

OUT of the SHELL

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Summer Institute on Sustainable Livelihoods in Coastal Communities

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The Summer Institute on Sustainable Livelihoods in Coastal Communities was held from June 9 to 27, 1997 at Lester Pearson International, Dalhousie University, Halifax. The institute was designed to start a process of developing a training program for people who will work in, and for, the sustainable development of coastal communities. The target of the training is expected to be researchers who may take either a "fisheries" or other sectoral approach to solving the problems of coastal communities, without trying to understand the context of the problems. The training would help them use a different way of thinking about the problem. The basis for the Institute is the assumption that such researchers will need to be trained in participatory research and a sustainable livelihood approach to understanding coastal communities.

The 24 participants represented 7 nations, and a wide diversity of professional and disciplinary backgrounds, most of them involved in either IDRC projects or in the ISLE Program. This mix of participants allowed for a variety of voices and experiences to be discussed about coastal communities and their needs. June was only the start of the process necessary to design and implement such training programs.

Very early on, the participants identified that their primary interest was in working for the benefit of coastal communities. However, participants also

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indicated that we were a gathering of academics, government representatives, NGO workers and international development workers and researchers. Fishers and other coastal people were not present, and we would have to represent them to the best of our abilities. Of those attending the Institute, a certain number have been involved in coastal resource management work for many years while others were very new to the field. Some participants had very little involvement with on-the-ground-work, while many others came with extensive experience working directly in coastal communities.

Goals

The goal of the Summer Institute was to begin the development of curricula for training programs focussed on sustainable livelihoods in coastal communities. This training program would outline the basic knowledge required for the training of those working in coastal communities. The Summer Institute was not intended to be a training or lecture course. Rather, it was intentionally designed with the flexibility to allow participatory planning and brainstorming on relevant topics. This allowed the Institute to focus on the topics and outputs that would best meet individual and group objectives.

Getting to Know Each Other

The participatory process used was extremely important to the Summer Institute participants and for the outcome of the three weeks. An important initial step for the participants was that of getting to know one another, which took place in three separate stages. First, each participant was asked to submit a curriculum vitae and a recent paper on their work/research so that everyone would have some knowledge of each participant's background and work before arriving in Halifax. Secondly, the first day of the conference was devoted to introductory exercises designed to draw out information about the countries represented and the issues they faced. The first exercise was an interview exercise in which participants from each country shared their countryfolks' spiritual connection to the sea. The second exercise, the world blank game, asked participants to work in groups to discover and report on the sustainable development issues faced by coastal communities in another country.

However, after the first day, the participants still felt that they did not yet know enough to understand the context of coastal resources management in each other's countries. Therefore almost 2 days were devoted to participants preparing and presenting "country reports" - a summary of coastal resource management activities in their countries. Country representatives attempted to explain where they were in the area of coastal resource management, and where they hoped to go. Each country report described coastal management history and regime, status of coastal communities and coastal resources, government, academic and non-governmental coastal

management role and activities, issues of concern, goals, training and capacity building needs.

Training Module Development

After these country reports and discussions, participants felt ready to begin training module development. The themes and topics to be addressed by these modules were identified, grouped and prioritized by the participants on the third day of the Institute. This was done initially through a brainstorming exercise in which participants worked in small groups to identify potential topics and contents. Following this, the whole group worked together to group the identified topics under larger subject headings. This was done in a very participatory and hands on manner by sticking the topic squares onto the back wall of the seminar room and rearranging them under various subject heading categories. This initial list was developed into a working document, further refined into potential training modules and assigned to 3 working groups: 1) Coastal Resources Management; 2) Research and; 3) Community Organizing, Environmental Education and Training, Culture for Community Based Coastal Resources Management (CBCRM), and Gender and CBCRM.

The three working groups spent the next 4-6 days developing preliminary training modules based on these topics. Developing and revising the modules took up the bulk of remainder of the Summer Institute. Each module group identified their target group and their objective for training and described a theoretical rationale and background for the identified topic, as well as suggested content and training methodology. The discussions and exchanges that took place within the working groups were recorded to complement the actual modules - these notes will be helpful in understanding the philosophy and context behind the modules themselves. While the modules are not exhaustive, they do reflect the common understanding and definitions arrived at by the working groups. The modules were presented to, and validated by the larger group before being handed out in second or occasionally third draft forms.

The modules, while far from complete, made large gains in:

1. Identifying training needs (who, what, when, where, how...)
2. Outlining what important points should be covered in the training

The modules will be further developed through CoRR and ISLE for use in new and ongoing projects and programs.

Sustainable Livelihoods

In addition to developing the modules, the participants also worked with Naresh Singh of the United Nations Development Programme (UNDP) on the use of the sustainable livelihoods framework in the context of coastal communities. Naresh introduced the history, key concepts, pillars and framework of sustainable livelihoods approach (SL). Small groups were formed to analyse 3 countries from a sustainable livelihood perspective. The representatives from Nicaragua, Vietnam and Cambodia worked with the other participants on a sustainable livelihoods analysis of their countries. They were asked to:

- 1) Conduct a community strengths/assets assessment and identify assets/entitlements, activities and knowledge base of the community
- 2) Develop a policy analysis matrix that identified the policy and policy combinations with disruptive and reinforcing impacts on sustainable livelihoods.
- 3) Assess the key technologies to improve the productivity of assets and livelihood systems.
- 4) Identify existing and traditional microfinance facilities for credit and savings, as well as new opportunities in this area.
- 5) Based on the information gathered during the first four steps, design a work program on sustainable livelihoods and design a training program for those to be involved in this SL program.

The outputs were presented to and discussed with the larger group with Naresh Singh replying to the participants' questions and comments. In general, the participants felt that the SL approach was interesting and could complement existing approaches and practices. The participants enjoyed the SL analysis

process, especially the emphasis on community strengths and capacity - a refreshing change from the more conventional focus on needs. The policy analysis was also a useful exercise in determining impacts of national decisions on coastal communities.

However, at the end of the workshop, the majority were not yet ready to embrace the concept of sustainable livelihoods. Recognizing that for most participants this was an initial and brief exposure to the Sustainable Livelihoods Approach and there was no opportunity to use it in a field case study, there were concerns that although SL is theoretically appealing, it is still vague and difficult to operationalize. More field work and case studies are needed on how the SL approach is actually workable in practice.

Trip to Sandy Cove

The time spent in Nova Scotia was enlivened by a field visit to Sandy Cove, Digby County during the second weekend of the conference. The purpose of the visit was primarily to give the participants an opportunity to see more of Nova Scotia than the city of Halifax, and to meet local fishing groups working towards community-based management.

The people in Sandy Cove were warm and hospitable. Saturday's activities included a hike and picnic, as well as a boat tour of the local harbour and fishing fleets. A community dinner and musical show with local musicians was held that evening. The performers sang songs about fishing written by children for a school musical and the Filipino participants demonstrated a traditional dance. On Sunday morning, the Fundy Fixed Gear Council hosted a workshop that explored what fishers around the world have in common. The participants and community members present broke into small groups to discuss: participation; common property management; participatory research and alternative economic development. The results of the discussions were summarized for the larger group. A brief discussion about networking followed.

Though the visit was short and intensive, some participants commented that it was a highlight of their visit to Canada. Everybody enjoyed meeting and discussing issues with the local fishermen and community development workers. They were

interested in maintaining contact and continuing to participate in information and cultural exchanges.

Networking

Summer Institute participants were very interested in discussing “networking” and information sharing. Two discussions were held about this, the first during the visit to Sandy Cove, and another on the last day of the Summer Institute. How and why membership in a learning network can enable an organization to work and function more effectively was discussed at both meetings.

As already noted, the countries represented at the Summer Institute had vastly different levels of experience at facilitating participatory research and community-based management. In many cases, information about coastal zone and community-based management is not available in the participant’s own country. Networking can help practitioners to get information about what and how coastal resources management are being done elsewhere. In addition, having access to experienced and knowledgeable trainers might facilitate the adoption of coastal resource management programs.

At an institutional level, global networks can begin to tackle international issues affecting coastal communities. Working together on international projects can help move understanding from local to global levels. It can also enable Southern researchers access to information and research that may not be available in their own countries. A certain synergy occurs when people and institutions share their knowledge and experience, making all participating partners stronger and better able to carry out their own work. The Summer Institute participants certainly put this phenomena into practice during their 3 weeks together.

At a personal level, communicating with other researchers and practitioners can be energizing, and provide mutual support against the discouragement and despair often felt by those engaged in community level work. International support and solidarity is vital when work in coastal communities involves particularly unstable or politicized situations. Beyond work related exchanges, participants in international networks enjoy their interactions with other coastal dwellers and the cultural exchanges.

Follow Up

The Institute participants seemed pleased with the work accomplished during the Summer Institute. The participatory process meant that everyone was involved in shaping the content and outputs and that very good communication and friendships developed between the participants. Participants were concerned that the modules will be put to work and expanded, and not gather dust. They were reminded that if these modules are to become “living documents” the participants should continue to develop and refine them; and continue to share and present them to practitioners for feedback. The participants felt similarly about the SL framework that they were introduced to during the Institute; many were eager to reread the documents provided and reflect upon how they could begin to incorporate the concepts their own work.

Everyone felt that the Institute had been very productive and were interested in continuing the work at a later date. Participants were also keen on keeping in touch and continue to share information and experiences. They were all encouraged to write about their work and share their thoughts through **OUT of the SHELL**.

Closing Ceremony

The Summer Institute was officially closed at a Friday evening cultural ceremony organized by the Filipino participants. The ceremony involved the participants sharing gifts of nature with the other participants to acknowledge the importance of the friendships and connections made during the Institute. Songs, poems and dances were performed by country groups. The ceremony was very moving and reaffirmed the personal and cultural context of work in coastal communities. This rather solemn ceremony was counterbalanced by an “awards night” after the group supper that night. At this time, everybody received a symbolic “present” commemorating their role during the Summer Institute. With this, the Summer Institute ended on a very positive note.



The Establishment of Marine Protected Areas Based on Coral Reefs in Vietnam

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Introduction

Vietnam is elongated in a north/south direction stretching across 13 degrees of latitude with approximately 3250 km of coastline and 2700 islands. Coral reefs are common habitats and belong to 3 structural types. Coastal fringing reefs are mainly distributed along the shoreline of the south central region. Along other shorelines, corals are absent or poorly developed. Island fringing reefs are observed around most islands of the continental shelf except in areas strongly impacted by rivers. Platform reefs are found in central and southern waters while atolls occur offshore.

Physical conditions influencing the nature of coral reefs are: (1) river runoff with high freshwater and sediment discharging into the sea, especially the Red River in the north and the Mekong River in the south; (2) sudden decreases of water temperature during northeast monsoon in northern and middle central regions; (3) unfavourable currents which transport planula larvae originating at the centre of coral diversity to other regions; and (4) effect of wave action caused by northeast monsoon and typhoons (Vo Si Tuan and Hodgson, 1996).

According to the survey on the hermaphroditic *Scleractinia* (Vo Si Tuan, 1996) in the coastal waters of Vietnam, there are 5 regions of distribution: western Gulf of Tonkin, middle central, south central, southeast and southwest. Among them, the south central region has the highest diversity in terms of genera (>65 genera) which is only slightly less than in the dispersion centre of Indo-Pacific corals including the Philippines, eastern Indonesia and Greater Barrier Reef (>70 genera).

Threats to Coral Reefs

In recent years, coral reefs and their resources have been impacted strongly by human activities. The main

threats are overfishing, destructive fishing, habitat destruction and pollution.

Overfishing

Recently, fish landings have increased because of changes in catch methods and an increase in the number of boats. Catch per unit effort (CPUE), however, seems to be declining. CPUE in 1992 was approximately half that in 1983 (MOSTE, 1995). This is because most boats have low power (80% are below 45 hp) and operate in coastal waters of less than 30 metres deep. On the other hand, the number of small boats has increased rapidly in recent years - the number of 20 hp boats has increased from 39,000 in 1989 to 54,000 in 1992. Fish catches are thought to be below what is available but it is clear that in some areas overfishing is occurring, effecting some species. Thirty seven fish species are listed in Vietnam's Red Data Book (Dang Ngoc Thanh, 1992). Moreover, species with high commercial value (mainly for export) such as lobsters, groupers, snappers, sea cucumbers, abalones and sea horses, have been depleted in all shallow water areas, especially around coral reefs. Rare species such as dugongs and sea turtles are also caught for food. Live coral is harvested for souvenirs at Ha Long Bay, Cat Ba Island and Nha Trang city. In Nha Trang, the harvest amounts to about 50 tonnes per year. Dead corals are also mined in the central provinces for construction. In Khanh Hoa, about 20,000 tonnes of dead coral are collected annually for lime cement production. Molluscs (e.g. *Trochus niloticus*, *Pinctada maxima*, *P. margaritifera*, *Charonia tritonis*, etc.) have been exploited for art souvenirs, with some used in lacquer paintings attractive to foreign tourists. Coral reef fishes are also caught for the aquarium trade in Nha Trang, Vung Tau and Ho Chi Minh cities some of which are exported. The effects of these commercial activities is becoming a serious threat for many species which will change the balance of reef communities.

Destructive fishing

Fishers have long used dynamite for fishing. This method has been decreasing recently but is still serious in some provinces mainly Quang Ninh, Nghe An, Quang Binh, Quang Nam, Da Nang and Khanh Hoa. Poison fishing with chemicals has now begun in Vietnam with poison imported from in Hong Kong

and Taiwan. Trawl fishing is common in shallow waters causing habitat destruction.

Habitat Destruction

Beside the physical impacts of human activities, coral reefs are also destroyed by river runoff. Coral reefs in western Gulf of Tonkin and eastern Gulf of Thailand suffer under the strong influence of siltation and high turbidity. Human activities intensify siltation and cause damage to coral reefs even those in other coastal areas. The main reason is deforestation - forest area declines about 9% annually (according to data from Institute of Forestry Investigation and Planning). Siltation is also caused by the use of trawl nets in shallow waters and by the construction of new ports. Moreover, coral reef habitats suffer negative impacts from marine tourism which has developed considerably in recent years. In Ha Long Bay and Nha Trang city many coral reefs have been destroyed by anchor damage, careless divers, graffiti, and the increased collection of corals, shellfish, and turtles for souvenirs.

Pollution

Marine pollution has not been very serious for coastal biodiversity and resources, except in areas strongly influenced by agricultural activities (mainly small bays and lagoons). However, high nutrient (mainly high NO_3 concentrations) have been recorded at many reefs of central regions. This situation prevents the recovery of hard corals on degraded reefs because of the successful competition by seaweeds (mainly *Sargassum*) and followed by *Diadema* sea urchin (Pham Van Thom & Vo Si Tuan, 1996). Algal blooms have been also observed in coastal waters of Binh Thuan province, Van Phong bay (Khanh Hoa province), and the mouth of the Dong Nai River (Ho Chi Minh city).

Establishment of MPAs

Because of high diversity and abundance, coral reefs in Vietnam play an important role for fishery, tourism, shoreline protection, etc. The status of coral reefs also reflect coastal environment changes. Therefore, in the process of economic development of Vietnam, the problems of conservation and sustainable use of this ecosystem should be paid attention in not only national but also regional levels.

Guidelines for the sustainable use of marine products are described in the *Regulation for the Protection of Aquatic Resources*, which has been published by Ministry of Fisheries. Restrictions in fishing seasons and minimum size of many reef animals such as lobsters, sea cucumbers, pearl oysters and turtles are specified and severe punishments are applied for dynamite and poison fishing. The Law on Environmental Protection emphasizes the marine ecosystem (including coral reefs) conservation and prohibit all activities causing negative influences to marine environments. In fact, the effectiveness of legislation is very low and marine resources are still seriously decreasing while coastal ecosystems continue to be damaged. In order to economize management efforts for marine conservation, a system of Marine Protected Areas (MPAs) is needed which would encompass representative coastal and marine ecosystems of high diversity under threats such as coral reefs.

The problems related to the establishment of MPAs have been mentioned since 1980 in the framework of National Marine Programs with the proposals of MPAs at Con Dao, Cat Ba and Sinh Ton islands. From 1992 to 1994, under the support of the World Wildlife Fund and National Centre of Natural Science and Technology of Vietnam, the Institute of Oceanography in Nha Trang carried out surveys on biodiversity, resource utilization and conservation potential of certain areas and proposed 7 priority sites as MPAs including islands Cat Ba (Hia Phong city), Co To (Quang Ninh Province), Cu Lao Cham (Quang Nam Province), Hon Mun (Nha Trang city), and An Thoi (Kien Giang Province). All proposed MPAs are based around coral reefs because of their importance for marine resources and environment. The characteristics of suggested MPAs are summarized in Table 1.

The establishment of MPAs in the Spratly Islands have been proposed to ASEAN countries (McManus, 1994). This marine area is considered to be very high in biodiversity. Coral reefs are distributed over a large area and are almost intact. Hermaphroditic corals are represented by more than 65 genera which is slightly less than in the dispersion centre of Indo-Pacific corals (Vo Si Tuan, 1996). Coral reef fishes are also very diverse with 326 species recorded (Nguyen Huu

Table 1. Main characteristics of proposed MPAs in Vietnam

Sites (refer to Figure 1)	Co To	Cat Ba	Cu Lao Cham	Hon Mun	Cu Lao Cau	Con Dao	Phu Quoc
Number of islands	29	366	9	4	1	16	14
Distance from mainland (km)	40	18	15	10	9	60	9
# of hard coral species	80	102	131	155	114	130	89
# of hard coral genera	35	37	39	44	45	50	37
# of reef fish species	34	45	178	176	159	158	125
Living coral cover							
<15%			7			8	
15-30 %			22	46	8	15	27
31-50 %	25	50	64	54	67	15	55
51 - 75 %	75	50	7		25	62	18

Phung, 1996). Sinh Ton atoll has been suggested as an MPA in Spratly by Vietnamese scientists.

In recent years, activities for establishing MPAs have been carried out by the Institute of Oceanography and some offices of local and central governments. The MPA system in Vietnam, however, has not been formed. Meanwhile, on land, the Ministry of Forestry has declared over 80 terrestrial national parks and forest reserves. Parts of Con Dao and Cat Ba islands are considered national parks but are designated mainly for forest protection. The following obstacles limit, in part, the effectiveness and timeliness of establishing MPAs:

1. Vietnam is a developing country with a high annual GDP increase (8.5% in 1994). Economic development is a priority for both government and communities. This has increased the standard of living but has also caused pressures on the environment and natural resources. Vietnam is a maritime country with 70% of the population living near the coastal and delta areas. Thus economic activities are concentrated in these areas. Proposed MPAs have suffered that pressure at different levels. The strongest impacts of MPAs would be on marine tourism and the export of marine living resources.

2. Knowledge of conservation practices is weak and not standardized. This situation applies not only for fishermen but also some local governors. So often the main incentives for MPA establishment often seem to be economic benefit and relatively little focus has been placed on protection. Marine conservation is not integrated into developing projects and it is often in conflict with economic goals. For example, on Con Dao islands, there are 2 existing projects - a commercial port and a national park. Poor knowledge of conservation and financial difficulties have limited government investment into this and many other proposed MPAs.

3. Competition in the market economy is also a source of pressure on proposals for MPA establishment. With a fishing fleet consisting mainly of boats less than 45 hp, coastal areas are the main fishing grounds. Many people do not want to lose the areas that provide them with daily products for consumption and market.

4. Information needed for MPA implementation is inadequate. Up to now, the surveys for MPA proposals have mainly focused on biodiversity. There is little information gathered on socio-economic aspects, sustainable resource utilisation and environmental impact assessment.

Although MPA proposals were submitted some years ago, the ability to implement them is restricted partly by shortcomings in government agencies and the lack of a national policy on MPAs. The management office of Forest Protected Areas belongs to the Ministry of

Forestry which rarely gives attention to MPAs. Maintenance and sustainability of MPAs attracts the interest of everyone. Investment from government and international organisations are only for the first stage of MPAs. The problem of sustainability must be resolved.

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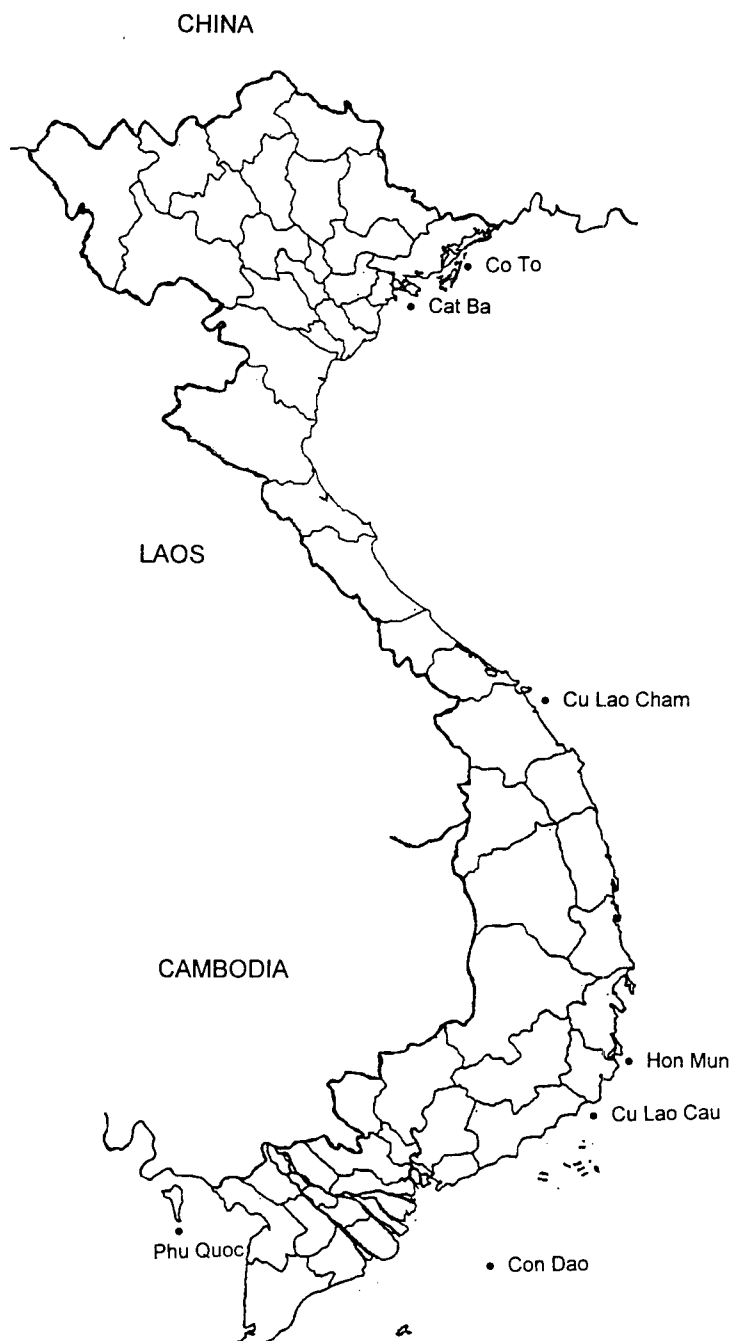


Figure 1. Map of Vietnam indicating sites of proposed MPAs.



***Buka Sasi* in Haruku village, Ambon**

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Research into community-based coastal resources management (CBCRM) should always begin with a look at the traditional forms of management already in place. In many countries, national governments have formulated their own rules and laws governing the extraction of natural resources without considering those already in place. This causes much confusion and often results in complete failure of management. It is now considered appropriate to seek out traditional forms of management and, if assessed positively, enhance them by lending support and adjusting for changes in social, market and technological pressures. In the Maluku Islands, Eastern Indonesia, a traditional form of resource management called *sasi* is still applied in some communities despite the fact that the government has imposed its own form of management.

The history of *sasi* is vague and has been interpreted in different ways. We should mention first that *sasi* is a generic name for different sets of traditional regulations (which include institution, law, and ritual) that restricted access to resources throughout the Maluku islands (Zerner, 1994). During the Dutch colonial occupation of Maluku (mid-16th century to early-20th century), these regulations were altered and inscribed to support Dutch control over resources. Presently, *sasi* is seen as a product of a society that conserved resources and ensured their equitable distribution and so *sasi* is used to protect dwindling resources and stop environmental degradation. In the following citation, Zerner (1994) explains the changing face of *sasi*:

"Rather than being an "indigenous" creation arising out of the local earth and waters, as some contemporary governmental and environmental spokespersons have claimed, *sasi* practices were and are the changing products of a border zone in which cultural and legal readings are strategically deployed. Like other collectively shaped rituals, *sasi* practices were never the coherent products of a purely local community or the production of a single,

Sasi is a set of regulations applied on some of the Maluku islands which protect, through prohibitions, certain natural resources from overexploitation. "Because the regulations for implementing this prohibition also touch upon man's relationship with nature and with other men in the area affected by the prohibition, *sasi* is also an effort to maintain the patterns of social life through the equal distribution among all local citizens/inhabitants of the benefits or income from the surrounding natural resources" (Kissya, 1995, p. 4). There are 4 types of *sasi*: Sea *sasi*, River *sasi*, Forest *sasi* and Village *sasi* (for more details see text).

Kewang is the traditional institution charged with the management of the village's natural, social and economic resources.

if collective, authority. Rather, these practices and their textual embodiments were and continue to be hybrid creations, shaped by a multiplicity of authors, over several decades, embodying diverging intentions, speakers who vary in their capacity to enforce their readings, with strikingly different "voices." (Zerner, 1994, p. 1083).

In his article, Zerner points out that during the Dutch occupation, *sasi* helped strengthen Dutch control as well as ensured a supply of natural resources (nutmeg, mace, cloves, etc.) for the European market. Today, environmentalists and NGOs emphasize the inherent conservationist qualities of Maluku communities which are demonstrated by the formulation of *sasi*. It is more probable that, as it developed, *sasi* included regulations which originated from conservation ideals as well as others which originated from a production focus. Retraubun (1996) assessed the effect of *sasi* management on the stocks of *Trochus* (a marine mollusk) in Kei. He concluded that in villages where *sasi* was no longer applied, *Trochus* stocks were overharvested and in danger of overexploitation while in those where *sasi* was still applied, the stocks remained healthy over a long period. However, under the pressure of strong market demand and the influence of modern society, *sasi* practices are dying. *Sasi* managers are not legally recognized by the government nor do they have the power to enforce their rules. In many areas, *sasi* still exists but is weak,

not enforced or only applied in part (ie. some rules are still applied, others ignored). The benefits of *sasi*, in terms of return to the community, equitable distribution of those benefits and the effect on natural resources, are still not completely understood. Will *sasi* die out completely before we have a chance to use it as a positive example and disseminate its ideas?

As part of the conference "The Role of Communities in Coastal Resource Management in Indonesia" (see **OUT of the SHELL** 5#3), some of the participants visited Haruku village on Haruku Island in Central Maluku. We met with some of the villagers at the environmental centre they recently built on the coast where the river meets the sea. Elly Kissya, or *Oom Elli* the head of the Kewang, gave us a synopsis of the recent history of Haruku and how *sasi* was re-instated in the village. We walked around the grounds of the centre where they are creating a sanctuary for an endangered bird, *Eulipoa wallacei*, which lays and bury its eggs in the sand. In this area, less than a week later, the *sasi* on *Lompa* fish (*Trisina baelama*) was lifted and all the villagers - young and old - cast their nets in the river.

Some examples of *sasi* regulations in Haruku¹

Village Sasi

1. People are prohibited from disturbing the peace and making noise on Saturday nights.
2. Going in the forest on Sundays is prohibited unless in an emergency or during clove harvesting season and with the permission of the Kewang.
3. Throwing grass and defecating in the river is prohibited.

Forest Sasi

1. The taking of young fruits such as pineapples, candlenuts, *cempedak* (resembles jackfruit), durian, areca nuts and others is prohibited.
2. Cutting down of areca palms which are bearing fruit or of any other fruit tree for the making of fences is prohibited.

3. The cutting of palm leaves for roofing (*atap*) or young sago leaves (*hahesi*) without permission from the owner and the Kewang is forbidden.

River Sasi

1. If *lompa* fish enter the river, they may not be bothered or caught, even though other fish entered the river together with the *lompa*.
2. When the *sasi* on *lompa* is lifted, it is forbidden to clean fish in the river or throw the heads of *lompa* fish into the river.
3. The washing of kitchen utensils (plates etc.) in the river is prohibited.
4. Mixed bathing by men and women is prohibited. Specific areas are allocated for each gender.
5. The felling of trees - except for sago trees - on the river banks near the *sasi* site is prohibited.

Sea Sasi

1. A certain specific area is covered by *sasi* regulations - that is about 150 meters out to sea in front of the village.
2. Catching of fish in the *sasi* area using gear other than a throw net (*jala*) is prohibited and even then only in waist deep water.
3. *Sasi* also identifies a free anchorage area where people may catch fish but may not quarrel.

Buka Sasi on Lompa Fish

Buka sasi translates into 'open *sasi*' meaning the lifting of a ban, in this case, on fishing. The *sasi* regulations on *lompa* fish are specific to Haruku and have been modified over the years. With the emergence of motorboats and more efficient fishing gears, *sasi* rules now include the prohibition of such modern technology in the fishing of *lompa* in order to avoid overexploitation. The *lompa* fingerlings first appear in April/May in the sea. It is only when they

¹ Taken from Kissya, 1995, pp. 8-12.

are larger, begin migrating daily up the river² in large numbers and other criteria observed by the Kewang council, that fishing of *lompa* is permitted for a limited time. The methodologies used by the council to manage the *Lompa* fishery were not divulged nor have they been discussed, assessed or compared to fishery stock assessment practices used in conventional science.

Last year (1996), the council decided to open the fishery on Saturday, November 16, for one day. On the eve (Friday night), the ceremony began with the Kewang council meeting and praying. They then paraded through the village, burning dry coconut leaves and announcing the lifting of the ban on fishing along with reminders of other *sasi* regulations. On Saturday at 2 AM, the Kewang members met at the environmental centre on the beach and had a ritual meal on coconut leaves. They then proceeded to the mouth of the Learisa Kayeli river to burn bonfires (about 15-20 palm leaf towers over twice the height of a person). One by one these structures were burned as an invitation to the *lompa* to enter the river. At sunrise, some of the gathered villagers almost lost hope and paced up and down the beach worriedly searching for the fish - including Oom Elli who paddled out in a traditional boat along the shore in search of the fish. As the sky became brighter, the waters suddenly became dark with schools of *lompa* swimming towards the mouth of the river. After the migration ceased, the men of the village drew a net across the mouth of the river to stop fish from returning to the sea and, as the tide receded, men, women and children bearing throw nets (*jala*) arranged themselves in the muddy river. At the sound of the drums, amongst laughter, joyful screams, and playful arguing, the villagers began to harvest the fish.

My host family described previous fishing ceremonies. Some years the fishery was open for a few days, sometimes the *sasi* was lifted a few times a year and, in some years, the fishery was never opened. This ceremony is a family occasion and those living away come home to join in - even from as far as the Netherlands. Each family reserves part of their catch to help less fortunate households that have no one to

² The *lompa* fish migrate up the river daily - they are found up to 1.5 km from the mouth of the river. The exact migration pattern is not understood by the local fishers nor by the local researchers.

partake in the occasion, and to neighbouring villages as a sign of peace. The fish are dried and stored to supplement the family's diet for the following year.

Although *sasi* on *lompa* fish seems to be successfully implemented in Haruku, one may attribute this success to the fact that the resource is not economically important and the fishery is more ceremonial rather than necessary. In other words, how successful would a prohibition promoting coral reef conservation be?

What will the future bring?

Just as in the past, *sasi* regulations were adapted and edited to suit Dutch colonials (Zerner, 1994), they are now being adapted to suit the environment of the late 20th century (Kissya, 1995):

- Some rules have been dropped: In Haruku, the *sasi* on women climbing trees to harvest fruit has been lifted - it is acceptable now for women to wear pants so why shouldn't they be allowed to climb trees (as long as they wear appropriate clothing).
- Some rules have been added: some new fishing technologies (motorboats, small mesh sized nets) are prohibited in order to protect fish from disappearing.

"All this indicates that *sasi* is not a collection of rigid *adat*³ regulations. It continues to be dynamic and responsive to the changing times, as long as the essence of its spirit, soul or life (i.e., the principle of conservation and balance in man's life with other men and in his relationship with the surrounding natural world) does not change and is maintained." (Kissya, 1995, p. 8).

Oom Elli (pers.comm.) has recently set up a sanctuary for endangered birds and the children of the village have contributed tree planting efforts to help maintain a good environment in the sanctuary. Oom Elli is also talking about coral reef protection. Although *sasi* does not secure all the coastal environment, there are no limits to its potential positive effects on resources. In some villages, it is true, *sasi* has been forgotten or is

³ *Adat* is a generic name for all customary or traditional law in Indonesia.

poorly implemented but in Haruku, *sasi* has reappeared and seems to be growing stronger in response to the environmental needs of the community.

Acknowledgements

I would like to thank Haruku villagers for hosting so many foreigners to share *Buka Sasi* with us and the NGO Hualopu for organizing our trip to Haruku. Discussions with Hualopu workers, Oom Elli, Bpk Raja Haruku, Jeffrey, Hermina, Cliff and Arie were very enriching. Irene Novaczek and Binny Buchori provided very useful comments on the draft.

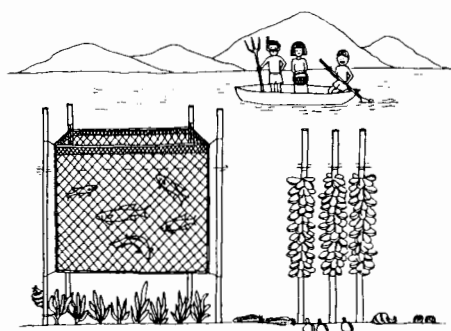
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Finding Better Crops for Seaweed Farmers in the West Indies

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Seaweed cultivation in the West Indies is focussed primarily on the production of agarophytes (*Gracilaria* spp.) used in the preparation of drinks and puddings that are a tradition in the English-speaking islands. Research on low-cost cultivation methods began in St. Lucia in the 1980s, in response to declining wild stocks and the evident increasing demand. The transfer of a workable technology for *Gracilaria* cultivation began in the mid-1980s, and has since been established in three communities in St. Lucia, where both men and women operate self-sufficient farms. While this is obviously a profitable activity, the experience gained by the farmers in St. Lucia, and the results of extension efforts elsewhere in the region, both suggested that cultivation was not reaching its potential and that further development work was needed.

The first problem related to the variation in agar quality among tropical *Gracilaria* species. In general, the best quality of agar, which is preferred by most processors, is found in slow-growing species. However, farmers have chosen to concentrate on faster-growing species whose poorer agar quality limits the range of marketing possibilities.

The second problem is the fact that the crop is susceptible to infestation by epiphytic algae, the severity varying with location and season. As a result, crops would be discarded at certain times or sites would be abandoned completely. Attempts were made to select superior strains of St. Lucian *Gracilaria* species, but all were affected by epiphytes to some degree, and none showed the desired combination of good growth rate and agar quality.

In 1996 CANARI began a project to search for new crop candidates among species in the Caribbean flora. The first to be tried was the agarophyte *Gracilariopsis tenuifrons*. This species is being

cultivated on the north east coast of Venezuela and is intended as raw material for the agar industry. Its rapid growth and excellent agar quality appeared very promising. Unfortunately its performance in St. Lucian waters was poor, and agar quality was low. The Venezuelan site is characterized by a localized upwelling system and high nutrient levels, and it is most likely that the different water conditions in St. Lucia were the cause of the difference in performance here. Another candidate was *G. cornea* from Anguilla, which grew approximately twice as fast as St. Lucian plants of the same species and deserves further investigation.

While most of the species harvested for food in the region are widely-distributed agarophytes, there is also one carrageenophyte of interest, *Eucheuma*, which has a comparatively limited distribution. *Eucheuma* is represented in the region by a single species, *E. isiforme*, which produces iota carrageenan. It is found in Florida and Belize, and a few islands in between. It was harvested commercially in Barbuda until the 1980s but is now commercially extinct there, apparently as a result of a lack of management of the harvest. Belize is now the only place in the Caribbean where *Eucheuma* is still harvested commercially from wild stocks.

Past attempts at cultivating *Eucheuma* in the region showed mixed results. Trials by French researchers in the neighbouring island of Martinique had been unsuccessful in the 1970s, and trials in Belize by a carrageenan extraction company were discontinued after being devastated by a hurricane in 1978. In Florida, the species was shown to die back after reproducing in the autumn, both in culture and in field trials, making it unsuitable for mariculture there. To test the response of this species under mariculture conditions in St. Lucia, a sample of plants was collected from the barrier reef in Belize in February 1996 and established at one of the *Gracilaria* farms on the south east coast of the island. The plants were propagated vegetatively using the same method as that used for *Gracilaria*, whereby fronds are inserted into the strands of long lines which are anchored at each end and buoyed at the water surface. The growth rate and general performance of the Belizean material was monitored for the next 12 months.

The first encouraging result was that the growth rate of this species was evidently good, with doubling times of individual tagged fronds of around 10 days. This compared favourably with the *Gracilaria* that the farmers were growing. With the onset of the wet season in the latter part of the year, the *Eucheuma* continued to demonstrate its suitability as a crop. The increased run-off and nutrient input during the wet season is correlated with the appearance of epiphytic algae which can smother the crop plants and trap a layer of silt that makes the plants unusable. Much of the *Gracilaria* crop was discarded during this period but *Eucheuma* on the same lines remained clean and totally free of epiphytes. By the end of the year it was also apparent that the plants could be maintained year-round, without the seasonal die-back that was reported for the Florida populations.

Seed material has now been distributed to five groups of farmers in communities on the south and east coasts of St. Lucia. These farmers are now concentrating on producing crops to be used for seed material to expand the area under cultivation. In early March, 1997, the first harvest for processing and sale was made on a family-owned farm on the south coast. In April, seed material was transported to two locations in Jamaica where cultivation of *Gracilaria* had been tried with some success in the past, and the initial results from Little Bay, near Negril, and Discovery Bay, are very promising. The next step will be to determine how the requirements for *Eucheuma* cultivation and processing differ from those established for *Gracilaria*. For example, *Eucheuma* is comparatively stenohaline, which will mean revising some of the current recommendations for site selection.

After a period of relative stagnation in the development of seaweed production in St. Lucia, due to limits in marketability of the *Gracilaria* species, and to biological factors that adversely affect its productivity, it seems clear that the characteristics and qualities of *Eucheuma* will provide the farmers with the opportunity to produce a superior crop and thereby enhance their returns from this occupation.

The Coastal Area Monitoring Project (CAMP-lab): An Update

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Introduction

The basic concepts of CAMP-lab were presented in **OUT of the SHELL** (Vol 5#2, April 1996). This update is intended to inform readers of the recent activities of this project and some of the challenges that it faces.

Many local people believe that the natural resources of Pearl Lagoon area are in need of management. This goal is challenging given the current socio-economic conditions on the Caribbean Coast of Nicaragua, where Pearl Lagoon is located. The communities located in Pearl Lagoon have Miskitu, Garifuna, and Creole ethnic origins. The traditional methods used in fishing, agriculture and wood gathering have been enough to satisfy self-consumption until recently. This has changed with the increasing connection of this remote area with world markets. The increasing commercial exploitation of local resources is unsustainable in certain cases such as the harvesting of timber from rain forests and pine savannas that surround the lagoon. The accelerating spread of the agricultural border, changes in natural resource exploitation patterns, poor nation-wide economic situation, and high levels of exploitation of particular species make it urgent to involve local inhabitants in the process of planning and decision making for natural resource management.

As previously reported in **OUT of the SHELL**, CAMP-lab intends to assist community participation aimed at accomplishing self-sustaining management of natural resources in the Pearl Lagoon area. The project goals are:

- to collaborate with local people in the drafting of a management plan for the area,

- to encourage the participation of local people in the research of their environment,
- to build local awareness to encourage the sustainable management of the area's resources, and
- to research the participatory process as it evolves.

Problem Identification

CAMP-lab has been involved in a participatory process for the last 4 years that has worked with local people to identify the main environmental problems that they face. This long process has gone beyond the traditional approaches for problem diagnosis to include data collecting field visits and discussion groups.

This work by CAMP-lab has been complemented by the work of a national-level effort towards coastal management by a program named MAIZco of the Ministry of Natural Resources and Environment. Two meetings have been organized by MAIZco, the first in Pearl Lagoon and the second at a regional level. These meetings focused on problem identification and the definition of the coastal zone, an important legal question for this Ministry. Through CAMPlab and MAIZco's efforts the following problems have been identified:

- 1) the lack of any resource management regime,
- 2) the lack of local participation in research,
- 3) the lack of a database for coastal resources,
- 4) communication failures between the Regional Government and local communities;
- 5) the need for communal land demarcation;
- 6) decreasing fish catches and over harvesting of timbers;
- 7) the expanding agriculture frontier.

In order to address these problems, CAMP-lab and other projects working in the area have begun to take action.

Project Activities

Community and Institutional Development

In 1996 and 1997, CAMP-lab was working with 6 of the 11 communities that surround the lagoon. The majority of these communities have established natural resource management committees that focus their work on the development of a management plan and other related activities. These committees are involved in:

- the monitoring of the area's environment,
- the analysis of data from the monitoring,
- the planning of activities such as tree planting, and
- the development of the management plan.

A member of each communal committee is elected to take part in a inter-communal committee that oversees CAMP-lab. Participants in these committees hope that this council will play a central role in the development and implementation of a management plan.

Participatory Research

In order to develop a database of information for resource management and develop local human resources, participatory research about the most important coastal resources has been a focus of CAMP-lab. Research has been conducted on the local pine savannas, yield of local fishers, and on water quality of the lagoon.

Students and others living next to the pine savannas have taken part in the monitoring of three important savannas: Pine Ridge, Pinal and Fine Pine. Data on tree circumference and height is taken from permanent transects that measure 50 x 30 meters. Other larger areas are surveyed for forest cover, soil type, fauna, and human disturbance.

Twenty-five fishers from five communities (between 5 and 10% of the total fishers) participate in the monitoring of their catch. They record their catch by species, effort, location of the catch, sales, presence/absence of eggs and other information they have decided is important and necessary for fisheries assessment. The main focus of this research activity

is to calculate catch-per-unit-effort as a means of monitoring the fishery. The data from the forest and fisheries monitoring is analyzed by computer by CAMP-lab staff and during workshops where local people are involved. The development of appropriate tools for participatory data analysis has been a challenge for CAMP-lab given that this is a new activity for local people. This information is then presented back to the communities during communal meetings.

To complement the fish yield study, CAMP-lab staff have been conducting interviews of local fishers about their knowledge of fish movements, abundance, and reproductive behavior. Research of traditional knowledge will become a bigger part in CAMP-lab.

Students and members of the CAMP-lab committee in Haulover actively participate in the monitoring of the lagoon. Measurements of turbidity, depth, temperature, salinity, dissolved oxygen and pH are taken weekly at twelve different sites. Occasionally, samples are taken from tributary rivers that empty into the lagoon, especially one that is a source of drinking water and ice for local people. In this case, fecal coliform levels are also measured as an indicator of contamination.

Recently, CAMP-lab began to work with local people to demarcate communal lands, a necessary step before the management of terrestrial resources. This work was requested by the Nicaraguan Agrarian Reform Institute (INDRA) and involves the walking of communal lands with leaders and the taking of coordinates with portable Global Positioning System (GPS) equipment. Besides coordinates, data on land use is also recorded. The aim of this work is to develop ethnographic maps for the whole Nicaragua Caribbean Coast that will then be used to apply for formal titles for communal titles and to solve land disputes.

Environmental Education

While field research is one form of education, other forms are also used by CAMP-lab. In particular, project staff and communal participants have given 28 presentations in elementary and secondary schools throughout the Pearl Lagoon area. These

presentations focus on basic concepts such as natural history and natural resource management.

Action Taking

Based on the findings of participatory research, local people have begun to take action to improve their forestry resources. Local people have planted approximately 600 trees in Fine Pine, Haulover, and Orinoco. In some cases, these trees have been cut down by other people, not interested in these resources. Clearly, change in the perceptions and use of resources is a very slow process. Haulover community members have decreased the numbers of forest fires in their area and the communal leader has appointed forest guards to patrol the savannas and report fires.

Staff Development

In order for CAMP-lab staff to improve their work with the communities, staff development has become a focus of the project. Staff have participated in training and field courses on Global Information Systems (GIS), ethnographic mapping, participatory research, rain forest dynamics, ecology and data management.

Staff have also benefited from exchanges with other people working on similar issues from around the world. Six staff members participated at the World Congress for Participatory Action-Research in Cartagena with the support of CoRR. Findings of the long term evaluation of the participatory research process that CAMP-lab has initiated were presented. In addition, Eduardo Tinkam, a CAMP-lab communal investigator, was asked to speak at the Congress plenary with Tanzanian and Colombia leaders about his experience with participatory research. More recently, two CAMP-lab staff were involved in the Summer Institute hosted by CoRR in Halifax, Canada. This opportunity to exchange experience with other coastal management practitioners will benefit CAMP-lab's field work.

In conclusion, CAMP-lab is progressing towards its ultimate goal - the empowerment of local people for resource management. The challenges of coordinating this work with other agencies that may not have this focus is difficult and requires constant vigilance. Financial support from the International Development

Research Center (IDRC), People's Popular Aid of Norway and support of CoRR have enabled CAMP-lab to provide an opportunity for Pearl Lagoon residents to realize their goal of locally-based resource management.

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Environmental Study Centers Development Project in Indonesia

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Through the Environmental Study Centers Development Project in Indonesia (ESCDI), Dalhousie University's School for Resource and Environmental Studies has been extremely active in the field of coastal zone management. The Japanese-assisted project based at the Indonesian Ministry of Education and Culture focuses on capacity building in 18 university-based Environmental Study Centers (ESCs) in Indonesia. These interdisciplinary centers bring together interested staff from university faculties and departments to carry out research, implement short-course training (mainly for government and community members), provide policy input to government, and undertake a variety of community service projects. The centers are important players in the field of environmental studies and environmental management in the country.

Besides managing the programs of 25 Master's and Ph.D. candidates from the ESCs enrolled in overseas universities, Dalhousie's role in this multifaceted project (1994-1997) has been largely to provide short and long-term technical assistance to the 18 ESCs. Consultancies are normally for a two-month period and the work has involved provision of up-to-date material on the topics in question, staff training, assistance in the writing of research proposals, and assistance in international networking. In a number of cases, these consultancies have resulted in initiatives for further cooperation under other auspices.

Early on in the project, a decision was taken to put increased emphasis on the preparation of certain "tangible" and potentially lasting ("sustainable") products that the ESCs could utilize on a routine basis. These have largely been in the form of integrated packages of training materials on 13 topics for use by ESC instructors in carrying out short-course training for their client groups. These

packages, many of them on topics that are new to the centers, not only assist the centers in better serving the public but in increasing revenue generation as the ESCs are largely self-financing. The packages are innovative, since they insist on a methodology using interactive, adult education principles and not on the standard university teaching methods of straight lectures with minimal time for "questions and answers".

The most popular single topic as determined by the ESCs themselves, has been coastal and marine resources management. This is in large part a reflection of the increasing awareness of the importance of these somewhat neglected resources in Indonesia - a maritime nation consisting of approximately 17,000 islands and a huge expanse of sea. Admittedly, the interest in this topic has, in part, been stimulated by the increased attention and availability of funds from international donor agencies.

Taking note of this interest, the project decided early on to develop a series of training manuals in this field for the use of interested ESCs. As the project nears its end, we are pleased to report the completion of training packages on the following topics (some of these packages include slides, overheads and videos, and many are accompanied by packages of basic readings):

- Introduction to Integrated Coastal Zone Management - John Carter
- EIA for Coastal and Island Regions - Peter Neame and staff of Hasanuddin University
- Community Participation in Coastal Zone Planning and Management - Jennifer Leith

Two related handbooks are also in the final stages of preparation:

- Guidelines on Assessment, Protection and Rehabilitation of Coastal Habitats in Eastern Indonesia - John Carter
- Handbook on Indicators and Monitors of Contamination in the Aquatic Environment - Doug Haffner and Chris Metcalfe

Other project training manuals that have some relevance to general issues of coastal zone management include:

- Ecotourism - G. Wall
- Integrated Watershed Management - K. Boehmer, B. Mitchell, M. Haight
- Wetlands Management - Wetlands International
- Mangrove Management (Jim Davie and staff of Brawijaya University)

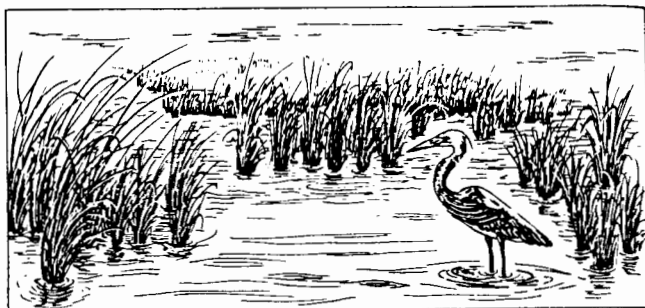
Several of these training manuals have been written directly in Indonesian, while the others have been or are in the process of being translated from English. A number of them are unique, at least to the Indonesian context in that while training and seminars may have been given on the general topic, little in the way of high-quality integrated training manuals has ever been prepared in a format ready for distribution.

Ownership of these manuals lies with the Ministry of Education and Culture, who are anxious to see that they are widely used. As the project draws to a close, a dissemination strategy is being developed. For the time being, parties interested in these manuals may contact:

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Live Reef Fish Trade in the Asia/Pacific Region

The following summarizes key findings of a study that was requested by the South Pacific Forum Fisheries Agency and The Nature Conservancy concerning destructive fishing practices to supply the live reef fish trade in Asia. Well over 300 individuals have already provided information for this study, including independent scientists, fishermen, village leaders, university researchers, divers and dive-tour operators, representatives of the live food fish trade, government fisheries departments, national non-governmental agencies and international conservation agencies.

The full report, titled "Environmental, Economic and Social Implications of the Live Coral Reef Food Fishery in Asia and the Western Pacific", presents further detail and is available upon request (see information at end of this article).

The Problem: Fishing with Cyanide

Hundreds of tons of sodium cyanide are being pumped into the coral reefs of Southeast Asia, seriously damaging the world's richest marine environments. This environment crisis is being driven by a rapidly growing restaurant trade in live reef fish in Hong Kong, south China, Singapore, Taiwan and other areas. The live reef fish trade threatens both the environment and the economics of many coastal communities, resulting in a vast and expanding ecological tragedy that has gone largely unnoticed outside the region.

A Rapidly Growing Market for Live Reef Fish

Economic prosperity in Asia has prompted a thriving new market for live reef fish. Certain species of these fish are now highly prized if caught and transported live to Asian restaurants, where prices are as high as U.S. \$75 per pound. Hong Kong is the largest consumer of live reef fish, but southern China, with its rapidly expanding economy and increasingly affluent population, is the market growing most rapidly.

Scale of the Industry

The live reef fish industry is currently estimated at 25,000 tons per year, with an estimated 60% coming

from wild capture. The current trade in live reef fish is estimated to have a wholesale market value of approximately U.S.\$1 billion per year. While Taiwan is the largest producer of cultured reef fish, Hong Kong-based companies dominate in the wild capture fisheries. It is estimated that in excess of 100 vessels specifically designed to transport live reef fish are based in Hong Kong with fish-holding capacities ranging from two to 20 tons.

Destructive Fishing Practices

Among the poor coastal villages of Southeast Asia and the Pacific islands, the high prices paid for these fish are causing dangerous and unsustainable fishing practices that have already degraded widespread areas of coral reef. Chief among these practices is the use of sodium cyanide, an extremely toxic chemical which is used to immobilize several species of groupers and humphead wrasse. It rarely reaches concentrations in these fish which could be toxic to humans.

Cyanide affects far more than just the target species. Smaller fish and invertebrates are less resistant to cyanide, and many die for each target captured. As reef fish stocks dwindle, the increasingly indiscriminate use of cyanide by desperate and impoverished fishermen destroys even the living coral framework upon which the rest of the reef community depends.

While quart-sized squirt bottles are normally used to administer the poison, in some cases fishermen have dumped whole 55 gallon drums of sodium cyanide into shallow reef communities, transforming them into aquatic graveyards.

Intensive hook and line fishing for the live fish trade is also eliminating large spawning aggregations of grouper that have sustained coastal villages for centuries.

Scope of the Problem

The areas affected by this trade include the most beautiful and biologically diverse marine habitats in the world. Fishing for live reef food fish now encompasses one-third of the world's coral reefs. These reefs are biologically the world's richest and span an area equivalent to one quarter of the Earth's circumference. More than 2,500 species of reef fish live in Indonesia and the Philippines. Thirty-five

percent of the world's fish species are found in Indonesia alone.

The extent of the damage and the speed with which this practice is spreading are equally alarming. Already major sections of the Philippines and some areas of Indonesia have been seriously depleted as a source for these species, and underwater surveys have revealed an extensive mosaic of heavily damaged corals.

Fish buyers in Hong Kong and Singapore estimate that within three to five years Indonesia's commercially harvestable populations of grouper and wrasse will be gone. Dive boat operators in Indonesia report that some of their favourite reef communities have been completely destroyed by cyanide fishing and that the damage extends to even the remotest reefs in the country. One dive boat operator returned to his "favourite reef in the world" a year after his last visit, to find a scene of complete destruction. "Not so much as a nudibranch was moving," he said.

The immense geographic scope of this problem is evidenced by the fact that live reef fish are currently being shipped to Hong Kong from as far away as Papua New Guinea to the east and the Maldives Islands in the Indian Ocean to the west. Depletion of reef fish stocks in Southeast Asia is resulting in growing pressure on the resources of adjacent regions, especially the islands of the South Pacific. No slowing of the geographic expansion of the fishery nor of consumer demand is in sight.

Danger to Village Divers

Village divers using cyanide generally have had no instruction in the use of compressed air for diving. Accidental death or paralysis due to the bends are widespread and fishermen say the frequency of such accidents is increasing as they find themselves forced to go deeper and stay down longer to get fish after depleting stocks in shallow waters. Of the 200 divers in one Filipino community, 30 got the bends and 10 died in 1993 alone. In the Philippines, a recent, informal survey showed that in seven out of eight communities surveyed, one or more divers had suffered deaths from bends within the last three years.

Long-term Effects Upon Villagers

Coral reefs are vitally important to the economies of the villages participating in the live reef fish trade. By degrading or destroying these reefs for short term gain, fishing companies are trading away the future of hundreds of island villages and severely damaging an important long term source of food and income. In many cases, fishing crews from outside the region destroy reefs while local villagers are powerless to intercede—either due to local laws, poor communities or bribery of village or government officials. In addition, divers receive a very small fraction of the large sums eventually paid for these fish. A grouper that sells for as much as U.S. \$75 per pound in Hong Kong typically earns only U.S. \$1.60 per pound for the local fishermen who may have risked his life to catch it.

Once they are seriously damaged, reef communities take several decades to recover normal function under favourable conditions. But it is unlikely that conditions will be favourable. Millions of poor villagers in the region have depended upon reef fish for their livelihoods, as well as their main source of animal protein, for centuries. Eighty percent of Filipino coastal fishermen's families are under the official poverty line. About the same percentage are malnourished, and coastal populations continue to rise. So the few food fish and invertebrates that begin to recolonize cyanided reefs are sought with increasing urgency. Understandably, under such circumstances, fishermen are motivated to use any method available to catch fish to feed their families. As long as such conditions persist, their reef communities cannot recover.

The destruction of coral reefs also results in a significant loss of marine tourism and recreational income. In Indonesia, tourism is presently the fourth largest source of foreign currency.

The Goal: Sustainable Fisheries - Meeting the Demand without Destroying the Supply

The Nature Conservancy's goal is not to eliminate the live reef fish trade, but to develop sustainable fisheries through regulation of the industry. Specific recommendations include the following:

1. Convince regulatory agencies that the live food fish trade is a distinctive form of fishery requiring special controls.

2. Provide villagers with the incentive to protect their marine resources by giving them the legal right to exclude outsiders from their fishing grounds. Train, deputize and support selected village fishermen as fish wardens.

3. Ban the possession of cyanide on boats, as Papua New Guinea has recently done.

4. Declare a moratorium on all fishing for live reef fish in areas where stocks are severely depleted, such as Indonesia is now attempting to do with the Humphead wrasse.

5. Commission a study to determine what kind of research and development are needed to enable selected grouper species and humphead wrasse to be raised commercially from the egg in order to reduce the demand for wild-caught fish.

6. Begin immediate instruction for live reef fishing operators outlining ways of reducing wastage of fish due to unnecessary high mortality rates.

7. Where logistics permits, set up cyanide detection laboratories (in importing countries such as Hong Kong as well as source countries) in order to monitor live reef food fish and marine aquarium fish operators, as has already been done in the Philippines.

8. Run taste-test panels in Hong Kong to determine if consumers can distinguish between wild and farm-grown grouper.

9. Support research on the effects of cyanide on corals and coral reef communities to get a better idea of their vulnerability and the magnitude of the "clearcutting" threat.

10. Carry out research to improve non-destructive methods of catching grouper.

For a copy of the complete list of recommendations from the report, "Environmental, Economic and Social Implications of the Coral Reef Food Fishery in Asia and the Western Pacific," contact The Nature Conservancy, 1116 Smith Street, Suite 201, Honolulu, Hawaii 96817; phone: 808-537-4508.

Calendar of Events

- Global Change Science in the Coastal Zone will be held at Noordwijkerhout, The Netherlands on October 10-13 1997. For more information contact:

LOICZ Core Projects Office
Netherlands Institute for Sea Research
P.O Box 59, 1790 AB Den Burg-Texel
The Netherlands
Fax: 31-222-369430
email: loicz@nioz.nl

- Bordomer 97, the Coastal Environment Management and Conservation Conference will be held at the Bordeaux Convention Centre, France on October 27-29, 1997. For more information, contact:

Daniele Pouvreau and Philippe Sinet
Bordeaux Congres Service - Bordomer 97
Palais des Congres
33300 Bordeaux Lac
France
phone 33-5-56-11-88-88
FAX 33-5-56-43-17-76
email: bordeauxcongresservice@ibm.net

- The Second Annual Symposium on Sustainable Aquaculture: Food for the Future? will be held in Oslo, Norway on November 2-5, 1997. For more information, contact:

Niels Svennevig, General Secretary of OC
c/o MARINTEK
P.O Box 4125, Valentinlyst
N-7002, Trondheim
Norway
Phone: 47-73-59-56-50
Fax: 47-73-59-56-60
email: marintek@post3.tele.dk
URL: <http://www.marintek.sintef.no/aqua97>

- Aquaculture 98 - You Can Bet On Aquaculture, the International Triennial Conference and Exposition of the World Aquaculture Society, the National Fisheries Association and the American Society Fish Culture Section will be held in Las Vegas, Feb 15-19, 1998. For more information contact:

Aquaculture '98 Conference Manager
21710 7th Place West
Bothell, WA
98021, USA
Phone: 1-425-485-6682
Fax: 1-425-483-6319
email: worldaqua@aol.com

- Crossing Boundaries: The Seventh Common Property Conference of the International Association for the Study of Common Property will be held in Vancouver, British Columbia, June 10-14 1998. For more information contact:

Evelyn Pinkerton
School of Resource and Environmental
Management
Simon Fraser University
Burnaby, British Columbia
V5A 1S6 Canada
Fax: 1-604-291-4968
email: iascp98@sfu.ca
URL: <http://www.sfu.ca/iascp98/>

- The Fourth Coastal Zone Canada conference "Community-based Integrated Coastal Management: Sharing Our Experience - Building Our Knowledge" will be held in Victoria, B.C from August 30-September 3, 1998. For more information, please contact:

CZC98, Institute of Ocean Sciences
PO Box 6000, Sidney, British Columbia
V8L 4B2, Canada
Fax: 1-250-363-6479 (c/o CZC98, Institute of Ocean Sciences)
email: czc98@ios.bc.ca
URL: <http://www.ios.bc.ca/ios/czc98>



Recent and Members Publications

The titles of publications listed below are those we feel would be of interest to our readers. Requests for these publications can be made to Becky Field or directly to the author where the address is provided. Requests to Becky Field should include the number of the reference, along with the author, title and journal information. In some cases, the information required to obtain the publication will be provided. Requests for bibliographic searches will be accepted. Please include a complete description of the information required along with 5 or more key words and the reasons for the request. The search will be easier to conduct if as many details as possible are given.

The publications of the CoRR Network Members are included in this list and are indicated in bold letters. If you are a member of the CoRR Network and would like your publication to be listed in the next issue of **OUT of the SHELL**, please send a copy to the CoRR office.

Aquaculture

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2251. Dankers, N. and Zuidema, D.R., 1995. The role of the mussel (*Mytilus edulis* L.) and mussel culture in the Dutch Wadden Sea. Estuaries 18(1A):71-80. DLO Institute for Forestry and Natural Research, P.O. Box 167, 1790 AD Den Burg, The Netherlands.
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2254. Findlay, R.H., Watling, L. and Mayer, L.M., 1995. Environmental impact of salmon net-pen culture on marine benthic communities in Maine: A case study. Estuaries 18(1A):145-179. Department of Biochemistry, Microbiology and Molecular Biology and Center for Marine Studies, Darling Center, University of Maine, Walpole, ME 04573 USA
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Science and Development: Towards a New Partnership, CAB International. pp. 403-408. Wageningen Institute of Animal Sciences, Department of Fish Culture, Wageningen Agricultural University, PO Box 338, 6700 AH Wageningen, The Netherlands.

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Community Management

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Coastal Resources Management

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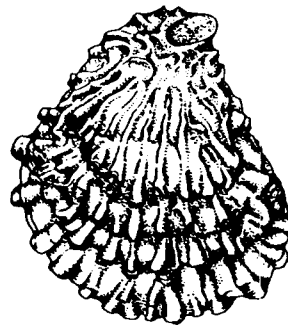
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