



Australian
Red Cross

Workshop #12 • Simeulue Island, Aceh • July 9-13, 2007

In the Hands Of the Fishers



IUCN
The World Conservation Union

In the Hands Of the Fishers

#12

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Supported By:
Australian Red Cross
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Mangrove Action Project Presents
In The Hands of The Fishers Workshop #12

by

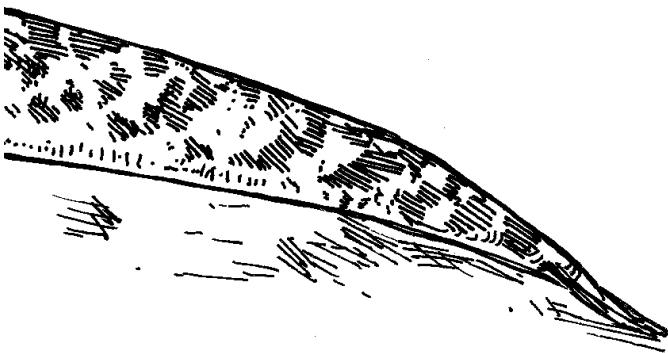
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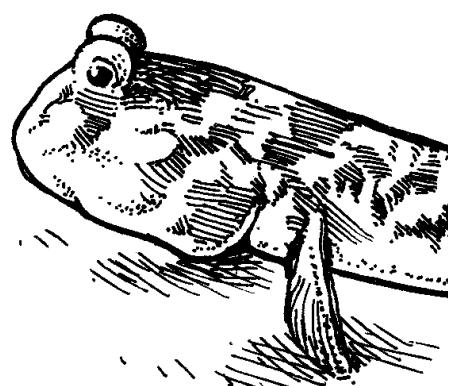
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Wassalamu Alaikum Wr. Wb
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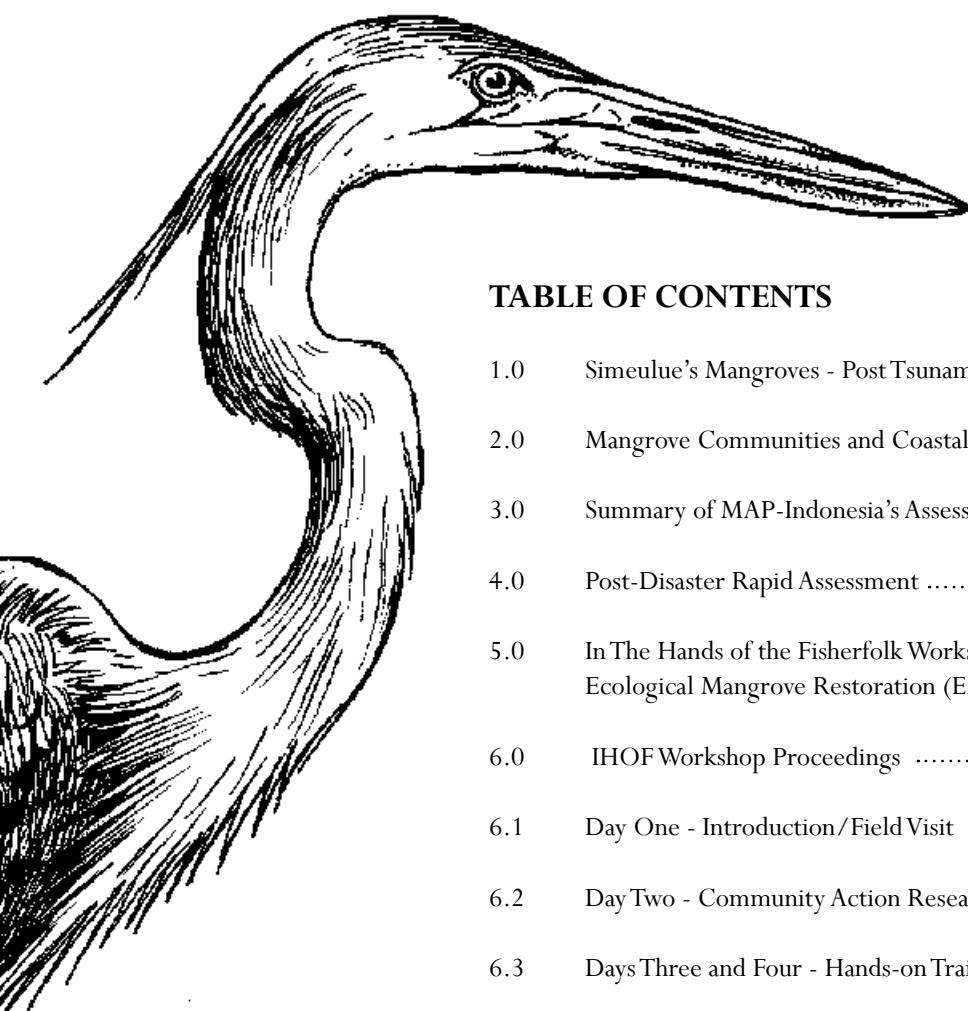


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1.0 Simeulue's Mangroves - Post Tsunami and Earthquakes

The December 26, 2004 Aceh earthquake which resulted in the tsunami which devastated coastal areas throughout the Indian Ocean region, also resulted in drastic tectonic change on Simeulue Island. In general, the western part of the island experienced uplift of 25-150 cm while points along the eastern edge of island experienced submergence. (Sieh et al, 2007)

Mangroves in uplifted areas fared better than some mangroves which experienced submergence, where significant and immediate mortality was observed. Mangroves experiencing significant submergence, will die quite readily as above ground components of root systems are no longer able to ventilate underground portions of the root system to enable respiration as they are both permanently submerged. The submerged roots are no longer able to respire, they can not adequately expel waste CO₂, circulate methane (CH₄) absorbed from the sediment, or resist Sulfur which is a by-product of anaerobic respiration in the substrate and which toxifies the root hairs. Lenticels (pores through which the mangrove breathes) on the trunk of the tree alone, at a certain level of submergence, can not effectively supply the roots with the oxygen they need to respire. On the other hand, mangroves which found themselves suddenly raised above the tidal zone, did not undergo immediate mortality but exhibited stress as well as becoming over-run with terrestrial species including many mangrove associates. Signs of stress included shedding of leaves, increased lenticel size, and lack of fruit/seed production.

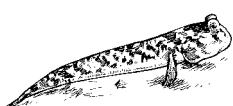
The March 2005 earthquake effectively uplifted the eastern part of the island. The maps on the following page show gradients of uplift from each separate earthquake, along with cumulative uplift contours for the entire island. Submergence on Simeulue Island, after the March earthquake, was no longer an issue. The island as a whole experienced uplift, but to varying degrees in various places. Appendix A provides uplift data for several locations on Simeulue of importance to workshop participants.

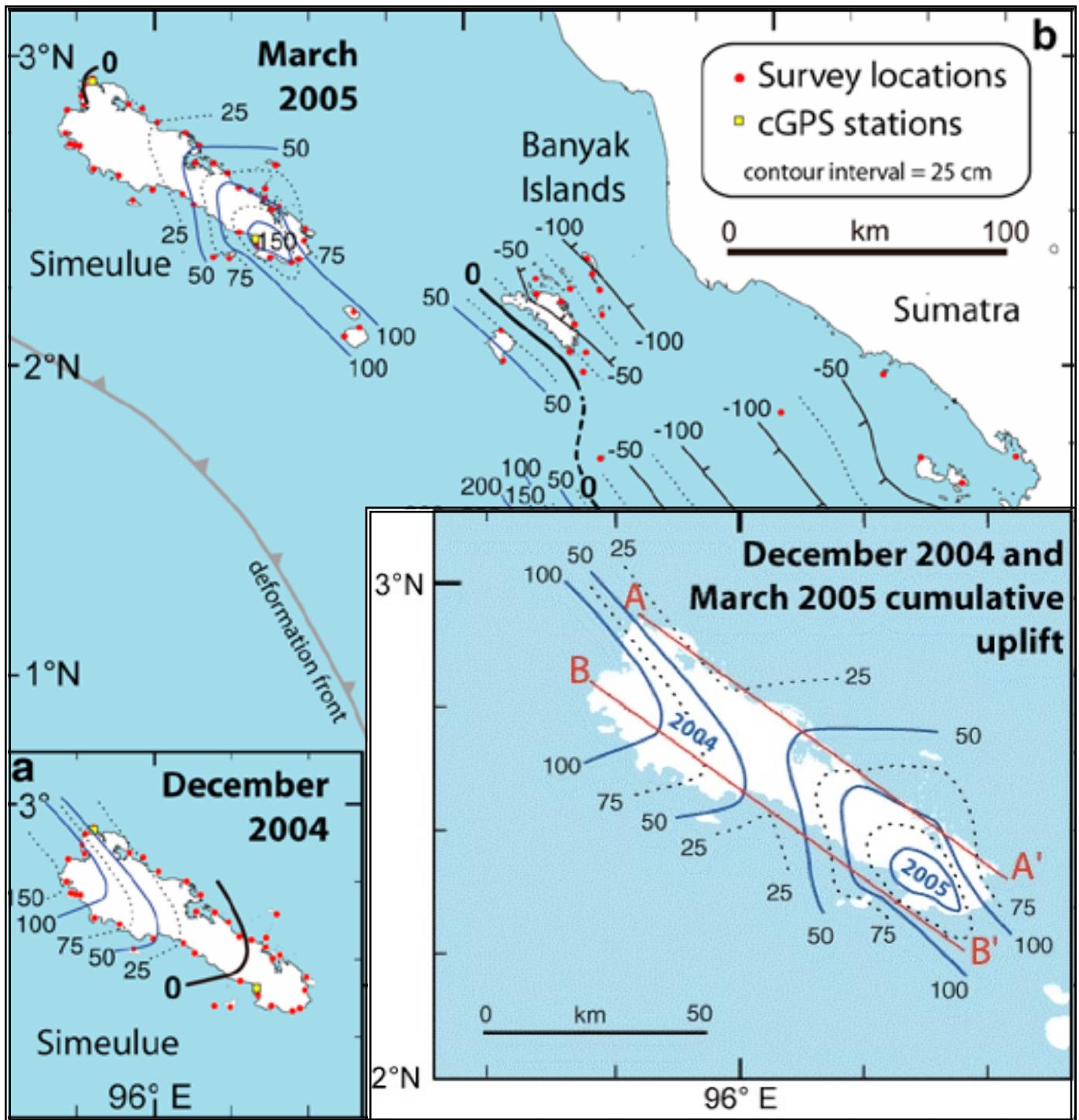


Uplift of course, not only affected mangroves, but other tropical marine ecosystems such as seagrass beds, tidal mudflats, coral reefs and their associated fauna. Fisherfolk from the entire island have noted significant decreases in coastal fisheries due to destruction of these habitats, and are desperate to restore what they can of fisheries habitats for livelihood security. Overall uplift in the east and west was quite significant, while overall uplift in the central part of the island was less dramatic, evidenced by the condition of the mangroves in these various regions. In the east and west, most mangroves were lifted completely out of the tidal range. This brought them into direct competition with terrestrial plants and colonizing mangrove associates. Over a two year period, some of these mangroves have stopped producing *propagules* (mangrove fruits, seeds and seedlings dispersed by water, both tidal and riverine) altogether, due to stress and competition. Where mangroves which exist outside of the tidal zone are still producing propagules, the propagules currently fall onto "dry" land, unavailable for dispersal by tides and ocean currents. Exceptions are mangroves that were not lifted completely out of the tidal range (mostly mangroves previously growing at the lowermost edge of the tidal range), or mangroves growing along tidal creeks and river. These mangroves are still able to produce and disperse their propagules and we can witness some natural regeneration of mangroves, which are "migrating" seaward and establishing themselves in newly uplifted land. These uplifted lands are former seagrass beds, coral reefs and tidal mudflats. Natural mangrove establishment in these disturbed ecosystems is dependent on a variety of factors, such as proximity to seed sources, substrate type, and strength of waves and currents along the coast (the energy of the system).

In central Simeulue, especially in the Teluk Dalam region, mangrove uplift was relatively low, on the order of 25-75 cm. More mangroves are surviving and producing propagules in this region, and there is a higher incidence of natural regeneration. This region will become an important source of propagules to assist regeneration of mangroves in the eastern and western parts of the island. Humans can help by collecting propagules and distributing them in target restoration areas during rising high tides.

In understanding the mangroves of Simeulue and their recovery, it is important to also understand that what has taken place as the result of tectonic uplift, is part of a cycle of uplift and subsidence in the region which has been played out over the centuries. Mangroves over the next several decades will migrate outward, re-establishing themselves within their limits in the tidal range. As the island subsides, mangroves will return inland vis-a-vis natural recruitment of seedlings. This time around, the rate of subsidence will be exacerbated by sea-level rise which is a by-product of global warming. This "adjusted" rate of subsidence is being calculated by Dr. Kerry Sieh of California Technological Institute. Understanding these long-term, cyclical processes is paramount for human's to understand in order to create a spatial plan that includes room for mangrove migration over the next 150 years.





Humans; however, are impatient beings. Thinking in terms of 100-150 year time scales and cycles is not our strong point. Undoubtedly, humans will begin to develop the uplifted coast line which is now behind the zone where mangroves will grow. They will plant their coconut plantations, build houses, roads etc. When subsidence occurs this time around (expedited by sea-level rise) migrating mangroves will run into whatever humans have put in their way, and conflict will likely arise. We can create likely scenarios to better understand the potential conflict. One such scenario starts with planting of coconut plantations just above the new high tide line. As the island subsides and sea level rises, salinization of coconut plantations occurs. People then build dike walls in an effort to protect their plantations. Dike walls cut off fresh water supply to mangroves, which suffer, and salinization actually increases. People, wanting both their mangroves and their coconut plantations, end up losing both and reverting to engineering measures to try to salvage what they can. This scenario has already played itself out in many regions around Indonesia.

The mangroves of Simeulue are exhibiting a high degree of resilience. Communities have taken care of mangroves in most parts of the island very well over the centuries, and they want their mangroves back now. But the future of mangroves on Simeulue, depends on an understanding of this resilience, and putting management plans and practices in place that maintain the resilience of mangroves, rather than plans that optimize short-term human utilization of the coastal zone. Already we are seeing this "optimization" mind-set take hold. What are the best species of mangroves for fisheries habitat. What are the best rees to plant along recently uplifted lands. Human's are eager to change nature to suit their own short-term purposes. History teaches us over and over, that our manipulation



of the environment will come back to haunt us in the end. Let us hope that the fisherfolk and governments of Simeulue can recognize their plight, and that if they really want mangroves around for the future, they act now to make it possible.

Summary of major points

1. Uplift of mangroves resulted in direct competition between mangroves and terrestrial plants including mangrove associates.
2. Propagule limitation has occurred as, a) stressed mangroves cease to produce propagules and, b) propagules fall to barren ground and are not distributed on tides and currents.
3. Out-migration of mangroves is taking place where propagules are available for distribution. Various species of mangroves are establishing themselves even on seemingly undesirable substrates (coral and coral rubble).
4. Humans can assist revegetation by assisting with dispersal of propagules, collected both from regions still producing propagules (Teluk Dalam etc.) as well as mainland North Sumatera and Aceh.
5. Humans need to be cognizant of long-term cycles, and plan for the outward and eventually back migration of mangroves.

2.0 Mangrove Communities and Coastal Communities of Simeulue

By and large the communities of Simeulue have been taken good care of their mangroves, but without actual intent to conserve them. Mangrove forests before the 2004-2005 tsunami and earthquakes were for the most part healthy, sustainably harvested for timber in most areas, but valued more for their role as fisheries habitat (fish, crabs and prawns). The exceptions to this rule took place near to the city center of Sinabang where mangroves have been clear-cut in the 1980s and 90s to fuel a coconut oil processing plant, and also for development along the coast. It is common in Indonesia, for rural fisherfolk communities to co-exist with healthy mangrove forests. Yet, even though traditional management practices may be sound, community based natural resource management lacks legal credibility. Mangrove forests can be seen as a socio-ecological unit. In order to remain resilient to damage, mangroves need to be both ecologically resilient as well as sociologically. In this day and age, passive, traditional management does not lend sociological resilience to a mangrove forest. At any given time, an outside disruptive force, such as a wealthy investor, can come along and make changes to the mangrove forest. Most mangroves are by law, state-owned forests. This makes them extremely vulnerable to political whimsy, and development or conversion for short-term economic interests.

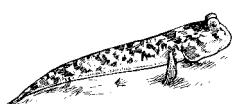
So, although communities of Simeulue have taken good care of most of their mangroves over the past century, the mangroves are at risk of development by outside forces. What has kept them out of the eye of investors over the past decades is primarily due to the remoteness of Simeulue Island coupled with political conflict in Aceh. But as is evidenced by the current conversion of rainforest to oil palm plantation in central Simeulue, the island now has the attention of outside investors, and local political will for forest conservation is weak. Community involvement in forest management may even be lower on the government's list of priorities.

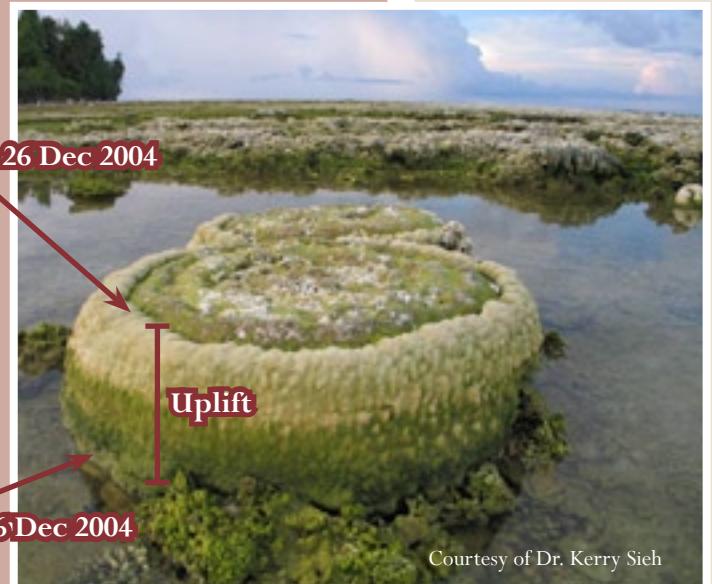
These issues of community involvement in mangrove management were the main focus of the policy sessions of days 3 and 4 held at Mohammad Ali's coffee stall as can be read in the proceedings.

3.0 Summary of MAP-Indonesia's Assessment

In May 2007, Mangrove Action Project - Indonesia performed a week-long assessment of six sites on the north coast of Simeulue Island where mangrove restoration projects had been undertaken. These restoration activities are actually better named afforestation, planting two to three species of *Rhizophora* propagules along the inter-tidal region where mangroves did not previously occur. The majority of afforestation attempts were unsuccessful, due to a variety of factors including; seedling rearing, transport, handling and planting, site selection, species selection and lack of attention to hydrologic requirements (predominantly substrate depth and tidal inundation requirements). Poorly planned/researched and unsuccessful mangrove restoration projects are nothing new in the region, especially as part of post-tsunami rehabilitation. What is less common, is the willingness of practitioners to right their wrongs. Australian Red Cross should be commended in noticing high mortality at some of their planting sites, engaging in monitoring activities and seeking assistance in improving restoration techniques.

MAP Indonesia's assessment can be requested at seagrassroots@gmail.com. In summary, the assessment found that tectonic activity during the December 26th, 2004 and March 28, 2005 earthquakes caused geomorphological changes in the form of coastal uplift between 50 cm to 2 meters in height around the entire island. These changes have caused drastic ecological change to all coastal ecosystems, lifting mangrove forests above the range of influence of the tides, while also raising tidal mudflats, coral reefs and seagrass beds. These former reefs and seagrass beds are in some cases being colonized by natural mangrove seedlings, where propagule production and dispersal are relatively undisturbed. In many areas; however, uplifted mangrove forests are unable to produce and disperse propagules, which are being out-competed by mangrove associates and terrestrial plants, and are no longer in contact with the tidal waters requisite for most mangrove dispersal. As a result of MAP-Indonesia's assessment, MAP made the recommendation that people discontinue planting activities, begin collecting a wide variety of mangrove propagules, fruits and seeds, and assist nature in dispersal by releasing these propagules over a period of several months on rising tides in areas appropriate for mangrove colonization and growth. After a period of observation, colonized intertidal areas should be protected from herds of grazing water buffalo. Apart from human assisted mangrove colonization, MAP-Indonesia noted local interest in developing information, skills and knowledge on both small-scale sustainable livelihood development in mangrove areas, as well as community based governance and conservation of mangrove ecosystems. Based on the assessment, MAP-Indonesia, along with Australian Red Cross planned the following "In the Hands of the Fisherfolk" workshop with the support of IUCN and local stakeholders to cover these topics in a hands-on manner, as well as continuing to provide technical support for local mangrove conservation efforts on Simeulue Island.





Clockwise from top right:
Mangroves in Teluk Dalam experienced mild uplift, but natural seedlings are able to re-establish themselves in most areas. This small patch of uplifted reef exhibits natural colonization of *Rhizophora apiculata* and *R. mucronata*, *Scyphiphora hydrophyllacea*, *Pemphis acidula*, *Nypa fruticans* and *Sonneratia alba*.

Old and new high tides on this high-energy, sandy beach demonstrate why mangroves are moving “out to sea.” High energy beaches like this were planted with mangroves even though no mangroves grew here.

Uplift of coral also demonstrates drastic change in the tidal zone. Core samples from massive coral heads like this one show scientists that Simeulue has experienced uplift and subsidence several times over the past centuries. The current rate of subsidence is being calculated by Dr. Kerry Sieh of California Technical Institute and his team.

Terrestrial plants and mangrove associates out-competing “true” mangroves.

Areas like this uplifted beach will be important to set aside for future mangrove migration inland. This type of long-term planning presents the biggest challenge to Simeulue’s mangroves in the future.



4.0 Post-Disaster Rapid Coastal Assessment

IUCN requested that Mangrove Action Project add a session on post-disaster rapid coastal assessment to this workshop. MAP and ARC approached appropriate government offices (Forestry and Planning Departments) several times to hold discussions on this topic and also to extend invitations to the workshop. Unfortunately, lack of positive response coupled with conflicting scheduling resulted in lack of government participation in the workshop. The assessment and workshop, however, did broach themes of rapid coastal assessment with community participants. As can be seen in this report, participants learned a method for determining appropriate coastal areas for mangrove restoration applicable in a post-disaster scenario. In this instance, tectonic uplift presented communities with the added challenge of determining the tidal range for mangrove growth.

A more in-depth look at post-disaster rapid coastal assessment is being prepared by MAP and IUCN in the form of a manual which will be ready in final draft form by October 31, 2007. This work involves translation and adaptation of existing IUCN documents into Indonesian language. Adaptation will include relevant information based on consultation with government planning offices, disaster relief agencies, local communities and literature reviews on PRA, RRA and resilience.

5.0 In The Hands of the Fishers Workshops (IHOF) and Ecological Mangrove Restoration (EMR)

The *In The Hands of the Fishers* (IHOF) workshop is a fisherfolk to fisherfolk environmental education programme that promotes sustainable development through the empowerment of fisherfolk to manage coastal resources in a sustainable manner. IHOF promotes coastal resource conservation and wise use of resources for the improvement of fishers' livelihoods utilizing community-based or collaborative management arrangements. IHOF participants are selected from local community fisher leaders, grassroots NGOs and occasionally local government officials, from various nations, which contain mangrove forests and face the threats of unsustainable developments, such as industrial shrimp aquaculture and over fishing by commercial trawlers. Participants attend a four to six day workshop in order to exchange ideas, share experiences and skills, and help design and later implement those various options or solutions which are reached during these workshops.

To date, twelve IHOF workshops have been held in Asia, Africa and Latin America. The workshops are continually being refined and are evolving to becoming more participatory, informal, regional and topic focused. Major topics from IHOF workshops have included mangrove restoration, overcoming illegal trawler fishing, consortium forming, community involvement in marine protected area management, and development of sustainable livelihood alternatives. There has been an attempt to move the workshop setting from hotels to rural settings near the participating communities, or even into the community itself. There is also a greater focus on field-based learning, both viewing successful working models as well as participating in hands-on learning activities. Facilitators often include fisherfolk themselves, to encourage fisherfolk to fisherfolk sharing and exchange. There has also been a realization of the need to incorporate seed funds for follow-up projects, allowing participants to test newly learned skills by practical application in their village setting. In summary, the workshops are sensitively adjusted to make the training experience "In the Hands of the Fishers" more suitable to the needs of the fisher participants.

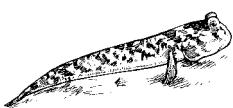
IHOF workshops in India, Sri Lanka, and most recently Simeulue Island, Aceh have incorporated the *Ecological Mangrove Restoration* (EMR) method as the main topic. Ecological Mangrove Restoration has been developed as a counterpoint to large-scale unsuccessful plantings of *Rhizophora* mangroves as the main form of mangrove restoration world-wide. The principles of Ecological Mangrove Restoration were put forth as a five-step method by Roy Robin Lewis III, and refined in partnership with MAP into the following six step method.

Ecological Mangrove Restoration (EMR):

Six Steps to Successful Mangrove Forest Restoration Emphasizing the Hydrologic Restoration Method

Work together with local communities, NGO's and government to:

1. Understand both the autecology (individual species ecology) and community ecology of mangrove species at the site, paying particular attention to patterns of reproduction, propagule distribution, and successful seedling establishment;
2. Understand the normal hydrologic patterns that control the distribution and successful establishment and growth of targeted mangrove species;
3. Assess modifications of the previous mangrove environment that currently prevent natural secondary succession;
4. Select appropriate mangrove restoration sites through application of Steps 1-3, above, that are both likely to succeed in restoring a sustainable mangrove forest ecosystem, and are cost effective. Consider available funds and staff/labor to carry out projects, including adequate monitoring of progress towards meeting quantitative goals established prior to restoration. This step includes resolving land ownership/use issues necessary for ensuring long-term access to and conservation of sites;
5. Design restoration programs at appropriate sites selected in Step 4, above, to initially restore the appropriate hydrology and take advantage of natural volunteer recruitment of mangrove propagules for plant establishment;
6. Utilize actual planting of propagules, collected seedlings, or cultivated seedlings only after determining through Steps 1-5, above, that natural recruitment will not provide the quantity of successfully established seedlings, rate of stabilization, or rate of growth of saplings established as quantitative goals for the restoration project.



6.0 IHOF Workshop - Simeulue

The 12th In the Hands of the Fishers workshop took place from July 9-13, 2007 on Simeulue Island, Aceh and was hosted by the village of Amaiteng and the Australian Red Cross. The workshop was sponsored by Australian Red Cross, The World Conservation Union (IUCN), and the Spanish Government's Autonomous Organization of National Parks (OAPN). Mangrove Action Project - Indonesia facilitated the five-day workshop, and are currently working with participants in small-scale follow-up activities supported by both Australian and Norwegian Red Cross. Forty villagers from eight villages across the northern coast of Simeulue attended the workshop, which combined indoor discussions and presentations with numerous field visits and hands-on learning experiences. The following proceedings report, provides highlights of the workshop along with insights as to how the information, skills and knowledge exchanged during the workshop will be applied to real life community based mangrove management activities in the near future.

As an overview of the workshop, the first half of day one was spent getting to know one another, and also learning about the mangroves of Simeulue, past and present. The afternoon of day one was spent at Linggi Village, gathering information for mural drawing activities which would take place on day two. Mural drawings of the present and past condition of Linggi's mangroves were used to broach the issue of future planning for all attendant villages on day two. Days three and four involved participants directly in six hands-on training sessions, provided in a round-robin format. Participants were able to attend four of the six sessions over the two-day period; sessions ranging from mapping and ecological mangrove restoration field trips, to cooking with mangroves, fish and crab-trap making, and policy discussions in a coffee shop. The final day involved a synthesis of the workshop, as well as a chance for participants to plan how they were going to present information learned at the workshop back in their villages for future action-planning and action-taking.

6.1 Day One - Agenda (July 9)

Welcome, Introduction and Overview

- Ice Breaker/ getting to know each other through paired introductions
- Why care about mangroves? (Brainstorm) > identify goods & services
- Expectations of the workshop

Mangroves of Simeulue – Post Tsunami Condition

- "Six Critical Steps Necessary to Achieve Successful Mangrove Restoration"

Field Trip to Linggi (By Land and By Sea)

- Step One: Mangrove ecology walk
- Step Two: Hydrology in the mangroves
- Step Three: Assessment of barriers to mangrove growth
- Step Four: Selection of appropriate mangrove restoration sites; (ecological, effective, economical, resolving land ownership/use)
- Sketches for present day mural drawing

Proceedings - Day One

The workshop began with welcomes from the village head of Amaiteng and Australian Red Cross. The village leader expressed hope that we would come to a greater understanding of how to restore and protect mangroves, especially in his village which had witnessed significant mangrove loss. The Australian Red Cross Head of Office expressed his hope that small-scale sustainable livelihood trainings would take hold, and that Aussie Red Cross would assist villagers with follow-up.

An ice-breaker activity was facilitated by Jajang of MAP. This activity involved participants in placing a personal item in a bag. When all participants had placed their personal items in the bag, they chose from the bag and were challenged with finding out who the owner was. They then had to get to know the owner of the item, and introduce the owner to the group, including an explanation of why the owner loves mangroves. Next, Ratna passed out cards for participants to write their expectations of the workshop, and also create a list about why communities of Simeulue felt mangroves are important. Most participants noted that after the tsunami and earthquake, and subsequent death of mangroves and coral reefs, coastal fisheries had plummeted. There is certainly a genuine community concern for the mangroves of Simeulue.

Jajang and Lukman then explained the agenda, along with the purpose of the workshop. The agenda was approved by participants, and the workshop was ready to begin after a tea break.



After the break, Ben Brown began a Power-point overview on the effects of the tsunami and two earthquakes on the mangroves of Simeulue. Satellite photos provided by Google-earth coupled with on the ground photos from the previous assessment outlined the current status of mangroves at six sites along the northern coast (Teluk Dalam, Teluk Dalam-Sambai, Linggi, Lugu, Amaiteng and Kuala Makmur). All of the sites had experienced tectonic uplift to varying degrees, Teluk Dalam sites experience the least degree of uplift (25-75 cm) with more significant uplift at the other four sites (75 cm-125 cm). Each site exhibited varying degrees of natural recovery, but for the most part, natural mangrove seedlings were only abundant directly adjacent to mangrove forests that had experienced relatively little uplift (25-60 cm) or were located along rivers and tidal creeks.



Propagule dispersal was obviously quite limited. There was little evidence of propagule dispersal or seedling establishment on beaches only 100 meters - 300 meters away from the above mangroves. Fisherfolk substantiated this anecdotally. Before the tsunami/earthquakes, mangrove propagules were considered a nuisance to fisherfolk who hauled in tens of kilograms at a time in their nets. After the tsunami/earthquakes, not only fish catches, but propagule landings drastically decreased. Propagule limitation is perhaps the most important factor limiting the natural recovery of mangroves in the region as discussed in section 1.0. The main reason being that adult mangrove trees which are still able to produce propagules, are unable to disperse these propagules on tides, as many are no longer situated in the intertidal zone.

Planting projects had been undertaken together with local communities by the Forestry Department as well as Australian Red Cross at these sites. Data from Australian Red Cross showed that survivorship of planted seedlings was nearly 0% on three of four sites, and 50% at a fourth site. Forestry department plantings met with similar results, and had already been re-planted at one site which had experienced total mortality within several months after the initial planting. Communities involved in the plantings were asked why they thought the plantings might have failed. Responses included:

- Wrong/inappropriate species
- Lack of training in planting methods
- Waves and currents too strong in some places
- Eaten by water-buffaloe
- Seedlings stressed during shipment from far away (Sumatera/Java)
- Planted in the wrong place
- Did not use local seed stock

These and other reasons for planting failure were to be investigated over the course of the next few days.



During the afternoon, four groups took a field trip to Linggi village. Half of the participants departed by van while the other half left Amaiteng by boat, switching on the return trip. This maximized participants' exposure to the mangroves of Linggi. Participants were asked to bring sketch books along with them, as well as data sheets to collect information on 1) the species of mangroves present, 2) tidal information, 3) disturbance to normal tidal flows, and 4) other scientific information such as substrate type, fauna and non-mangrove flora encountered. Their sketches would help them prepare a present-day mural drawing of Linggi the following day.



Understanding autecology is the first step of EMR. This *Scyphiphora hydrophyllacea* seedling was found growing on what is the windward side of a mangrove isthmus (① on the map). Approaching the isthmus from the backside, the group came upon a remnant *Rhizophora apiculata*, no longer producing fruit and well above the high tide mark. (② on the map). The group decided mangroves have little hope of growth here. Area ③ on the map was planted with thousands of *Rhizophora* seedlings, none of which have survived. The group noted that waves and currents on this windward beach were too strong for mangrove growth, and that this was actually the "back or windward side" of the mangrove forest.





Breaking through to the front of the mangrove brought the group into a relatively undisturbed forest, dominated by zones of *Nypa fruticans*, *Sonneratia alba* and *Rhizophora apiculata* and *R. mucronata* on the leeward edge (④ on map).

This area caused the group to rethink whether or not water buffaloe were the cause of planting mortality. All planted seedlings in the picture are dead, but these four natural recruits (*Nypa* and *Rhizophora*) are alive and well. (⑥ on map). It was decided that perhaps handling and planting of seedlings, was the main cause of mortality. This example also reinforced the thought that it might be better to help nature disperse mangrove propagules rather than planting.



Entering from the windward side of the isthmus, the group examined large *Sonneratia alba* trees, already showing signs of stress. Very few were producing fruit, and fruits that develop fall onto hard ground. Tides no longer reach this back edge of the mangrove forest. (⑤ on map)



This part of the back or upper mangrove is now being outcompeted by terrestrial plants including what are known as mangrove associates. Over time, this area will become terrestrial forest. Over the next century, as sea levels rise and the island subsides, mangroves may come back to inhabit this area naturally if humans do not convert the area for another land-use. (⑦ on map).



A *Sonneratia alba* seedling, extending the former edge of mangrove growth. *Sonneratia* can act as an excellent pioneer species, each fruit containing hundreds of small seeds. Understanding that dozens of species, not just *Rhizophora*, will be needed to re-establish the mangrove forest is an important lesson to learn. (⑧ on map).

6.2 Day Two - Agenda (July 10)

“Do Your Own Mangrove Action Project”

- Present-day mural drawing and group presentations
- Develop ten interview questions for conditions of lagoon in the past
- Past day mural drawing and group presentations

Introduction to Community Mangrove Management for Conservation & Sustainable Utilization

Overview of Hands-On Sessions and Break into Groups for Round Robin Training

Proceedings

The second day of the workshop began with a slide show, reviewing the field trip from the previous day. Participants were given a chance to talk about the field trip, noting observations about the mangrove forest, plantings, and other coastal features and comparing Linggi's situation with their own village. Then participants broke back into their groups from day one, to draw a pair of murals. These mural drawing activities are taken from MAP's Action-Research/Problem-Solving curriculum “Do Your Own Mangrove Action Project.” (downloadable in English and Indonesian versions at www.mangroveactionproject.org). The goals of the mural drawing activity are 1) to get participants thinking about changes in the coastal area over time, 2) identifying problems or issues in the coastal zone, 3) prioritizing and selecting a single issue to resolve together.

After drawing the present day mural, a group leader was selected to present each mural before the audience. The audience were encouraged to ask questions and provide comments for clarification. It was noted that although all participants visited the same area and were given the same drawing task, the murals were markedly different. Differences and similarities between the various murals received comments from the group. It was noted that although we all maintain different mental maps of places, events, stories etc., these differences need to be accepted and appreciated. Differences, after all, are the spice of life.

In drawing the mural of the past, participants formulated several interview questions for an elder from Linggi, who participated in the workshop. His descriptions of the past condition of Linggi's coast were translated into symbols and overlaid on one of the murals by the facilitator team. By understanding the past and present of Linggi's coast, the group was more clearly able to visualize an ideal future coastal area.



Collaborative Management Case Studies - Jaring Halus Village and Bengkalis Island

The goal of this session was to present information to the participants about on-going community based mangrove management programs in other parts of Sumatera. Two case studies were presented; from Jaring Halus Village, Langkat, North Sumatera, and Jangkang River, Bengkalis Island, Riau.

Jaring Halus Village - SE Langkat Wildlife Sanctuary - North Sumatera

This case study was presented by three fisherfolk from Jaring Halus Village who have played various roles during the development of collaborative mangrove management in their area. Jaring Halus is a village of 3300 residents, sitting on pilings atop the mouth of the Wampu River. Jaring Halus borders the 9000 hectare SE Langkat Wildlife Sanctuary which is predominantly a mangrove forest. This protected forest, however, has suffered from decades of illegal logging for industrial charcoal production, with only 3 government staff tasked to protect the entire area. MAP was contacted by NGO partners JALA in 2003 to survey the region as a potential mangrove restoration site. Financial support was received for mangrove restoration activities, but during PRA activities with the local community, it was discovered that there was very little community support for mangrove restoration. The community had planted mangroves before in the sanctuary at the bidding of the National Agency for Natural Resource Conservation (BKSDA), but their plantings too were eventually logged to make charcoal. The community was apathetic, and rightly so, without a legitimate claim to manage and/or utilize the resources

Mas Yono from Jaring Halus explains the designation of the 500 hectare collaborative management area in the SE Langkat Wildlife Sanctuary

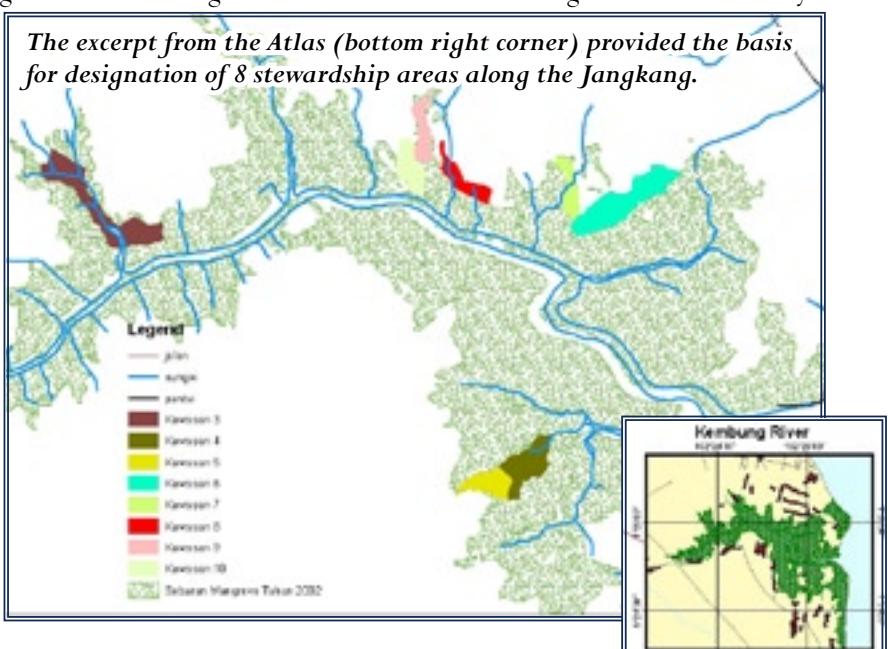


within wildlife sanctuary bounds. The community itself had conserved 33 hectares of mangrove forest in pristine condition since the founding of their village, exhibiting the highest biodiversity of mangroves in the region. It was suggested by MAP to lobby BKSDA for collaborative management rights in the wildlife sanctuary, based on a 2004 law making collaborative management possible in wildlife sanctuaries and protected forests. After a single presentation and a field visit, to compare the condition of mangroves within the village forest with those of the wildlife sanctuary, BKSDA readily agreed and in 2005 a collaborative management MOU for 500 hectares was signed. Since the signing of the MOU, there have been mangrove restoration activities, as well as development of sustainable livelihood alternatives, but the main work of the collaboration is management and protection of the 500 hectare area. A participatory biodiversity survey, development of a management plan based on a resilience assessment, and active enforcement mechanisms are planned for 2007-2009.

Jangkang & Kembung Rivers - Bengkalis Island - Riau

In 2002, MAP partnered with local NGO Yayasan Laksana Samudera to create a GIS atlas on the state of the mangroves of Bengkalis Island. One page of this atlas was used to suggest community mangrove stewardship areas along the Jangkang (8) and Kembung (2) Rivers. Yayasan Laksana Samudera, in consultation with the regency government (Kabupaten), made the recommendations on this page come true as part of the ADB Co-Fish program. Ten community stewardship groups were granted mangrove stewardship areas ranging in size between 5 and 69 hectares (averaging 26 hectares/plot), totalling 260 hectares along the two rivers. Each stewardship group is legitimized by both a village ordinance, as well as regency level umbrella legislation, enabling the groups to conserve and sustainably utilize mangrove resources in their respective areas. Nonetheless, the mangrove areas, as in the case study above, had been decimated by years of clear-felling for charcoal production. Mangroves were also suffering from a change in hydrology. Communities had built a 20 kilometer long dike wall to prevent brackish water from entering into their coconut plantations, which exist behind the mangroves. This dike wall did not prevent salinization of the coconut plantation, but acted to disturb mangrove growth by limiting freshwater entry into the mangrove forest. Cut mangroves would not regenerate and instead the back mangrove was colonized by the mangrove fern *Acrostichum aureum*. In 2004, MAP and YLS began working with individual stewardship groups to restore their mangrove management areas. Planting activities had met with mixed success, until MAP introduced Ecological Mangrove Restoration methods. In the first trial area, tidal creeks were re-connected to their terrestrial water sources, *Acrostichum* mounds were razed, and half of the area was planted with 12 species of mangrove seedlings while the other half was left to experience natural revegetation. The success of this project caught on and members of this first community group (Belukap) have gone on to train an additional 4 groups in ecological mangrove restoration techniques. MAP also facilitates sustainable livelihood programs in this region, and is planning completion of mangrove restoration by 2011.

The excerpt from the Atlas (bottom right corner) provided the basis for designation of 8 stewardship areas along the Jangkang.





The participants next commented on the two presentations. They were very enthusiastic about their praise for the communities in Bengkalis and Jaring Halus for involving themselves in the protection of their mangroves. They compared this to the case on Simeulue, where neither community or government had actively tried to protect mangroves to date. Government and community only began paying attention to the condition of Simeulue's mangroves after the tsunami and earthquake. Most mangrove forests in Simeulue are granted status as production forests by the regency level of the Forestry Department. Production forests are extremely open access. There have been cases of post-tsunami reforestation on the island, under the GERHAN program, where the forestry department works with NGO's and communities on replanting. These GERHAN replantings have met with much failure, even though a statement from the forestry department claims them to be 70% successful. In the field, however, sites exhibiting 100% mortality of seedlings, sites that were replanted after total mortality and restoration sites claiming coverage up to 200 times larger than actual coverage are not uncommon.



6.3 Days Three and Four - Agenda (July 11-12)

The third and fourth days of the workshop were dedicated to hands-on learning opportunities. These included several livelihoods trainings, along with coastal mapping and advanced ecological mangrove restoration. These mini-trainings were led both by MAP staff as well as several fisherfolk from Jaring Halus Village, in North Sumatera who have been working with MAP for several years on the collaborative mangrove management project presented on day 2. The trainings were offered in morning and afternoon sessions, using a round-robin format so that participants could attend up to four mini-trainings over a two day period. This format also enabled trainers to specialize on a single topic.

	Wednesday			Thursday		
Morning	Community mapping (Lukman)	Added value fisheries products (Ratna, Dodon & Masiah)	Community Based Policy (Jajang)	Community mapping (Lukman)	Added value fisheries products (Ratna, Dodon & Masiah)	Community Based Policy (Jajang)
Afternoon	Advanced EMR (Ben)	Non-timber forest products (Ratna & Masiah)	Fish and crab trap making (Yon)	Advanced EMR (Ben)	Non-timber forest products (Ratna & Masiah)	Fish and crab trap making (Yon)

Proceedings

Below are accounts of the individual sessions over the two days. Write-ups of several of the sessions using a curriculum format have been included as an Appendix in the Indonesian language report to assist others with carrying on similar or adapted trainings.

1) Community Mapping

Facilitator - Lukmanul Hakim

Location - Amaiteng Village

Ten participants joined this session on day 3, with 9 participants on day 4. Several ARC staff also studied GPS mapping on the beach at the end of the workshop on day 5.

Activities During the Community Mapping / Map-making Workshops

1. Introduction to mapping, mapping defined and technical summary
2. Using a compass
3. Field Activity: transverse survey using a surveying compass
4. Map drawing using the results of the transverse survey
5. Calculating the area in the drawn map
6. Presentation on use of GPS (for ARC staff)
7. Field Activity: Using a GPS for mapping (for ARC staff)
8. Downloading GPS data to the computer (for ARC staff)

Goals of the Mapping Training

1. Participants will understand basic principles and theory of map making
2. Participants will create a map based on a field activity using a surveying compass.

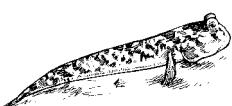


Results

1. The 10 participants from day three split into 3 groups. Of the three groups, only one group successfully completed their map, due to time shortage.
2. On the second day, all participants satisfactorily completed their maps.
3. Participants from both days felt the mapping training was too short, and hope for a future week long workshop specifically on mapping.
4. Participants also hoped to learn to use GPS, but due to time limitations, only ARC staff were able to learn GPS use. This took place on day 5 after the workshop.
5. Participants feel that mapping skills are extremely useful to them for a variety of purposes including mangrove conservation and restoration.

Future Recommendations from Trainer

- * Need 3-4 full days to for a useful mapping training
- * Need slightly better equipment for more accurate mapping.



Community Map Making From Theory to Practice



Mapping is a tool often used to help villagers explain their village situation. There are many types of maps; boundary maps, topographic maps, theme maps, sketch maps, etc. Each map serves a slightly different purpose. IHOF participants learned how to use a surveying compass to create a simple boundary map, later useful for demarcating mangrove conservation and restoration areas, as well as village and farmland boundaries.

Participants began the session with a bit of mapping theory (upper left), followed by field work, performing a transverse survey with the use of a surveying compass and meter tape (upper right and middle). Data collected during the field mapping was taken back to the workshop location to make simple polygonal boundary maps (lower right).

2) Added Value Fisheries Products

Facilitators - Ratna, Dodon & Masiah

Location - Australian Red Cross Guest House Kitchen - Amaiteng Village

Fish products are perhaps the most important part of the fisherfolk diet. Fish are a low-cost protein source, containing 20% protein with an array of amino acids very well matched to human needs. Eating fish regularly provides the body with protein, essential fats and oils, vitamins, and assists the body with physiological processes such as provision of energy for growth, homeostasis (self-repair) and reproduction. The downside of fish is that it is a perishable product, made 80% of water with flesh that is easily digested by autolyzing enzymes, turning the flesh soft and vulnerable to bacterial attack.

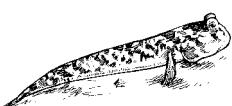
On Simuelue Island, fish catches can be very high during certain seasons. By storing fish or fish products, fisherfolk have greater bargaining power and are not as vulnerable to market fluctuations. Up to this point, communities have no method for storage of mackerel or tuna, as the fish are not dried or smoked and there is no long term cold storage available. By learning how to process fish products themselves, communities hope to be able to store fish longer, add a new menu item to local cuisine, and hopefully reach markets on mainland Sumatera. A survey was distributed amongst fisherfolk prior to the workshop to determine which species were difficult to market, in order that MAP trainers could prepare several fish processing options. Below is a table of the results of the survey.

Local name/Indonesian name:	Tempik, Sure/Tongkol
Latin name/Common English name:	<i>Euthynnus affinis</i> /Black Skipjack/Bonito/Little Tunny <i>Auxis thazard</i> /Frigate Mackerel/Mexican Skipjack
Fishing method:	Hook & Line, Net
Catch per unit effort:	25 – 40 kg / 7 - 8 hour
Fisherfolk per village:	40 – 50 people
Season:	April, May, June, July, Agustus, September
Current processing:	Sold fresh
Where is the market?	Local village and Sinabang
How is it currently sent to market?	Styrofoam Box/Ice
What price does it fetch at the market?	Wet: Rp 20,000/kg at a size of 5 fish/kg
What are done with unmarketable fish?	Sun-drying
Current cooking method at home:	Fried and curried
Local name/Indonesian name:	Budu, Tamban/Tembang, Lemuru
Latin name/Common English name:	<i>Sardinella fimbriata</i> , <i>Sardinella Longiceps</i> , Sardines
Fishing method:	Net, Seine
Catch per unit effort:	20 – 30 kg / 5 hour
Fisherfolk per village:	30 – 35 people
Season:	Monthly
Current processing:	Sold fresh and sun-dried
Where is the market?	Local village and Sinabang
How is it currently sent to market?	Fresh - Styrofoam Box/Ice, Dried - Sacks
What price does it fetch at the market?	Wet Rp 3000/kg / Dry Rp 10.000/kg
What are done with unmarketable fish?	Sun-drying
Current cooking method at home:	Fried and curried

It was not expected that all fish processing trainings would be put into practice by communities, but it is hoped that fisherfolk will continue to explore locally appropriate fish storage and processing options for the future. MAP trainers decided to focus on processing of the skipjack tuna. The main processing technique would be a type of fish “floss” known in Indonesia as abon. Abon is usually made with beef or chicken, but in Sulawesi is made with skipjack and if prepared properly, can keep for over a month unrefrigerated and up to a year refrigerated. A trial of smoked skipjack (ikan asap) was also planned.

The Norwegian Red Cross (NRC) maintains work sites on the far Western end of Simeulue Island. NRC works with communities around the inland lake known as “Laut Dalam.” This lake provides a lucrative walking catfish industry (*Clarias spp.*) which are prepared by hot-smoking before shipping to Sinabang and onto mainland North Sumatera. Hot-smoking is smoking directly over a fire, in this case, without a smokehouse to contain or concentrate smoke. There are three major disadvantages to this type of smoking:

1. Fish are exposed directly to heat, and are cooked rather than cured. Cooked fish have a shorter shelf-life, compared to cured fish. In order to smoke-cure fish, a separate firebox is needed, so that the fish is exposed mostly to smoke and not heat.
2. Much smoke is lost by “smoking” over an open fire. This reduces the effectiveness of the curing process and also uses significantly more fuel wood. As fuel wood use is an issue in these villages, a fish-smokehouse design was recommended to reduce fuel-wood use.
3. By heat smoking over an open-fire, practitioners are exposed directly to smoke, and can suffer from a respiratory disease. Use of a fish smokehouse with a chimney greatly reduces the amount of smoke inhalation.



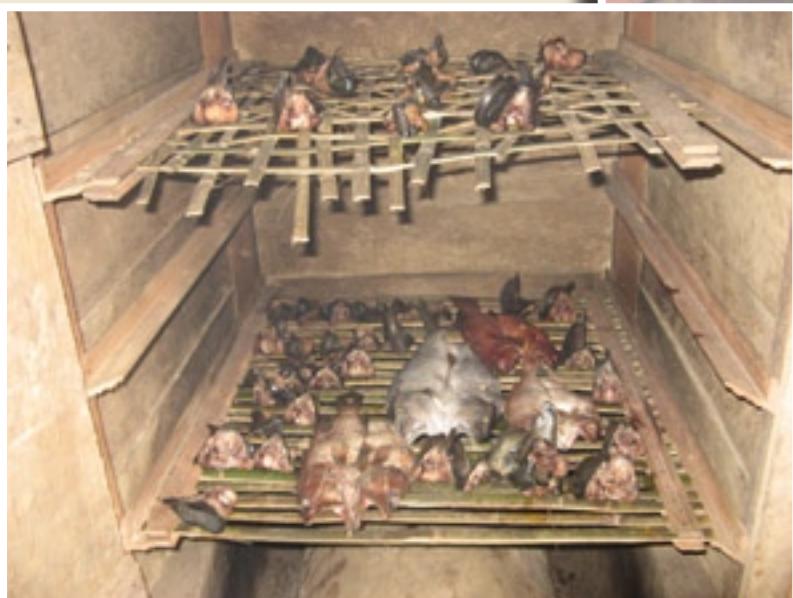
Improved Fish Smokehouse - Amaiteng



The Norwegian Red Cross supported the development of two fish smokehouses during this workshop. The first smokehouse was built prior to the workshop in the village of Sibigo, together with catfish smoking practitioners. The second was built during the workshop in Amaiteng Village for smoking skipjack tuna as well as other fish. Unfortunately this smokehouse was not ready for firing by the end of the workshop. Dodon of MAP's research and development division stayed on for three weeks, going back and forth between East and West Simeulue assisting the villagers in getting the smokehouses in fine working order. Dodon is now working together with the Asian Regional Cookstove Program on an illustrated manual supported by the Norwegian Red Cross to help with the dissemination of this appropriate technology.



Improved Fish Smokehouse - Sibigo



The firebox is made by mixing clay/loam dirt, ash, and rice husks. Catfish are cleaned and seasoned, and then arranged on bamboo smoking racks. A fire is lit in the firebox and the fish are smoked for 8-12 hours until dry. The community say the fish taste great. Continued experimentation with smokehouse design, data keeping on fish shelf life and production of a manual are being run as follow-up activities.

Participants were very interested to learn to make floss out of mackerel and skipjack tuna, as prices drop during the season when catches are high. By making floss out of fish, storage time greatly increases. Price and even nutrition can increase as well. The floss can be sold separately, or used in bread and cake recipes, so that there are numerous marketing opportunities. As they say though, the proof is in the pudding, and communities first had to learn how to make the product, and test to see if it was locally appropriate. Ease of preparation, use of locally available and low-cost ingredients and taste were listed by participants as important criteria.

Recipe # 1 - Skipjack Floss (Abon Tongkol)

Ingredients

- 5 kg skipjack tuna
- 200g palm sugar
- 100 g shallots
- 100 g garlic
- 30 g coriander seeds
- 250 g lesser galangal
- 250 g red chillies
- 8 tablespoons salt
- 7 salam leaves (Indian bay leaf)
- 2 liters cooking oil

Instructions :

1. Clean the fish and chop into small pieces
2. Steam the small fish pieces until well cooked
3. Pick apart the meat from the bones
4. Chop the fish meat into very small pieces, but do not use a food processor
5. Fry the fish in oil in a large wok until medium brown and very dry
6. Chop the shallots, garlic, chillies and galangal until very fine
7. Pound the coriander seeds with a mortar and pestle
8. Stir-fry all the spices together
9. Mix the stir-fried spices into the wok with the fish and continue cooking over a low heat until dry
10. Press the oil out of the fish floss with paper towels to remove some grease, then place on cookie sheets for cooling
11. You can package the floss in mason jars, or in plastic sealed bags for sale.



3) Community Based Policy

Facilitators - Jajang Sonjaya

Location - Mohammad Ali's Coffee Shop - Amaiteng Village

The policy session consisted of three activities; 1) presentation on community based mangrove management in Indonesia, 2) discussion about the concept of policy and legislation, 3) simulation on problem identification and policy formulation.

The presentations on community based management took place on day two with the entire group as described on page 14. The discussion and role play activities were run at a coffee shop on days 3 and 4. The coffee shop was chosen to provide a relaxed atmosphere where participants would feel at ease to speak their minds during the three hour discussions. Coffee shop discussions over a range of subjects from politics to family matters to fishing, are common in Simeulue. The talk was not limited to workshop participants only but Mohammad Ali, shop owner and former sailor, as well as shop staff and patrons. The first discussion was attended by 11 workshop participants, including the village head of Amaiteng, a traditional coastal leader, two housewives, six fishermen and a village youth. The second discussion was attended by 10 participants including a village government secretary, a local NGO worker, two village youth, five fishermen and the Head of Office from Norwegian Red Cross. The case study and simulation used to spark discussion were the same for both days, so the following notes apply to both discussions.



The session began with a discussion on the concept of law. The facilitator asked the general question to the participants; "What do you know and understand about the law?" Participants had a variety of responses, many went on to list various types of law in Indonesia; laws and acts (undang-undang), village ordinances (SK Desa) rules and regulations (peraturan), rules of the game (aturan main), etc. In Indonesia, the root word for law or policy (kebijakan) is "bijak" which means wisdom. Wisdom helps people lead good lives, and the facilitator went on to explain that policy was intended for the good of the people as a whole, and that policy making needed to be made based on knowledge, experience and wisdom. Next several examples of Indonesian policy were presented, and the group commented on whether or not these policies were sound and intended for the good of the people or not. Many of these policies seemed good on paper, but it was discussed that often-times in Indonesia, well-intended policy is not carried out. One reason is that government officials do not understand the base concepts underlying the policy and are not accustomed to applying "bijak" thinking to governance.

A hypothetical case study about a coastal village situated amidst the mangroves was distributed to participants. The story was based on real events in Simeulue Island, learned during assessment (see box on the next page). The participants were given 10 minutes to read the case study, and then identify all of the issues and problems from the story facing the people of Kuala Permai. These were listed each on a large sheet of butcher paper, one issue per sheet. Problems were then ranked from most pressing or troublesome issue to least. The next step was to determine if these issues were linked, for instance linked by cause and effect? Participants were asked to draw these links. As an example, the participants linked mangrove destruction to uplift of the island between 70-150 cm. Mangrove loss was linked to fish loss, including areas completely unproductive for fishing nowadays called "sleeping areas." Participants then began to work up problem trees. The problem trees were made so that participants, acting as policy makers, could better understand the processes that are causing the problems, and what policies could be drafted to improve the situation. Participants were challenged to make policies that answered more than one problem at a time.



The facilitator closed this session by clarifying principles and steps to drafting policy based on the story from the simulation. Principally, good local policy needs to be created using a bottom up approach, because communities best understand what is at the core of problems that are taking place at the local level and what specific policies are needed to address local issues.



Hypothetical Case Study
THE MANGROVES of KUALA PERMAI

I live in a village called Kuala Permai. It is a beautiful village because it is at the mouth of a river and is surrounded by healthy mangrove forests and rainforests. Ninety percent of the villagers fish for a living, five percent are farmers and five percent are government employees, teachers or traders. The village economy is entirely dependent on fisheries.

The tsunami and earthquake disaster two years ago changed our lives. Our vast mangrove forest was lifted up and the water has receded 1.5 meters. Many mangroves have died. Only in certain parts of the forest are mangroves still living and producing fruit, but next year these too might die as they are drying out. Because the mangroves have died, there are less fish along the coast. Of course, fish catches by our fishermen have also decreased. There are still fish out in the open sea, but we need to compete with modern fishing boats from Thailand, Taiwan and other industrialized countries to catch them and we do not have modern fishing equipment.

The government has enlisted people from our village to plant mangroves along the uplifted beach. But 90% of the mangroves planted have already died. I don't know why? It appears the seedlings are being eaten by water buffalo. Young leaves are missing and some mangroves seem to have been trampled. In our village water buffalo are allowed to range along the beach, forest and river. There used to be regulations regarding where water buffalo could range. The owner of a water buffalo that ate a planted tree would be fined. This did not resolve the issue, however, because almost all villagers own water buffalo and all the buffalo eat plants, both naturally occurring and planted. I am confused about what can be done with these buffalo because they are important to us too. The buffalo are like bank accounts for their owners, when we need cash we sell a buffalo.

Even if mangrove seedlings grow, they are not of use to us yet. It will take tens of years for the trees to grow large and become a refuge for fish. This means we will have to wait a long time for fish catches to come back to normal, and that's if the mangroves come back successfully. Villagers from our community need to make money in the short term, at least enough for basic survival.

Truthfully we put a lot of our hopes on the youth. It is a shame that many are not carrying on as fishermen like their fathers. They do not know how to determine different fishing seasons, or the movement of the tides. They are happier working in the towns as teachers and government officials. The women in our village already have many duties at home, raising the children, cooking, preparing fish for market, it is a burden if they also have to find new work outside of the home.

We can farm actually, but the good land for farming around here have already been planted with clove trees, which have very little value at the market now. Our rice fields are very reliant on the rains, which are less reliable nowadays. The area which could be used for farming is the mangrove area which has died after the tsunami, and is becoming terrestrial forest. Should we turn this into farmland? On the far side of the mangrove forest, we can see that new mangroves are growing naturally on the mud and uplifted coral reef out to sea.



4) Advanced Ecological Mangrove Restoration

Facilitator: Ben Brown

Locations: Amaiteng Village (Day 1), Lugu Village (Day 2)

The first field trip took place in Amaiteng. The village head of Amaiteng came along for this session, and informed the group of historical mangrove coverage in the bay, which was fully forested until the mid 1980's. The 80's and 90's saw nearly total depletion of mangrove forest, as trees were used for fuel wood to fire a coconut oil industry. Fisheries, especially crab fisheries, had plummeted after the mangrove loss, and communities are interested in re-establishing mangroves for fisheries value and protection against storms. As of yet, Amaiteng had not conducted mangrove planting activities, but were very supportive of following up with Ecological Mangrove Restoration activities.

The second field trip took place just around a small isthmus in Lugu village. Lugu had also experienced clear cutting of mangrove forests in during the same time period as Amaiteng. By and large, villages further to the west had kept their mangrove forests in tact even during the time period of cutting near Sinabang. Lugu, unlike Amaiteng, had worked with ARC in re-planting mangroves. 30,000 *Rhizophora* mangroves of two species were planted, and a fence was constructed. At the time of the workshop, less than 50% of these plantings were surviving, and in some areas there was total mortality. This would be investigated with the group.

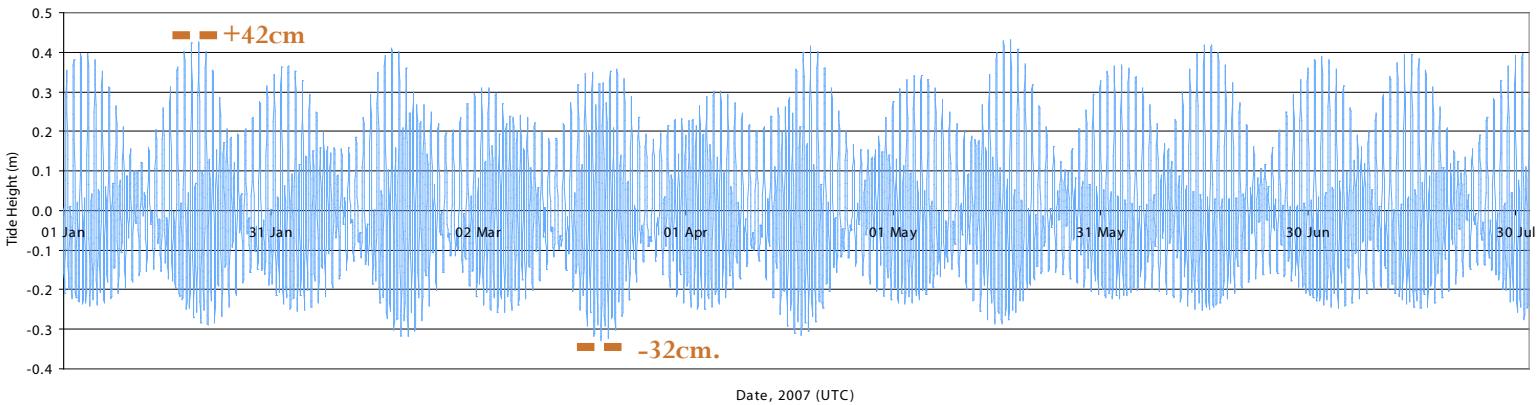


The first step of the field trips involved learning about different species of mangroves. MAP brought 12 species of propagules from North Sumatera to the meeting, and together with the participants learned their local name, way of growth, distribution. Propagules were laid out on the sand, and a rudimentary profile of the mangrove was drawn. Participants then arranged propagules in one of three zones, upper, middle and lower tidal based on their experience and a little guess-work. There are thought to be over 24 species of true mangroves on Simeulue Island, but very few propagules are now available after seismic uplift.

Next the participants learned how to read a tide table and compared this information with their own knowledge of tides. The tidal range on the Northeast coast of Simeulue is around 74 cm (from a high of +42cm to a low of -32cm).



Sea Surface Height – 7 months' view



Participants used the tide table (right) to determine the sea surface level at the time they were in the field. Using the Lugu field trip (July 12) as a case study, the water surface was -20 cm (-0.20218 m) at 13:00 when the team began taking measurements. This meant that mean sea level (+0 cm) would occur 20 cm above the current water surface. A stake was driven into the ground and marked with electrical tape 20 cm above the surface.

The next task was to mark the lowest low tide, which can be read from the 7 month chart above as -32 cm. This meant that we needed to place a stake at the point where the substrate/bottom was 32 cm below mean sea level (0 cm) or, remembering that sea level was currently -20 cm, 12 cm again below the current level of the sea (to get to -32 cm, we needed to go down an additional 12 cm from current sea level which we knew to be -20 cm from the tide table). This position was staked out, in line with the first stake (showing mean sea level), perpendicular to the coast.

2007/07/12 12:00 UTC	-0.04183
2007/07/12 12:30 UTC	-0.06912
2007/07/12 13:00 UTC	-0.09959
2007/07/12 13:30 UTC	-0.13076
2007/07/12 14:00 UTC	-0.15998
2007/07/12 14:30 UTC	-0.18460
2007/07/12 15:00 UTC	-0.20218
2007/07/12 15:30 UTC	-0.21061
2007/07/12 16:00 UTC	-0.20830
2007/07/12 16:30 UTC	-0.19431
2007/07/12 17:00 UTC	-0.16839

To mark out the highest high tide on the beach in line with the first two stakes, we needed to refer to the 7 month view of tides again, and also employ the use of a water-hose level. The participants already understood well the task at hand, and soon had placed a stake 42 cm above MSL. Most rural villagers from this part of the world are familiar with use of a simple water-hose level used in building and road construction.

Now that the tidal profile was marked out in actuality, the group took a closer look at the intertidal zone. The first thing that was noticed, was that nearly half of the mangrove plants were planted beyond the lowest-low tide mark. No mangrove will survive this amount of inundation. It was added that most mangroves find their home quite a bit within the lowest low tide and highest high tide, and that the range for mangrove growth on Simeulue may well be 50 or 60 cm rather than the full 72 cm. Participants are eager to mark out their intertidal zones in their own villages and find out for themselves, where the many different mangrove species of Simeulue grow. The group also noticed a natural zonation pattern of the scarce, but present naturally recruited seedlings at the site. *Scyphiphora hydrophyllacea* and *Nypa fruticans* growing up highest on the beach, *Sonneratia alba* and *Rhizophora apiculata* at mid elevations and *Rhizophora apiculata* only at the deepest elevations. This matched their understanding of forest zonation before tectonic uplift.

Now that the intertidal was marked out, the groups had some fun. They decided to plant some of the propagules in the proper intertidal zone, and distribute the rest by throwing them out to sea, to let the tides and currents do their work. In planting propagules, test strips, perpendicular to the beach, and not horizontally along the beach were suggested. This would enable us to study preferential tidal inundations of the various species planted.

All of the previous plantings, took place horizontally along the coast in a relatively narrow range. This decreased the chance that mangrove seedlings would be planted at the appropriate substrate depth. In other words, it increased the chances that the majority of mangrove seedlings would be planted at an inappropriate substrate depth, such as the case in Lugu, where many seedlings were planted beyond the lowest low tide.



Marking Out the Intertidal Zone



Amaiteng: After having determined mean sea level (marked in this case with packing tape), the group measured up on the PVC pipe 42 cm and used a water-hose level to mark the actual highest high tide on the beach. Permanent tidal markers, using concrete posts with aluminum markers can be erected at need. (Top left) This Rhizophora seedling is growing on substrate around 15 cm below Mean Sea Level (marked with black electrical tape on the white PVC pipe). (Top right)

Lugu: On day four, a new set of participants went through the same activity, marking out mean sea level, lowest low tide and highest high tide along the beach using a tidal table, a water-hose level, PVC pipes and some electrical tape. After marking out the inter-tidal zone they noted that about 1/3 of the plantings were planted deeper than the lowest low tide.

Understanding Mangrove Zonation, Planting and Propagule Distribution



After demarcating the inter-tidal zone the group laid out different propagules based on where they usually find these trees in the high, middle and lower intertidal. Next participants began distributing propagules in various ways. Some of the *Rhizophora*, *Bruguiera* and *Ceriops* propagules were planted based on their observed tidal preferences. The rest of the propagules, big and small, were released in tidal creeks, and thrown to sea for distribution by tides and currents.

As follow-up, communities will monitor where natural seedling growth seems significant, and may choose to fence these areas to discourage grazing by water buffalo. Collection of propagules from Teluk Dalam, and another few shipments from North Sumatera are planned in order to provide propagules for continued human-assisted dispersal.



5) Non-Timber Forest Products

Facilitators - Ratna & Masiah

Location - Australian Red Cross Guest House Kitchen - Amaiteng Village

MAP-Indonesia has just recently begun to explore the possibility of developing and promoting non-timber forest products (NTFP's) from mangroves, as a short-term economic incentive for communities to get involved in long-term mangrove conservation. In 2006, MAP adapted and re-printed a cookbook using mangrove fruits and leaves as the main ingredients in 40 recipes. Livelihood manager, Ratna Fadilah has worked with women's groups in Kalimantan, Java, Sulawesi and Sumatera in developing NTFP's over the past several years. This workshop session was amongst the most well attended (12 on day one, 14 on day two), in part because it offered an escape from the sun, but more likely because everyone got to sample the tasty food being concocted in the ARC kitchen. Participants attended both hands-on sessions as well as discussions on non-timber forest products. One discussion focused on utilization of *Nypa fruticans* (mangrove palm) but there was no time in the workshop to visit a *Nypa* forest for direct practice. There was also discussion on use of *Sonneratia caseolaris* and *Avicennia* spp. fruits, but fruits were not available for the hands-on sessions. The hands-on sessions focused on use of the mangrove fern, *Acrostichum aureum*, and two species of mangrove holly *Acanthus ilicifolius* and *A. ebracteatus*, with follow-up sessions on making virgin coconut oil.

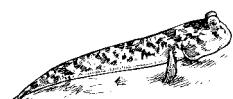


After the 2004 tsunami, reports came out in the press worldwide that amidst the devastation, some areas in the direct path of the tsunami wave were spared, Simeulue Island being an oft-cited example. It is true that Simeulue only suffered 3 deaths out of 45,000 inhabitants as a result of the tsunami. But this was due in large part to local legend, preparedness of the inhabitants, and proximity to high ground along most of the coast. Local legend, known as "Smong," dates back to the tsunami of 1907 and perhaps was reinforced in large earthquakes such as the 1935 earthquake which resulted in a large tectonic emergence as well and a recent 7.4 Richter earthquake in 2002. Soon after the 2004 tsunami, it was reported in the world press, rather, that thick mangrove coverage saved the island from destruction, which is to some extent reinforced by local opinion but is not likely true. It was also falsely reported that many villagers sustained themselves on prepared *Avicennia* fruits as a substitute for rice, shipments of which were interrupted after the tsunami and 2005 earthquake. Local residents deny that they ate *Avicennia* fruits, but some had remembered that this practice did take place during the Japanese invasion of World War II, and perhaps mangroves were part of Simeulue Islander diets in the early parts of the 20th century. The "ilmu" or skills and knowledge, of how to prepare food from mangroves had long been lost, however, and Simeulue residents were eager to learn.

During the workshop, the group made tea and fried crackers from the holly mangrove (*A. ilicifolius* and *A. ebracteatus*), and crisps from the mangrove fern (*Acrostichum aureum*). They were assisted by Masiah, a leader of SEROJA, a women's youth cooperative from Jaring Halus who have developed and marketed 5 NTFP's over the past two years. The facilitators shared not only recipes and technical experience, but also insights on the importance of forming an organization such as a cooperative, approaching the health department for permits, packaging and marketing strategies and financial management tips.

The participants were also given recipe books, revised and augmented by MAP based on a recipe list created by Yayasan Mangrove of Jakarta. These books contain 40 mangrove recipes with space for cooks to add their own ideas. The cookbooks can be downloaded in PDF form on the MAP web site in both English and Bahasa Indonesia:

<http://mangroveactionproject.org/map-programs/toolkit/mangrove-cookbook>



Non-Timber Forest Products - Recipes

Recipe # 1 - *Acanthus ilicifolius* crackers
 (Akin to shrimp crackers in texture and flavor)

Ingredients:

- 200g of *Acanthus* leaves, de-thorned
- 1 tbsp salt
- 1/2 tbsp baking soda
- 1 tbsp sugar
- 1 kg cassava flour
- 1 clove of garlic
- Banana leaves for steaming

Kitchen equipment:

- | | |
|---------------------|---------|
| • Washbasin | • Knife |
| • Wooden spoon | • Wok |
| • Mortar and pestle | • Spoon |
| • Blender | |

Instructions :

1. Take the thorns off the *Acanthus* leaves, wash and pound.
2. Boil leaves in 1.5 liter of water until 1 liter remains and water is green colored strain this extract back into the pot and set it aside.
3. Pound the garlic, and mix with sugar, salt, baking soda.
4. Mix the ingredients from step 3 into the pot with the extract from the *Acanthus* leaves.
5. Stir continuously while cooking these ingredients for several minutes.
6. Remove from heat.
7. Slowly add the remaining flour to the mixture, until all the liquid is evenly absorbed in the flour.
8. Roll pieces of dough to around 10 inches long and 2 inches in diameter.
9. Wrap the dough in banana leaves.
10. Steam the banana leaves with dough inside for 15 minutes and then cool.
11. After the dough is cooled, remove the banana leaves and cut the dough in size pieces, the size of a large coin.
12. Dry these pieces in the sun or in a solar dryer.
13. When the pieces are dry, they can be packed for sale or fried in oil. You can package and sell both dry/un-fried crackers as well as already fried crackers.

Recipe # 2 - *Acanthus ilicifolius* tea
 (Akin to green tea, an excellent tonic brew)

Ingredients:

- 500g of *Acanthus* leaves, de-thorned
- 15 grams Pandan leaf
(Pandanus amaryllifolius)

Kitchen equipment:

- | | |
|--------------------------|--------------|
| • Scissors | • Knife |
| • Oven or wok | • Wash basin |
| • Solar drier (optional) | |

Instructions :

1. Take the thorns off the *Acanthus* leaves and wash.
2. Cut the leaves into very small pieces with scissors, or find an appropriate machine which will grind the leaves into fine pieces. This is best done with dry leaves.
3. Dry under the sun for 3 hours and then roast in an oven or in a wok over low heat until the leaf moisture is minimal.
4. Store in a ventilated basket for packaging. Can be packaged in paper, wax paper, plastic, etc. for sale.
5. When preparing the tea, add one tablespoon of leaves to a glass of hot water, steep for 3-5 minutes. For best tonic performance, do not add sugar.

Recipe # 3 - *Acrostichum aureum* crisps

Ingredients:

- 500 g *Acrostichum aureum* fiddleheads and young leaves
- 500 g rice flour
- 1 egg-white
- 1 thumb-sized piece of greater galangal
- 4 candle nuts
- 1/2 teaspoon coriander
- 1 tsp salt
- 10 kaffir lime leaves
- Half of a coconut, grated
- 1 liter cooking oil
- Water

Kitchen equipment:

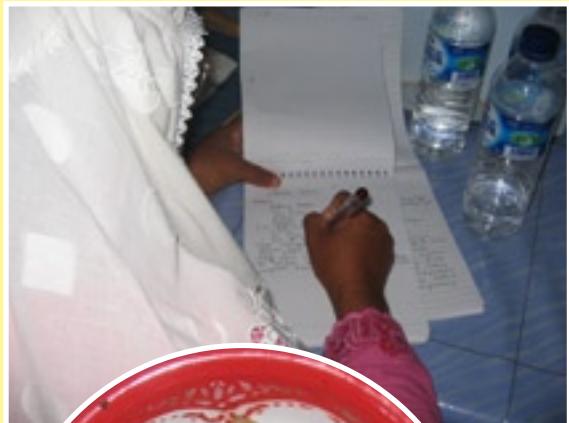
- | | |
|---------------------|------------------|
| • Washbasin | • Knife |
| • Wooden spoon | • Wok |
| • Mortar and pestle | • Chopping board |
| • Blender | |

Instructions :

1. With mortar and pestle, mash the galangal, candle nuts and coriander
2. Beat the egg white and mix with the above ingredients
3. Cut the lime leaves into very fine pieces
4. Add flour, lime leaves and grated coconut
5. Add air while stirring to achieve a pancake batter like consistency
6. Wash leaves and fiddle heads and pat dry.
7. Heat up the wok and add oil
8. Dip leaves/fiddle heads in the batter and fry.
9. If the crisps are being produced for retail sale, it is best to let the fried crisps cool, and then fry a second time.



Harvesting of *Acanthus ilicifolius* is best done with a pair of gloves and pruning shears. (Top right) Take care not to over-harvest from a single plant, even though it seems as if there is an unlimited supply. That's what our ancestors said about fish in the sea once upon a time. A sustainably harvested plant will produce new leaves year-round. Mangrove herbs, are both nutritious and delicious, if prepared with a little TLC.



Acanthus crackers after steaming and slicing, ready for sun-drying



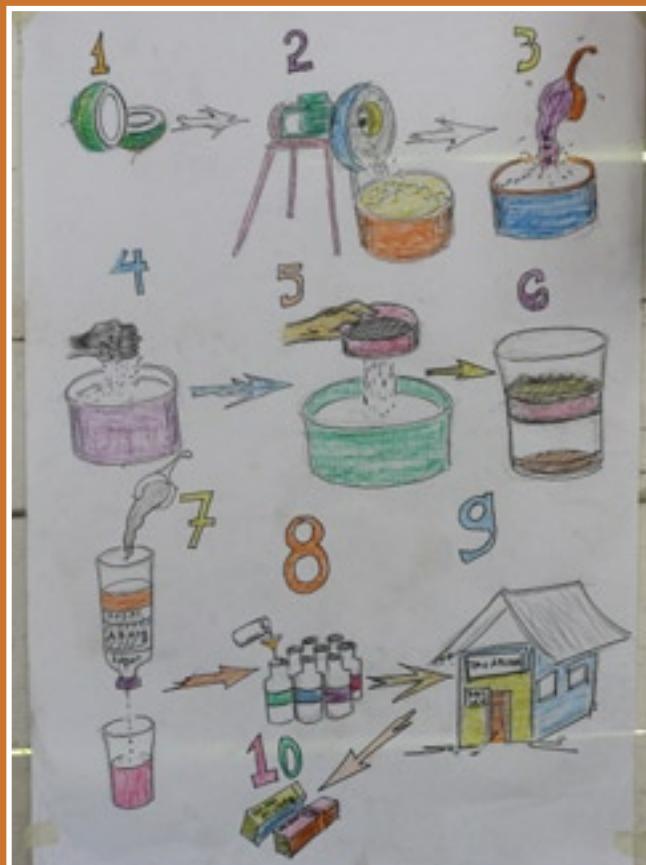
The group also sampled several products produced by SEROJA of Jaring Halus, North Sumatera (Virgin Coconut Oil, Acanthus tea, Acanthus crackers)



Non-Timber Forest Products - Follow-Up

MAP staff led by livelihood manager Ratna Fadilah remained in Simeulue from July 14-31 to follow-up on workshop outcomes with livelihood extension work in the following participant villages; Lugu, Linggi, Kuala Makmur, Amaiteng and Teluk Dalam. MAP staff also assisted Australian Red Cross livelihood staff in undertaking environmental education at an elementary school in Sambay Village during this period.

Livelihood sessions involved IHOF participants acting as co-facilitators to introduce the activity to women's organizations averaging 20 women per village. A lesson on making Virgin Coconut Oil was used as an ice-breaking activity. Additional trainings on the various non-timber forest products developed during the IHOF workshop are scheduled for future village meetings.



The steps of Virgin Coconut Oil production were illustrated by Dodon of MAP and carried out by the various members of the government sponsored PKK women's organizations. Grating, cold pressing for oil production, filtering and taste testing are all pictured here. Virgin Coconut Oil is gaining popularity world-wide as a medicinal and health food product, and can significantly increase the value of a coconut crop by depending on access to markets.



6) Fish and Crab Trap Making

Facilitator: Yono

Location: Workshop Venue- Amaiteng Village

Most fisherfolk around Indonesia have a history of fish trap making. In some places, trap making skills have been lost, or are only in the hands of a few elders. Fish traps enable fisherfolk to catch fish while still pursuing other livelihood activities, such as farming or hook and line fishing. Fish traps are also often used by village youth as an added livelihood activity. Learning how to make traps for both crabs and reef fish was identified as a need during the assessment. Fishermen from Simeulue currently catch small grouper and jack trevally by hook and line for grow-out in floating fish cages. Use of hook and line leads to higher mortality of stocked fish (due to stress during the catching process). Others are flying in juvenile fish for stocking from mainland North Sumatera, which incurs a high cost, and is difficult for practitioners without access to capital. Crabs are caught in healthy mangrove areas by hand at night, and crab traps are seldom employed by Simuelue residents.

A fisherman from Jaring Halus village - North Sumatera, was brought in to train Simeulue fishermen on how to make a variety of fish and crab traps out of locally available materials including bamboo, nylon netting and large gauge framing wire. This activity was a big hit among the male participants, who began studying on day 3, and requested a full day session on day 4 as well. Pak Yono, the trainer from Jaring Halus, stayed on for an additional few days in Simuelue to continue making traps with workshop participants. Use of traps and a cost-benefit analyses will be prepared after one year of use by MAP.



6.4 Day Five - Agenda (July 13)

Synthesis - Go Home, Then What? - Plus, Minus, Change and Reflection Evaluation

Proceedings

On this fifth and final day, participants were highly energized as a result of their new experiences, and the room was filled with chatter and eagerness to go home and spread the word. There was also an air of apprehension. They did not yet feel ready to go it alone, and requested continued facilitation by MAP and ARC. Indeed, follow-up activities were already planned for the short-term. The morning began with a recapitulation of the previous four days; presented using a photo slide show, with comments from the presenters and audience alike.

The facilitation team had been planning to run an action-planning activity, as a standard workshop closer. But it was pointed out that we were skipping a very important step. The participants, four people from each of eight villages, could not be expected to make plans on behalf of their entire village. They would have to return home first as emissaries of what they had learned about mangroves. The questions put to the group were; "What information, knowledge and skills would they share with their fellow villagers, and how would they start?" "What segments of society would they bring their messages to?" "How would they get this information across?" "What resources would they need?" "How did they expect their community to respond?" Finally, together with informed community members, they would be ready to plan an action-taking activity. Before asking for community input on all the above questions, it was stressed by the facilitators, that planning for and implementing one single action, identified, prioritized and chosen by the community was the best way to jump into action. After successfully resolving a single issue, people are much more ready to tackle additional problems and issues. This is the way to build empowerment amongst the community.

The first column in the table below contains comments written by the participants at the start of the workshop on what they hoped to get out of the workshop. The second and third columns were generated during the discussion that took place on the last day in response to the questions above, what new skills, information and knowledge were gained this week, and what will you do with these skills upon return to your village?

Hopes for the Workshop	New Skills & Knowledge	What Next?
Want to learn about rearing mangrove seedlings	This workshop gave a new understanding about mangroves, and how to protect Simeulue's "community refrigerator"	Laut Tawar Village: I will teach other fisherfolk in my community how to make crab and fish traps
Learn about the different types of mangroves	My hopes for this workshop were met, learning how to cook with mangroves and make new fish products, join in discussions and place mangroves so that they live and not die. I hope that our tutor will come back and share new skills and knowledge with us.	Sambay Village: We will start mangrove rehabilitation by gathering mangrove propagules and planting them in areas indeed suitable for mangroves, following the tips we learned from our tutor during this workshop. We will also test out the fish and crab traps we made and report back on how they work.
Utilization of mangroves for food and also how to utilize Nypah Palm	We learned not only utilization of mangroves but are now messengers back to our communities for mangrove conservation.	Kuala Makmur: We will develop much of what we learned from our tutors this week, starting with making <i>Acanthus</i> and <i>Acrostichum</i> crackers to get some small capital together, and also teaching other women of the small business ideas through the PKK meetings in the village. We will teach people to think creatively about developing livelihoods.
Want to learn everything about mangroves	Up until now, our community held the view that mangroves are merely another of God's adornments to nature. With this meeting, we know that humans and mangroves are not separate entities, but part of one whole.	Lingga Village: Teach making mackerel floss (abon) <i>Acanthus</i> and <i>Acrostichum</i> crackers and <i>Acanthus</i> tea at the PKK women's meetings. Teach the entire community about how to restore mangroves and hopefully we can protect the mangroves when they are established.



Hopes for the Workshop	New Skills & Knowledge	What Next?
Want to learn how to make a map of the coastal area	It was a blessing for the visitors from Sumatera to come and teach us fish trapping. Hopefully we will be able to develop this skill in Simeulue.	Will use the fish traps to stock cages for grouper and crabs.
Also want to learn how to go about making village ordinances for mangrove protection and about mangrove management for the future.		
We heard we will make fish and crab traps and are eager to learn		After joining in the workshop, I think it is important for the entire population of Simeulue to be involved and support the protection of mangroves as well as possible, because mangroves have a lot of uses although none as important as protecting our environment.
Would like to make friends		I will hold "musyawarah" (discussions) in my village about what we learned at this meeting.

Plus - Minus - Reflection Evaluation

Ordinarily, MAP runs a Plus-Minus-Change and Reflection Evaluation with workshop participants. This time around, instructions perhaps were not so clear, and the participants completed the plus and minus sections but not the change section. The change section suggests changes for future workshops. Instead participants wrote about the activities they felt were most beneficial and also reflected on the week.

Plus (+)	Minus (-)	Reflection
Very happy with the knowledge learned in this workshop and hope it will spread throughout all of Simeulue.	If the skills and knowledge learned during this workshop are not developed, we are worried they will be lost.	Mapping and Fish/Crab trap making were the most useful activities this week.
The cooking sessions were good. The food was delicious and easy to prepare. There was lots of food.	The rice at the workshop for lunch was hard and the entrees and snacks were not good.	I came to know about different uses of mangroves, like Rhizophora, Nypa, Acanthus and Acrostichum. I will return home with this new knowledge and tell my community, starting at home amongst my family. Then I will tell the greater community during meetings and challenge them to be more creative with using mangroves products.
The discussions helped us to become brave to speak in public.	The workshop was not long enough, we still need to learn more about the mangroves.	We learned many useful things this week; -making Acanthus tea and crackers, and fish floss - mangrove restoration - discussions - mapping
If I could, I would attend another training like this.	The venue was dark and hot and sitting on the floor was hard	Before this workshop, we did not appreciate mangroves as much. We know now, mangroves are very useful. We love mangroves more now.
The style of presentation of all the material was extremely good.	Bad coffee	I will pay more attention to mangroves now.
Ben is funny	No transportation to pick us up from Kota Batu.	The most beneficial thing was understanding how to restore mangroves by planting and not planting too.
All the material was both practical and useful		I will work with my community of Kuala Makmur to assist economic livelihoods based on mangrove use.
The style of presentation, bringing about common understanding, followed by support and then hands-on practice was very good		We hope that MAP will come and stay in Simeulue for a long time to help with mangrove programs.
The mood was peaceful and safe at the workshop		
Very clear explanations		



6.5 Conclusions

What a fun week! Full of relevant activities, poignant discussions and opportunities to make new friends. The participants clearly learned and shared a lot. On the surface, many people were most pleased by the hands-on livelihood activities, building crab traps, cooking mangrove herbs etc. But there were also a plethora of deeper feelings expressed based on observations and experiences and new thoughts. There was even a clear shift in values taking place. It is clear that Simeulue Islanders had taken their mangrove forests for granted over the past decades, and in a very few places had actively destroyed them. But, it was also clear that there was genuine concern over the loss of mangroves, and a desire to bring them back. This workshop provided, through discussion and demonstration, insights to making mangrove recovery a reality.

Strict planting of Rhizophora mangrove seedlings clearly is not going to bring about the desired recovery. For that part, effective, Ecological Mangrove Restoration alone will also not obtain the desired results. What will ensure the long term success of mangroves on Simeulue, in other words, what will maintain the resilience of the mangrove forest ecosystem, is the building of a common understanding about mangroves by a concerned citizenry, coupled with active and cognizant management of the mangroves for their sustainable use and also protection.

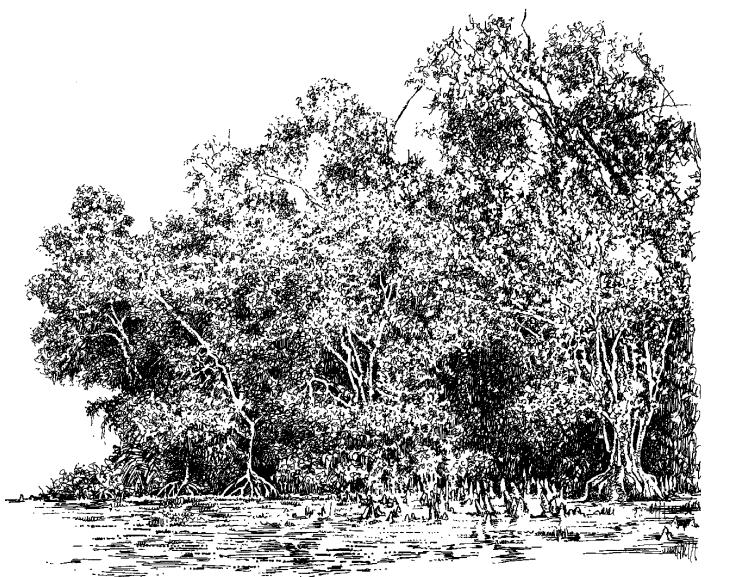
Some of the tools to achieve this vision were presented during this workshop. Community based mangrove management examples, discussions on policy, techniques for mapping and for ecological mangrove restoration are all useful implements to get communities on their way. The small-scale livelihood sessions go beyond providing schemes to earn an extra rupiah from mangroves. Development of small scale livelihoods also provides the opportunity to begin the organization process at the community level. An organized and united community is the best tool possible when approaching other stakeholders such as government, in order to bring about long-term conservation of mangrove resources.

In terms of resilience, one could say that the mangroves of Simeulue will bounce back after this seismic disturbance, much as they have for centuries. This time around, however, exploitative interests may prevent the re-establishment of mangroves for although the mangroves may be resilient, there are not yet social structures in place to act as responsible stewards of the mangroves.

Two outcomes of this workshop will help bring about this needed social change. Firstly, participants are returning to their villages, and with the help of MAP and ARC facilitators, are engaging their local communities in undertaking some of the activities learned throughout the workshop. There have already been follow-up activities many of the mini-sessions from days 3 and 4 of the workshop, as well as the start of Environmental Education activities at local schools. As a second action outcome, MAP has been invited to Teluk Dalam by T.M. Nazir, the traditional coastal leader (Pawang Laut) of the area. Pak Nazir has asked MAP to help approach local government to delineate critical mangrove habitats in Teluk Dalam as protected areas, and start local communities on the path to collaborative management. Ecologically, Teluk Dalam is the center for mangrove biodiversity on the island, and also, due to relatively low seismic uplift, maintains the most viable population of mangroves on the island. The next challenge is to strengthen social systems needed to adequately protect the mangroves, through legislation, awareness building, enforcement, sustainable utilization and restoration.

When considering a resilient mangrove ecosystem, it is essential to see the mangrove forest and human systems as a whole. The domain of humans, and the domains of mangrove flora and fauna on Simeulue, as elsewhere, is inter-dependent. To consider one in isolation of the other is to come up with a partial solution to mangrove conservation that can lead to collapse of the mangroves in the future.

- To the Mangroves of the Future!



Appendix A - Uplift Data for the Island

Data from the following table was taken from the data table "Uplift and Subsidence Values" calculated and presented by Dr. Kerry Sieh of California Institute of Technology in the following paper; "Deformation and Slip Along the Sunda Megathrust in the Great 2005 Nias-Simeulue Earthquake", Richard W. Briggs,* Kerry Sieh, et. AL Published 31 March 2006, Science 311, 1897 (2006) DOI: 10.1126/science.1122602 . This data will be useful in comparing new zones of establishment for mangroves with substrate depths/ elevations in pre-seismic uplift mangrove forests.

Landmark	Latitude	Longitude	Cumulative Uplift after March 28, 2005
Teluk Sinabang	2.50182	96.38086	111 cm
Teluk Sinabang	2.51252	96.40407	87 cm
Teluk Dalam	2.65409	96.13341	52 cm
Teluk Dalam (Sambai)	2.65153	96.19441	64 cm
Teluk Dalam harbor	0.5646	97.8266	-44 cm

Appendix B - References

- Briggs Richard W, Kerry Sieh, Aron J. Meltzner et. al. "Supporting Online Material for Deformation and Slip Along the Sunda Megathrust in the Great 2005 Nias-Simeulue Earthquake." 31 March 2006, Science 311, 1897 (2006)
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For more information on ecological/hydrological mangrove rehabilitation see: www.mangroverestoration.com
Also visit the Mangrove Action Project website: www.mangroveactionproject.org

Appendix C - Glossary

Afforestation - Planting of trees in an ecosystem that was not previously forested.

Creation - The conversion of a persistent non-wetland area into a wetland through some activity of humans.

Ecosystem Services - The combined actions of the species in an ecosystem that perform functions of value to society (water treatment, provision of medicines, storm protection, fisheries production...).

Enhancement - The increase on one or more values of a wetland, often accompanied by a decrease in other values.

Propagules - Mangrove fruits, seeds and seedlings dispersed by water, both tidal and riverine.

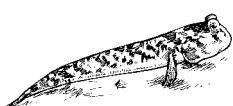
Propagule Limitation - A condition in which the proposed mangrove restoration site has appropriate hydrology, topography and soils to allow for natural regeneration via volunteer mangrove propagules (not planted), but propagules are not available due to lack of adjacent seed sources, or physical barriers to propagule dispersion.

Reforestation - Planting of trees in an ecosystem that was previously forested but has been disturbed.

Rehabilitation - Any activity undertaken which aims to convert a degraded system to a stable alternative use which is designed to meet a particular management objective. Rehabilitation is also intended as an umbrella term that includes both restoration and creation.

Resilience - The amount of change a system can undergo (its capacity to absorb disturbance) and remain within the same regime - essentially retaining the same function, structure, and feedbacks.

Restoration - Returned from a disturbed or totally altered condition to a previously existing natural, or altered condition, by some action of humans.



Appendix D - List of Participants

Participant	Village	Participant	Village
Kamila	Gunung Putih	Nurdin	Kuala Babek
Iham Ratida	Gunung Putih	Hendra Gunawan	Kuala Babek
Roslan	Gunung Putih	Taufik Walhidayat	Kuala Babek
Safrijamin	Gunung Putih	Rosi Yanti	Kuala Babek
Dahri	Sambay	Cut Fadillah	Kuala Makmur
Alimudin	Sambay	Rosnawati	Kuala Makmur
T.M. Nazir	Sambay	Rosmidah	Kuala Makmur
Sarhana	Lugu	Ayu Soraya	Kuala Makmur
Rusdin M	Lugu	Nangisudin	Kuala Makmur
Raswan	Lugu	Danuin	Amaiteng Mulia
Rafika Yanti	Lugu	Edi Wardi	ATM
M. usul	Lingga	Mansurdin	Laut Tarwar
Nurabida	Lingga	Ali Asdin	Sigulai
Ahmad Nur	Lingga	Anja Saputra	Amaiteng
Nurmaini	Lingga	Marlina	Amaiteng
Taufit	Kota Batu/Desa Kolok	Edi Wardi	Amaiteng
Nurdin	Kota Batu	Novizar	Amaiteng
Hendra	Kota Batu	M Basri	Sibigo
Rosi Yanti	Kota Batu	Anjar Asmara	Indonesian Red Cross
		T. Zaini	Indonesian Red Cross

Presenter	Organization	Presenter	Organization
Benjamin Brown	MAP-Indonesia	Melissa Bentivoglio	Australia Red Cross
Lukmanul Hakim	MAP-Indonesia	Paul Drossou	Australia Red Cross
Jajang Sonjaya	MAP-Indonesia	Edy Yansyah	Australia Red Cross
Ratna Fadilah	MAP-Indonesia	M. Basri	Jaring Halus
Ahmad "Dodon" Kahar	MAP-Indonesia	Masiah	Jaring Halus
Novaria Larasati	Australia Red Cross	Waryono (Yono)	Jaring Halus
Fahmi Abdullah	Australia Red Cross		





Australian
Red Cross



SELAMAT DATANG
PESERTA WORKSHOP PERBAIKAN EKOLOGI BAKAU &
PENGEMBANGAN MATA PENCARIAN BERKELANJUTAN DI DAERAH BAKAU
KERJA SAMA ARC, MAP, PMI, NRC, IUCN, DAPN
TGL. 09 S/D 13 JULY 2007 DI DESA AMAITENG MULYA
DENGAN WORKSHOP INI MARI KITA LESTARIKAN BAKAU DI PULAU SIMEULUE ATE FULAWAN

IUCN

