/MDV/2904 – Integrated Pest Management of Coconut Beetle:** project completed in July 2005. Consideration being given by MFAMR to follow up phase to support further development of a plant quarantine/plant protection system;
- **TCP/MDV/3001 – Master Plan for Sustainable Food Security, Agriculture and Regional Development:** ongoing; coordination of activities with MFAMR and participation on steering committee; in final stages of preparation; senior policy consultant recently completed a 6-week mission to advance this process;

- **TCP/MDV/3101 – Production of Virgin Coconut Oil (VCO) and value-added products for the enhancement of livelihoods and food security through income generating opportunities:** ongoing; inception mission in March/April 2006; project off to slow start.

As a follow up to the Minister's attendance at FAO Conference and the Regional Conference, the OiC and ERC assisted MFAMR re: preparation of TCP on assistance for review/development of policy and legislative framework for food security and agricultural development. In addition, the Ministry consults the ERCU continually on agricultural development matters generally.

### ***Sector Coordination***

Prior to the tsunami, UNDP, UNICEF, WHO and UNFPA were the only external development agencies represented in the Maldives. The period immediately after December 26, 2004 witnessed an explosion in the numbers of such organizations in the country. This has severely stretched the limited human resources in public sector agencies in terms of their capacity for coordination and implementation. What may have been a manageable problem before the tsunami has turned into a crisis following the influx of significant financial resources and the multiplicity of external partners and activities within a constrained time period.

MFAMR has been finding it difficult and challenging to cope satisfactorily with the sudden expansion and intensification of activity and especially with linking the emergency/relief response to its regular agricultural development work. Implementation of some approved donor-funded post-tsunami relief activities got off to a slow start. The Ministry continues to look to FAO for assistance and support in strengthening planning, organizing and implementing capacity. The external development partners understand this. The IFI's, actively and regularly seek out FAO ERCU Maldives for guidance on matters related to agricultural development.

MFAMR has expressed willingness but has not yet been able to assume leadership responsibility for sectoral coordination. In this vacuum, the ERCU has convened *ad hoc* agricultural livelihoods coordination meetings of development partners. FAO attends the weekly meetings of the UNCT where it is called upon to provide leadership and direction on food security and agricultural development issues. It is also a member of the UN security team and plays an active role in the Waste management Theme Group.

### **Lessons Learnt**

The lessons to be learnt from the past 18 or so months operational experience of the FAO ERCU Maldives constitute a mix of constraints to be loosened and opportunities to be grasped.

### ***Key Constraints***

Agricultural emergency operations in the Maldives were affected by two types of constraints; those which derived from the in-country situation and others which may be described as FAO institutional.

***In-country:*** Significant in-country constraints which impeded progress and extended timelines for implementation of the agricultural activities, thereby delaying responses to the needs of beneficiaries include:

- **Inadequate human resources:** Effectiveness of operations inhibited by the inadequacy of quality staff in MFAMR, with consequential demands on time and resources of FAO Maldives, especially lack of technical support at atoll/island levels;

- **Deficiency in database and planning:** Considerable effort was expended in reviewing, validating and verifying basic data originally collected; beneficiary targeting was impacted;
- **Inadequate coordination systems:** Limited experience by MFAMR in coordinating so many activities and partners; staff more comfortable dealing with individual agencies; compounded by the fact that more than one partner requested to assist in the same area;
- **Complex logistics:** The dispersion of beneficiaries and islands made for tremendous difficulties in organizing and maintaining distribution/delivery schedules;
- **High internal transport costs:** This significantly limits internal travel, limits field monitoring and erodes budgets;
- **Distribution by seas over long distances:** The dynamics of internal transportation arrangements requiring sea transport of procured inputs over long distances often resulted in delays due to inclement weather; additionally cargo dhonis not designed to move plants.

### *FAO/Institutional*

- **Procurement and administrative mechanisms:** Unsuitable/inadequate for emergency operations;
- **Unpredictable delivery schedules of procured supplies:** Created difficulties in planning and organizing delivery to beneficiaries;
- **Insufficient delegation and cumbersome bureaucracy:** Led to costly delays in operations;
- **Lack of FAO in-country presence prior to the tsunami:** Resulted in lack of institutional knowledge of local environment and in the immediate post-tsunami period, relative invisibility as a key player in development;
- **Lack of coherent integrated organization-wide approach for dealing with emergencies:** Evidenced by absence of linkages between emergency and development and ineffective coordination between emergency operations and technical units;
- **Inability to tap locally available funds:** Absence of well-defined mechanisms; uncertainty of FAO in-country tenure;
- **Potential difficulty of maintaining effective in-country partnerships from Sri Lanka:** Practical problem deriving from non-resident status.

### *Success Factors*

The foregoing constraints notwithstanding, the ERCU was able to make considerable progress in delivering on its mandate. The achievements highlighted previously and below reflect the collective effort of the entire team. They were also the result of the generous support and cooperation of many understanding and helpful colleagues at headquarters, the regional office and the Representation in Colombo. Most importantly, these would not have been possible without the active collaboration of counterparts in the MFAMR.

Accordingly, the following key success factors are acknowledged:

- excellent team work of FAO Maldives staff;
- commitment of and effective working relationships with MFAMR (Minister and staff);
- advice, guidance and overall support of colleagues at headquarters, regional office and FAOR Colombo – TCEO colleagues were exemplary;

- close collaboration with development partners – the FAO/UNDP/MFAMR partnership in agricultural relief activities is noteworthy;
- FAO's acknowledged leadership role in the agriculture.

## **The Future**

The immediate challenge for the ERCU is to successfully complete the approved tsunami-relief activities. These relate in the main to the distribution of remaining procured seedlings and cuttings. In addition it is necessary to design and implement an exit strategy that would facilitate smooth closure of the office. Fortunately, it is already agreed to extend operations to September 2006 to allow completion of project activities. Planning the related operational and financial/administrative management activities to effect the foregoing is already in train.

However, there is the larger question of FAO's role in the transition from relief to rehabilitation and recovery. This is a major preoccupation of Government and development partners alike. In this regard, many current activities have significance implications beyond the immediate. For example, the distribution of mist blowers needs to be located within the context of IPM; distribution of agricultural inputs and the follow-up discussions with farming communities have exposed the inadequacies of the agricultural extension services and underscored the need for training and enhanced technical assistance.

Discussions will be intensified with MFAMR and other partners on proposed new strategies and interventions for FAO to continue to support medium- and long-term agricultural development. These must be seen within the comprehensive framework of the 7<sup>th</sup> National Development Plan (2006-2010) and the Agricultural Master Plan (2006-2020), both currently in preparation. Of relevance here too are the possible and required linkages with the shelter programme undertaken by UNDP and the Red Crosses; and initiatives being pursued with ADB, WB and IFAD.

How can FAO be more fully involved in all of this?

In recognition of a larger and continuing role expected of FAO, MFAMR (both the Minister and senior officials) has been advocating with development partners for FAO Maldives to be involved in implementing their planned and ongoing activities. In this regard, discussions are continuing with WB, ADB and IFAD. In the latter case, an inception mission for the approved post-tsunami Agricultural and Fisheries Post-tsunami Rehabilitation Project (Loan – SDR 1.4 m; Grant – SDR 140000) will be in country in a few weeks to finalize implementation arrangements. MFAMR intends to pursue with the proposed IFAD mission the feasibility of FAO Maldives having an active role in the implementation. Meanwhile, a current IFAD/TCI formulation mission for a follow-up US\$4 m agricultural and fisheries development project has also raised concerns about viable implementation mechanisms and is interested in the decisions on implementing the current IFAD project.

The Minister has formally approached the Director-General on the issue of a more permanent FAO presence in the Maldives. Cognizant of the financial constraints impacting the realization of this objective, he is using the full weight of his office to influence the extension of the current model of FAO operations in the Maldives until a more permanent solution is found.

The main driver of this approach is the recognition by MFAMR that FAO – and the current model of its operations in the Maldives – has been an effective, accessible vehicle of development support the need for which will continue to be critical over the short- to medium-term as the country transitions from emergency/relief to rehabilitation and recovery. The enhanced contributions to rural livelihoods,

economic diversification and strengthened inter-sectoral linkages (e.g. agro-tourism) expected of the agricultural sector will make increased demands on the Ministry and be reflected in an intensified call for FAO technical assistance.

The FAO relief to affected communities is considered a precursor to more sustainable agricultural and rural development. The FAO ERCU Maldives, using the relief activities as a point of departure, has been catalytic in managing and implementing in-country FAO development assistance in a coordinated and integrated manner. In light of the current deep search for ways of enhancing FAO relevance and effectiveness in the field, the applicability of this model could be further analysed as a possible approach to managing FAO in-country field activities.

In addressing the challenge to develop a sustainable mechanism(s) for FAO's continued support to agricultural development in the Maldives, the ERCU is seeking answers to the following questions:

What is FAO's role in the transition from relief to rehabilitation/recovery?

What are the priority sectoral issues/challenges?

What are the priority programmes?

Where does FAO have a comparative advantage?

How to take advantage of the linkages – actions and arrangements – implemented for the tsunami-related operations?

How to effectively recruit, integrate and coordinate the involvement of the FAOR, the Regional Office and Headquarters in all this?

An instructive lesson emerging from the ECRU's operations in the Maldives is that all major stakeholders in the sector – Government and development partners, including the UN system and IFI's – recognize FAO as a corporate unity and make no distinction and really care little about the preoccupations of its constituent units, divisions and departments.

## 2.6. Rehabilitating the tsunami affected agriculture sector of Maldives<sup>7</sup>

Mohamed Zuhair, Deputy Minister, Ministry of Fisheries, Agriculture and Marine Resources, Male, Maldives

### Background

The 26 December 2004 tsunami devastated the agriculture sector of the Maldives. Approximately 50 percent of the cultivated area on inhabited islands was destroyed due to salt water intrusion with economic losses in agricultural sector estimated to be US\$6.46 million. Fields of perennial trees such as coconuts, breadfruits, mango, betel leaf, guava, water apple were reportedly uprooted by the waves and (except for coconut) died from salt toxicity. Banana stands being highly susceptible to salt stress were severely damaged. The groundwater aquifer in more than 50 percent of the inhabited islands was seriously affected by salt water intrusion and in the remaining islands the water quality was severely compromised. It is estimated that approximately 58 percent of the farmers and 14172 home gardeners on the islands were impacted upon by the tsunami.

In an effort to rehabilitate the agricultural sector and provide assistance, 8 major programmes were drafted, out of which 3 programmes are currently progressing with the aid of ADB, FAO, UNDP, World Bank, IFAD and JICS support (Table 6.1). One of the programmes was ruled out after the initial assessments. The rest of the programmes are set to begin as funding becomes available.

**Table 6.1. List of major agricultural sector programmes proposed along with their associated funding requirements and current status**

Project Code	Project Title	Cost (US\$ m)	Funds Received	Financing Gap
AGR 001	Replacement of Basic Production Inputs and Infrastructure to the Tsunami Affected Agriculture Communities	11.17	9.38	1.79
AGR 002	Strengthening of Agriculture Extension to Facilitate Re-Establishment of Agriculture & Horticulture	0.36	0.25	0.11
AGR 003	Improvement of Soil, Forestry and Water Resources in the Tsunami Affected Areas	0.75	0.58	0.17
AGR 004	Detailed Assessment of the Status of Terrestrial/Land and Water Resource	0.57	~	~
AGR 005	Provision of Credit for Small Scale and Commercial Farmers	1.11	~	1.11
AGR 006	Capacity building in the Agriculture Section of MoFAMR	0.16	~	0.16
AGR 007	Strengthening Agriculture Institutional Capacity	2.20	0.47	1.73
AGR 008	Development of Agricultural Infrastructure in Uninhabited Islands (including commercial farming islands)	0.31	~	0.31
	<b>TOTAL (US\$ million)</b>	<b>16.63</b>	<b>10.67</b>	<b>5.38</b>

<sup>7</sup> This country report has not been formally edited and the designations and terminology used are those of the author.

## **Details and progress of current programmes being implemented**

### ***Agri: 001 – Replacement of basic production inputs and infrastructure to the tsunami affected farmers and home gardeners.***

Under this programme 9 individual projects are being undertaken, namely:

1. Restoration of livelihoods of tsunami affected farmers in the Maldives.
2. Tsunami emergency assistance programme.
3. Emergency assistance to support affected rural communities in the Maldives.
4. Immediate provision of agricultural inputs to worst affected fisher and farmer groups in the Maldives.
5. Rehabilitation of marine fisheries and agriculture sectors.
6. Replacement of inputs to farmers and home gardeners.
7. Forestry programme for early rehabilitation of Asian tsunami affected countries.
8. Island livelihood revitalization and development programme.
9. Provision of agriculture machinery and equipment to strengthen agriculture after the tsunami.

The projects 1 and 2 are aided by funding support from the Asian Development Bank (ADB). These projects are being carried out jointly as both have similar goals. Under this programme a revolving fund has been setup in 26 of the tsunami affected major agriculture islands. The fund will provide loans to tsunami affected beneficiaries to be used for agricultural purposes. Fund Committees have been elected and Fund Officers have been given training in operating and monitoring the loans. Workshops to introduce the cooperative concept have also been conducted in the 26 target islands. These projects will endeavor to strengthen as well as develop agriculture extension services and facilities. The projects will also promote the concept of cooperative societies to farmers in the Maldives.

Projects 3 to 7 are currently being undertaken with assistance from Food and Agriculture Organization of the UN (FAO) and United Nations Development Programme (UNDP). Under projects 3, 4, 5 and 6, seedlings, fertilizers, agriculture inputs and hand tools are being distributed to 50 worst affected agricultural islands. Technical assistance is being provided by FAO in the distribution process and beneficiaries are receiving instructions on how to apply the fertilizers provided to them. The 7<sup>th</sup> project is related to forestry and as a large area of natural forest in the Maldives was affected by the tsunami, work is underway to assess the damage and plan sub-projects in collaboration with affected island communities that have a focus on their rehabilitation.

The 8<sup>th</sup> project is supported by the World Bank and has the explicit purpose of providing cash grants to the tsunami affected farmers and home gardeners. Phase one of the project has successfully been undertaken with assistance having been given to 88 islands. Work is underway to assist later claimants.

The Japan International Cooperation System provides aid with respect to the 9<sup>th</sup> project, which has the objective of providing medium sized-medium-load machinery to tsunami affected farmers and home gardeners in 21 major agricultural islands. This mechanization includes tractors, shredder machines and composting units have been provided to the islands.

***Agri: 002 – Strengthening of agricultural extension to facilitate re-establishment of agriculture and horticulture***

Under this programme 2 projects have been initiated:

1. Saving the tsunami affected fruit trees in the Maldives. (Poverty and Environment Programme). Under this programme a team of tree doctors visited severely affected islands and treated damaged fruit trees. Currently work is underway to distribute fruit trees to the affected islands.
2. Assisting the tsunami affected islands with agriculture extension volunteer, under the United Nations Volunteer (UNV) programme. A UNV has been placed on 3 of the agricultural related islands to assist in the extension programmes.

***Agri: 007 – Strengthening agriculture institutional capacity***

The programme focuses on strengthening and re-habilitating the local goods markets in Male. Construction of infrastructure is about to commence in the capital and several regional goods markets are planned for the islands.

***Agri: 003 – Improvement of soil, forestry and water resources in the tsunami affected areas***

The project is being implemented with the assistance of FAO and includes the management and rehabilitation of shoreline forest communities. Forest sites have been classified rehabilitation has been initiated.

**Constraints**

There are several issues and constraints that have been encountered during the implementation of these assistance programmes and are highlighted below:

- Beneficiary verification: There are no clear records of farmers and farm fields within communities affected by the tsunami making the verification of beneficiaries of assistance difficult.
- Lack of trust among the communities has contributed to difficulties in identifying accurate numbers of beneficiaries prior to the distribution of assistance packages. This increases costs due to a second phase of implementation.
- Travel and transportation between the islands has been difficult due to their geographical distribution. The islands are separated by large areas of sea and there is a scarcity of adequately sized vessels that have the capacity to carry large amounts of material to the islands. Thus transportation costs are very high.
- There is a distinct lack of trained and specialized field staff in the ministry. This is hampering the overall task of providing effective and functional extension services.
- Seedlings, seed and agriculture equipment all have to be imported to Maldives as they are not available locally. The costs of importing these items are extremely high. In addition, imported seedlings and young plants are required to remain in quarantine for several months before they can be distributed to farmers for planting resulting in significant delays in delivery to recipients.
- Technical assistance is lacking and expertise in the field of agriculture.



## **Outcome**

The plants and seedlings that were distributed to the farming communities have been effectively utilized by the communities. Some crops that were established have been harvested and with the diversity of planting material that was provided it has acted as an incentive for them to broaden their farming capacity. The islands that do not engage in agriculture have also begun farming and home gardening as a result of the high income earned by farming communities.

After the cooperative society introductory workshops, voluntary cooperatives have emerged within the communities. Work is underway to legally register the cooperatives.

The beneficiaries who have received training in agriculture have started to set up their own farms using new and better techniques with other farmers following suit. This has had a positive impact of the quality and lifestyle of farmers.

## **Lessons Learnt**

The following lessons were learnt:

- There is a need for the development and implementation of a more efficient monitoring system to enable timely distribution of assistance activities and effectiveness of the aid.
- Disaster management to be able to take quick actions – an earlier warning system would assist in this matter.
- There is a dire need to develop technical skills and support within the country to cope with such disasters and in the rehabilitation process.

## **2.7. Rehabilitation of agriculture and fisheries in tsunami affected areas of Myanmar<sup>8</sup>**

*Tin Shwe, Township Manager, Patheingyi Township, Ayeyarwaddy Division, Myanmar Agriculture Service, Ministry of Agriculture and Irrigation*

### **Background**

The tsunami of the 26 December 2005 had limited impact and was confined to areas of the Myanmar coastal zone. The most severely affected townships in Myanmar were: Labutta and Ngaputaw Townships in Ayeyarwaddy Division; Kawthaung Township in Tanintharyi Division, and Kyaukpheung Township in Rakhine State. In general, the magnitude of destruction caused by tsunami was not as severe as that experienced in Thailand, Indonesia and Sri Lanka. The Pyinsalu sub-township of Labutta Township was the worst affected area with 25 people losing their lives, more than one thousand people left homeless and 289 houses totally destroyed. Four villages, namely Khar Pyat Thaung, Lay Yin Kwin, Kaingthaung and Aung Hlaing in the Pyinsalu sub-township were severely affected.

Without the intervention of government, international organizations and NGOs, it would have been very difficult to rehabilitate the livelihoods of affected communities. As part of the rehabilitation effort project (MYA/05/001) that addressed fishing communities, fisher-farmers and homestead gardeners was launched and implemented in accordance with the Letter of Agreement that was signed by FAO with UNDP on 13 April 2005. The project was started on 13 March 2005 and

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<sup>8</sup> This country report has not been formally edited and the designations and terminology used are those of the author.

completed at 30 April 2006. The major contributor was the Government of Japan. Total budget used in the project was US\$804 000.

### **Project Objectives**

The main goal of the project was to provide necessary assistance so as to resume the livelihoods of tsunami affected fishers and farmers with a focus on both the immediate and long-term. To meet this goal the following objectives were laid down and implementation activities were undertaken accordingly.

- To replace the lost fishing boats and fishing gear of tsunami affected fishers so that they could resume normal fishing activities in order to supply fish to the local communities and restore fish production quality.
- To rehabilitate and restore agricultural production through the provision of agricultural inputs such as: seeds, seedlings, fertilizers, agricultural hand tools, and other necessary inputs.
- To provide technical guidance, training and supervision for the adoption of good practices aimed at improving their normal livelihood.

### **Target Beneficiaries**

This project was designed to support small scale fishers and farmers, living in the worst affected tsunami areas of Pyinsalu Sub-township in Labutta Township, Ayeyarwaddy Division. Beneficiaries were selected according to the following criteria:

- Small-scale fishers who lost their fishing boats and fishing gear.
- Fishers-farmers who lost their fisheries assets or agricultural assets and livestock.
- Homestead vegetable growers whose lands were inundated by seawater.
- The owners of lowland intruded by seawater.

### **Project Components**

The project components could be grouped into two categories – fisheries and agriculture.

#### ***Fisheries***

Small and medium fishing boats and fishing gear were planned to provide a total of 149 beneficiaries who lost their fishing gear as a result of the tsunami. In addition technical trainings on ecologically friendly and sustainable fishing methods were conducted so as to avoid the depletion of marine resources. Similarly, post harvest technologies and production of valued added goods using with marine resource were disseminated to diversify income sources and create employment opportunities. Fishermen who had decided to give up fishing and convert to farming were encouraged and assisted in this process.

The total amount of distributed aid to fishers through the programme is presented in Table 7.1.

**Table 7.1. Complete list of fishing materials distributed through the programme**

Item No.	Description	Distributed
1	Bottom set gill net (thread fin, sea bass, shark) (7.5" mesh) (Mesh Length and depth -300 x 15.5 = 28.5 m x 2.9 m) for 32' boats.	480 nets
2	Drift/gill net, 3" mesh (Hilsa, Pomfret, Thread fin, Spanish mackerel) (Mesh length and depth) -700 x 105.5 = 26 m x 7.9 m) for 32' boats.	2 080 nets
3	Drift/gill net, 3.5" mesh (Hilsa, Pomfret, Thread fin, Spanish mackerel) (Mesh length and depth) -615 x 105 = 28 m x 9.5 m) for 32' boats.	2 560 nets
4	Drift/gill net, 3" mesh (Hilsa, Pomfret, Thread fin, Spanish mackerel) (Mesh length and depth) -700 x 105.5 = 26 m x 7.9 m) for 20' boats.	2 010 nets
5	Tiger Mouth nets	950 nets
6	Long lines	67 units
7	Ice boxes	131 boxes
8	Life jackets	361 units
9	Top lantern	67 units
10	Signal lamps	32 sets
11	Medium motorized fishing boats	32 nos.
12	Small fishing boats	67 nos.
13	Engine spare parts	32 sets
14	Tool boxes	32 sets
15	Magnetic compass	32 nos.
16	Anti-foulant (5 litres can)	64 cans
17	Earth oil	294 gals

### ***Agriculture***

Farmers who lost their crops, livestock assets and home gardens to the tsunami, were provided with fertilizers, HYV seeds, OPV seeds of various crops including paddy, pulses (peas and beans), oilseed crops (sunflower) and different kinds of vegetable seeds (gourd, melon, squash, watercress, roselle, chilies, tomato, egg plants). Agricultural hand tools comprising of a sickle, hoe, machete, shovel and spades were also provided. A complete breakdown of the distribution of aid to farmers is presented in Table 7.2.

Moreover the following training activities were conducted and altogether 516 trainees participated.

1. Home gardening and post-harvest management.
2. Field crops management training.
3. Horticultural crop production and protection training.
4. Crop production technology training.
5. Training on salinity mitigation measures.

**Table 7.2. Comprehensive list of agriculture aid distributed through the programme**

Item No.	Description	Distributed
1	Paddy seeds (46 lbs baskets)	2 625 baskets
2	Sunflower seeds (35 lbs baskets)	3 600 kgs
3	Mung bean seed (72 lbs baskets)	570 baskets
4	Cowpea seed (72 lbs baskets)	1 875 baskets
5	Black gram seed (72 lbs baskets)	275 baskets
6	Mango seedlings	3 600 nos.
7	Pummelo seedlings	1 200 nos.
8	Lime seedlings	1 200 nos.
9	Urea Fertilizer (50 kg bags)	1 920 bags
10	Triple super phosphate (50 kg bags)	1 200 bags
11	Muriate of potash (50 kg bags)	
12	15:15:15 Compound fertilizer (50 kg bags)	1 500 bags
13	Rock phosphate fertilizer (50 kg bags)	1 200 bags
14	Gypsum fertilizer (10 kg bags)	24 000 bags
15	Rhizobium bio-fertilizer	3 600 kg
16	Acephate Insecticide	2 100 kg
17	Mancozeb Fungicide	3 600 kg
18	(a) Vegetable seeds packages (gourd, watermelon, squash, watercress, roselle, chilli, tomato, & egg plant)	1 200 packs
	(b) Vegetable seeds packages (gourd, watercress, roselle, ladies' finger)	1 250 packs
19	Agricultural hand tools packages (1 sickle, 1 hoe, 1 machete, 1 shovel, 1 spade)	1 200 packs
20	pH meter	8 units
21	Salinity meter	4 units
22	Foot operated thresher	28 units
23	Manual cleaner	16 units
24	Jacto Sprayer	32 units

### Technical Backstopping Missions

Technical backstopping missions, for fisheries and agriculture were undertaken to support the government in implement the projects activities. The Backstopping Missions were headed by representatives from Fishing Technology Service (FIIT) and FAO Regional Office for Asia and the Pacific (FAORAP) and Emergency Operation Service (TCEO).

### Constraints

During the implementation of the project, there are some constraints encountered. These were listed below:

- Remoteness – The tsunami affected areas are situated along the coastline of Pyinsalu Sub-township in Ayeyarwaddy Division. This is a remote part of the coast taking between 12 and 24 hours to reach from Yangon. Therefore assessment and assistance activities were constrained due to the remoteness and difficulty in accessing the area.

- Reconfirmation of the beneficiaries – Reconfirmation of the beneficiaries took a long time as the approval of the Chairman of the District Peace and Development Council of Myaung Mya District was required. Later, the approval of the beneficiaries was made by a committee formed by the District Chairman.
- Travel to the Project Area – During June 2005 there was restriction associated with visits to the area by International and National Consultants which caused some delays in implementing the project activities.
- Transport of inputs – Due to the remote location of the affected area, the logistics of moving resources to the project area was difficult and time consuming.
- Distribution of inputs – The approval at the sub-township level, township level, and district level was required before the distribution of inputs could be made thereby causing delays in distribution. Recently, there has been a new ruling that all the inputs have to be sent to Labutta and registered with the customs department before being sent on to Pyinsalu for distribution. This additional procedure will increase cost of providing assistance and add further delays.
- Handing over of boats – Due to the high value of the boats, the authorities from Myaung Mya District requested that ceremonial hand-over be conducted in the presence of authorities. Consequently there was a 1<sup>1</sup>/<sub>2</sub>-2 months delay in the handing over to facilitate this request.
- Inflation – During the procurement of inputs the exchange rate of Kyats per US\$ changed significantly for example 930 kyats in May 2005, 985 kyats in July 2005, 1153 kyats in September 2005, 1250 kyats in October 2005 and 1123 kyats in April 2006. Therefore, bidders were reluctant to give the valid dates of quotes. This caused difficulties in the procurement process.

### **Lessons Learnt**

There are several lessons learned during the project including the following:

1. The affected areas are situated along the shoreline of the Ayeyarwaddy Division where transportation is rather difficult. The people who live in this remote area do not have advanced knowledge and technical know-how regarding agriculture and fisheries. Therefore they should be equipped with advance technologies which are adaptable to their existing environment;
2. There was a decline in fish catches post-tsunami with a gradual recovery. It is suggested that a survey be conducted to verify this phenomenon;
3. Post-harvest fish technology that would allow the production of healthy and value-added products is important with respect to enhancing the health and economic status of the people from the project area. Proper drying techniques and availability of ice is important in this respect;
4. Keeping the boats in the saline water without proper maintenance could cause damage to boats. Anti-fouling or proper maintenance such as painting with exterior of the boat with anti-foulant and the interior with earth oil once every 1-1<sup>1</sup>/<sub>2</sub> month is necessary;
5. The size of Tiger Mouth Nets differs according to the place/village, therefore, the Tiger Mouth Net making should be done at that place or nearby villages with the supervision of the local fishers. Empowering the women in this area is very important as the female population is more than 50 percent;

6. Tiger Mouth Net making i.e. connection of ready made netting materials as demonstrated by Trainers from DOF which is one of the project activities is beneficial due to: a) faster in net making; b) better fish catch; c) less expensive;
7. Seawater intrusion has a hidden effect on growth and yield of rice although the result of salinity testing in these fields during the rainy season indicated a low EC content. The height of paddy fields were significantly shorter than in previous years and the yield is about 1/3 of the yield of former years;
8. Cowpea, sunflower, and watermelon grow better in the seawater intruded area when compared to black gram and mung bean. The soil fertility of most of the affected areas is poor as the farmers cannot afford to use chemical fertilizers and also availability of organic fertilizers is limited;
9. The farmers in these areas are not used to growing a second crop such as pulses and vegetables after paddy, and introduction of cowpea, sunflower, and vegetables is very effective. Watermelon grown using the seeds provided by the project was popular in and enhanced the income of the farmers;
10. There is a lack of seed technology expertise amongst farmers, training and assistance in this area would be of great benefit.

### **Recommendations for follow-up activities**

Based on the experiences gained and lesson learned, the following recommendations are made in the rehabilitation process:

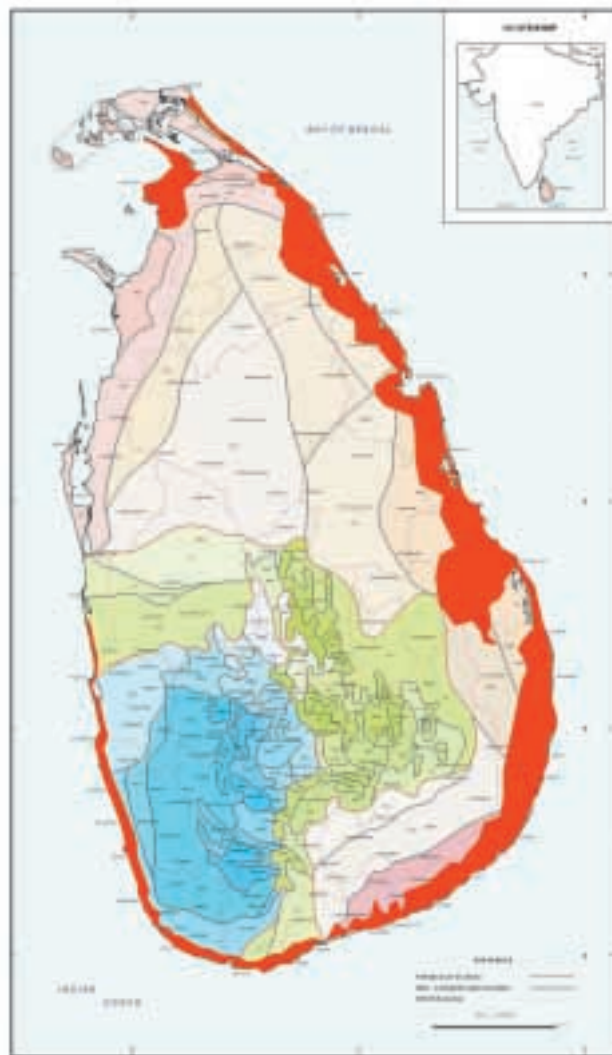
- Undertake the information/data collection on catch-efficiency and socio-economic status of fishers in the coastal area.
- Evaluate Mud Crab (*Scylla serrata*) populations and potential of sustainable mud crab fishing.
- Demonstrate mangrove friendly aquaculture focusing on the integrated farming of mud crab, mollusks and shrimp.
- Install drying plant facilities for fish and shrimp.
- Install an ice production plant at Aung Hlaing/Thit Pote and Kaing Thaug area.
- Undertake training in the proper maintenance and repair of fishing boats, engines, fishing nets, fishing gear.
- Encourage and provide training for empowering women in fishing gear making.
- Undertake training in the use of salinity meters so as to mitigate the effects of salt water.
- Assist and educate farmers in the growing cowpea, watermelon, and vegetables, and the use of chemical and organic fertilizers.
- Undertake compost making using organic waste e.g. fish waste use should be encourage on a wide basis in the project area to enrich the soil fertility.
- Assist and train farmers in seed technology to keep their own seeds and to establish storage facilities.

## 2.8. Effects of the tsunami on the agriculture sector of Sri Lanka<sup>9</sup>

*R.M. Senanayake, Additional Secretary, Ministry of Agriculture, Sri Lanka*

### Background

The tsunami that struck the coastline of Sri Lanka resulted in the loss of over 38000 individuals, 5000 persons remain unaccounted for and 550000 people were displaced (Figure 8.1). The waves caused extensive damage to fishing, tourism, agriculture and small-scale industries. 53 percent of the fishing fleet was destroyed and 23 percent of the fleet damaged.



**Figure 8.1. Map showing in red the area of Sri Lankan coastline impacted upon by the tsunami**

Within the agricultural sector significant losses in livestock, including cattle, buffalo, goat and poultry were sustained and damage to irrigation infrastructure was significant. The deposition of debris on farming land was extensive and losses of fruit orchards, home gardens and crop land were widespread in the affected area.

<sup>9</sup> This country report has not been formally edited and the designations and terminology used are those of the author.

## **Recovery programme**

The recovery programme implemented by the Ministry of Agriculture and NGOs in the agricultural sector has focused on the following elements:

- The provision of conductivity and pH meters as a means to monitor the degree of salinization of both soils and water. Fertilizers, paddy seed, vegetable seed packages, sprayers, water pumps and hoses were distributed to affected farmers as a means of reactivating the agricultural sectors and supporting the livelihoods of farmers affected by the tsunami. An effort was made in pumping saline water from affected wells.
- Several projects were initiated by NGOs (i.e. Spanish Red Cross) to reinvigorate agricultural communities and enhance their livelihoods through diversification and the introduction of new small-scale enterprises. This included projects on nursery management, mushroom cultivation, food process and the establishment family business gardens.
- In addition to the government common recovery package, funds have been provided to farmers for land preparation and loans provided to self employed farmers to enable them to restart their enterprises. Seedlings (i.e. coconuts) and animals have been distributed to farmers (i.e. cattle and goats) in some of the badly affected districts.

## **Recommendations**

Several recommendations have been suggested that would effectively empower communities to cope more effectively with such disasters. They include the following:

- The establishment of an early warning system.
- An awareness campaign that targets communities that are most vulnerable to such disasters should be implemented. This should focus on training communities in disaster awareness and steps to avoid/mitigate the potential negative impacts.
- A buffer zone along beach areas should be demarcated. Shelter belts should be established in order to reduce the negative impact of waves.
- Farmers should be encouraged to grow salt tolerant crop varieties in coastal regions wherever this is feasible.
- Proper and effective drainage networks should be maintained to allow seawater to immediately drain from fields.



## **2.9. Agricultural rehabilitation one and a half years after the tsunami in the northeast region of Sri Lanka<sup>10</sup>**

*K. Subramaniam, Provincial Director, Ministry of Agriculture, North East Province, Trincomalee, Sri Lanka*

### **Background**

Sri Lanka has been extremely hard-hit in terms of loss of life, infrastructure and economic assets. Tsunami is widely acknowledged as the most devastating natural catastrophe in the history of the country. Mostly the poorest families of fisher communities and smallholder farmers were extremely affected necessitating the mobilization of external support to assist in the recovery process. It is important to note that the northeast region of the country was significantly impacted by the tsunami since communities in the region are still recovering from the affects of twenty years of civil war.

The northeast consists of 8 administrative districts and occupies approximately 28.7 percent of the island. It falls within the dry zone, has a total population of 2.62 million made up of 250000 farmer families. Approximately 800 km of the coastline was affected by the tsunami with the northern districts of Jaffna and Mullaithevu being hardest hit and the eastern districts of Trincomalee, Batticaloa and Ampara being severely impacted upon.

### **Extent of damage**

#### ***Crop sector***

The damage to the agricultural sector was mainly confined to the destruction of standing crops in paddy, other crop fields, home gardens, fruit orchards and economic perennial tree crops along the entire coastal belt. This included the washing away of parts of cashew and beetle plantations along the eastern coast. Inundation by seawater of productive fields has induced high levels of soil salinity. Consequently, farmers are unable to grow crops on these soils until the salinity levels have been reduced through flushing of salts associated with the seasonal monsoon rains. A total of 3400 hectares of crop land area were completely destroyed. In addition, about 2000 homestead with crop gardens were washed away. The total damage to the agriculture sector was estimated to be \$8.7 million.

#### ***Livestock sector***

In terms of livestock, the overall damage is not significant at the provincial level, although many poor families have lost domestic animals, which served as a safety net against vulnerability which provided supplementary incomes, and had added health and nutritional benefits. In terms of value of lost resources, it was estimated to be \$2.7 million.

#### ***Fisheries sector***

Sea fishing has been the most severely hit sector industry and the livelihoods of these communities have been negatively impacted upon by the tsunami. The total damage to the sector excluding the damage to housing and personal assets of the victims is about \$60 million.

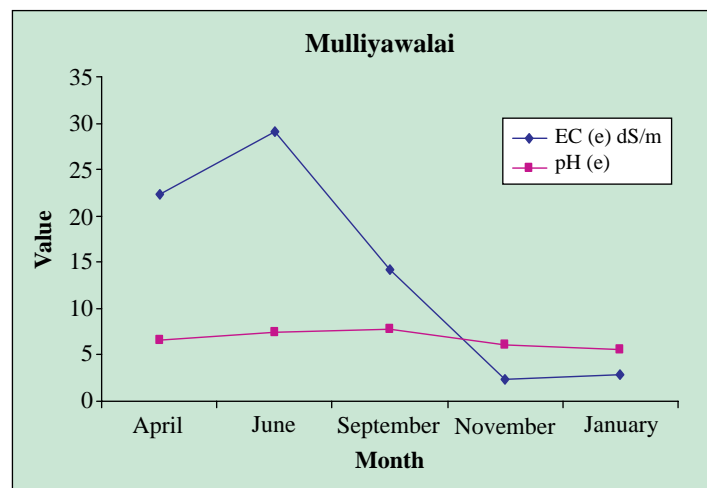
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<sup>10</sup> This country report has not been formally edited and the designations and terminology used are those of the author.

## Activities undertaken in address the agricultural needs of communities

A number of activities and initiatives have been undertaken and implemented since the devastating event. These include the following:

*Land rehabilitation:* Soil samples were collected to assess the degree of salinization and permanent monitoring sites established to assess the degree of remediation associated with the monsoon (Figure 1). There is clear evidence to suggest that flushing of salts is occurring (Figure 9.1).



**Figure 9.1. Effect of flushing of salt associated with the onset of the monsoonal. Permanent salinity monitoring site established at Mulliyawalai where pH and electrical conductivity (EC) are routinely measured**

*Crop recommendations:* Field demonstration plots have been established that evaluate different strategies and crop species that could be grown during the rehabilitation process. In addition, crop recommendations based on soil salinity levels have been made to farmers.

*Infrastructure rehabilitation:* The reconstruction of damaged wells has been undertaken. This has included the pumping out of saline waters.

*Farmer empowerment:* Capacity building in salinity reclamation has taken the form of field and institutional training activities along with the establishment of crop demonstration plots in the field. Basic inputs of seed, fertilizers, hand tools and water pumps/2W tractors have been provided to farmers. Social mobilization in rehabilitation has resulted in the mobilization of communities to take responsibility for their lives through group action. This has included the establishment of community gardens in transit camps, the cleaning and clearing of drainage channels, and the establishment of home gardens.

## Lessons learnt

There are several aspects in the rehabilitation process from which lessons have been learnt. These include the following:

There are different levels of salinity in the soils that is contingent on the degree of inundation, length of period the soils were inundated for and the soil type. Hence the rehabilitation process with differ from place to place.

Dug wells remain saline even after the soil has been flushed of salts. In addition, there is evidence to suggest that salinity levels in the soil fluctuate in some locations indicating the possible remobilization of salts from lower down the profile.

The land productivity as indicative of crop production has increased by 75 percent over time, but has still not reach levels of productivity that were being achieved prior to the tsunami.

Sunhemp cultivation and its incorporation into the soil as a green manure have been shown to be an effective tool in reducing salinity. In addition, the application of large quantities of organic matter has been demonstrated to improve the productivity of saline affected soils.

There appears to be a quality change in the crops produced on these affected soils.

### **Constraints**

Whilst the rehabilitation process has continued several constraints have been experienced associated with productivity improvement, social mobilization, the provision of services and poor governance.

Salinity remains a problem in some locations thereby hindering the return to normalcy. Lost farm implements have not been fully replaced and crop lands have been left fallow due to a delay in resettlement. There is a general lack of interest in crop diversification to species that are more salt tolerant and adapted to the prevail environment.

There has in general been poor people participation in community action activities; a reluctance to resettle away from an individuals domicile; delay in infrastructure rehabilitation; and problems with land adjudication and titling. Added to this service institutions in the affected areas have not been adequately re-equipped to provide the required level of service to clients. Finally there has been a general lack of coordination and transparency that has hindered the rehabilitation process.

### **Status of recovery needs**

Immediate recovery programmes focused on helping affected families to recover from their losses. In addition, the affected population was provided with micro-credit facilities through community-based revolving fund mechanism to restart their livelihoods.

The rehabilitation of damaged structures and agriculture/livestock service is require and has been inadequately addressed. Through addressing these aspects in the rehabilitation process one would reduce adverse environmental impacts and also provide immediate employment opportunities in affected villages.

The agriculture department has been carrying out testing of salinity and take measures to provide technical guidance for a speedy recovery of those fields. Relief inputs such as seeds, fertilizer and basic farm tools were supplied to restart agriculture for livelihoods in collaboration with national and international NGOs. Efforts should also be made to repair the agricultural related infrastructure (buildings and other public facilities) damaged by the tsunami to enable a fast resumption of services to those who have been affected.

Farmer capacity building in soil reclamation and productivity improvement should be effectively implemented in participatory manner. The lost capacities of the service providers should also be re-equipped and strengthened.

The recovery strategy should focus on medium- and long-term needs of the victims. Therefore, enhanced and meaningful consultation with local affected communities and stakeholders is essential. Local communities should be empowered to make their own decision in the recovery process. The principle of subsidization should be applied in rehabilitation interventions.

All interventions need to respond to clearly identified and articulate needs of the affected community. A coordinated approach is critical to ensure the participatory principle and to avoid duplication in activities. The recovery process also needs to focus on the reduction of future vulnerabilities through multi – hazards risk approach.

### **Future plans**

The focus areas for future activities include the resettlement and restoration of the productive capacity of salt-affected lands; crop development and diversification that takes into account the prevailing soil conditions (i.e. tolerance to salt); the renovation of damaged agro-wells; the establishment of salt exclusion/perimeter bunds; protective tree plantings along the coastal belt; and the strengthening of service providers.