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Towards Better Management

See Pages 9-17

Needed : Solutions to fisheries management problems

Food tastes are supposed to be notoriously fickle. But fish is the evergreen favourite. Demand for fish continues to be high. And insatiable.

How about supply? Marine capture fisheries, the main source of supply, seems to have plateaued. Aquaculture, yesterday's great hope, is today under savage attack from environmentalists. The future of both marine fisheries and aquaculture depends on sound management of production and resource eco-systems. But management has been elusive, because investors and producers selfishly and short-sightedly pursue profit.

Efforts are being made to strengthen the institutional and legal framework of management and to upgrade technical expertise. But neither fishermen nor administrators – nor most other stakeholders – seem to take fisheries management sufficiently seriously, despite the growing awareness of how badly it is needed.

More recently, efforts have been initiated to involve resource users and stakeholders in the management process. The concept of community-based people-centered eco-system resource management has exciting possibilities. Its rationale is simple: empower resources users and stakeholders; let them assume more and more responsibility for managing the very resources on which they rely for sustenance and livelihood security.

Government agencies and NGOs seem equally convinced about the soundness of community-based management. But they have failed to comprehend the implications; what empowering people in resource management entails. Many Governments are still unwilling to share the power to control or manage. The communities on the other hand, are often hardly ready to assume power or responsibility for management. If community-based management is to become a reality, some hard thinking and planning is essential. And a serious dialogue with fisherfolk. And a co-operative approach on the part of all stakeholders.

The mass media – glossy magazines, high-circulation newspapers, television channels – frequently highlight fisheries resource issues. But what they invariably do is to dramatize the problem, sometimes in apocalyptic terms; they have little to say about solutions. As for fisheries science institutions, how much of R & D have they devoted to solutions concerning management? The depiction of problems is overdone, that of solutions hardly attempted. Now is the time to discuss possible solutions in the mass media.



This issue of *Bay of Bengal News* looks at some fisheries management issues. It discusses the implications of empowering the people on resource management. It mentions examples of innovative management approaches by the fisherfolk community in the Bay of Bengal region. It talks about indicators of success in coastal zone management. It discusses the ornamental fish industry in Sri Lanka, which involves a multiplicity of government departments and agencies. BOBP is assisting efforts to bring all these players together to discuss the subject and work towards a solution.

Solutions to the problems of fisheries management are difficult. They are complex. They are full of hassles. But we have to work toward them. Putting off a difficult solution today means making it almost impossible tomorrow.

This issue of *Bay of Bengal News* reflects our humble quest for solutions to fisheries management issues. We hope it gives the process a momentum.

Kee-Chai CHONG

PERSONALISING AND SOCIALIZING FISHERIES MANAGEMENT: WHAT ARE THE PRACTICAL IMPLICATIONS?

by Kee-Chai CHONG

*Only when the last tree has been cut down,
Only when the last river has been poisoned,
Only when the last fish has been caught,
ONLY then will WOMEN realise they cannot EAT MONEY*

— Cree Prophecy

Recognising the importance of, the need for, the benefits and methods of fisheries management, is much easier than working out the practical guidelines for it and operationalising it. Public awareness of fisheries management-through public education and publicity — can help make it work by bringing about changes in behaviour more efficiently and effectively. Behaviour, however, is influenced by an individual's value system, attitudes, self-interest and perceptions — and most importantly by his environment and upbringing.

Time was when people lived by certain rules of good conduct and responsible behaviour. Saws and adages abounded about such conduct and such behaviour. No more. When did you last hear that lovely gem of wisdom, "Waste Not, Want Not"? There are many other prescriptions of behaviour — for individuals as well as for communities — that need to be revived.

Working with Fisherfolk as Individuals

During the last 3-4 decades, government effort at introducing and implementing fisheries management remained at the aggregate 'level. There was hardly any effort to individualise and personalise fisheries management by working with individual fisherfolk. Entire communities of fisherfolk were asked to co-operate and accept government intervention at face value, on the assumption that the government knew what was needed and best for all concerned.

Wasn't it bad enough for fisherfolk to be lumped together and treated as an identical mass? To make it worse, a management system was imposed on them from the top. Forget individual

fisherfolk. Even the community was rarely listened to, let alone consulted.

Because the approach adopted was neither sufficiently consultative nor participatory, there was poor ground-level understanding about fisheries management-its needs, methods, benefits. There were also perceptual and attitudinal problems associated with the system of management. The purposes and objectives of management were not clearly explained to them. The concepts, principles, structure and functions, processes and guidelines to operationalise fisheries management remained unclear. In other words, fisherfolk had a very vague idea of what was expected of them. Furthermore, they soon realised that non-compliance resulted in punitive action by government officials. No wonder violations were rampant.

Fishing communities were asked to co-operate in an activity to which they had not been adequately exposed. Long used to a system of resource exploitation characterised by a common property structure with open access and free entry into the fisheries, fisherfolk found the newly imposed fisheries management 'structure' alien to them. Worse. It impinged on their freedom. The change from 'unregulated' to 'regulated' fishing did not interest them. And they were not willing to comply.

Recent field surveys based on one-on-one interviews with fisherfolk have revealed that they resent being treated as a nameless faceless mass. They want their individuality, their distinctness, to be respected. Just as you and I do. But fisheries development and management interventions failed miserably to do so.

Government work in fisheries has remained at the national, state, district or village level. There are good reasons for such an approach. However, greater emphasis should be placed on government intervention and assistance at the individual level, appropriate to the needs and circumstances of the fisherfolk, and responsive to individual opinions and views.

Take government loans to fisherfolk. Many fisherfolk interviewed were upset that they were viewed as poor credit risks. They claimed that there were many honest hard-working fisherfolk who could benefit from a sound government credit scheme; administrative malpractices were mainly responsible for poor repayment.

Depicting Problems More than Solutions

In much of fisheries analysis, there is a conspicuous emphasis on portraying problems rather than solutions. The solutions if any figure at the end of the report. By the time the reader is through with the problems, his patience, even his attention, are exhausted.

Solutions are even scarcer in the products of mass media-such as posters, charts, brochures and leaflets, videos and films-which are meant to create awareness and educate the public.

Further, many of the solutions are external in origin, and have not involved the fisherfolk in working them out.

The 'Personal Touch' in Resource and Environmental Management

Human beings are by nature creatures of habit. Habits are picked up at various levels-the family, the community, the nation. Singapore provides an excellent example

of responsible citizen behaviour influenced by government. A value system of respect for the law, and regard for the rights of the individual and of society, can be promoted in every individual at the national level.

It has been observed that individual behaviour is more predictable than that of the community. Get individuals to change: you will have a new society. The 'personal touch' can lead to more responsible public behaviour; it can also mean stronger commitment to manage and protect the planetary environment and its resources..

One way of personalizing fisheries management is to get all concerned fisherfolk to take a "pledge" that they will safeguard the environment. BOBP has drawn up a pledge "Towards a Better Environment," that recalls the Earth Pledge from the 1992 Earth Summit of Rio de Janeiro, and also introduces a "Fisheries Pledge" (see illustration) that says "I pledge to act to the best of my ability to conserve and protect aquatic resources and the aquatic environment for the present and future generations."

Copies of the fisheries pledge are being distributed at public gatherings of fisherfolk. Please write to us for copies if you want them for your work.

From Individual-Level to Community-Level Management

Modernisation and advances in science and technology have weakened community bonds. The "community feeling" has suffered gradual but sure erosion, a victim of 20th century pressures. There is today a real need to re-build and strengthen the good old 'community feeling'. We must also put an end to individual and collective indifference to the planetary environment. It is possible to strive for success simultaneously at the individual and community levels. In fact, the synergy of the two can powerfully influence responsible behaviour in protecting the planetary environment.

Implications of People-Centered Ecosystem-Based System of Management (Community-Based Fisheries and Coastal Resources Management)

BOBP was instrumental in highlighting the implications of people-centred ecosystem-based management, not only in informal discussions with government, industry and non-government personnel

but also in public fora. It is easy to articulate the need for people empowerment and people participation in resource management, including community-based systems of management. But scant attention is being paid to examining the real implications of such people empowerment.

The key implication: Is the government willing to delegate management responsibilities and authority and share them with the people, in this case the fisherfolk and other coastal stakeholders? The concept of "resource users as resource managers," empowering the people to take on more responsibility for the resources they rely on for their food and livelihood security, is currently very popular with NGOs and development workers concerned with poverty alleviation. However, such ideas are confined to literature; they have yet to be executed in practice.

With a few exceptions, governments are still silent or non-committal about the idea and have not really taken a position on it.

Resource management authority and responsibilities have traditionally been vested in government, notwithstanding old customs and traditional community-based systems of resource management prevalent since pre-colonial days. However, with Independence, ownership and authority for all natural resources and assets within the country have passed to the national government. BOBP's work with member countries reveals that not all countries are willing as well as able to delegate such authority. Those that are willing are exploring ways of doing so within their existing management framework. Or they are looking for possible "loopholes" in their laws that will allow such a people-centred ecosystem-based management system. Some other countries are still hesitant and reluctant about it because of negative experiences in the past.

It is often said that the top-down approach to fisheries management has not worked or succeeded. Such an approach is an 'intervention' in the daily life of fisherfolk that is imposed from the top. As fisherfolk and coastal inhabitants are used to a largely unfettered lifestyle virtually free from any kind of restrictions, they have come to view any management initiative as a severe curtailment of their daily activities. **They**

do not fully understand that management does not mean no fishing or severely restricted fishing.

By the same token, it can be safely said that the **bottom-up** approach is not any easier either. The people themselves may not be sufficiently organised or ready to assume more control and management of the resources they exploit. BOBP's limited regional survey on the values, perceptions and attitudes of fisherfolk towards ownership of fisheries resources, reveals that fisherfolk lack a sense of entitlement about the resources — as compared to their land-based counterparts in forestry or pastoral agriculture.

A good case in point is the availability of a community centre, fish landing and fishing boat repair and maintenance facility constructed by the Thai Department of Fisheries for the use of the local community. While they are already using the fish landing facility, the local community has not used the community centre — because they are afraid to use it, nor are they sure how to use it. They informed Thai fisheries officials that they need some assistance in organising themselves to be able to use such facilities, implying that they can benefit from training on **leadership**, a finding which the BOBP preliminary survey also confirmed.

In many of the fishing communities found in BOBP member countries, there is a general lack of leadership among fisherfolk, dominated as they have been for a long time by the articulate segment of the population. Success with bottom-up approaches to management calls for considerable preparatory work to organise the fisherfolk and other stakeholders as resource managers. Marrying the two approaches - top-down and bottom-up — is clearly needed to bring about improved management and sustainability of fisheries and other coastal resources.

After about two years of concerted effort, including periodic close follow-up with BOBP counterparts, there is today a greater appreciation of the need for greater coordination in government circles, and among GOs, NGOs, fishing communities and other stakeholders. Some close collaboration has already come about through the catalytic effort of BOBP counterpart colleagues and staff. In fact, member countries repeatedly request BOBP to act in such a capacity

because they view the Programme as a neutral referee, able to bridge the conflicting needs of member countries.

Fishing communities deeply appreciate GO and NGO co-operation with them. The alternative, which means these agencies work independently and in isolation of each other, has resulted in public disaffection with GOs. NGOs on the other hand have grown in popularity. This is because the working style and work habits of GOs and NGOs are dissimilar. NGOs work amidst the communities and have no office hours to clock in and out; they are frequently better funded than GOs and are more flexible in carrying out their work than GOs, who have to abide by well-established government regulations. Thus, a mutually reinforcing relationship should be encouraged between GOs and NGOs, based on their comparative strengths.

During the last two years, BOBP has broken fresh ground in bringing together all stakeholders and preparing them for

greater co-operation in analysing what ails their communities as well as in coming up with solutions which all stakeholders identify with. This then is the strength of a Programme such as BOBP. Here are examples of selected outputs and impact which illustrate the Programme mandate, thrust and direction.

It is frequently claimed that fisherfolk are not willing to return gravid and undersized fish to the waters to allow them to spawn or grow larger. Because they have no assurance that the fish will remain theirs when they have spawned or grown larger. In Phang-Nga Bay, the Thai Department of Fisheries, working together with local area NGOs and fishing communities, has shown a way out. Bay fisherfolk there are actively involved in self-management, further reinforcing GO and NGO effort at monitoring, control and surveillance of illegal fishing. Fishing communities around the Bay are helping to keep the push netters and trawlers out of the 3000 m fishing zone for small-scale fisher-folk.

At the same time, they are building artificial reefs — not as a fishing gear but as a fisheries management tool. They report that they can net about Baht 500 or US \$20 for only 3-4 hours of fishing per night around the artificial reef. More recently, they have constructed cages for gravid female crabs to allow them to spawn. The spent females are then sold and the income goes into a community chest or community revolving fund. Besides, closed areas and closed seasons are observed during the spawning cycles of fish.

In India, in the state of Tamil Nadu, local fisherfolk offered their own fishing boats and services to help enforce management measures and ensure compliance, because of the lack of adequate management enforcement capability in the district of Kanniyakumari. In Malaysia, where the Department of Fisheries has an adequate budget for enforcement, there is greater compliance with fisheries management measures. Violator boats are either impounded or confiscated;

The "Fisheries Pledge" prepared by BOBP to motivate more responsible individual behaviour.



TOWARDS A BETTER ENVIRONMENT

Earth Summit

*V.N. Conference on Environment & Development,
(Rio de Janeiro, Brazil, 3-14 June 1992)*

Sustainable Fisheries for Food & Livelihood Security

*Bay of Bengal Programme for
Integrated Coastal Fisheries Management*

Earth Pledge

Recognizing that people's actions towards Nature and each other are the source of growing damage to the environment and resources needed to meet human needs and to ensure survival and development.

*I PLEDGE to act to the best of my ability
to help make the Earth a secure and hospitable home
for present and future generations.*

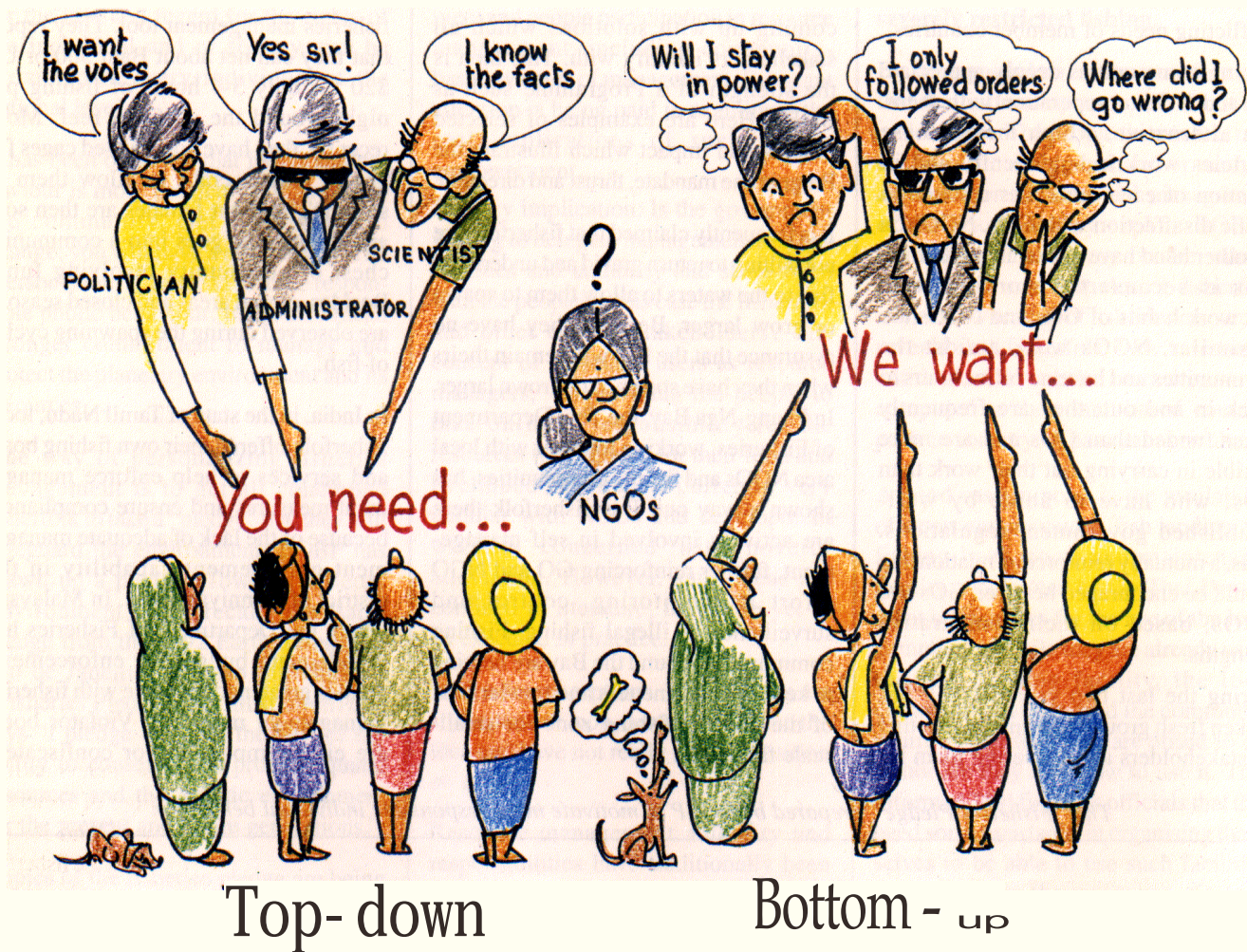


Fisheries Pledge

Recognizing that people's actions towards the sea and coast are sources of growing damage to the aquatic environment and to aquatic resources needed to meet human needs and to ensure resource sustainability.

*I PLEDGE to act to the best of my ability to conserve
and protect aquatic resources and the aquatic
environment for the present and future generations.*





Both the top-down and bottom-up approaches to fisheries management have their flaws and limitations. Combining the two approaches results in combining the strengths of both.

their owners are penalised and fined. To save on expenditures and reallocate the released funds to other more productive investments, the Department of Fisheries, Malaysia, is exploring a more participatory form of management. Such an effort will reduce the size of the enforcement unit, including its annual budget.

Another example: during the recent stakeholder consultation and analysis in Tamil Nadu, a leading fish trader asked BOBP what species he should stop buying so that he could help the process of management. This is a startling revelation, which implies that the level of awareness is rapidly growing and spreading; even market intermediaries realise that their future source of livelihood and security depend on a healthy and vibrant fishery.

Other examples and experiences in operationalising fisheries management will be reported in future issues of *Bay of Bengal News*. Suffice to say that all stakeholders are moving in the direction of responsible fisheries and sustainable production.

Community Learning and Earning Centre

Fisheries management is of course not new; and it is not being started all over

again. Like all management processes, it is a continuing and evolving learning process. Experiences show that fisherfolk are not overly enthusiastic about fisheries management, especially if imposed from the top, and much less if it is also punitive. Fisheries management must serve the needs of the fisherfolk and not the other way round.

As pointed out above, the Programme's effort at awareness building and public education is beginning to pay off. Over the last two years, BOBP has been trying to institutionalise fisheries management through resource user groups, government personnel and other stakeholders, either directly or indirectly. **Because of this, it is crucial that their perceptions, values, habits and attitudes are examined to find out how positive attitudes and habits can be rewarded and negative behavioural traits or characteristics, attitudes and habits, perceptions and values, be corrected.**

Just as the attitude of fisherfolk towards quality can be changed, so can their attitude towards management — by continuous public education and awareness-building. More and more people today are quality-conscious. Likewise, more and more fisherfolk can become management-conscious.

This is where the setting up of a 'community learning and earning centre' (CLEC) in strategic fishing villages can help to bring about desirable changes in the attitudes of the people towards fisheries management and responsible fisheries. CLEC can prepare them to come up with their own solutions to their own problems, especially when the entire community is involved. While some member countries have already set up such CLEC, others are in the process of identifying facilities for these centres.

In sum, there is little need for more policies and strategies to guide successful management of the fisheries. What is critical is effective implementation of available fisheries management policies, strategies, approaches and methods.

To put it differently, no amount of legislation on fisheries management will help. Only implementation will.

CLEC can increase the understanding, awareness and knowledge of fisherfolk on fisheries management, and lead to closer co-operation between the fisherfolk and the government on a subject that concerns both — sustainability of the fisheries and of the fisheries resources.

Towards a World without Hunger: 1996 World Food Summit in Rome

Leaders of more than 150 countries (including more than 40 Presidents and 40 Prime Ministers) who attended the World Food Summit convened by the FAO in Rome, November 13-17, 1996, adopted a Declaration on World Food Security and a Plan of Action.

The Declaration, adopted on the very first day of the Summit, affirmed the effort of governments to "eradicate hunger in all countries" and "reduce the number of undernourished people to half their present level by the year 2015."

The Rome Declaration contained seven important commitments. The Plan of Action listed objectives and actions to meet these commitments. Here are extracts and excerpts:

Commitment 1: Ensuring "an enabling political, social and economic environment designed to create the best conditions for the eradication of poverty and for durable peace ..."

Some of the recommended actions:

- **Develop conflict prevention mechanisms to settle disputes by peaceful means**

- Develop policy-making, legislative and implementation processes that are democratic, transparent, participatory, empowering and responsive
- Establish legal mechanisms that advance land reform, recognise property, water and use rights, enhance access for the poor and women to resources
- Integrate population concerns into development strategies
- Support commitments made at the Fourth World Conference on Women (Beijing, 1995) to advance the gender perspective in all policies

Commitment 2: "Implement policies aimed at eradicating poverty and inequality and improving access by all at all times to sufficient, nutritionally adequate and safe food ..."



Examples of recommended actions:

- Pursue sound policies that will permit farmers, fishers, foresters and other food producers to earn a fair return from their labour, capital and management . . .
- Promote access by farmers and farming communities to genetic resources for food and agriculture . . .
- Develop and update a national food insecurity and vulnerability information and mapping system, indicating areas and populations at risk of hunger and malnutrition . . .

Commitment 3: ‘Pursue participatory and sustainable food, agriculture, fisheries, forestry and rural development policies and practices in high and low-potential areas . . .’

A few of the recommended actions:

Promote early ratification of the FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. Implement sustainable fisheries management and practices, in particular the Code of Conduct for Responsible Fisheries . . . Strengthen and establish appropriate regional and sub-regional fisheries management organizations or arrangements . . .

- Strengthen local government institutions in rural areas and provide them with adequate resources, decision-making authority and mechanisms for grassroots participation . . . develop technical and educational infrastructure in rural areas . . . promote rural banking, credit and savings schemes . . . promote the development and diversification of rural markets, reduce post-harvest losses and ensure safe storage, food processing and distribution facilities
- Promote empowerment of small-scale family farmers, fishers and foresters, both women and men, to set up their co-operatives and business undertakings, as well as farmers’ and fishers’ financial institutions
- Develop international South-South technical co-operation programmes to facilitate nutritional programmes that have succeeded in other developing countries.

Commitment 4: “Strive to ensure that food, agricultural trade and overall trade policies are conducive to fostering food security for all through a fair and market-oriented world trade system...”

Some of the recommended actions:

- The international community should assist countries to adjust institutions and standards both for internal and external trade to food safety and sanitary requirements . . . promote financial and technical assistance to improve the agricultural productivity and infrastructures of developing countries to optimise trade opportunities
- Promote technical assistance and encourage technology transfer consistent with international trade rules . . .
- Conduct international trade in fish and fishery products in a sustainable manner in accordance with international agreements
- Food exporting countries should reduce subsidies on food exports in conformity with the Uruguay Round Agreement . . .

Commitment 5: “Try to prevent natural disasters and man-made emergencies and meet emergency food requirements

in ways that encourage recovery and rehabilitation and a capacity to satisfy future needs...”

Recommended actions:

- Use international, regional and national mechanisms to prevent situations that lead to emergencies
- Co-ordinate policies to combat terrorism
- Maintain preparedness strategies and mechanisms including climate forecast information for surveillance and early-warning, drought, flood, other natural disasters, pest and disease alertness
- Promote appropriate community-based and regional surveillance systems to gather information and implement preparedness programmes
- International organizations should strengthen the coordination and efficiency of emergency assistance to ensure rapid and appropriate response

Commitment 6: “Will promote optimal allocation and use of public and private investments to foster human resources, sustainable food, agriculture, fisheries and forestry systems, and rural development in high and low potential areas...”

Recommended actions:

- Promote policies to enhance the flow of investments for food security. Encourage public-private partnerships in promoting responsible investments from domestic and foreign sources and increase the participation of local communities in investment. Raise sufficient and stable funding from domestic and foreign sources to achieve and sustain food security. Encourage investments to create infrastructures and management systems that facilitate sustainable utilization and management of water resources
- Focus overseas development toward countries that have a real need for it, and enhance their capacity to utilize it effectively
- Promote mechanisms to mobilize domestic savings, including rural savings

Commitment 7: “Implement, monitor and follow-up this Plan of Action at all levels in co-operation with the international community...”

Recommended actions:

- Governments should review and revise national plans and strategies to achieve food security
- Encourage a greater role for civil society organizations in addressing food security
- Mobilize public and private resources to support community food security initiatives
- Plan and monitor implementation of recommendations of all UN conferences aimed at eradicating poverty and improving food security
- Focus technical assistance more effectively on building up and mobilizing national capacity, expertise and local institutions
- International organizations are invited to assist countries review and formulate national plans of action including targets, goals and timetables for achieving food security

TOWARDS BETTER MANAGEMENT OF THE ORNAMENTAL FISH SECTOR IN SRI LANKA

by Rathin Roy

The ornamental fish industry provides jobs, incomes and foreign exchange but raises environmental concerns. BOBP is helping to bring all of the industry's players together to discuss management.

At first sight, an aquarium tank of beautiful ornamental fishes seems such a tranquil reminder of the majestic beauty of nature. Behind it lies an industry scattered across the tropical world. It involves divers who collect the fishes, traders who buy and sell, breeders, exporters and transport systems who handle their delicate and vulnerable live cargo to provide pleasure, recreation and education to hobbyists, educational institutions and scientific institutions. Why, one may well ask, does such an activity need management?

Why bother to manage?

In the island nation of Sri Lanka, surrounded by the Indian Ocean, the Bay of Bengal and the Arabian Sea, the capture, breeding and export of ornamental fish is an important industry, if one can call utilization of a natural resource an industry. It provides jobs and incomes to several thousand people; it is an important source of trade and foreign exchange. The annual trade in ornamental fish amounts to over Sri Lankan Rupees 300 million. But, and there is always a but, there are concerns.

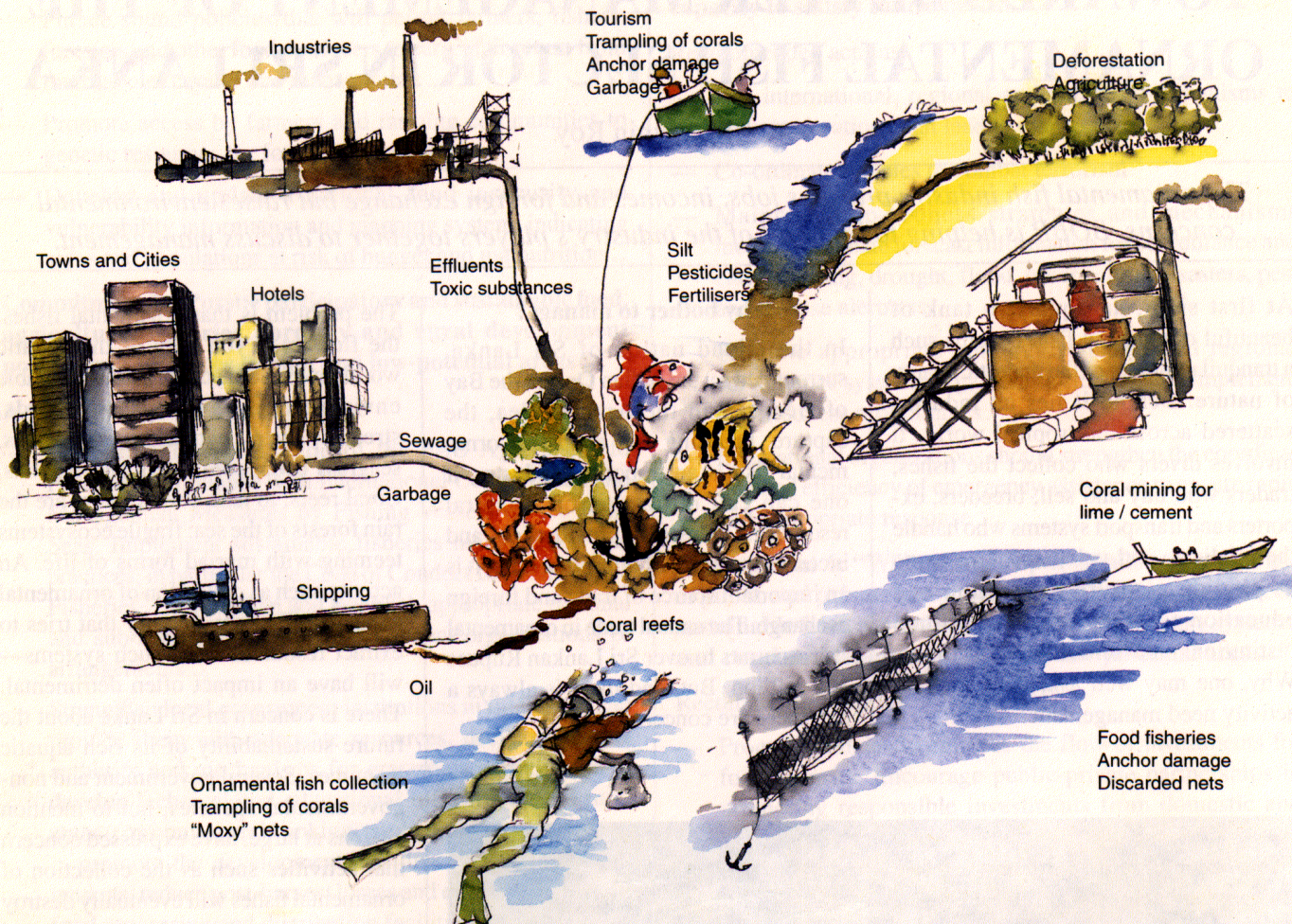
The problem is that ornamental fishes, the flowers if you may of the aquatic world, live in some of the most vulnerable environments: swamps, wetlands, streams, rivers, estuaries, mangroves, seagrass beds, coral reefs and lagoons. Coral reefs, to take one of them, are the rain forests of the sea: fragile ecosystems teeming with myriad forms of life. An activity such as collection of ornamental fishes—in fact any activity that tries to extract resources from such systems—will have an impact often detrimental. There is concern in Sri Lanka about the future sustainability of its rich aquatic resources. Several government and non-governmental agencies, not to mention citizens at large, have expressed concern that activities such as the collection of ornamental fishes will eventually destroy the country's precious biodiversity and put the environment and the people in it at risk. This concern has already translated itself into policy and action. The Department of Wildlife Conservation, in its Flora and Fauna Act, sets out guidelines that restrict and in some cases ban the export of selected aquatic organisms. The Ministry of Fisheries and Aquatic Resources Development is in the process of notifying an ordinance under the Fisheries Act of 1996 to ban and restrict the export of selected ornamental fish.

Towards improving the management of the ornamental fish sector in Sri Lanka

During its third phase (1995-1999), the BOBP was requested by the Government of Sri Lanka to assist the Ministry of Fisheries and Aquatic Resources Development by facilitating and enabling improved management of the ornamental fish sector. The Ministry felt that the lessons learnt would help improve the management of larger and perhaps less organized fisheries that target food fish. The question therefore was not why, the ornamental fish sector requires manage-



Threats to Sri Lanka's Coral Habitats



ment . That is obvious: Sri Lanka and its people are naturally concerned about their environment; employment opportunities for people, and trade and foreign exchange earnings, realities that one cannot walk away from. The question was is it possible to hit a balance between environment and development? Can a people tap and utilize a natural system in a manner that not only satisfies reasonable needs but also sustains the environment for tomorrow? Rational management of a resource, in this case an open access resource which anyone with a snorkeling mask and pair of flippers can get into, is perhaps the only answer. This would be a sort of a middle path between the extremes of development as if there is no tomorrow and a conservation/preservation ethic that ignores the fact that people also belong to the ecosystem and therefore can and should live off it.

The nature of the problem

Management of the ornamental fish sector, like most complex situations, is

not as easy as it sounds. Often, conflicting goals and objectives that consider ecology, economics and politics need to be set. Practical and workable management mechanisms have to be evolved. The concerned have to be persuaded to sign on, as it were, to do the needful. And rules and regulations have to be put into place and enforced. But to begin at the beginning, one needs to understand the problem before jumping to the solution. And that is where BOBP began, by trying to better understand the real problems.

The ornamental fish sector in Sri Lanka saw its beginnings in the late 1940, and has grown steadily. The bulk of the ornamental fishes sold locally or exported were captured from the marine and freshwater ecosystems. As technologies developed, the sector slowly ventured into the breeding and culture of certain freshwater species. A summary glance at what little data exists suggests that the marine capture sector leads the market; the freshwater capture and freshwater breeding and culture sectors trail well

behind but are growing rapidly. Collecting and buying ornamental fish from other nations, such as the Maldives or the Gulf and Red Sea nations, and reselling them to major markets in Europe and the U.S., is also a lucrative business.

Managing the fish! Managing the fish habitat?!

The concern about the ornamental fish sector in Sri Lanka is at two levels. First, given that little is known about the available numbers or the biology of several of the species, and given that some of the species are endemic to Sri Lanka and rare, there is a genuine fear that indiscriminate collection would stress fish populations and eventually push them toward extinction. Related to this is the concern with the way these delicate creatures are collected. In some parts of the world, toxic substances such as cyanide are used to stun the fish and make their capture easy. Luckily, there are no known cases of such capture methods in Sri Lanka. However, in addition to the more eco-friendly hand-held nets there are

more destructive nets such as the “moxy” nets which are spread over corals, and the ‘tickler rods’ that scare the fish out of the corals into the nets. Tickling is perhaps a wrong word to use as it often destroys and breaks the coral formations.

Second, and less well known, is the concern about the impact of human activities on the habitats of ornamental fish. And the list of such activities is a long one: urban habitats along the coast and tourist hotels take the easy route and dump sewage (raw or partially treated at best) directly into the sea, causing algal blooms, suffocation of corals and even eutrophication. Industries, inland and along the coast, dump toxic wastes to pollute the coastal waters. Upland plantations and agriculture result in leached fertilizers and pesticides finding their way into coastal waters through rivers. Coral is mined to produce lime and cement. Tourists, attracted by beautiful coral reefs, use glass bottom boats which anchor indiscriminately, destroying corals. Tourist divers trample on corals. Fishers targeting food fish cause damage to corals by anchoring and leave behind bits of tom nets which continue to fish and kill. While it is known that all this and more is happening, little is known about the extent of such activities and what their impact is on the habitats. Given *this scenario, trying to manage the ornamental fish sector by just banning the export of some species and restricting the export of some others may prove futile, even if successfully implemented, if no attention is paid to the very quality of the habitat which recruits and provides a home for the creatures concerned.*

Is there enough information to manage? The need for precautionary management

Assuming that data collection and scientific studies are expensive and often take a lot of time, can Sri Lanka wait till it knows enough to start management? And the answer has to be an emphatic NO! By the time we know enough there may be nothing left to manage. The obvious route to take is one of PRECAUTIONARY MANAGEMENT. But let us think about why this is not already being done.

Who manages, who facilitates management, and why?

Thinking through the problem raises several questions: ultimately, who can manage the activities that result in damage and destruction to the ornamental fish stocks and their habitats? Whose job is it to facilitate and enable such management and to enforce regulations? Why should anyone want to manage ornamental fish stocks and their habitats, or, to put it more bluntly, what is in it for them?

The answer to the first question, as to who can manage, is obvious: only those who are actively involved in the activities which result in the problems. Collectors of ornamental fish, food fishers, coral miners and producers of lime and cement, municipalities and tourist hotel operators, glass boat and tourist diving operators, the agriculture sector, and so on and so forth. If, and only if, these people change the way they practise their livelihood will any real change come about to benefit the fish stocks and their habitats. In order to change they have to know the need for, the benefits of and approaches to management and there have to be incentives and disincentives to push awareness into action. Which brings us to question three — what is in it for them? The answers would vary. For the ornamental fish collector/exporter, their very future is linked to better-managed stocks and habitats. For the others the answers are perhaps more nebulous and will have to be tempered with disincentives to help them to see the benefit for themselves.

The second question, as to whose job it is to facilitate and enable management, lays the responsibility squarely on government, which reflects the needs and concerns of the country and its people. The real problem here is that there are so many government ministries and agencies involved. The Ministry of Fisheries and Aquatic Resources Development is the agency mandated for management of aquatic resources. However, the Department of Wildlife Conservation has a wider mandate to worry about and conserve all wildlife. The Forest Department looks after the well-being of mangroves. The

Agriculture Department can do something about pesticides and fertilizers leaching in the waters. The Customs Department can help by controlling what goes in and out of the country. The Department of Coast Conservation looks after the development of the coastal zone. And the list goes on.

Coming together to manage natural resources: the only way!

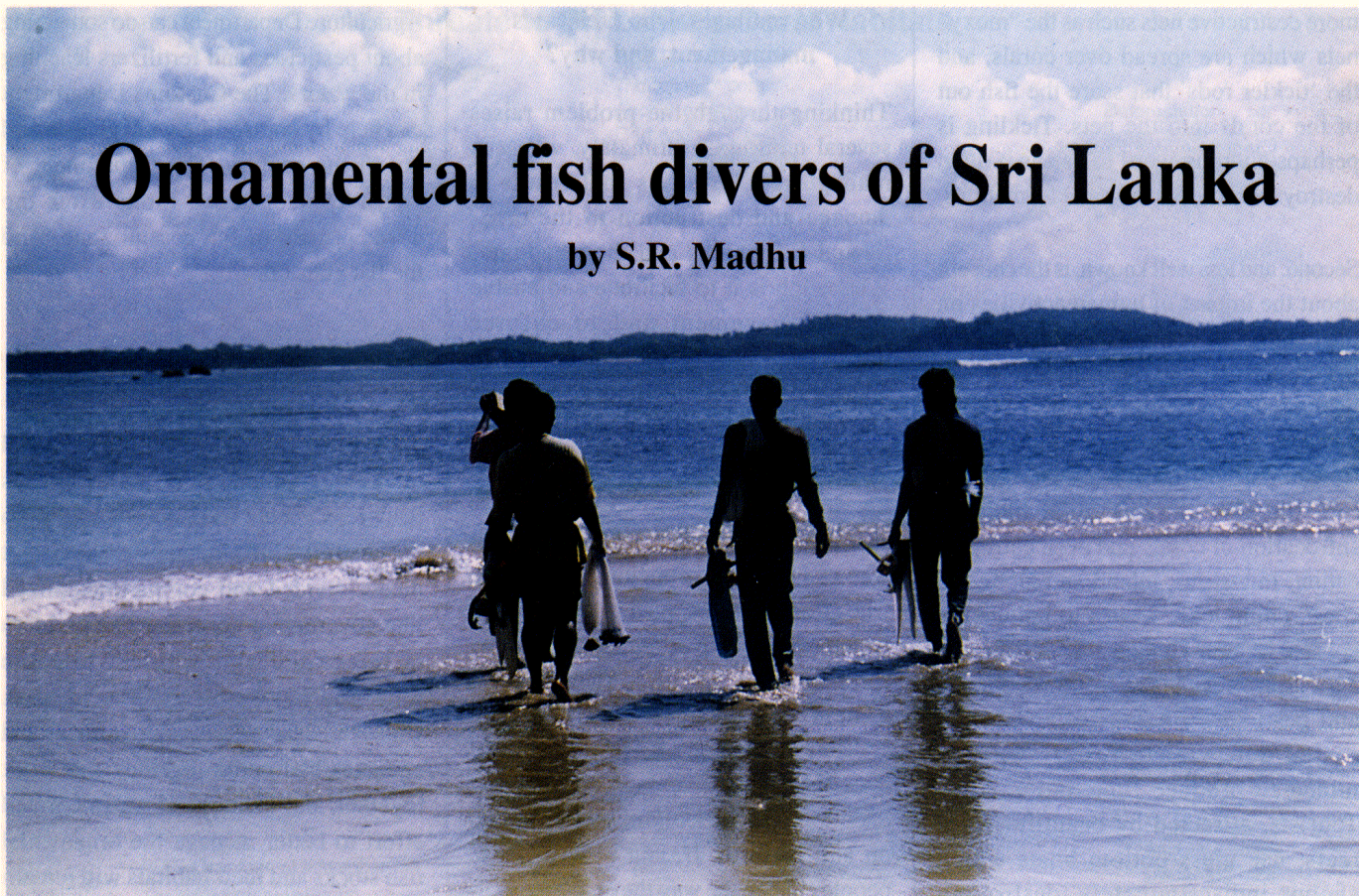
Each department or agency has its official mandate, its planned activities and its resources, manpower and budgets to do the needful. Unfortunately, nature is not nicely divided and compartmentalized like government agencies. The problem is integrated and whole while the solutions are piecemeal and uncoordinated. Unless all the concerned departments and agencies can come together and work together, the chances of an integrated effort to better manage the ornamental fish stocks and their habitats will remain a distant dream. And all the parties will stand to lose.

Making a beginning: learning how to work together

Getting different agencies and government departments to work together has never been and will never be easy. But a beginning can be made if they come together and understand that only by working together can they address their problems. And then by evolving ways and means of working together. It is not the final decisions or the regulations and means of enforcement but rather the ways to arrive at them which will matter in the long run. The Ministry of Fisheries and Aquatic Resources Development and the BOBP hope to set this process in motion by bringing together the key policy makers from all departments and agencies who are concerned with ornamental fishes and their habitats, in January 1997, to agree on common concerns and to evolve approaches and methods of working together. If it works, we may all be able to move towards sustainability through improved management. If not, we and our future generations will pay dearly for our lapses and actions.

Ornamental fish divers of Sri Lanka

by S.R. Madhu



Armed like astronauts, they set out to sea with their cylinders, compressors and helmets, and get aboard a small motorized boat. A few minutes later, a kilometer from the shore, they stop the boat, get ready and dive. Within minutes they are 10 feet below water. They are looking for little multi colored treasures that dart and dance in the water. Ornamental fish.

Several hundred divers every day based in Dehiwala, Beruwela or Weligama or anywhere along Sri Lanka's coastline explore an amazing underwater world rich in marine life, plants, corals, fish. But what they are looking for is ornamental fish.

These divers have helped establish a US\$2 million export industry. They supply aquariums of Europe and the United States with a steady stream of ornamental fish.

The ornamental fish have jaw-breaking scientific names: *Apolemichthys trimaculatus*, for instance, or *Cheatomodon citrinellus*. The common names are far more interesting: angels, banner fish, butterfly fish, damsel fish, surgeon fish etc. To be more specific: flagfin angel, blue ring angel, emperor angel, threadfin butterfly fish, vagabond butterfly fish, spotted butterfly fish.

Sri Lanka has 300 varieties of marine fish and 150 varieties of ornamental freshwater and brackishwater fish. During the past 10 years, export of aquarium fish has grown from SRL Rs 30 million in 1981 to Rs 150 million in 1992. Around 75% of the fish exported from Sri Lanka is marine.

Sri Lanka is known for "quality" marine fish. "This is mainly attributed to the manual collection methods employed by divers," says Mr Arjan Rajasooriya, NARA research scientist. "They don't resort to drugs, dynamite, or poison to capture these fishes from the wild." Such practices have been reported from other countries.

Sometimes the divers look for specific species that importing aquariums ask for. Often, they catch any ornamental fish they can. The divers know an ornamental fish when they see one. They know the value of each fish: what price they will get for it, and what price it commands in the international market.

In the past, divers confined themselves to shallow areas less than 15m deep, says Mr Rajasooriya, and obtained satisfactory catches. But there are now far more divers and exporters than before, and scuba diving equipment is in use; inshore waters have been heavily

exploited. Collectors have therefore moved to new areas; they dive deeper than before. The industry has benefited too: some new species have been discovered in recent years.

A diver catches an ornamental fish gently with a "handnet". He also uses a "moxynet" that is somewhat similar to castnets. It catches fish in coral habitats where fast-moving fish are difficult to capture. A specialized net is also used to capture fish such as "blennies" and "gobies" that dwell in holes within the reef structure. Says Mr Rajasooriya "This is a small net with a diameter of about 5cm, attached to a rubber ring at the mouth. The net is placed firmly against the reef surface after ensuring that the fish is within its burrow. The fish is coaxed into the net using a thin wire inserted through the net mesh into the burrow."

The divers return ashore with their precious catch in plastic bags. They fill the bags with oxygen, condition the fish in basins for about half an hour, then transport the bags in three-wheel rickshaws or taxis to export companies. The latter place the bags in temporary conditioning tanks before packaging them for export.

Who are these divers? Some of them have inherited diving skills from their parents. Some, like University of Colombo

lecturer Suki Ekaratne and NARA research scientist Arjan Rajasooriya, enjoy doing it; they go scuba diving whenever they get a spare moment

Interviews with divers

Darryl Wilmot Fryer, 36, has been a diver since the age of 14. He started his own little scuba diving enterprise in 1984 along with four brothers-in-law. They bought a breathing air compressor second-hand from an ornamental fish exporter. "This compressor is fundamental to scuba diving. It pumps air into the cylinders taken by scuba divers to the sea," he says.

"A new compressor would have cost us Rs 65,000 then. The exporter gave it to us for Rs 30,000. We also bought some second-hand boats and engines, and got into business. We use this equipment ourselves, we also give it out on lease."

"There are over 200 ornamental fish divers in Dehiwala alone. We are trying to get divers from the north and south, including those based in Trincomalee together. But it has proved difficult," says Darryl. He and his brothers-in-law go scuba diving themselves. They also buy ornamental fish from about 15 other

divers along the coast at Dehiwala and sell to about half a dozen exporting companies.

"The previous government wanted to ban the export of live fish. We met the Minister of Trade. He was surprised to see us, he didn't know there were so many divers.

"Exporters don't mention the divers on whom they depend. They get awards, we are not even known."

"As long as we supply the exporters with fish, they are good to us. If we want a higher price, they get upset. They don't accept even slightly damaged fish, though they have facilities to correct slight damages," says Darryl. (Exporters, on the other hand, refer to their big investments and high overheads. While they pay the divers on delivery of the ornamental fish, the exporters bear the entire risk of sending the consignment by air to a distant country. They get their money only after the fish reach their destination safely and in a healthy condition.)

Which are the popular ornamental fish the divers catch? There are about 35 varieties. Cream angel, for instance, for

which a diver gets Rs.40. A blue angel fetches Rs 350.

How far do the divers go for ornamental fish? The nearest reef is about 1km away, other reefs a further 2-4 km, says Darryl. "The season for ornamental fish on the west coast is September through March. However, business is possible only for about four months. During heavy rain the water gets dirty and visibility is poor. We don't even meet the cost of petrol and boat hire during two of the six months.

"On the east coast, the ornamental fish season is from March to September. Ideally, we should be busy throughout the year — six months on the east coast, six months on the west. But we dare not go east because of the security problem."

"In 1990 some of us divers went to Batticaloa, and survived an ordeal we'll never forget. The Tigers captured us near Poonanee rail station and put us in a camp. One of us was beaten up badly. The Sri Lankan army rescued us some days later. But I lost much of my equipment — five cylinders, cans and regulators. My boat has still to be retrieved from Batticaloa. After that incident, we don't go east."

Left : A scuba diver at Dehiwala near Colombo all set to board a boat. He will dive into the sea for ornamental fish after reaching a coral reef that's about a kilometer away. Right : After a diving trip. Two skin divers at Weligama with their catch of ornamental fish.



"We live for 12 months on what we earn during four to five months. I'm on my toes during this period from 7 a.m. till 8.30 p.m. But the remaining six months of the year I've little to do. I just have to maintain the equipment," says Darryl.

Diving is a hazardous business. "The dreaded 'bends' or decompression sickness could strike us under water, below certain depths. To put it simply, we are short of air. The hands get numb, eyes blur, we feel weak," Darryl tells us. "All my brothers-in-law have been struck by bends. If the first or second diver in our team out on a boat has been struck by bends, we may have some cylinders with us, and we may be able to help the victim. Else, it is difficult. 'We divers would like to acquire a decompression

chamber. That will save many divers' lives. But it's expensive. If all exporters pool their resources, they could get such a chamber for us," Darryl asserts. (There is reportedly only one decompression chamber in Sri Lanka in working condition — with the Navy.)

Sri Lanka's ornamental fish divers are in demand in the Maldives too. "Conditions are different there. We have to dive deeper, currents too are stronger."

How do divers and fishermen harm the underwater environment? Says Darryl: "Fishermen sometimes spread their net on the reef. Crabs and lobsters get caught. If the nylon net is left on the rock, it 'poisons' the rock. Sometimes fishermen entangle a coral with the net and pull; this practice damages the reef. Live

corals get damaged by fishermen, not by divers. "Fortunately, the ornamental fish breed liberally. Blue damsels, for instance, which are much in demand, we can catch in shoals. The other fish — their lifespan is very short. Perhaps they get eaten up during the monsoon. But till March we find lots of them."

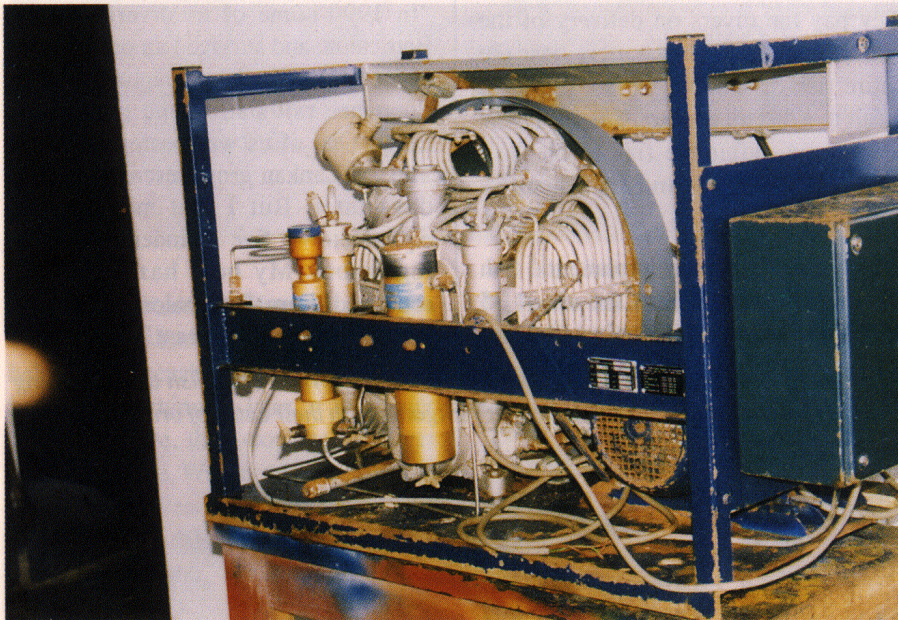
Would Darryl like to set up an exporting company himself? "The task is a bit complex for me at the moment," he says. "Right now I'm concentrating only on my group of 15 divers, including freelance divers."

Ornamental fish divers are active at many places along the west coast. At Weligama, two hours away by car from Colombo, M P Dharmasiri, 45, supplies ornamental fish to half a dozen exporters. He has been in the business for the past 20 years. Earlier, he used to transport ornamental fish. The peak season, he says, is November to May. Every two days' catch of ornamental fish, which fills some 60 to 70 polyethylene bags, is sent by lorry on the third day to Colombo.

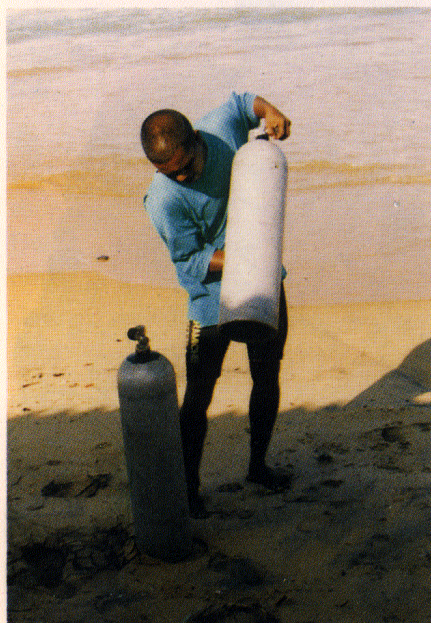
Talking about his problems, Dharmasiri says he is short of oxygen equipment. To expand his business, he would need more and better equipment. "I have remained in the same position as a supplier for the past 20 years," he says. Transport from Matara to Colombo also poses hassles.

There are some 100 skin divers in Weligama. One of them is Nishant, 21, who has been diving for the past six years. He goes out diving every day and dives to a depth of 5 to 10 m. Sometimes he catches three or four fish, sometimes nothing. "I can stay under water for about three minutes," he says. He earns about SRL Rs 2500 per month. He suffered an eel sting once; it kept him home for three days. Medication and an injection cured him. "I have been diving ever since I was a boy," he says. He adds "There are more ornamental fish in Batticaloa, Tangalle, Kolpetty and Puttalam districts than here — a pity I can't go there."

Nishant and Darryl both make the point that ornamental fish provides many people with livelihood. There are the divers and their families, their helpers, the entire export business which depends on the divers for supply, there are the transporters of ornamental fish. "We need recognition from the public, and help from the government and the industry," says Darryl.



Above : Darryl Fryer's breathing air compressor equipment. Below left : Divers carry air-filled cylinders like these with them. Right : Darryl shows the nets used to catch ornamental fish.





Export of ornamental fish

“This business runs on trust”

A profile of Sri Lanka's largest exporter of ornamental fish, the Lumbini Aquaria Wayamba Ltd., and of its managing director, Mr Vibhu Perera.

When India's first Prime Minister Jawaharlal Nehru visited Sri Lanka in the early 1950s, he is said to have asked for milk from the famous Lumbini dairy farm.

Lumbini was then known for lush green fields and a splendid herd of cows. But the Lumbini name is today synonymous with a different facet of natural resources — ornamental fish. The Lumbini dairy farm was in 1953 converted to an aquarium. It came to be described eight years later by Dr Herbert Axelrod, world-renowned author of a fish atlas, as “the largest

tropical fish exporter in the world” in the magazine *Tropical Fish Hobbyist*.

Lumbini is Sri Lanka's market leader for ornamental fish. Every month, 1000 to 1200 boxes of ornamental fish go from Lumbini's office in Mt Lavinia to some 40 destinations in 26 countries, bringing Sri Lanka \$100 000 per month in foreign exchange. The US is the biggest importer. The company has an annual turnover that exceeds a million dollars. Mr Vibhu Perera, son of the company's founder and the present Managing Director of Lumbini Aquaria Wayamba Ltd., is the President

of the Sri Lanka Ornamental Fish Exporters Association. Some 50 leading exporters are members.

Lumbini's 4.5 hectare project at Giriulla, some 55 km from Colombo, breeds and grows guppies, a variety of small, bubbly bright-colored ornamental fish prized everywhere. Guppies are in fact the world's most popular aquarium fish. Every month the company produces 800 000 guppies — 400 000 male, 400 000 female -for export to Singapore and other countries. Guppies from Giriulla won Lumbini the “Grand Champion”



Rearing of ornamental fish in nursery tanks.

trophy, and also the trophy for the Red Tuxedo category at Aquarama '95 held in Singapore.

Lumbini also produces high-quality freshwater ornamental fish at another place: a E-hectare site at the historical capital of Polonnaruwa, from where the company markets high-quality goldfish, *koi*, angels, barbs, tetras and gouramies.

At the company's Mount Lavinia headquarters, fish from Giriulla and Polonnaruwa are quarantined and packed for export. Freshwater ornamental fish collected from the wild are also housed here in nursery tanks, bred to stocking size, then sent to Giriulla or Polonnaruwa for grow-out. They are then brought back; breeders are put in tanks, the other fish are packed and exported.

Lumbini's Mt. Lavinia office has numerous cubby holes with country labels, like a postal sorting office.

Correspondence, queries, status reports etc concerning export to a particular country are kept in the relevant cubby hole. When you deal simultaneously with 40 destinations worldwide, you need such a device to be on top of all the transactions.

Vibhu Perera speaks

The man who runs Lumbini today is Mr Vibhu Perera, 55, son of the founder, Mr Lloyd Perera. He is naturally strongly committed to the progress of Sri Lanka's ornamental fish industry. Here is what he has to say — about his company and its success, and about the industry:

"Some people demand a complete ban on the export of ornamental fish. Obviously, we should not export rare species; they should be protected and conserved. But there is no point in banning species that are found in abundance, because it will mean loss of

jobs and valuable foreign exchange. Foreign aquariums will end up buying these fish from other countries, and Sri Lanka will be the loser...

One anomaly is that there is apparently no ban on the capture of rare ornamental species, only on their export. It is possible to find these species at the nearest fish market, buy and eat them...

What the industry needs is management and regulation to discourage fly-by-night operators, not an export ban. Unfortunately there is no concerted effort to protect the environment in Sri Lanka. Fifteen ministries are involved in the ornamental fish fishery. Whose business is it to look after the habitat? Recruitment and survival depend on habitat protection...

The monsoon cycle in Sri Lanka is fortunately a force for conservation. When it rains on the west coast, it doesn't rain on the east coast, and vice versa. So fish on both coasts have six months to breed. Ironically enough, the tragic civil war in Sri Lanka has been another force for conservation. It has prevented over-exploitation...

What should be our attitude to the environment? Protect it and keep it at a distance, or use it wisely, for people's welfare? The ecosystem is meant to be used for the benefit of the people. It's not meant to decorate the world.

We must identify the species in abundance in each country and know the environmental conditions. We should breed these fish in our own waters. A lot of research is needed. On the nutrition of ornamental fish, life cycles, hatchery practices, breeders, feed. What were identified as rich areas — rich in ornamental fish - 15 years ago, are no longer so now. Fish tend to migrate.

We have won recognition for the guppies we produce. Guppies have a lifespan of about 1 1/2 years. It's the sheer variety of guppies, apart from their myriad colours, that account for their popularity. Aquarium owners naturally do not wish to import the same fish every year. Sri Lanka has developed its own strains of guppies. A lot of research goes into such development. We named one strain *Micariff* after the breeders who produced it — Michael and Arif.

One of my foreign customers remarked that Lumbini applies the best technology because we use the least technology . . . What this means is that I control the use of chemicals and antibiotics in the entire production process. Excessive use of antibiotics — such as tetracycline, ampicillin, chlorphenicol — only makes the fish immune to them.

Any antibiotics we do use are mainly for freshwater fish. For marine fish we restrict antibiotics to the bare minimum, such as copper sulphate to treat a common disease in marine fish...

We must bear in mind that the importer too would need to use some antibiotics, because he receives fish that have been subjected to the stress of transport over a long distance . . .

I don't like to tranquillize fish before sending it abroad. This is done to reduce the metabolism of the fish, and perhaps ensure that it needs less oxygen. You can then pack more fish into a container. But no one knows the after-effects of tranquillization...

We have three types of buyers: wholesalers, consolidators, retail buyers. A "consolidator" does just that; he collects orders for ornamental fish from various buyers or retail shops in his country and gives us a single order. We make a consolidated shipment to them. Retailers

place direct orders with us. When there is a wholesaler in one area, we don't deal with a consolidator in the same area...

Thirty or forty years ago, it's public aquariums that imported our fish. Today they have transferred technology to individuals. Now 90% to 95% of our export finds its way to personal aquariums...

What's the most challenging order we have received? Every order is a challenge. As a marketing concern we have to look at the consumer. We need a long-term understanding with the buyer. We give every buyer the best possible attention . . .

Our plans for the future? We are learning and growing. Five years ago, 70% of Lumbini's export consisted of marine species, 20% were tank-raised freshwater ornamental fish, and 10% consisted of freshwater fish collected from the wild and bred. Now the proportion is different: only 35% consists of marine fish. Tank-raised freshwater fish takes up 60%. Wild-collected freshwater fish accounts for 5%...

We were the first to start the practice of "outgrowth". We produced fingerlings, transferred technology to poor families and let them grow the fingerlings. We bought them back after they had grown

to stocking size. Following my example, some other producers started the practice of outgrowth too. This helped fish exports. This practice has enabled many exporters to come up . . .

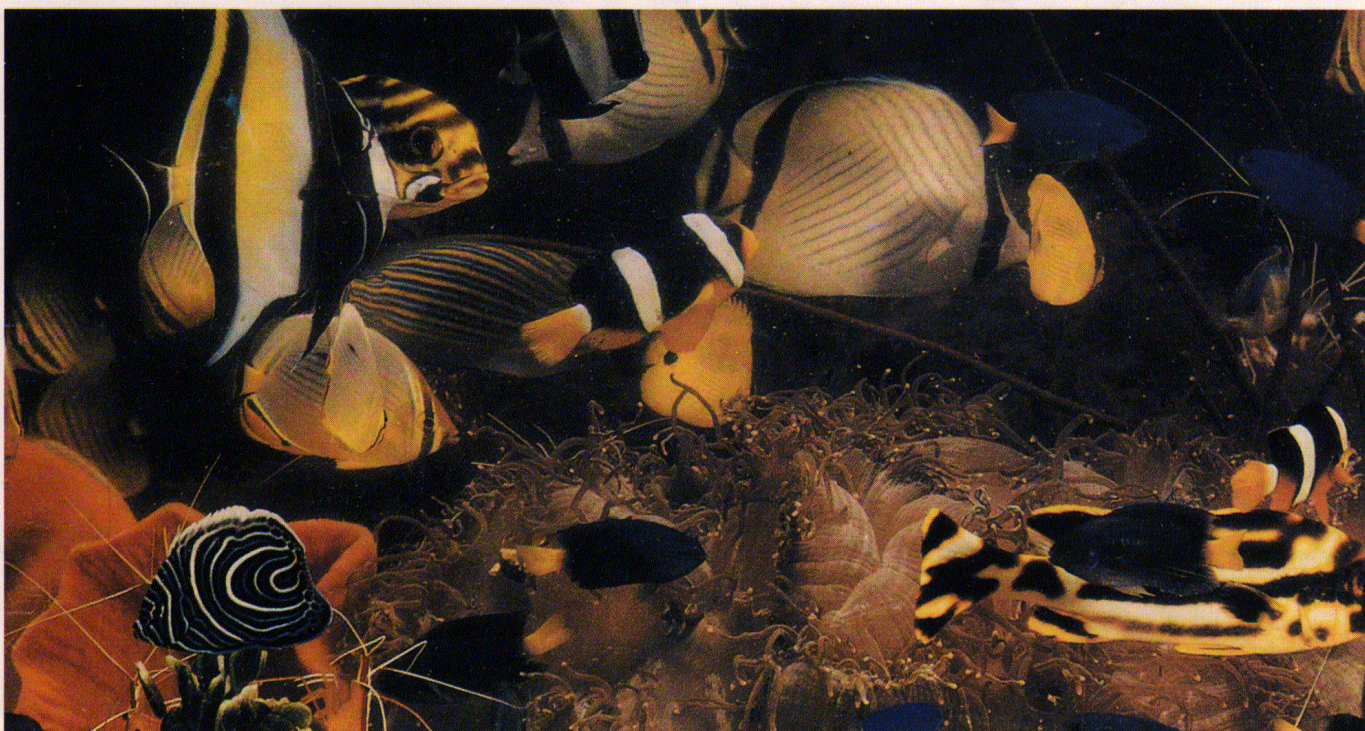
Let me talk about our problems. The government should enter into a discussion with industry before any controls. The multiplicity of government agencies creates problems too. The government should stipulate just one or two agencies to deal with the industry...

We also need a system to link producers with exporters. Sometimes a breeder is left high and dry because an exporter doesn't honour his commitment to buy fry from him...

All divers must be licensed. We'll then know how many there are, organize training in scuba-diving, control over-exploitation.. I'm glad to say that a few divers have become exporters themselves. Aquarium Seahorse is an example. It's a company started by a diver.. .

Nearly 90% of exporters don't go in for marine fish. Because it's a risky business. The risks include delayed payment, mortality, natural disasters. There is no insurance. Our profit margins have to cover these risks . . . This business runs on trust."

S.R. Madhu

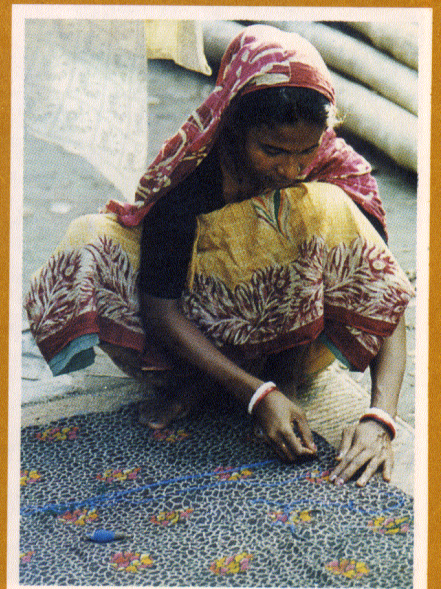




by E. Amalore

*Income
options for
women in
Bangladesh
fishing
communities*

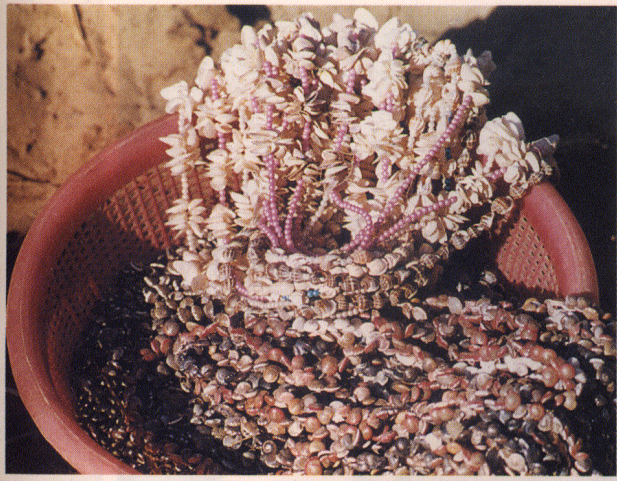
Left : Bamboo mat weaving
Below : Mattress-making





Two important fisheries in Bangladesh – the estuarine set bagnet and the push net – are considered resource-damaging. But discouraging these fisheries would mean depriving thousands of fisherfolk of their source of livelihood. BOBP is supporting a study on alternative sources of income for the fisherfolk community, both within and outside fisheries. In this context the photograph here, on various occupations that women from





fisherfolk communities engage in at present, may be of interest. The potential of these occupations needs to be tapped systematically.

1. *Mat-making from tall grass*
- 2 & 3. *Shell craft - ornaments from sea shells*
4. *Agriculture*
5. *Cattle-rearing*
asket making from bamboo



7



9



8



7. Small entrepreneurship (running a shop or retailing).
8. Weaving (patterns for bags). 9. Tailoring 10. Chicken rearing

10



SUCCESSFUL APPROACHES TO INTEGRATED COASTAL MANAGEMENT: SOME INDICATORS

by Donna J. Nickerson*

Coastal Zone Management Adviser, BOBP

The author discusses some "indicators" of success in integrated coastal management in the Bay of Bengal region and outside. She says these indicators are examples of "small steps forward" in the long-term process of change which is the goal of ICAM (integrated coastal area management).

Integrated Coastal Area Management (ICAM) is an approach to resource management that views the ecosystem as a whole, and human societies as part of the ecosystem. ICAM integrates ecological, economic, and social concerns. The five essentials of ICAM are public involvement; a comprehensive ecosystem approach to identifying and solving problems; integration of disciplines, skills and knowledge; decision-making by consensus as much as possible; and flexibility.

ICAM is never easy. It is a process of change that is full of difficult moments, even in the most successful of programmes. It is also an opportunity to achieve successes in resource management – successes not possible without the co-ordination and co-operation inherent in ICAM governance approaches.

Indicators of success in ICAM must be able to depict the many small and subtle steps forward in a long-term incremental process of change. The best indicators are those drawn from practical experience. While ICAM is a relatively new discipline, many ICAM programmes have been running successfully for over 20 years. Some others are more recent and are in the early stages of setting up management structures.

The indicators described in this paper analyse both successful and less successful ICAM programmes around the world.

What makes programmes successful? Many inter-related factors determine success. But the most salient factors are hard work and commitment on the part of participants, openness to change, and figuring out when to change. Indicators help provide a compass for the participants of ICAM during difficult moments.

The Need for Measuring Success in ICAM

A LONG-TERM INCREMENTAL PROCESS

The ultimate goal of most ICAM programmes is a better environment. For example, improvements in the health and productivity of the coastal ecosystem. Improvements in social welfare are also often explicit goals of ICAM programmes, but more often these are implicit goals, particularly in developed countries.

ICAM is an approach to achieve these goals. In the process of making environmental change, ICAM drives change within the institutions and the public involved in management. ICAM creates new governance approaches that lead to environmental changes. Environmental indicators tell you if the solutions created under ICAM are working. Therefore, monitoring of environmental indicators is an important part of ICAM

ICAM is a long-term incremental process. It can take 10 or maybe even 20

years to achieve the ultimate goals. Therefore, you can't always wait for environmental, social or ecosystem changes to find out if the programme is working. You need indicators along the way to tell you if you are moving in the right direction.

AN ADAPTIVE AND OPEN GOVERNANCE PROCESS

ICAM is dynamic by design. It is experimental. It is also a new way of governance for most countries. In some communities, it marks a return to the more traditional and practical system of the past. In either case, it means changing the status-quo and requires flexibility.

A successful ICAM governance approach is flexible and takes note of the area's culture, political system and geographic characteristics. ICAM programmes must adopt their own unique structures—they will vary between countries and within country. The process or approach itself must be open to review and analysis by the participants.

* This article is condensed from a paper presented at the South Asian Symposium on Fisheries and Coastal Area Management, held 30 September-1 October 1996 in Madras, and organized by the International Collective in Support of Fishworkers, Madras. The full version of the paper will appear in the proceedings.



Under ICAM, human societies must be viewed as a part of the ecosystem.

Indicators for Measuring Progress and Success

For this reason, indicators can be broken down into two broad groups: those that show progress within the ICAM structure and the governance process, and those that show progress in the **outputs** of the governance process. The output of the ICAM process is a consensus-based management plan or a new set of agreements, actions or solutions to address the problems.

The two groups of indicators — for the process and the outputs — are closely interlinked and mutually dependent, but it would be useful to separate them to help determine how to continue improving ICAM efforts.

INDICATORS WITHIN THE ICAM MANAGEMENT STRUCTURE OR GOVERNANCE PROCESS.

• Early Participation by Stakeholders

Bringing stakeholder representation into the management process early achieves the acceptance of solutions that the stakeholders helped develop. It builds and sustains stewardship. It also helps to

ensure ownership of the programme. It should help in problem identification. ICAM began from a strongly united local public concern about coastal areas. In the US, it was the public that spurred the government to become more active and accountable in its actions affecting coastal resources. The public determined that not enough was being done about their coastal areas, and assumed an active role in helping to solve problems in the coastal zone. The effort was non-confrontational but persistent — and changed government and public thinking about management of coastal resources.

• Representation of 'key' stakeholder groups in the management structure

Who are the 'key' stakeholder groups needing representation on the management structure? This will depend on the initial issues or problems identified in the situation analysis stage of ICAM. These issues must be taken up by the affected stakeholder groups. The process must be flexible to be able to add more stakeholder groups as the issues change or evolve.

• Access to scientific findings for all stakeholders and the wider public

Openness with scientific findings will enable the public to help identify and rank priorities for action. The management approach benefits from such openness in many ways. First, the public is a source of knowledge about the ecosystem and the threats to its valuable resources. Second, the public learns from the scientific findings — they often change their original perceptions of the issues. Their ability to contribute as stewards in managing of the ecosystem gets strengthened.

ICAM has successfully bridged the gap in many programmes between scientists, managers and the public. Science under ICAM has to have relevance to the managers — it has to be applied to practical questions. It is not meant for scientists alone. It is meant for everyone to use and direct.

Often, the experimental nature of ICAM leads participants towards creative approaches to the use of information for management. In Indonesia, the

Directorate-General of Fisheries, the Provincial Fisheries Service and BOBP are conducting an institutional and legal review to identify strengths, weaknesses and gaps in the institutions' ability to address problems identified in the coastal zone. The review also covers the informal institutional framework found within the project site. These informal 'community codes' and 'customary laws' are often better enforced than the formal legislation. They offer useful insights into potential management solutions.

In the Maldives, scientists from the Marine Research Section (MRS), Ministry of Fisheries and Agriculture, are working closely with fisherfolk under the BOBP-supported Integrated Reef Resources Management (IRRM) project to develop and implement solutions to identified issues. MRS scientists are learning from the traditional knowledge of fisherfolk, and sharing their own scientific understanding with the fisherfolk who helped identify IRRM issues.

In Malaysia, the Department of Fisheries and BOBP are combining fisherfolk knowledge with scientific information. Science can verify fisherfolk knowledge. Scientists, on the other hand, can use fisherfolk knowledge to better understand how the ecosystem functions and what's the human impact on it.

• ***A comprehensive understanding of issues by all concerned stakeholders***

When ICAM participants look at an ecosystem, it is not from the standpoint of

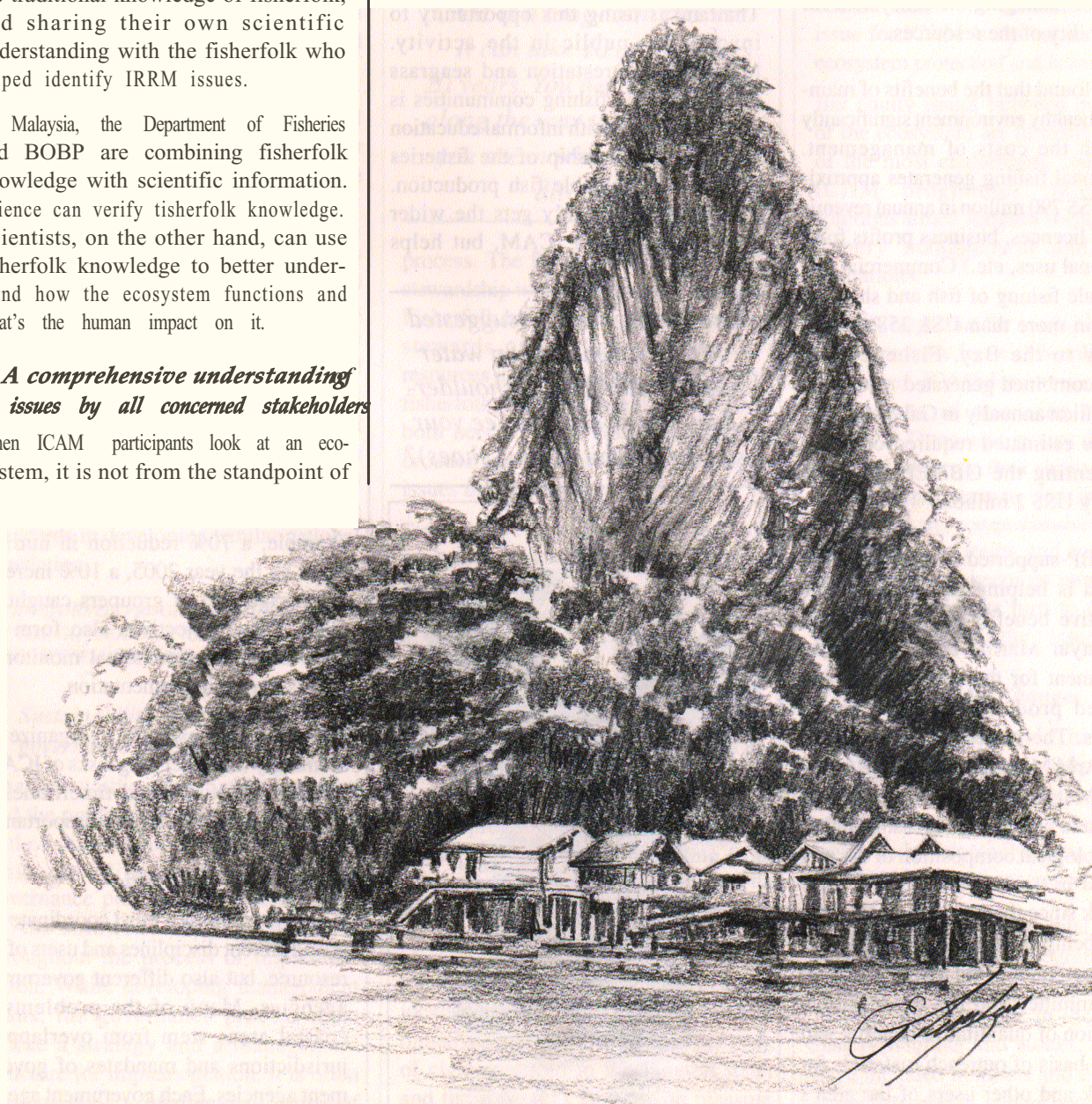
one pollution problem or one pollution source, but from the multiple impacts of all the human activities.

A comprehensive understanding of the issues helps resolve multi-use conflicts inherent in the coastal zone. Example: The Galveston Bay National Estuary Programme (GBNEP) in Texas, USA, used science and public pressure effectively to overcome a major problem. The Galveston Bay has many oil wells and oil processing plants — they discharged 'brine water' which is very harmful to the fisheries of the Bay. The oil companies were the major polluter of the Bay and an important stakeholder in the ICAM process. They came to the process a bit nervously, not wanting to encounter more 'confrontation' than they had already, particularly from fisherfolk and environmentalists. But they were also eager to

change their bad public image. After three years under the GBNEP process, the oil companies voluntarily set zero discharge levels for all their operations in the Bay area.

What led to this decision? Several factors. The most important was that the companies wanted a voice in eventual decisions that affected them. They wanted to gain the acceptance of fellow representatives in the ICAM process and the wider public. The non-confrontational approach of 'partnership' allowed the companies to set a more stringent level than would have been imposed on them. They sought to improve their public image by bringing about change through consensus.

The mass media play an important role in providing a comprehensive picture of the issues and of the ICAM process to



Fisherfolk in Phang Nga Bay, Thailand, seek restoration of the habitat as a management measure.

the wider public. The media influence and shape public opinion. As the 'first reviews' of an opening play can make or break a Broadway show, so does the press affect ICAM.

- *A holistic 'systems-thinking' approach towards management of issues*

An 'ecosystem-based' approach to problems is vital to scientific understanding. It regards us as part of the ecosystem, as stewards with responsibility for the resource.

An interdisciplinary approach speaks to people of many different backgrounds. While some individuals understand best a scientific point of view, others may need a cultural and socio-economic context. People also want to know what the ecosystem is doing for us — and the benefits of managing the ecosystem for sustainability of the resources.

GBNEP found that the benefits of maintaining a healthy environment significantly outweigh the costs of management. Recreational fishing generates approximately US\$ 790 million in annual revenue (through licences, business profits from recreational uses, etc.) Commercial and small-scale fishing of fish and shellfish brought in more than US\$ 358 million annually to the Bay. Fisheries and tourism combined generated more than US\$8 billion annually in Galveston Bay while the estimated required costs for implementing the GBNEP solutions were only US\$2 million.

The BOBP-supported ICAM project in Malaysia is helping to determine the quantitative benefits of managing the Pulau Payar Marine Park, as habitat enhancement for the conservation and sustained production of the area's resources. The project is developing a Special Area Management Plan (SAMP) for the Marine Park and surrounding coastal land and marine areas. Changes in the ecological composition of the reef areas and in the catches of small-scale fisherfolk since the establishment of the Park are being determined. Draft findings will be presented to the SAMP management committee and the wider public. Description of quantitative benefits will form the basis of outreach materials for fisherfolk and other users of the area's resources.

- *Involvement of the wider public in ICAM activities and decision-making*

ICAM programmes need to reach out to the wider public, get their ideas and obtain their support in developing solutions and actions during the ICAM process. Involvement of the wider public is crucial at all levels (national, state or provincial, and local) of ICAM. But direct public involvement is most important for local-level programmes. Measurable parameters could include the number of people participating in early actions and the number of public events initiated by stakeholder groups.

In Thailand, habitat restoration was identified as a management solution by the fisherfolk of Phang-Nga Bay's villages under the BOBP-assisted Community-Based Fisheries Management Project. Thailand is using this opportunity to involve the public in the activity. Mangrove reforestation and seagrass planting by the fishing communities is being combined with informal education about the relationship of the fisheries habitat to sustainable fish production. This activity not only gets the wider public involved in ICAM, but helps

The Sneaker Index (suggested by a U.S. Senator) on water quality: Standing in shoulder-deep water, can you see your sneakers (white tennis shoes)?



bridge the gap between scientists, government and the public.

One of the best ways to understand something is to get out to the field for first-hand experience. People will protect something they care about; they will only care about something they understand. This philosophy was also reflected in students' recommendations at the IRRM Workshop in the Maldives. They asked for school field trips to the coral reefs, to better understand the reef ecology. They asked to organize environmental clubs in schools for holding debates and poster competitions on coral ecology. These activities are ways to maintain two-way communication and active involvement throughout the ICAM process.

- *Clear vision, objectives and priorities for management*

ICAM is a planning and management approach to comprehensively address coastal resource issues. It is issue-driven. To resolve the issues of the area, ICAM programmes generally go through a series of methodical phases — problem identification and priority setting, scientific characterization, solution development and implementation. All phases are guided by a participatory consensus-based decision-making body that must set forth a vision, objectives and priorities for management of the ecosystem.

The vision could be one of restoring the ecosystem or of maintaining environmental quality. Objectives should be consensus-based, specific and short-term. They should be quantified. For example, a 70% reduction in nutrient loads by the year 2005, a 10% increase in average size of groupers caught by 1999. These objectives also form the basis of the environmental monitoring efforts during implementation.

Prioritization is essential to organize the seemingly overwhelming tasks of ICAM. Setting milestones and timeframes to implement each solution is important.

- *Effective coordination*

ICAM programmes must coordinate not only different disciplines and users of the resource, but also different government agencies. Many of the problems in coastal areas stem from overlapping jurisdictions and mandates of government agencies. Each government agency with jurisdiction in the area's identified

issues should be represented on the main decision-making body of the ICAM programme to facilitate coordination between agencies.

A sense of 'ownership' of the programme among all participants will help ensure coordination. Each agency and stakeholder group should share equally in the achievements of the programme. Achievements should be visible. Newspaper articles that cite agencies active in the programme encourage their continued participation.

- ***National support to local-level initiatives***

ICAM is perhaps most effective in showing tangible effects at the community or local level. But national-level support of its process, solutions, and implementation strategy is essential. You don't want an oil well or a deep sea port built right in the centre of your community-managed fishing area.

National-level support provides the local programme with harmonization of policy initiatives, funding and legislative backing.

A local ICAM programme in Buzzard's Bay, Massachusetts, US, found that the national legislation for septic systems was not adequate for the Bay area. The Buzzards Bay communities developed their own standards to take into account the high water tables. The state adopted the standards under its Coastal Zone Management (CZM) legislation. The national government later used these standards in developing similar national legislation.

*INDICATORS OF PROGRESS IN THE OUTPUTS OF THE GOVERNANCE PROCESS
- ECOSYSTEM AND SOCIAL CHANGES*

- ***Sustainability of the new governance process***

Changes within government agencies and the public concerning management of the entire coastal ecosystem should be institutionalized or sustained. The governance process that developed the ICAM solutions needs to continue throughout the process of implementation. While developing management plans, the governance process must define a strategy and a management structure for implementation. It is often composed of a smaller core group of decision-makers.

The new approach to management should be sustainable to implement solutions successfully. Sustainability largely depends on the achievement of indicators within the governance process..

- ***Extent of stewardship within ICAM and the wider public***

An effective ICAM approach brings about a positive attitude and a sense of hope among stakeholders towards future management of the resource. It creates a strong constituency among key stakeholders, the wider public, scientists, political leaders and managers.

Early work in the Maldives under the BOBP-supported project has identified those groups that would benefit most from education and awareness to enable participation in the new governance

***ICAM is a long-term process.
It can take 10 or maybe
20 years. You need indicators
along the way to tell you that
you are moving in the right
direction.***

process. The Project will seek to build stewardship within government agencies. Fisherfolk have historically been strong stewards of the fisheries and reef resources in the Maldives. Under IRRM, fisherfolk and government agencies will both need to work closely together to broaden the scope of the reef resources issues they will address.

Stewardship evolves throughout the ICAM process partly through involvement and partly through the exchange of information that enables all participants to become better resource managers. Early successes reinforce and encourage stewardship.

- ***Adequate financial support for actions***

ICAM programmes often find that they cannot depend totally on funding from government or existing sources. The programme must also generate revenue by itself to implement actions.

Public stewardship assists in generating local sources of revenue. Local funding initiatives such as the US \$2 tax per pack of cigarettes sold in Washington state, and the Buzzard's Bay tax on pleasure boats required the support of an active

and concerned public. The tax on cigarettes in Washington state fully funded the Puget Sound National Estuary Program (PSNEP) process and implementation. The pleasure boat tax initiated by the Buzzard's Bay ICAM Programme received many votes.

Revenues from the tax were able to fund a large part of the programme implementation.

Malaysia is considering introducing visitor fees into the Pulau Payar Marine Park for the first time. Revenue may fully fund SAMP initiatives and solutions that benefit fisherfolk.

- ***Greater equity in resource allocation and use***

A central purpose of ICAM is to help resolve the many inequities existing in coastal areas. The fundamental equity issue for ICAM is the balance between ecosystem protection and human uses.

But equity issues between human uses of the ecosystem are in many ways one of the most challenging issues for an ICAM programme. Management solutions aimed at equity include zoning, fishery management and effluent limitations.

Equally important for resolving conflicts is the process by which solutions are developed. ICAM forces user groups to participate in resolving their own conflicts. Once user groups do so, they gain confidence in their ability to resolve problems and begin to view issues more objectively and comprehensively. Interaction between groups and reactions to future problems becomes more positive — and participants turn to the ICAM process to resolve future issues.

- ***Environmental Changes***

Perhaps the most 'visible' indicators of the effectiveness of an ICAM programme are the changes to the ecosystem and natural resources -improvements in the health and productivity of the ecosystem -resulting from management solutions.

Objectives and environmental indicators vary between ICAM programmes. For example, where programme objectives involve improvements in the health of fishery habitats and stocks, indicators have included numbers and diversity of target fish species, habitat conditions and increased size of target fish species. The

catches of local fisherfolk can yield good data. A community-based management project in Similon Island, Philippines (White, 1989) found that the fish population and diversity had increased after a marine reserve was set up and managed under an ICAM approach.

Water quality affected the health and productivity of the valuable shellfish beds in the Puget Sound, a large Bay in the northwestern US. Sewage, a growing coastal population, and agricultural runoff all led to the closure of the shellfish beds in Puget Sound during the 1970 and 1980s. The Puget Sound National Estuary Programme (PSNEP) set a stringent objective for itself — it determined that water quality should be improved enough for at least one contaminated shellfish bed to reopen each year. (Shellfish beds are closed in the US by the Health Department when the bacteria counts in the shellfish get too high.)

Roles and responsibilities were assigned to the line agencies: Health, Natural Resources, and Ecology. Health would monitor water quality; Health and Ecology developed the shellfish protection strategy and funding priorities and progress reports; implementation would involve Fisheries; State Parks; Native American tribal governments; Health; Natural Resources; and Ecology. The PSNEP achieved its objective and was one of the first areas in the US to reopen shellfish beds.

- ***Use of the monitoring information to redirect the programme's activities***

Monitoring provides information to help revise and redirect solutions. When the stakeholders are the ones to apply their monitoring data to activities within the management process, they will most likely collect better quality data. Malaysia, for example, will monitor the changing conditions of resources over time in the SAMP area. Monitoring will reveal whether the broad management objectives have been achieved and whether the SAMP has been able to help

sustain the fisheries resource and improve the livelihood of fisherfolk.

The Chesapeake Bay ICAM Programme in the northeastern US has improved its water quality dramatically in the last twenty years. Volunteer monitoring played an important role in achieving this objective. The programme evolved a simple and scientifically valid indicator that came to be known as Bernie Fowler's "Sneaker Index". Senator C. Bernard Fowler was fond of relating how, as a boy fishing in the Chesapeake Bay and standing in shoulder-deep water, he could see his sneakers (white tennis shoes). All these years, a surfeit of nutrients in the water from agricultural sources, plus urban and rural sediment runoff, fouled the water quality of the Bay. The simple "sneaker index" indicator allowed more people to participate in monitoring, made science more understandable and less intimidating.

Conclusions

The two broad groups of indicators — those that show progress within the ICAM governance process, and those that show success in the outputs of the ICAM process — are closely interlinked and mutually dependent. Successful implementation of solutions depends largely on the strength and sustainability of the new governance approach.

The indicators described in this paper are broad-based. They can guide further development of a set of parameters to quantitatively measure change and progress. They are not intended to be comprehensive, but to encourage further thinking by practitioners and participants of ICAM governance approaches.

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