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## Perspectives on shrimp culture

*This issue carries three thoughtful articles on aquaculture, focusing on shrimp culture: a global overview, an assessment of shrimp culture in India, and a demolition of myths about farmed seafood. The last article (by the Global Aquaculture Alliance) recalls Peter Drucker's remark that fish farming, not Internet, is one of the new century's most exciting industries. In sum: there's no alternative to aquaculture as a source of seafood; and governments and shrimp farmers should ensure that shrimp culture practices become systematic, eco-friendly and socially responsible.*



# Breaking the Us vs Them Divide

Competition and conflict are inevitable **in human affairs. The history of humankind is replete with human conflict. Even in the animal kingdom, competition – for space, for food, for a mating partner – is rife. In fact, competition and conflict are about the only human endeavours that can be described as sustainable!** Everywhere, humans find it difficult to see eye to eye with each other, even within a family. The *Us vs Them* human schism often finds an entire community split into two or more hostile factions.

Why this perennial schism? Is it a curse? Is coexistence not possible? Can community conflicts be made a thing of the past? Can competition be healthy? Do numbers matter? Do greater human numbers mean worse competition and more conflicts? If so, will smaller numbers mean better resource management because of less severe competition? *Quo vadis* human unity! Is a galactic war the only way to pressure humans into unity?

Competition and conflict arise when different groups of people or individuals take sides, polarise. Polarisation occurs from differing human perceptions of events or phenomena. Differing perceptions – over interests, pursuits, causes – result from looking at things differently, different upbringing (cultural, ethnic, religious or political), exposure to different environments and contexts. When perceptions are at odds with one another, clashes or open conflicts result. Such conflicts polarise the human species.

As the second millennium comes to a close and the third begins, the *Us vs Them* human divide must be broken. The third millennium belongs to the people. More and more people are looking forward to, if not demanding outright, more and more empowerment and local self-governance. People are wary of the ineffectiveness of a governmental system driven from afar, the centre of power. The march to empowerment goes on, whether or not the government is willing to relinquish its authority.

There is clearly an urgent need to evolve a more inclusive system of human

enterprise, one that brings the poor centre stage. The government is still the **best** institution to bring about such an inclusive system, even though it may not have succeeded in the past. As the government is constituted of the people, it has to uphold democratic principles and processes and deliver on its mandate, and give the poor a better deal.

The *Us vs Them* divide derives partly from the non—inclusive system of human enterprise which has evolved over time. **Because of the selfish human** trait of appropriation (cornering all the benefits of enterprise for themselves), of grabbing, others get excluded. Every human being wants affection and a sense of belonging, and feels alienated when he is kept out. He feels wronged, unjustly ignored. He believes he has as much right to benefit as the others. **Result:** polarisation. Someone's insistence on his or her right to a share of the goodies – that's what sows the seeds of discord.

Seeking redress against exclusion can take many forms: it can be peaceful, it can be legal, it can be confrontational. The spirit of coexistence suffers. Decency and civility break down. A breach occurs in unity and harmony. People take sides and join opposing camps. Antagonism grows and bursts into open conflict. There's no winner. All are losers.

A spirit of live and let live would make everyone a winner. But this spirit is difficult to encounter in the divisive and fractious world of today.

A flexible and enabling framework for discussion and debate is needed under which all the information is made available and various vested interests are made public. Vested interests are not bad in themselves. It is when they exclude other parties and harm others that they become anti-social and anti-community and inspire opposition. A framework of full disclosure of information and **vested** interests can encourage opposing parties to work out acceptable and enforceable agreements. Discussion enables a process of clarification, explanation, **consensus-building, negotiation,** mediation and compromise, without any

one feeling compromised. The framework must also be able to integrate diverse points of view or differences of opinion, and bring knowledge and expertise to bear on resolving conflicts. Local knowledge and experience of local conditions, values, perceptions and attitudes can improve understanding of the conflict-resolution process.

At the other extreme, people have been known to cleverly use information or keep information away from others to advance their own interests and further their own causes. The power of information to build and arouse awareness is potent. It can highlight differences in perceptions and expose everyone's ultimate motives or aspirations. Once articulated and highlighted, all aspirations may reveal common ground. Particularly today when every person young or old aspires to a cleaner and more secure environment, more sustainability, more responsible consumption, more responsible resource exploitation and management, more vigorous conservation and protection to ensure environmental security. Differences in perceptions are often merely the result of misinformation and manipulation. (See *Bay of Bengal News* September, 1998, p 19-21).

Misinformation – **keeping information away from the have-nots** – is a form of communication mischief. This has been at the root of human problems. **Misinformation is resorted to because of a vested interest in the status quo. People who are born into privilege or who have acquired it by means fair or foul, are not prepared to give it up. They will fight hard to retain it. But such an attitude must change if we are to break the Us vs Them divide which has not served any purpose other than bringing human insecurity upon all. We are in it together.**

The work carried out by the member **countries of the Bay of Bengal Programme** such as stakeholder **consultation, analysis, implementation** and engagement is a small effort to **institutionalise a more inclusive system** of resource management of their natural resources.

- Kee-Chal CHONG

# Networking for Environmental Sustainability

by Kee-Chai CHONG

*If you collect enough dust, you can make a mountain*  
*Japanese Proverb (Source: Ando 1995)*

No man is an island. Human beings are social and communal. But they have so far used this trait for narrow purposes to advance racial, religious or sectarian interests rather than that of society as a whole. Result: the world is being increasingly polarised. The *Us vs Them* syndrome is getting accentuated. (See page 2).

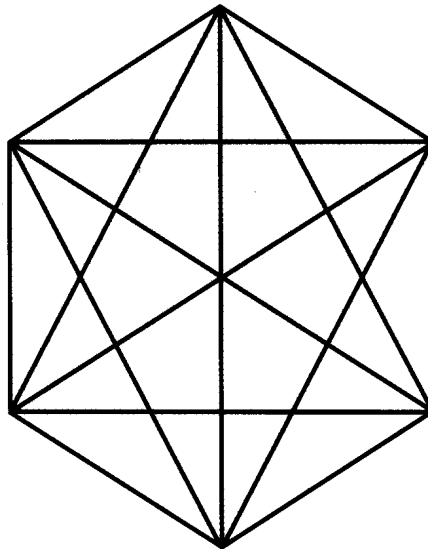
When human numbers are few and resources abundant, there is enough of everything. Competition is sparse. But when numbers grow and resource scarcity becomes acute, the spirit of co-operation vanishes. Competition begins, confrontation sets in. The spirit of sharing comes under increasing strain. This spirit of sharing and caring has to be revived.

Down the ages, human beings have not been able to institutionalise a system of governance that is all-inclusive. Democratic may be, but all-inclusive? Not yet! An inclusive governance system would bring people together and integrate interests and concerns. But it is a divisive non-inclusive framework of governance that exists everywhere. It excludes rather than includes people. Many of our present-day systems of governance continue to exclude people, especially the poor.

## New Answers to Old Problems

Management and conservation are not the sole responsibility of government. Nor of the experts only! They should be the daily concern of people who rely on nature for their livelihood, their food, their income. The way natural resources are used by people, the way they are governed and managed, must change in response to growing resource scarcity. Materialism and consumerism on the one hand, and growing poverty on the other, have only intensified the demand for scarce resources.

Poverty has not declined despite the many breakthroughs in science and



technology; it has only deepened and widened. New answers must be summoned to address this problem, and that of the unsustainable use of natural resources. Today, more than a third of the world population, some two billion people, have to make do with about two US dollars a day. What is vitally needed is a political breakthrough; it has to be driven by self-empowerment, which in turn calls for networking.

Humans can no longer continue to take from Nature without giving back something to it. New relationships have to be forged between humans on the one hand, and the environment and natural resources on the other. These new relationships must emphasise sustainability at any costs. Sustainability must become a way of life.

Humans must sacrifice short-term gain and material comfort for long-term sustainability. As the dominant stakeholders of Mother Earth, they must be sensitised to sustainability. Such a stakeholder orientation is long overdue. As people become better informed, they will become more aware of their responsibility to one another and to Mother Earth.

## Participatory Pro-Poor Inclusive System of Self-Governance

The second millennium has ended; the third millennium should belong to the people. People everywhere are looking forward to local self-governance, if not demanding it outright. They are wary of a governmental system driven from afar. The march to empowerment is growing – whether or not the government is willing to recognise the fact.

There is clearly an urgent need to evolve a “more inclusive” system of human enterprise, one that responds to the needs of the poor. Even with its shortcomings, the government remains the best institution to bring about such an inclusive system. As the government is constituted by the people, it has to uphold democratic principles and processes. Besides, governments are expected to carry out the will of the people! More important, the government must keep the people informed and not withhold information from them. A better informed public will be able to question decisions made that affect them and their community. This is because information not only increases awareness but improves understanding. Information also creates and builds accountability, and thus compels action. Once you are aware of the information, you may be held accountable.

Redressing the problem of exclusion, especially of the poor, can take many forms: awareness-building and government intervention, legal processes or the confrontational process. So far, it is mainly the confrontational process that has been in evidence: tenants vs landlords, labour vs management, large-scale vs small-scale, artisanal vs commercial, poor vs rich, haves vs have-nots, we vs they. Nobody wins in a confrontation, peaceful, legal or otherwise. A philosophy of live and let live benefits all people, all stakeholders. But this lesson has not been learned and put into practice.

## Networking: A Framework for Mass Movement in Resource Management

Responsible human behaviour has never been automatic. People rarely fall in line to comply with responsible behaviour, especially in the public domain. They bring self-inflicted destruction upon themselves. People should instead capitalise on their natural conservationist and protectionist instincts.

A flexible and enabling framework is needed for discussion and debate, with all the information made available and vested interests laid bare for closer examination. Vested interests by themselves are not necessarily bad. It is when they exclude others, such as the poor or the have-nots, that they should be opposed or resisted. A framework for information-sharing, with full disclosure of information, will encourage opposing parties to come together and work out acceptable and binding or enforceable agreements.

Discussion enables a process of clarification, explanation, even reasoned disagreement, consensus-building, negotiation, mediation and the acceptance of compromises. The framework must also be able to integrate diverse points of view or differences of opinion and bring available knowledge and expertise to bring to bear on resolving conflicts. Local knowledge and experiences of local conditions, values, perceptions and attitudes can improve understanding of conflict mechanisms and resolution processes.

For fisheries and other aquatic resources, the Code of Conduct for Responsible Fisheries provides the basis and the framework for a concerted mass movement to bring about a participatory pro-poor inclusive system of integrated resources management and self-governance. Another framework is the *Codex Alimentarius*.

People have been known to cleverly use information (or keep out information) to further their own interests and causes. Information is a potent tool that can throw light on differences in perceptions and reveal the common aspirations of the community. Every person has his special perception or outlook. The key to a harmonious society lies in narrowing down such differences so that they become common aspirations. Most responsible people advocate more sustainability, more responsible consum-

ption, more responsible resources exploitation and management, conservation and protection to ensure environmental security. Differences in perceptions occur because of misunderstanding and misinformation.

Misinformation and communication mischief have been at the root of human problems. There is an effort to keep information out of the reach of the poor – because of a vested interest in preserving the status quo. Information and knowledge should not be the monopoly of the well-connected. Information dissemination can be democratised to benefit one and all, especially the two billion poor!

For a start, networking among all stakeholders can bridge the *us vs them* divide. It will arouse awareness that the problems being faced are the common problems of all humankind, not just the problems of the poor. Everyone is in it together.

### Management as a Mass Movement

By now, it should be obvious to all that there is no short cut to management. Human security hinges critically on sustainable use of resources and the environment. Sustainable resources use comes about only with management. There is just no way out.

It is therefore crucial that management becomes a mass responsibility with every person doing his or her share of responsible consumption. It is ultimately the level of consumption that determines the level of production, which in its turn determines the rate of sustainability of resources exploitation and use. If management is to be promoted as a mass movement, it must be accepted as a cause to be pursued with vigor, not just a “feel good” cause!

How can people’s attention be drawn toward management as a cause to pursue? How can attention be drawn to what ails the environment at the local and global levels? Networking can be a good start, a first step.

### NETFARM (Networking for Fisheries and Aquatic resources Management)

To succeed as a mass movement, management action at the individual and community levels must be informed by a spirit of volunteerism. Volunteerism

is crucial because no person or institution, not even the government, will pay for activities to manage the global commons! People’s role in management becomes vital. If volunteerism is not forthcoming, it must be developed, even coaxed out of every person, through peer pressure and community pressure.

The BOBP is in the process of activating and operationalising an FAO information network that is known as “Supporting Fisheries Management in Asia: An APFIC Information Network”. For a start, networking will be limited to the BOBP’s member countries.

### Activities

A virtual discussion of NETFARM will soon be held on organising a national fisherfolk week in every member country. The discussion is about how awareness leads to volunteerism and in turn to action. As people become more aware of actions that harm, impair or degrade the environment, they will realise that they alone can help reverse environmental degradation. If sufficiently aroused, they will volunteer on their own to act. When each individual stops unsustainable habits, the cumulative sum of these individual actions will amount to a mass movement.

Volunteerism can start with consumer power. The consumer can send the producer economic signals through his purchasing power by buying or not buying goods and services sold in the marketplace.

Example: When consumers stop buying gravid female fish or under-sized or juvenile fish, they will send very strong signals to fisherfolk that there is no market for such fish. Middlemen will then stop buying the fish. When this happens, more fish are allowed to spawn and grow into large size, thus increasing total production.

Community spawning cages could be installed in strategic locations to encourage fisherfolk to place gravid females in them and let them spawn. The presence of such cages encourages fisherfolk to deposit gravid females there. After the spawning, the spent females are removed and sold in the market. The income from such sales boosts a revolving fund for community development. NETFARM can promote such ideas.

# Shrimp Culture: A Global Overview\*

By W G Yap

Aquaculture Consultant, SEAFDEC/AQD

*Reviewing the status and problems concerning shrimp culture worldwide, the author says that after the feverish growth of the 1980s, shrimp farming production appears to have stabilised around the figure of one million tons. The most serious issue facing the shrimp industry is sustainability. Biological and mechanical means to lower pollution, such as use of less polluting feed, are being explored. But the soundest approach ecologically is likely to be the zero discharge system, where waste water is treated and recycled.*

## Showing Signs of Peaking

Greenpeace and whitespots notwithstanding, the six billion dollar shrimp farming industry manages to hover at the production level it has been at since 1995 – close to one million metric tons. After a spectacular 26.4% average annual growth between 1984 and 1991, the industry managed to squeak by with a 2.2% average annual growth between 1991 and 1997. The industry appears to have reached its plateau since 1992. Although there are signs of decline, don't bet on it – the 1997 contraction was less than 1%. Meanwhile new players continue to come in and may just boost total production.

As industries go, shrimp farming is relatively new. Not counting the pioneering research work of Dr Hudinaga in the 1930s which eventually led to the development of shrimp hatchery technology, and the extensive cultures using wild seedstock, shrimp culture as an industry can be traced back only to the early 1970s. That was when interest in its culture started to perk up outside traditional growers in Southeast Asia in their age-old earthen ponds. Despite its relative newness, close to a third of world shrimp production is now made up of farmed shrimp (Figure 1).

If the production of the major farmed species is compared with that of the same species from capture fisheries, the contribution of aquaculture is found to be considerably higher. As shown in Figure 2, of the six major species being farmed, only the *Kuruma* prawn,

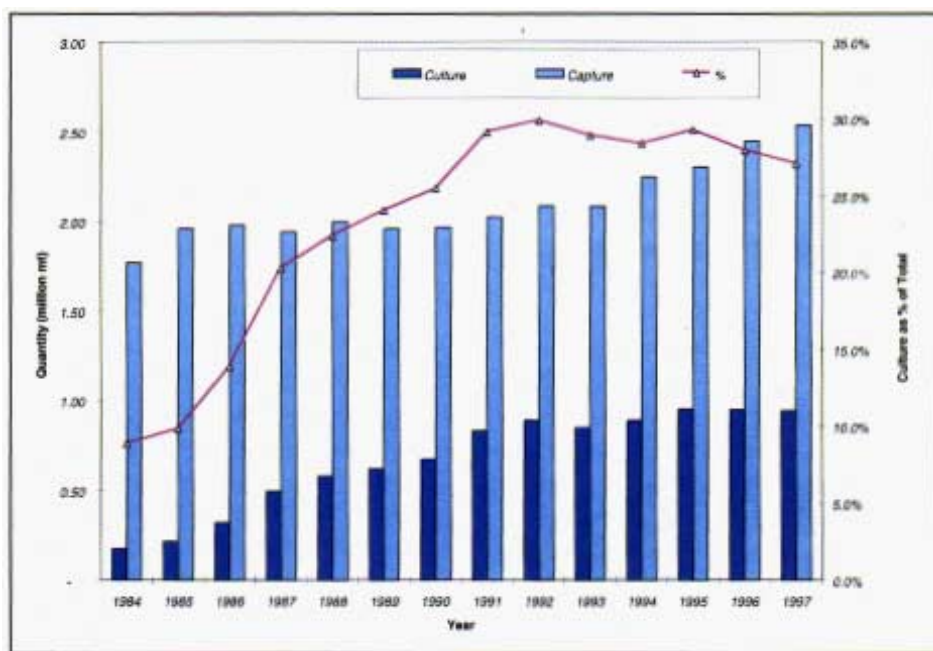


Figure 1: World production of shrimps from capture and culture showing percentage of farmed shrimps to total, 1984-1997 (Source: FAO Aquaculture Statistics)

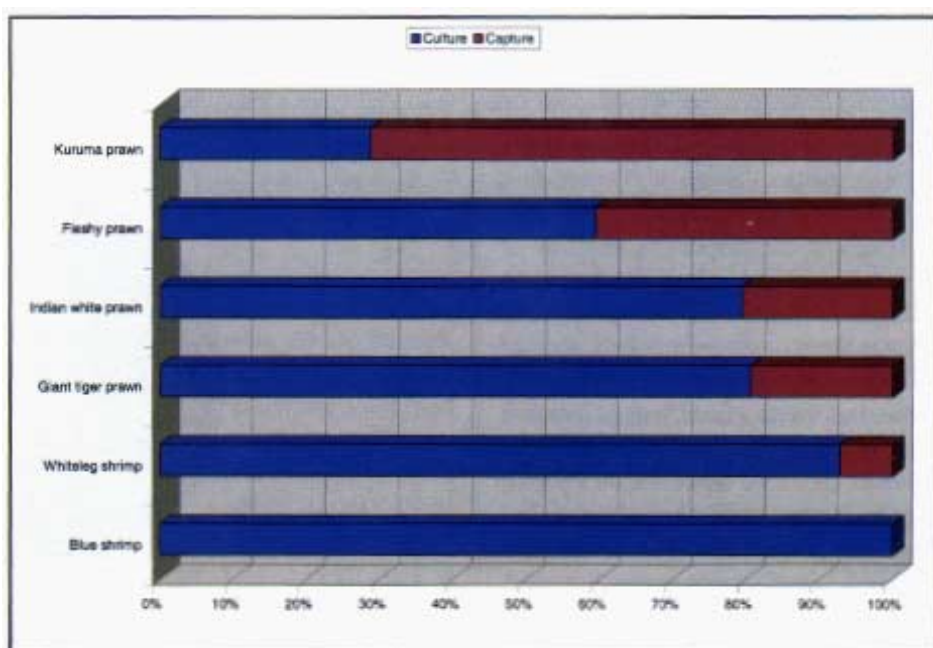


Figure 2: Percentage contribution of aquaculture and capture fisheries to the production of major penaeid shrimp species.

\* This article is reproduced from SEA FDEC Asian Aquaculture, Vol XXI. No. 4, August 1999, courtesy of the publication and the author.

*Marsupenaeus japonicus*, still relies more on capture fisheries than on aquaculture. On the other hand there are no entries at all of landings from capture fisheries in the FAO Fisheries Statistics of the blue shrimp, *Litopenaeus stylirostris*.

As for the other species, farmed shrimps make up 92.6% of the total world production of whiteleg shrimps, *Litopenaeus vannamei*; 80.6% of the giant tiger prawn, *Penaeus monodon*, 79.5% of Indian white shrimps, *Fenneropenaeus indicus*; and 59.4% of the fleshy shrimps, *Fenneropenaeus chinensis*.

### P. monodon Still Dominates

The giant tiger prawn, which is known in international trade as black tiger, has been and continues to be the leading cultured species. As shown in Figure 3 some 52%, or 490,195 mt of the world's farmed shrimps consist of the giant tiger prawns. Coming a distant second is the whiteleg shrimp *L. vannamei* with 17.9% followed by the fleshy shrimp, *F. chinensis* with 11.1%. The fleshy shrimp used to be the second most important species after the jumbo tiger. With the collapse of the industry in China which produced 95% of the species, the fleshy shrimp was overtaken by the whitelegs in 1995. The banana shrimps, *F. merguensis*, constitute only 5.3% and the Indian white *F. indicus*, only 0.5%. In spite of its very high price, especially when live, there is very little aquaculture of *Kuruma* shrimp, *M. japonicus*, which makes up only 0.3% of the total shrimp produced from aquaculture.

It should be noted that the top three culture species, namely *P. monodon*, *L. vannamei* and *F. chinensis*, are also endemic to the respective regions or countries where they are mostly produced. For sure there have been several attempts to introduce a species to a country where it is not endemic. There has been some limited success such as for instance the introduction of various penaeid species to French Polynesia where they are not native, but no country has ever become a major producer out of such introduction.

### Asia Leads in Shrimp Production

During the last 14 years from 1984 to 1997 some 63 countries are listed in the

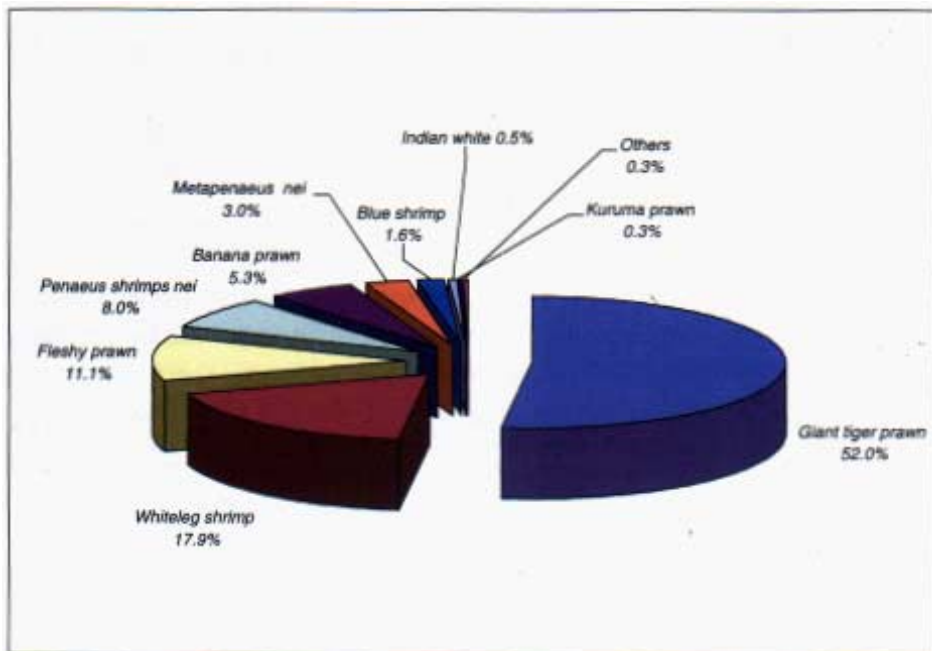


Figure 3: Percentage composition of world production of farmed shrimp by species, "nei" means not elsewhere included (Source: FAO Aquaculture Statistics)

FAO aquaculture statistics as having produced shrimps at one time or another. In 1997, nine of these countries did not report any production. This leaves 54 shrimp producing countries. In 1984 only 29 countries reported any shrimp production. The producing countries are found in all regions including Europe and the Mid-East: One of the newest entries to the shrimp culture club is Albania which reported a 10 mt production of *kuruma* shrimp in 1997. If grouped according to major regions, Southeast Asia is still the leading shrimp

producing region with 506,035 mt or 53.7% of the total. If all of Asia is considered together as one region, then it contributes 737,380 mt or 78% of the world's farmed shrimp, with the Americans contributing 198,925 mt or 21%. The remaining one per cent is distributed among all the other regions. In the Americas, the producing countries are all part of Latin America with the exception of the United States which managed to produce 1,200 mt despite stringent environmental laws and high labour cost.

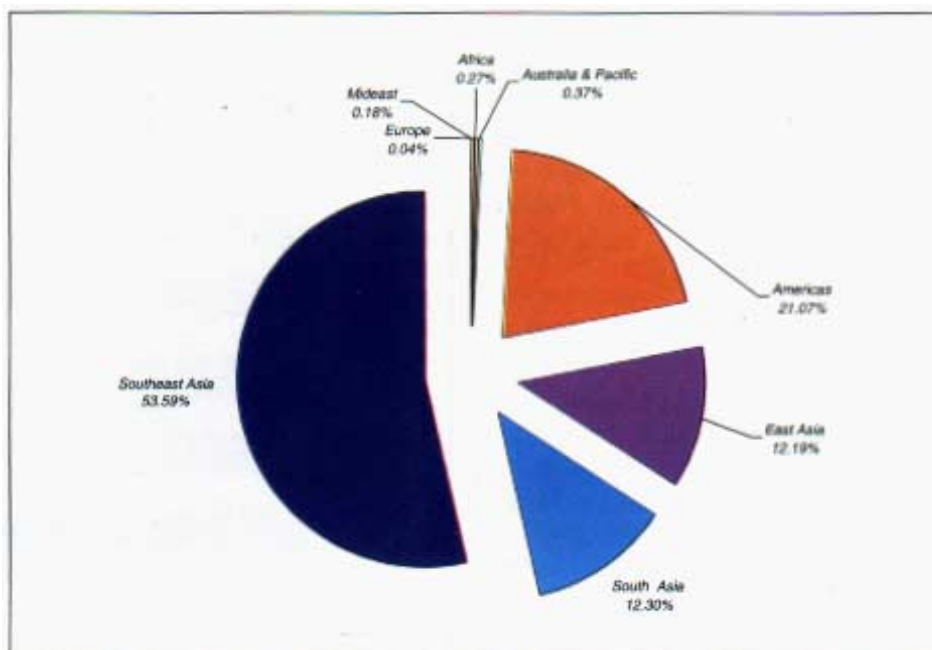


Figure 4: Percentage contribution of various regions to total world shrimp production of 941,814 mt in 1997 (Source: FAO Aquaculture Statistics)

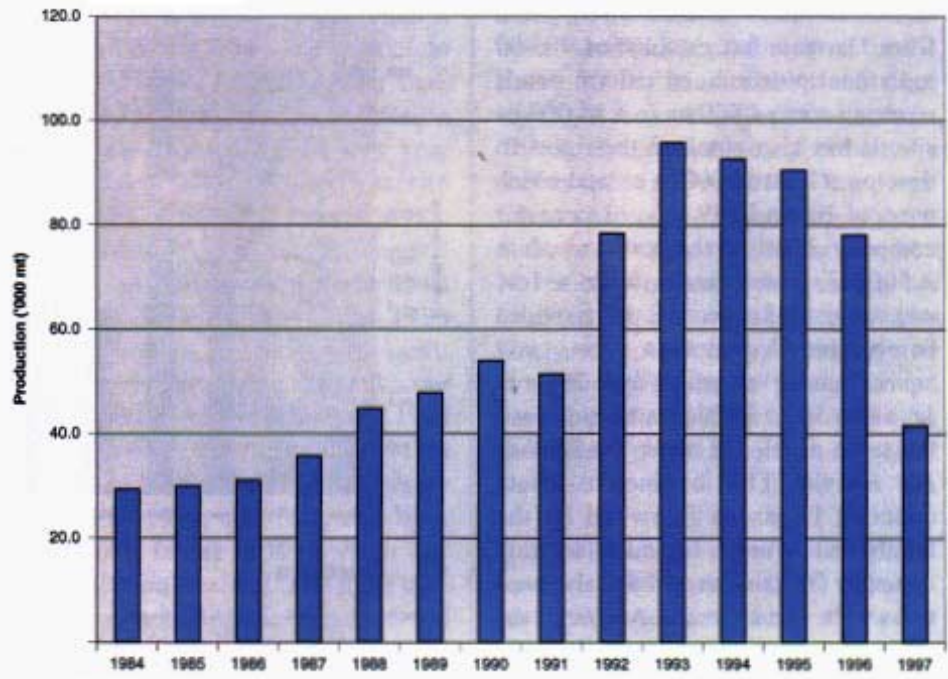
## Thailand

By country, Thailand is the leading producer in 1997 with 215,000 mt, a position it has maintained since 1993. Thailand's 1997 production is already 19% lower than its peak production of 265,524 mt in 1994. Like all other countries in Asia, Thailand also suffers from disease and environmental problems, not the least of which is the WSSV or White Spot Syndrome Virus. That Thailand managed to remain on top has been attributed to, among others, the fact that 80% of the 12,500 intensive culture farms are owned by small-scale farmers operating 1-2 ponds, each ranging in size from 0.16 - 1.6 ha. These farms produce 80% of Thailand's *P.monodon*. No big shrimp farms with high investment and large overheads have been able to survive. Kongkeo attributes the failure of the large farms to "insufficient care in farm management." Simply put, it means hired technicians and workers in large outfits cannot match the attention lavished by small shrimp farmers on their own farms.

It also helps that the government provides considerable assistance to the industry. Proof of this is the development of a Seawater Irrigation System (SIS) which brings in clean seawater that individual shrimp farms can tap. The SIS incorporates pre- and post- water treatment using mechanical and biological treatment measures (Tookwinas & Yingcharoen 1999). A good system of shrimp disease diagnosis, in place using the latest PCR technique, helps minimize the risk for Thai shrimp farmers by avoiding the use of WSSV-infected postlarvae and/or spawners.

Thai shrimp farmers have been very fast in expanding to new areas. When the original shrimp producing area in the eastern coast started having problems, production shifted to the southern coast. Now Thailand has expanded its production area 50 to 60 km inland, by using mainly freshwater. Estimates of the total area used range from 5,000 to 8,000 ha. Saltwater is trucked in and used only in the beginning and is diluted to very low salinity. Since it still uses some amount of saltwater, the practice has become controversial due to its impact on neighbouring rice fields. This has forced the government to restrict any further expansion and to limit its practice to coastal provinces only.

## Philippines



## Thailand

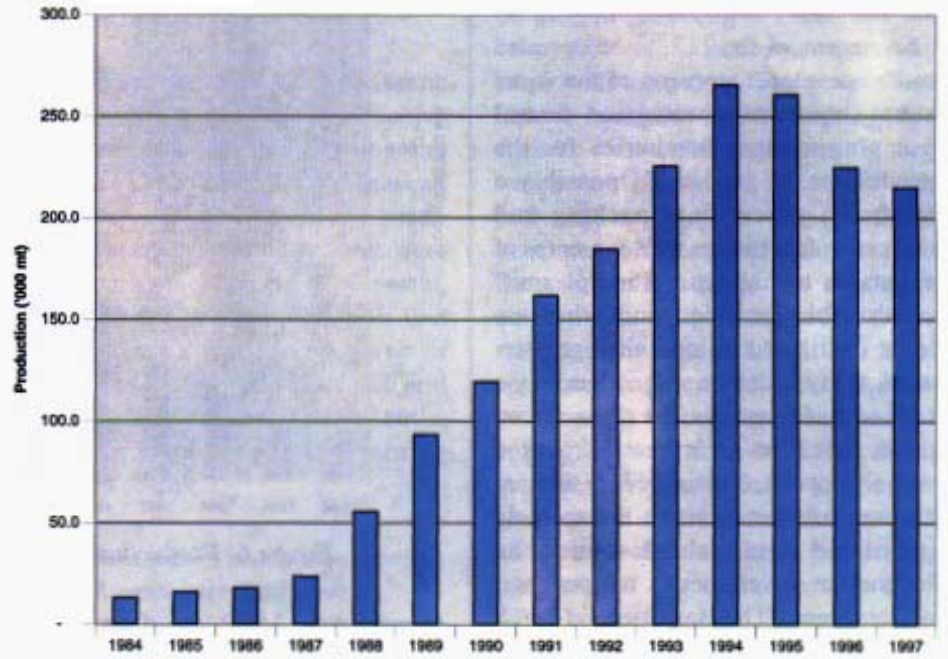


Figure 5: Production of farmed shrimp in the Philippines and Thailand

## Indonesia

The distinction of being the top farmed-shrimp producer has somehow always eluded Indonesia. Between 1988 and 1989 it was second only to China. Thailand dislodged Indonesia in 1990 and Indonesia slipped to the third position. This was to be so until 1992. The next year China suffered a catastrophic production failure and Thailand became the leading farmed-shrimp producer, Indonesia rose up to become the second largest producer, a position it has maintained up to the present.

Indonesia produced 159,480 mt in 1997, its highest ever. Like many other places in Asia, shrimp farms in the main island of Java are also struggling against diseases brought about by unbridled intensification in the past. Unlike most other countries in Asia, however, Indonesia still has large undeveloped land in the outer islands particularly in Sumatra and therefore has the potential to later become the world's largest farmed shrimp producer.

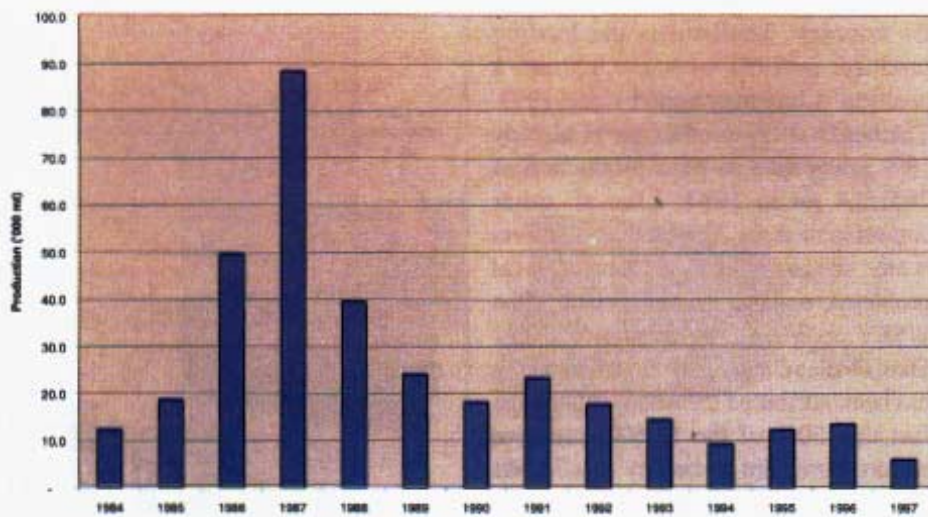
In the province of Lampung which is located in southern Sumatra, one of the world's largest shrimp farms under the

control and management of one company can be found. Here the P.T. Dipasena Citra Darmaja has established 18,000 individual plastic-lined culture ponds covering some 4,500 ha in a 16,000 ha site. It has also obtained the rights to develop at least 50,000 ha of land which used to be under Wahyuni, a sister company. Most of the ponds measure 2,500 m<sup>2</sup>, gross area, with a few measuring half a hectare. As provided for under Indonesian law, any aquaculture development over 30 ha in Java and 50 ha in islands outside Java has to be developed under the *Tambak Inti Rakyat* (TIR) or nucleus-estate concept. Dipasena is owned by the family that owns the tire manufacturing company Gajah Tunggal and also used to own the Bank Central Asia until the Asian currency crisis virtually brought down a large portion of the Indonesian banking industry.

The nucleus of the TIR, to be operated by the developer, consists of the water supply system including the central pumping station; hatcheries for the production of seedstock; possibly a feedmill; processing, packing and marketing facilities as well as a corps of extension technicians. The “plasma” consist of the grow-out ponds which are to be distributed to individual growers who qualify under the programme. In the case of the Dipasena mega shrimp farm, the beneficiaries are migrants from the densely populated island of Java who are encouraged to migrate to the sparsely populated outer islands under the Indonesian government’s *transmigrasi* programme. The families of such migrants are provided transportation to the island they intend to move into, farmland and shelter, and the means to get started, such as working animal and farm implements. In Lampung, the farmlands are ready-to-operate shrimp farms. Every shrimp farm consists of two grow-out ponds each measuring 2,500 m<sup>2</sup> gross or in some instances, one unit of 5,000 m<sup>2</sup> pond.

With half a hectare per family, one can see that 4,500ha of ponds will have close to 10,000 beneficiary-families. With an average of four persons per family, the whole shrimp farm estate is a town in itself complete with schools, shops, mosques, a hospital and other amenities. The site runs for more than one hundred kilometers along the coast and has a total

### Taiwan



### Vietnam

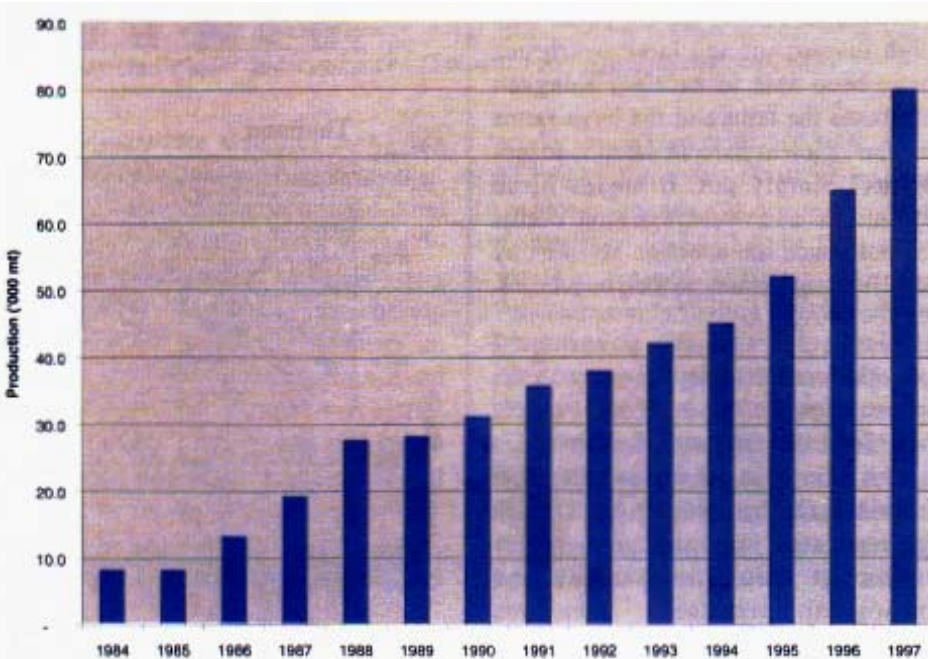


Figure 6: Production offarmed shrimp in Taiwan and Vietnam

of more than 1,000 km of supply and discharge canals. The drainage canal is used as a main transportchannel for both people and cargo.

In a scheme patterned after home financing programmes, the developer, in this case P.T. Dipasena, is paid by the servicing bank the full development cost plus a pre-agreed profit margin once each half-hectare farm is turned over to a qualified beneficiary. Each beneficiary is then expected to pay the servicing bank the cost of the farm over a set period of time at a pre-set amortization schedule. The nucleus company then provides the shrimp fry, feeds and other inputs and buys the shrimp produced for processing and export. In theory it is a win-win arrangement. The small farmer gets to own a modem shrimp farm and is assured

of inputs and a market for his produce. The developer makes money on the development and continues to make money by providing the fry and other inputs and in the processing and export of the shrimps. Between 1996 and 1998 Dipasena reportedly produced some 16,000 to 19,000 mt of shrimps per year.

The 1997 Asian currency crisis has hit Indonesia hard. The Indonesian currency plummeted from 2,800 Rupiah to the US dollar to as low as 15,000 Rupiah. It has now stabilized somewhat at the 7,500 to 8,000 Rupiah level. This has affected the shrimp industry in general and Dipasena in particular. Feed mills are having a hard time sourcing dollars to import essential feed ingredients. Dipasena found the rupiah cost of the imported plastic liners soaring beyond the farm development

price that has been pre-agreed with the servicing bank. Reports indicate that the development pace has slowed down considerably and that the company is considering the development of 5 ha earthen ponds for extensive culture for the additional 50,000 ha area. Just to provide a scale for comparison, the total brackishwater pond area said to be used for shrimp farming in the Philippines is only 54,000 ha.

Before the Asian currency crisis and the political turmoil that came after it, the Indonesian Directorate General of Fisheries already had a plan to become the world's largest producer of farmed shrimps. This it intended to do by developing up to 250,000 ha of shrimp farms, with the government financing 30% of the cost, to produce one million tons of shrimps and earn up to US\$8 billion annually. It should be noted that this level of production is even greater than the 1997 world production of cultured shrimps. It is not known whether the government still has the political will and the financial capability to push through such a large undertaking after all the troubles the country has been having.

## China

As late as 1980, Chinese shrimp production from aquaculture was so insignificant that it was often lumped together with "others." While aquaculture is said to have started in China, it

centered on freshwater aquaculture, and the country had no strong tradition in coastal saltwater aquaculture. Then it grew rapidly by leaps and bounds to reach 19,300 mt in 1984. After that, Chinese farmed shrimp production practically doubled itself every year during the succeeding three years to reach more than 153,272 mt in 1987. From successive years of 100% annual growth, the growth rate slowed down somewhat to only 30%. The 1998 production was 199,418 mt. Subsequently production suffered some minor setbacks between 1989 and 1990 but recovered somewhat in 1991 to exceed the 200,000 mt level. A minor decline in 1992 was followed by a catastrophic failure in 1993 which saw the production level fall from more than 200,000 to only 87,856 mt in 1993 and finally reach its nadir at 63,872 mt in 1994. Shrimp culture has since slowly recovered, with production already exceeding 100,000 mt in 1997.

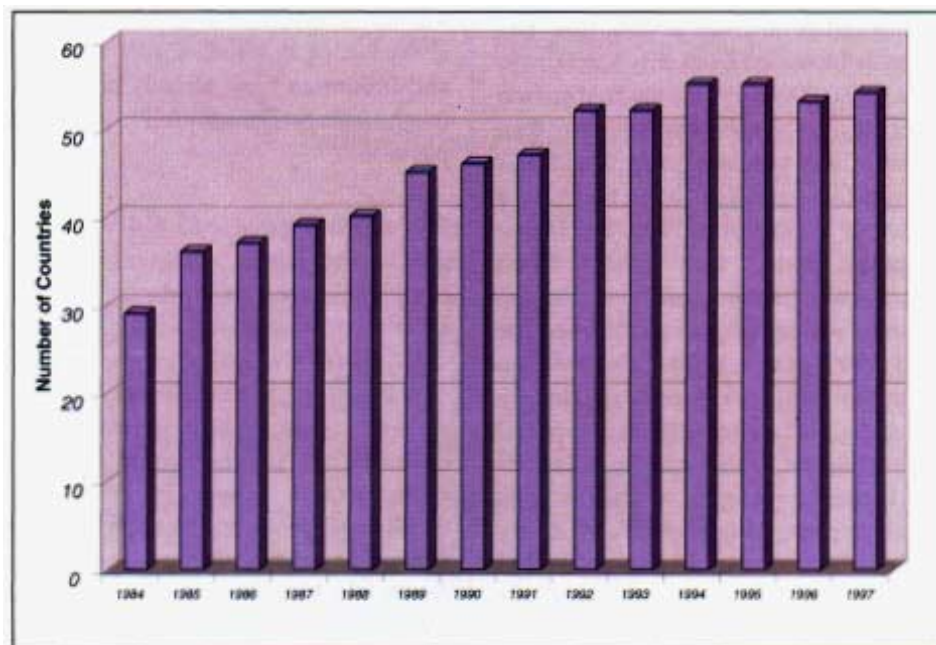
The meteoric rise in the Chinese shrimp industry was made possible by a massive development programme along the Bohai Bay coastline in the northeast all the way down to Fujian in the south. Every year, thousands of hectares were developed by the Chinese government, when it came to the realisation that shrimp farming was the best way of making productive vast tracts of arid saline-alkaline coastal flat lands, providing employment and earning foreign exchange.

If subject to a standard feasibility study it is doubtful if any of the mega-farms along the northeastern coast would have been found feasible. Most of the area is above 30°N latitude, about the same level as Los Angeles, California. Therefore, the window of opportunity for shrimp farming is narrow. The ponds have to be stocked by July of each year at the latest and have to be harvested by November. The rest of the year it is too cold to do any aquaculture. The hatcheries operate only for brief period from mid-spring to early summer and have to produce all the fry required for the year in a period of no more than eight weeks.

But the Chinese government took a macro-economic approach to development. Without the shrimp farms the coastal flat lands were useless for anything else. Saline and highly alkaline and without any freshwater they cannot be used to grow crops. There was not enough economic activity to gainfully employ all the people. The government had to subsidize food, clothing and shelter. With the shrimp farms, money which could have gone into subsidy went into shrimp farm development and generated jobs for people starting from the construction stage. To maximise employment, all the construction works were done by manual labour. Machines were used very sparingly, if at all. Even the crushing of boulders into concrete aggregates was done by hand. Sand, gravel, cement, bricks and other construction materials were hauled to the construction sites either by wheelbarrows, if the distance was only a few kilometers away, or with bullock or donkey carts if the source of material was 50km or more away. Cement mixing was done manually. In this manner, hundreds of thousands of people were gainfully employed to develop the shrimp farms.

The fall of the industry in 1993 has been attributed to over-stocking and the lack of provision for treating wastewater discharge. The heavy use of wet and fresh feedstuff such as small mollusks and brine shrimp biomass as feed exacerbated the build up of organic load in the water. With so many families depending on the industry the production failure must have hit shrimp producing areas hard. The industry is now showing signs of recovery and with the hard

Figure 7: Number of countries reporting shrimp and prawn production from aquaculture, 1984 to 1997. (Source: FAO Aquaculture Statistics)



## A short note on scientific names

Many readers may be bewildered by the unfamiliar genus attached to a familiar species names. These 'new' generic names are not exactly new. They had always been there but only as subgenera, which are rarely used. Taxonomists have always known that the group of shrimps and prawns familiar to everyone as belonging to the genus *Penaeus* actually consists of different distinct groups based on their reproductive morphology and biology but hesitated to split it up due to the confusion that may ensue since everybody is already familiar and comfortable **with penaeus**. Very recently, **Perez-Farfante and Kensley (1997)** took the bold step of placing the different penaeid shrimps in their proper 'taxonomic bincards' by elevating the former subgenera to the level of full genera.

The **black**tiger and the green tiger shrimps remain under the genus *Penaeus* so they are still *P. monodon* and *P. semisulcatus* respectively. The Indian white shrimp (*P. indicus*), the banana shrimp (*P. merquiensis*), and the Chinese fleshy shrimp (*P. chinensis*) now belong to the genus *Fenneropenaeus*. The South American whiteleg and the blue shrimp should now be referred to as *Litopenaeus vannamei* and *Litopenaeus stylirostris* respectively. The *kuruma* shrimp (*P. japonicus*) is now *Marsupenaeus japonicus*. **It should be noted that the specific names remain the same.**

**It will** take time for these new generic names to be widely used. There may be some initial resistance. **But then considering** how wide and how fast the acceptance has been when taxonomists reclassified the Nile tilapia and the Mozambique tilapia from plain old Tilapia to the jawbreaking *Sarotherodon* and finally to the currently used tongue-twister *Oreochromis* within less than ten years, resistance to the changeover from plain old *Penaeus* to their respective "qualified-penaeus", may be futile - **W.G.Y.**

*Perez-Farfante, I and B.Kensley 1997. Penaeoid and Sergesroid Shrimps and Prawns of the World. Keys and Diagnoses for the Families and Genera. Memoire due Musee National D'Histoire Naturelle. Paris, France 233 pp.*

lesson already learned, Chinese shrimp farmers, like their counterparts everywhere, are likely to be more cautious this time.

### The Rest of Asia

The case of Taiwan is already well known. From one of the top producers in 1986-87 Taiwan is now a net shrimp importer.

Philippine shrimp production continues to be sluggish due to widespread infection by the luminiscent *Vibrio* bacteria. At its peak in 1993, the Philippines produced 95,816 mt of all species but mostly of the giant tiger prawns, based on official government statistics which is also the basis for the FAO figures. The total 1997 production was 41,610 mt. The 10,000 mt production level in the 1997 issue of World Shrimp Farming published in the United States by *Shrimp News International* is even less than the export figure of 10,532 mt.

Unlike in Indonesia or Thailand, the Philippines shrimp growers do not have the luxury of finding new areas for development. The Philippines have run out of new sites to develop. Shrimp growers in Negros Occidental which

used to be the center of intensive shrimp farming are slowly and very cautiously trying out lower densities, using probiotics, pond bio-remediation techniques and even enlisting the assistance of what was till now shrimp pond enemy number one – the tilapia – to minimize the risk of *Vibrio* infection. Panguil Bay, which used to be the northern Mindanao equivalent of Negros Occidental is still a virtual disaster area as far as shrimp growing is concerned. Many of the shrimp growers have shifted to milkfish and lately to tilapia.

Vietnam is the country to watch. Vietnamese shrimp production has steadily increased from only 8,000 mt in 1985 to 80,000 in 1997, a ten-fold growth over 12 years. It now produces more than India which produced only 54,647 mt during the same year after touching a figure of 97,539 mt in 1995. The Indian Supreme Court ruling in 1997 which practically banned intensive shrimp farming within 500 m from the coastline and 200 m from rivers, did little to dampen Indian interest in shrimp farming. However, the widespread occurrence of WSSV has put a damper on further development and on high stocking rates. Bangladesh is also slowly inching up and with 56,480 mt in 1997 already produces more than the Philippines.

### Ecuador and the Americas

Ecuador stands out as an oddity among the major shrimp producing countries - it is the only one outside Asia. As early as 1984 it was already producing more than any of the major shrimp producing countries in Asia. Since it was dependent totally on wild fry the industry remained at almost the same level in 1987 and was overtaken by China and Indonesia in 1985. Production perked up only when hatcheries started to be put up. Production exceeded the 100,000 mt level for the first time in 1991 and touched a peak of 113,137 mt in 1992. However, by that time China, Thailand and Indonesia were already producing much more. So Ecuador fell to the fourth position.

Production dropped to 83,404 mt in 1993 due to the Taura syndrome but has since recovered to reach an all time record production of 132,709 mt in 1997. There was an initial controversy over the etiology of the Taura syndrome. At first it was widely believed to be caused by toxic agents in the environment. However, it is now confirmed to be caused by a virus which has been designated Taura Syndrome Virus or TSV (Hasson et al 1995).

Practically all the Latin American countries from Mexico to Peru have also started their respective shrimp culture industries. However, except for Mexico which in 1997 produced 17,422 mt, all the rest produced less than 10,000 metric tons.

### The Middle East

The Middle East with all its oil, is also striving to become a shrimp producing region. Many of the countries in the region including UAE, Kuwait and Yemen have initiated moves to venture into shrimp farming. So far however, serious and large-scale development has taken place only in two countries: the Kingdom of Saudi Arabia and the Islamic Republic of Iran.

Shrimp culture in Saudi Arabia started way back in 1983 when a private company, the Al-Balaa Establishment, developed a 20 ha pilot farm along the Red Sea, using largely Filipino consultants and technicians. This actually preceded whatever shrimp farming activity was carried out by the government's fish farming center. For more than 10 years the Al-Balaa operations at Al-Lith remained at the pilot level. It was only in the mid-1990s that the company decided to expand its operation to 100 ha. Now it is developing what is reported to be a 1,000 ha farm.

The most remarkable aspects of the Saudi Arabian shrimp farming operation are the species and the salinity level. Who would have thought that *P. monodon* can grow normally in salinity above 40 ppt? The water of the Red Sea is already 40 ppt. Once in the supply canal the very

dry air and the high temperature drive the salinity up to 42 to 45 ppt. The *P. monodon* spawners are caught mostly in the southern part of the Red Sea near Yemen. These prawns must have already adjusted to the high salinity level of the area.

Saudi Arabia reported a production of 830 mt in 1997. It is not known how much of this is from the Al-Balaa farm in Al-Lith and how much from the newer Saudia Fisheries Company farm in Gizan province which has a series of circular ponds. The Al-Balaa farm in Al-Lith reportedly suffered huge production failure late in 1998. MBV had previously been detected in the farm but this time around the animals reportedly tested positive for WSSV. The entire 100 ha farm as well as three hatcheries are now on an extended dry out in an attempt to break the disease cycle.

Another company, the Gizan Agricultural Development Co. (GAZADCO), already has detailed engineering designs for initial 200 ha grow-out farms in a 500 ha site. It is now in the process of selecting the contractors and consulting engineers for the construction and development phase.

Iran is moving very fast after culture trials under a UNDP/FAO Project showed that it is possible to breed and grow local species found in the Persian Gulf which has an average salinity of 38 ppt. Initially two species were being farmed, *P. semisulcatus* and *F. indicus*. However, due to slow growth of the former when farmers shifted to a locally milled feed, all the farms are now stocked with *F. indicus*.

The UNDP/FAO Project also assisted Iran in the identification of sites suitable for shrimp culture development. Sites are now being developed all along the coast from the province of Khuzistan, which borders Iraq, to Chabahar in the south, which borders Pakistan. Space does not permit a full report on the development status. But to provide an example, in Khuzistan a 5,000 ha site is being developed. Thus far 2,500 ha (gross area) has been completed although only 570 ha (net water area) has been stocked. All the three other provinces already have hundreds of hectares of ponds stocked and thousands of hectares still awaiting development.

Unlike Saudi Arabia where the development has been purely a private sector initiative involving large companies, albeit with generous government incentives, Iran is taking a directed development approach to benefit smallholders. The government is developing the sites into a shrimp farm park by providing basic infrastructures such as main supply and drainage canals, road network and electricity. The developed area is then subdivided into 20 ha lots, which are awarded to qualified individuals. Veterans of the Iran-Iraq war or the children of those who died in the war are given priority. The recipients then become eligible for a bank loan to develop the 20 ha lot awarded to them. A working capital loan is also provided.

Since everything is developed according to a master plan the drainage canal outlet is always located very far from the supply canal inlet. There is no possibility of one farm pumping in the neighbour's discharge. In the 3,000 ha site in

## Farmed Shrimp Production in Major Producing Countries, 1984 to 1997

(In '000 tonnes)

Country	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Bangladesh	8.2	11.3	14.7	14.8	16.6	18.2	18.6	19.6	21.0	28.5	28.8	34.0	49.3	56.5
China	19.3	40.7	82.8	153.3	199.4	185.9	184.8	219.6	206.9	87.9	63.9	78.4	88.9	102.9
Ecuador	33.6	30.2	43.6	69.2	74.5	70.1	76.4	105.2	113.1	83.4	88.7	105.6	107.9	132.7
India	10.0	13.0	14.0	15.0	20.0	28.0	30.0	35.5	40.0	72.2	91.2	97.5	95.2	54.6
Indonesia	32.1	37.7	41.8	59.0	77.8	98.4	107.3	140.1	141.7	138.8	135.1	146.6	151.8	159.5
Philippines	29.3	29.9	31.1	35.7	44.9	47.9	54.0	51.4	78.4	95.8	92.6	90.5	78.1	41.6
Thailand	13.0	15.8	17.9	23.6	55.6	93.5	119.5	162.1	184.9	225.5	265.5	260.7	224.8	215.0
Vietnam	8.0	8.0	13.0	19.0	27.5	28.0	31.0	35.6	37.8	42.0	45.0	52.0	65.0	80.0
Taiwan	12.2	18.6	49.6	88.3	39.5	24.0	18.1	23.3	17.7	14.4	9.2	12.2	13.5	5.9

Khuzistan, the main drainage canal is 7 kilometers long and has a telescoping width starting at 200 m and gradually expanding to reach 500 m at the mouth.

Like China the northern part of Iran also has a problem of cold winters. However in the southern provinces of Chabahar and Hormuzgan the winter may be short enough to allow two croppings a year. The hatcheries operate only between April and July. Spawners are still obtained from the wild. The lack of spawners is now a serious constraint. After the spring spawning, no sexually gravid shrimps can be found anymore. A land-based broodstock and maturation system is now being tried in Shilat's Kollahi experimental station where shrimp culture technology was first demonstrated.

Shilat, the Iranian fisheries organization, is encouraging farmers to stock at no more than 20 fry/m<sup>2</sup>. The aim is 50,000 mt annual production capability. With a 1997 production of 524 mt, it still has a long way to go.

#### Prospects for the Future

Worldwide interest in shrimp farming remains strong though no longer in the

same feverish mode that characterized the rapid development during the 1980s. Production appears to have stabilized. The most serious issue facing the shrimp industry is sustainability. Environmental groups such as Greenpeace are convinced that shrimp farming as now practised can never be sustainable. Its high value and marketability always tempt growers to stock more than what the natural environment can safely bear. In the meantime work on less polluting feed which also uses less fish meal continues to be undertaken. Beneficial bacteria to hasten decomposition of waste products as well as to exclude the entry of disease bacteria are increasingly being used. The role of the mangrove as a possible nutrient sink to purify discharge water is being explored. Mechanical means, such as the use of ozone-generator to treat pond water, are also being tried.

However, the most ecologically sound approach is likely to be the zero-discharge system where waste water is treated using a combination of physical and biological processes and recycled. Once this system is fully worked out and shown to be financially viable, shrimp farming can become more friendly to the

environment. Then perhaps even shrimp farms can be viewed as green spots.

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# Ups and Downs of Shrimp Farming in India

by W.G. Yap

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*Shrimp culture practices should be made environmentally and socially acceptable, so that the industry's growth is healthy and sustainable. The setting up of an Aquaculture Authority to regulate shrimp farming is a positive development. So will the passage of the Aquaculture Authority Bill now before India's Parliament.*

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Even before shrimp farming became an important activity in India, shrimp, particularly the black tiger, *Penaeus monodon*, was already an important commodity. Starting in 1988 when catch figures on the species first appeared in FAO Fisheries Statistics, India was already landing 89,382 metric tons. This figure steadily rose to 130,570 mt in 1992 but dropped to 55,441 mt in 1996.

In contrast, only 20,000 mt of *P. monodon* was produced in 1988, increasing to 40,000 mt in 1992. Shrimp culture has been practised for some time in India, but only at traditional and extensive levels. One of the more noteworthy practices is that of rotating shrimps with rice, significant especially in West Bengal.

It was in 1993 that shrimp farming really took off in India, increasing by 80.5% to 72,200 mt. It was a relatively late start; by this time, the industry had collapsed or had already reached its peak in most of the neighbouring Asian countries. Farmed shrimp production reached an all-time high of 97,317 mt in 1995 – at a time when landings from capture fisheries dropped to 78,912 mt. Thus for the first time *P. monodon* production from aquaculture exceeded that of capture fisheries. However this was short-lived. Shrimp aquaculture suffered a downturn in 1997 – only four years after it took off. This will be discussed in greater length later.

A lot of the credit for catapulting shrimp to its present importance in India should go to the tireless promotional effort of the Marine Product Export Development Authority (MPEDA). This body helped in obtaining the latest technology and establishing a market for Indian farmed shrimps.

MPEDA established the first-ever commercially successful shrimp hatchery in Vizag. Good-quality hatchery-

reared fry was made available to farmers, paving the way for the entry of many new farmers to the sector.

Interestingly, while on an average between 1988 and 1997, 83% of the shrimps from capture fisheries came from the western side of India, the West Coast produced on an average only 32% of farmed shrimps. Shrimp farm development was more widespread and occurred earlier along the Bay of Bengal side of the Indian peninsula, particularly in the state of Andhra Pradesh. The topography of the East Coast is apparently more suitable for shrimp farm development than the topography of the west coast.

1993-1996 was the boom period of Indian shrimp aquaculture. It was during this period that large established companies, including the Tatas, entered the field. Prior to this, brackishwater aquaculture in general and shrimp culture in particular were in the hands of small and medium holders using traditional practices which were mostly extensive and natural food-based, relying mainly on wild-caught fry. In a way it was a blessing that the large Indian corporations “woke up late” to the potential of shrimp farming. By the time their farms were ready, the industry had collapsed in China, was levelling off in Indonesia and the Philippines and had reached its peak in Thailand.

The large companies put up both hatcheries and grow-out ponds and in some cases, such as Waterbase, even a feedmill. These large corporations, among them Bommidala and Rank Aqua in Nellore, employed the services of foreign consultants from Asia (Japan, Thailand, Taiwan and the Philippines) and the United States. Although shrimp larval rearing and shrimp culture is not exactly new to India, these were largely limited to government and university research stations, none of which had

trained technicians to serve the needs of the rapidly growing industry. The corporate shrimp farms and hatcheries therefore had no choice but to source most, if not all, their technical manpower needs from foreign countries such as Thailand and the Philippines. Initially, some American technicians were also involved but their engagement did not last long since similar or even better expertise could be recruited from Asia at a much lower cost.

The early to mid-1990s was a good time to recruit experienced technicians, particularly from the Philippines, because by then shrimp farming had started to peak. Furthermore the eruption of Mt. Pinatubo in 1991 destroyed and closed down many hatcheries, including the country's largest hatchery, in Zambales – one of the Philippines' prime hatchery sites which faces South China Sea. It was not surprising that between 1992 and 1997, Filipino technicians could be found everywhere in India – Tamil Nadu to as far north as Orissa in the east coast and Maharashtra in the West.

## **Production of shrimps from capture fisheries and aquaculture, India, 1987 to 1997. (FAO, 1999 Fisheries and Aquaculture Statistics)**

*In metric tons*

Year	Capture	Culture
1987	–	15,000
1988	89,382	20,000
1989	82,457	28,000
1990	92,661	29,985
1991	119,840	35,500
1992	130,570	40,000
1993	102,474	72,200
1994	128,467	91,168
1995	78,972	97,317
1996	55,441	94,990
1997	91,464	54,483

The continued reliance of hatcheries on foreign technicians (even after local capability was established) was due to a number of reasons. One, many of the foreign technicians were willing to enter into “no-production – no pay” arrangements instead of a straight salary regardless of production success. It was common for some foreign technicians to be paid merely an assured room and board plus a fee on a per fry basis. There was no set formula for such sharing but this was usually calculated on a graduated scale. Thus for the first 20 million PLs, the technicians may agree on getting only 2 paise per fry, increasing to 3 paise per fry between 20 and 30 million, 4 paise between 30 and 40 million and so on. The technicians’ share might reach 10 paise per fry at the 100 million PL level. Large corporate hatcheries often prefer to pay a fixed salary plus a production bonus if a pre-agreed target is attained.

Another reason for the reliance on foreign technicians is that the hatcheries are unable to keep local technicians – they tend to move on once they have learned the basics. (This situation continues to this day.) Invariably these technicians will put up their own consultancy firm since many are academically qualified, with an MSc or even a PhD. Some of the Indian shrimp hatchery or grow-out farm technicians eventually went to Saudi Arabia or Iran when the industry in India started to suffer a slump, and bumped into some of the Filipino technicians they had already been acquainted with in India.

The period 1993-1996 was a heyday for the hatcheries. With grow-out farms fast expanding, shrimp fry were in great demand – so much so that cash deposits were made by pond operators just to be assured of getting the number of fry required. Often PLs were sold when they were still at a relatively young stage. The risk-taking technicians stood to earn a considerable sum. One problem, however, was collecting their full share of the income from some of the shrewder hatchery owners. Even if they did collect the money, remitting it home was always a problem because of India’s restrictive foreign exchange controls.

Despite the foreign exchange and the employment generated by shrimps, the shrimp culture industry has a lot of detractors in India. They are among the most active and vociferous in the world

in denouncing the effect of shrimp culture on the mangrove and the marine environment, and its negative social impact on rural communities. As a result of a suit filed by S. Jagannathan, a social activist, against the Government of India, the country’s Supreme Court issued a ruling in December 1996 banning semi-intensive and intensive shrimp farming within 500 meters of the high water line or within the Coastal Regulation Zone (CRZ). The basis of the Supreme Court’s decision was the Coastal Regulation Zone notification of 1991 issued under the Environmental Protection Act of 1986.

What was the effect of the Supreme Court order? Intensive farming in any case had been discontinued after 1994 because of the white spot disease. Large corporate projects – which could be regarded as semi-intensive – had also started to dwindle since 1995. They took shelter under the Supreme Court order to wind up. The Supreme Court order for demolition of intensive farms within the CRZ was stayed in March 1997 and again in August 1997. The stay is still operative.

An Aquaculture Authority (AA) was set up as a result of the Supreme Court’s directive in its December 1996 order. The AA has taken up the issue of licences for shrimp farms outside the CRZ and for traditional and improved traditional farms within the CRZ.

Thus in 1997 hatcheries continued to operate and enjoyed a good market for their fry from individually owned farms, which did not engage in intensive farming. But since it is virtually impossible to draw a line between “extensive” and “semi-intensive”, many of the farms continued to stock more than what could technically be considered extensive.

The production of farmed shrimps in 1997 at 54,483 mt was 42.6% lower than the 1996 figure of 94,990 mt. This decline was due to both the white spot virus attack and the Supreme Court order. Farmers did not risk stocking their ponds, because although the Supreme Court had stayed its December 1996 order, review petitions were pending. Farmers weren’t sure whether there would be any relief for them. This situation continued till August 1997.

A note about the production statistics in the report – the figures are all based on

FAO Aquaculture Statistics, which in turn are based on official government statistical reports to FAO. It is considerably higher than the figures that appear in “World Shrimp Farming”, the annual report published by the US-based *Shrimp News International*. For instance, the 1997 farmed shrimp production figure for India in “World Shrimp Farming” is only 40,000 mt. Production figures in “World Shrimp Farming” are based on the “guesstimates” of *Shrimp News International’s* network of volunteer-correspondents from the industry. Which figure is more accurate, the government’s or those of independent personalities, is anybody’s guess. But the government’s method of obtaining statistics is likely to be more systematic and consistent.

There is still a strong interest in shrimp farming, despite the white spot virus. But those concerned await the passage of the proposed Aquaculture Authority Bill by India’s Parliament. This bill will encourage commercial banks to meet the working capital requirements, including insurance of small-scale farmers and thereby revive shrimp farming.

Meanwhile, in view of the potentially high returns, many independent growers continue to farm shrimps in spite of the risks. The introduction of modern diagnostic tools such as DOT blot and PCR techniques to check the presence or absence of white spot virus in the shrimp fry prior to purchase and stocking, helps reduce the risk. In addition, new management techniques are being tried. This involves the use of reservoirs, and bio-remediation through various micro-organisms and enzymes, probiotics and immuno-stimulants added to the feed, usually in combination with one another.

There is no doubt that in India the present disease problem will lead shrimp farmers to adopt more sustainable practices. As long as the world market for shrimp remains strong, shrimp will continue to generate foreign exchange and provide jobs. After all, while shrimp account for only 35% of the marine product export by volume, they account for 71% by value. Thus it is in everybody’s interest that shrimp culture practices are made environmentally friendly and socially acceptable so that the industry becomes sustainable.

## Comic Book on Shrimp Culture

The comic book of guidelines on shrimp culture (See *Bay of Bengal News*, September 1999) is out. It has been produced by the Aquaculture Foundation of India, on the basis of surveys of existing shrimp culture practices in Andhra Pradesh and West Bengal, and discussions with several institutions and individuals. These include the BOBP; shrimp farmers and the Departments of Fisheries of the two states; the Director of the Central Institute of Brackishwater Aquaculture (CIBA), Dr. G.R.M. Rao, and scientists of CIBA; the Director of the Marine Products Export Development Authority (MPEDA), Mr. V. Venkatesan; Dr. Y.S. Yadava, formerly Fisheries Development Commissioner of the Government of India; and the Ramakrishna Ashram Krishi Vigyan Kendra, a West Bengal NGO.

The comic book was produced in three languages - English, Telugu and Bengali. The project was made possible

with a \$10,000 grant from the Netherlands Embassy. The BOBP, in particular its Director, Dr. Kee-Chai Chong, closely monitored the project, provided technical support to the AFI and additional funds for printing.

The comic book was scripted by Kamala Chandrakant and illustrated by Lalitha Thyagarajan.

“The comic book is well-researched, presented imaginatively, in story form, and is attractively illustrated,” says Dr. Chong. “Sustainable shrimp culture cannot be achieved overnight. It is a process, and we are happy to have encouraged it and participated in it.” Dr. M. Sakthivel, President of AFI, says “We hope the Bengali and Telugu versions of the book help small-scale shrimp farmers in their efforts to raise a sustainable shrimp crop.”



# Farmed Seafood: combating lies with facts

*This article, reproduced from Fish Farming International, London, is an abridged version of a letter sent to the magazine by the Global Aquaculture Alliance.*

Is it environmentally responsible to buy and sell farmed seafood? This is increasingly being asked of consumers and retailers. Unfortunately, only one side of the story is being told. We need to respond clearly with facts, such as: aquaculture is the only sustainable mechanism to increase seafood production.

The world's population exceeds six billion and is still growing. To feed us all for the next 40 years, we need to produce more than all the food produced since the beginning of time. How can we do that?

Ocean catches seem to have reached their limit. The solution is farming – the same as ages ago when wild game became scarce.

In a *New York Times* interview, management guru Peter Drucker predicted that one of the new century's most exciting industries was not the Internet, but fish farming.

The UN World Commission on Environment and Development defines sustainable development as: meeting current needs without compromising the ability of future generations to meet theirs.

Not all environmentalists agree. Randal O'Toole of the environmental 'think tank', the Thoreau Institute, divides the environmental movement into preservationists and conservationists.

Preservationists say 'nature knows best' and should be preserved at any cost. Sustainability means "no impact", so neither aquaculture nor any other system of food production has much growing room.

Conservationists are more realistic. Their goal is to maintain ecosystems through collaborative management by public and private stakeholders at a local level.

Clearly, aquaculturists are also conservationists. In most areas, water rights are publicly held and access to space requires farmers to engage in a permitting process.

Regardless of their leanings, environmental groups make an important contribution by alerting the public to risks. However, as they proliferate and compete for public attention and funding, they tend to reduce facts to 'soundbites'.

In a recent survey to quantify cancer risks, 400 experts were asked to rank risks such as sunlight, tobacco, etc. The same questionnaire sent to 100 environmental groups showed that environmentalists greatly magnify many risks.

Recently, the National Audubon Society in the US released a package of educational materials, including a small card for use at restaurants and grocery stores.

Along a sliding scale from best to worst, it rates 34 of the world's major seafood groups. Farmed shrimp and salmon are flagged by a "do not eat" symbol. This was backed by a two-page guide.

The guide refers to farmed shrimp in just one soundbite: "Shrimp farms pollute and destroy the habitat – so much so that the Indian government recently ordered more than 100 farms closed." Let's look at these assertions.

*"Shrimp farms pollute."* To the consumer, pollution conjures up visions of smoke-stacks, toxic waste, etc. But shrimp farm waste is natural algae and organic matter; neither toxic nor illegal.

Over the last 10 years, farmers have halved the water discharged per kilogramme of shrimp produced, so the assertion is both exaggerated and out of date.

- *"Shrimp farms ... destroy habitat."* This refers to mangroves. Early shrimp farmers were actually encouraged by governments to tap mangrove areas, but they soon learned that the poor drainage and acidic soils were not well-suited for pond construction.

**It is far better to build farms on higher ground, and leave mangrove areas intact to help recycle discharges and protect farms from erosion and storms. Shrimp farmers recognise their value and are leading mangrove conservationists.**

In Honduras, high altitude imagery shows that the area of mangroves in the vicinity of shrimp farms actually increased in the last 10 years.

- *"The Indian government recently ordered more than 100 farms closed."* This is misleading. In 1995, shortly after shrimp farming began in India, a shrimp disease passed through many farms. In 1996 the Indian Supreme Court ruled to close all shrimp farms within 500 metres of the high-tide line.

However, the decision was later stayed before it could take effect. The government proposes to introduce an aquaculture bill with environmental safeguards for sustainable development. Meanwhile, the farms are learning to manage disease, and production has increased to some 70,000 tonnes a year.

On salmon, the Audubon Guide uses one soundbite: "Salmon farming pollutes, displaces wild fish, and prompts the shooting of predatory seals near farms." Let's consider each assertion.

- *"Salmon farming pollutes."* This is a distortion of the truth. Most salmon are raised in cages in cold, deep water along protected coastlines. Regulatory frameworks are well

established, and siting is subject to strong oversight based on sophisticated water quality models.

A typical salmon farm with 18 cages and 50,000 salmon produces 1471b (dry weight) of fecal matter per tide change of 864 million gallons of water. This is the equivalent of two tablespoons in 24 backyard swimming pools.

Lease applications for sites are not renewed that don't meet strict environmental standards.

In British Columbia, Aquamatrix Research analyzed data from three studies reviewing the environmental impact of salmon farming waste. The conclusions were: "Actual loss of wastes to the environment by today's industry is approximately one-third of what it was in the late 1980s. This in spite of the fact that production levels at these sites have increased by approximately three times."

Antibiotics also generate heated debate. Using the worldwide average as an example, no more than 2% of feed given to farmed salmon is medicated with antibiotics, which are used to minimize the impact of naturally occurring bacterial infections.

In Maine, all eggs and, sperm are tested for disease, thus ensuring that juveniles are disease-free. As extra insurance, each juvenile is vaccinated – much like a child is immunised – before being placed in a cage. Thanks to this, in 1998 Atlantic Salmon of Maine had only 0.00183% of feed medicated.

*"Salmon farming displaces wild salmon."* This is unfounded. The question of escapees mating with or weakening wild salmon is greatly contested. DNA testing of wild stocks is under-way in several areas to see if any contain markings that suggest cross-breeding. So far, geneticists disagree on whether testing shows a cross-breeding link.

In fact, by keeping a variety of salmon genes thriving through salmon farming, a broad gene pool is being preserved. With the advent of vaccinations and disease-free broodstock, the argument that salmon cages spawn diseases that kill wild salmon is difficult to substantiate.

It is known that for 100 years before salmon farming started in Maine, the federal government stocked millions of salmon into the rivers of Maine and never once did a self-sustaining run ever materialize.

- *"Salmon farming prompts the shooting of predatory seals near farms."* This is not supported by facts. A 1998 study by University of Maine's Department of Wildlife Ecology found that in the state's salmon farming region, harbour seal population growth is more robust than in any other part of the state. Other studies show that various shellfish, as well as bald eagles and osprey, also flourish near Maine's salmon farms.

Aquaculturists should recognise the need of seafood buyers and consumers to be better informed. From an environmental perspective, aquaculture dovetails with conservationist goals better than many standard agricultural practices do.

Environmental groups tend to exaggerate the facts and appeal to emotion. The National Audubon Society's soundbite judgements are not supported by the facts.

The truth is that aquaculture is a young, rapidly-growing industry with a promising future as the only sustainable means of increasing seafood supply to help feed the world's growing population.

Website : [www.gaalliance.org](http://www.gaalliance.org)

*"Ocean catches have reached their limit. The solution is farming."*



Pic. Courtesy Dept. of Tourism, Singapore

# Small-Scale Fisheries in India: Does It Exist Any More?

by Venkatesh Salagrama

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*Many changes have occurred in fishing villages during the last two decades in the way fish are caught, processed and marketed. But these changes have been mostly confined to affluent fisherfolk. A large majority of the people remain untouched by change. "Small-scale fisheries does not exist any more, but small-scale fishers do" is the author's sombre conclusion.*

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A question that often crops up nowadays in fisheries circles is "Does small-scale fisheries exist any more?" Admittedly, there have been many significant and revolutionary advances in the way fish are caught, processed and marketed in the sector, and the implicit assumption behind the question is, why bother about small-scale fisheries when they have changed to an extent where little distinction remains between the traditional small-scale and mechanised operations?

Motorization of traditional crafts, use of new materials like plywood and fibreglass reinforced plastic (FRP) in boat-building, synthetic fishing gears that have become increasingly more sophisticated and species-specific, the emergence of new areas of growth such as aquaculture – these factors have had a tremendous impact on the small-scale sector. Result: it is almost unrecognisable from what it used to be hardly two decades ago. Market forces entered fisheries in general, and small-scale

fisheries in particular, in a big way in the 1990s, and opened up opportunities for excellent returns for the produce. On the social front, more children from fishing communities are going to schools than previously. English-medium 'convent' schools have come up in many of the bigger fishing villages. Health services have improved, transport and communications facilities have got better, almost every fishing village has been electrified, and though clean water is still a problem, it is not as serious as it



once was. And yes, the cable TV revolution has definitely reached many fishing villages.

However, a brief appraisal of the growth of this sector during the last two decades shows a development pattern that is mostly confined to the more affluent sections within fisherfolk communities. A large majority of the people remains untouched. There is no denying that **there has been an improvement in the quality of life over the period, but this phenomenon covers the entire spectrum of the population, and owes very little to developments within fisheries.**

Generally, the word 'small-scale fisheries' is implied to mean traditional – indigenous – fishing systems. To begin with, everything in the fisheries sector was traditional and, obviously, small-scale. The fishing communities were, by and large, homogeneous. There was a small craft-owning class and a large worker class, but economically there was little distinction between the classes: the

difference in incomes between the owners and the crew was not all that great to set them apart. In many areas, traditional management systems held the power of control over the community. A system of caste-within-caste was apparently in operation which ensured that strict division of labour was enforced. Fishing was confined to the waters close to the villages, and most fish were sold within a short radius from the landing centre. Men's roles were confined to fishing and women did the processing and trading, besides running **the household. Overall, it was subsistence fisheries, where everyone clung together for survival.**

**The technology-oriented and technology-based development efforts have given rise to a new class in the fishing villages, a class that had not existed previously. The appearance of mechanised boats – trawlers – in the early 1970s set in motion a process of change which accelerated through the 1980s and the 1990s. It split the craft-owning class into two: those who saw a future in the**

trawlers and were adept enough to make the change to trawling, and those who remained behind as traditional craft owners, for whatever reasons. As it turned out, the 1970s were the golden age of trawlers, and many fortunes were made and new power centres emerged in the sector. It is important to remember that those who made the migration to the mechanised sector were from within the fisher community, albeit from the more influential sections, and consequently, they continue to make decisions on behalf of the community, and are generally the people consulted on all matters concerning the fishers. Naturally they would be loath to any changes that affect the status quo. **The** fantastic returns in the trawling industry also attracted a large number of rich outsiders, who were lured by generous government incentives. It is this small craft-owning class which, for all intents and purposes, stands for the 'fishing industry' in the minds of the government and the public. 'Valuable foreign exchange earners' as a synonym for all shrimp-hunters entered the vocabulary, and continues to be the



most important argument for supporting the industry.

Going back to the traditional sector, as motorization became necessary, wood became scarce, and alternative boat building materials like FRP entered the scene, there was another split among the craft-owning classes. Those who could, or were lucky enough to obtain the boats through generous government schemes, managed to get hold of them and emerged as the *nouveauriche* class – not yet the trawler-class but affluent enough to stand apart from the mass. This period also saw the emergence of new market relationships, which were to have far-reaching consequences. A semblance of prosperity was seen in many fishing villages in the mid-1980s, and attracted large numbers of outsiders – mostly from the agricultural sector – into fisheries. Being unskilled, they settled down to jobs such as petty fish trading, which intensified competition at the landing centres. The story of these new migrants is both interesting and tragic. By quitting their traditional occupations, they became outcasts within their own communities. On the other hand, the fishing communities and their support agencies never treated the immigrants as anything but outsiders.

More interesting changes occurred to those members of the craft-owning class who could not manage the jump to the mechanised sector or to the ‘fibreglass’ class. Some clung to the trappings of their class for as long as they could – like the feudal landlords of the late 19th century India – before quickly joining the working classes, or getting out of the sector for good, as happened in the early 1990s in some parts of Andhra Pradesh. Many others adapted themselves to the changing situation quite admirably. They secured new positions that evolved with the increasing commercialisation of the sector and quickly became indispensable. Many became ‘traders’ – another new class that emerged in the 1980s: middlemen who purchased fish and high value prawns from the fishermen for sending up to distant export agencies. A sizeable number of people also became political animals: ‘fixers’ with the right connections, whose sole livelihood depended on ‘arranging’ things for a fee. In the end, members of this once craft-owning class – which is hardly a homogeneous entity any longer

– managed to become quite influential in the communities. Many of them are better off than ever before. Like the trawler-owning class, they have every reason to ensure that things remain as they are forever.

In the post-harvest sector, there were traditionally two classes: processors who salted and/or dried large quantities of the fish landed in the village, and a few petty traders who carried the fish to the nearby markets for sale. In the 1990s, ice made an appearance in many fish landing centres, and that changed the equation drastically. A third class appeared – the trader-middlemen, as mentioned above – who cornered a major portion of the catches for export markets; the once-powerful fish processors suddenly found themselves short-changed. And the decline is drastic: traditional fish processing is dwindling, and the number of people employed in the activity has come down significantly. Some large-scale processors switched to the fresh fish trade, becoming trader-middlemen themselves, but many medium- and small-scale processors had to opt out of the business and seek alternate opportunities.

Which brings us to the working classes. They have traditionally constituted the majority – outnumbering the affluent classes by many times – and with the fresh influx of people from the craft-owning classes and from other sectors, their numbers have, if anything, gone up further. What has been the impact of developments of the last two decades on this vast majority? The picture that emerges is not very bright: they did benefit from development programmes. But by and large, the development efforts have given them just enough pace to keep up with the changes, but not enough to take advantage of it. In other words, they were always poor, and continue to remain so.

Under the influence of market forces, traditional management systems gradually became corrupt and are defunct in many areas – an indication of the shift of focus from community survival to individual gain. With most subsistence fisheries being replaced by commercial systems, marginalisation and vulnerability are increasing. Another effect of the emergence of new technologies and new market forces is

that traditional boat-building is now a vanishing art, so are village-level activities like net making, leaving a large number of artisans unemployed. Idle manpower in the fishing villages is on the rise. Conflicts within and from outside the community are on the rise, and there is an ever-growing pressure from external forces, which traditional villagers do not even know, let alone understand. Thatched roofs still remain the predominant features of a fishing village. Educational standards continue to be abysmally poor, and in the face of uncertain catches; more children are entering into occupations such as shrimp-seed collection.

Taking one step backward, in small-scale fisheries, in the accepted sense of the word, nothing remains small-scale: the boats are expensive, motorization is expensive, there is an ever-growing range of species-specific nets that a boat needs to carry which increases investment, the operating costs are high, cost of ice is a new investment, payment of large sums as advances to the crews is a major expense – and so on. The market linkages and networks which have developed during the last decade make the fish trade as complex as any boardroom conference.

By no stretch of the imagination can any of the current activities be classified as small-scale or ‘traditional’. Does small-scale fisheries exist any more? No, it does not. But small-scale fishers do. Their lives are essentially the same as ever. Their socio-economic conditions were in the past characterised by uncertainty, poverty and conflicts, and these characteristics continue to be endemic to a large majority of people today. In a situation where the external support services have succeeded magnificently, but the people who were to benefit from them have remained poor (“The operation is a success, but the patient is dead!”), it is pertinent to pose the question whether the services were relevant to the needs of the people.

The answer to this question opens a whole range of opportunities for helping the fishers help themselves. Nowhere is there a better case for people-centred approaches than in small-scale fisheries. And nowhere are they more urgently needed either.

# Documentation of Learnings Indonesia

*A two-member Mission\* has documented the learnings from the activities of BOBP's Third Phase. Here are the findings of the Mission relating to the work in Indonesia.*

Indonesia, the largest archipelagic State, has a coastline of 80 000 km and a jurisdiction over 3.1 million sq. km of territorial waters and 2.7 million sq. km of exclusive economic zone. The contribution of fisheries to food security, employment and income has been recognized by the Government of Indonesia. Fisheries development is an integral part of the National Economic and Social Plan.

Like other countries in South and Southeast Asia, the marine fisheries of Indonesia is a multi-gear, multi-species fisheries, operated by a large number of small-scale fishermen and confined to inshore and coastal waters. Fisheries in Indonesia is primarily artisanal and the fishing fleet is dominated by small boats, non-powered and outboard and inboard motor-powered boats of less than 30 GRT

The Directorate General of Fisheries (DGF), the Provincial Fisheries Service (PFS) and the Central Research Institute for Fisheries (including the Research Institute for Marine Fisheries) are government agencies responsible for administration, development and management of the fishing industry in Indonesia. The DGF and the research institutes are under the Ministry of Agriculture, while the Provincial Fisheries Service is under the Ministry of Home Affairs. The administration of the local fisheries industry is the responsibility of the Governor at the provincial level, and of the Head of the District at the district level.

The Mission (to document the learnings of BOBP's Third Phase) visited Jakarta, Indonesia during the period 17-21 July,

1999. During the visit, the Mission had detailed discussions with officials of the Directorate General of Fisheries and of the Asian Development Bank's Project at Jakarta. The Mission, however, could not visit any of the field sites; its observations are therefore based on interactions with DGF and others.

The "Situation Analysis" conducted in 1994 at the start of BOBP3 identified inadequate management measures and inappropriate enforcement mechanisms, leading to conflicts between groups of fishermen and other stakeholders as management problems to be addressed by the Third Phase. The recent development of mariculture (leading to collection of wild seed using destructive fishing practices), the unmanaged development of fisheries to generate feed for the mariculture sector, and pollution were cited as topical examples. Realizing the complexity of such problems and given the constraints it faces in terms of manpower and resources, the government expressed its keen interest in addressing the problems comprehensively through participatory approaches at the community level.

The Situation Analysis therefore proposed development of model management schemes for coastal fisheries and mariculture using participatory, community-based approaches to conserve and sustain coastal fisheries resources and improve the livelihood of fisherfolk. The Analysis recommended a pilot exercise in the Tapan Nauli Bay area of North Sumatra Province, in the hope that learnings from the exercise could be extended to other parts of Indonesia.

The functional focus of the DOFIBOBP Project was defined as Community-Based Fisheries Management (CBFM) and mariculture. The geographical focus of the Project was identified as Tapan Nauli Bay area in the North Sumatra Province of Indonesia.

The objectives of BOBP3 in Indonesia were to undertake CBFM, and facilitate and enable improved management of mariculture, anchovy lift-net fishery and small-scale fisheries in the Tapan Nauli Bay area of North Sumatra Province, so as to evolve model fishing villages. Awareness building, strengthening the institutional capacity of concerned agencies and provision of technical assistance were considered as the key activities to attain such objectives. The Project was initiated in 1995. Some of the important activities undertaken by the Project:

Selected DGF, PFS and DFS staff were trained in the conduct of stakeholder identification, stakeholder analysis, stakeholder communications and perceptions analysis. The staff designed and developed a study design to undertake stakeholder analysis.

- Organized a stakeholder consultation in 1995 which brought together representatives of stakeholders of all three target fisheries for discussing their problems and concerns and their suggestions for solution options.
- Conducted a Workshop in Medan, North Sumatra, in 1996, to discuss the findings of the stakeholder analysis. On the basis of the analysis, a project strategy and work plan were evolved. The Project workplan was endorsed by DGF, PFS and DFS and commitments were made regarding responsibility and resource allocations to facilitate the Project.
- Completed field work for the study of values, perceptions and attitudes of fisherfolk and other stakeholders. BOBP staff conducted an orientation in the processing of questionnaires into ready-made information for analysis.

\* The Mission consisted of Dr. G.L. Preston (Fisheries Consultant, Gillet, Preston and Associates Inc.), and Dr. Y.S. Yadava, Fisheries Development Commissioner, Government of India.



*Fisherfolk need to be prepared for community-based fisheries management.*

- BOBP in co-operation with the DGF and the ADB-supported Project on Coastal Community Development and Coastal Fisheries Management organized a 4-day Workshop on CBFM in Bengkalis, Riau Province, which helped the participants drawn from various provinces to better understand CBFM and incorporate the approaches in their efforts.

To implement the Project, a multi-pronged strategy was evolved on the basis of Stakeholder Analysis. At the national level it was proposed that efforts had to be taken to build awareness and promote the concepts of CBFM and stakeholder approaches. At the local level, the approach was to build awareness on the need for, the benefits of and the methods of management amongst all stakeholders; promote and encourage consultation and negotiation amongst and between stakeholders to arrive at management plans; and provide technical inputs to enable more sustainable practices in fisheries. The overall approach was to take the participatory consultative route, wherein solutions and strategies would

emerge from consultations amongst stakeholders.

DGF designated the PFS of North Sumatra and the DFS of Sibolga and Thpian Nauli Districts as the agencies responsible for implementation of the BOBP-assisted activity. These staff were trained in the conduct of the regional study of values, perceptions and attitudes of fisherfolk and other stakeholders towards fisheries resources, fishing practices, and fisheries management. The questionnaire was also translated into Bahasa Indonesia. DGF incorporated fund allocations into their annual budget to cover necessary expenses beyond the assistance available from BOBP sources.

The Mission, during their visit to Jakarta, had detailed discussions with the Director General of Fisheries, Bapak. Untung Wahyono and officers of the DGF responsible for implementation of BOBP3. The DGF at the outset said that the spirit and philosophy of the Project has been good. The fishermen have been very enthusiastic about the Programme, and it has been effective in raising the

awareness levels on sustainability and CBFM, but translation of the awareness into concrete action has not taken full shape. Training was very significant for fishermen. It had some positive impact. Earlier, management action merely meant following instructions from the Government, but now there is a better understanding in the minds of the fishermen about joining hands with the Government for management of fisheries.

The Precautionary Approach to Fisheries Management Workshop in Medan was particularly good for policy-makers. It made them aware of the Code of Conduct for Responsible Fisheries (CCRF). A Workshop on CCRF was also planned during 1999. A Bahasa Indonesia workshop was also similarly held to expose fisherfolk to the concept of the Precautionary Approach & CCRF. Translation of the CCRF had started, and an amount of Rupiah 120 million (Rupiah 8,500 = US \$1) for translation and distribution of the CCRF had been earmarked. The FAO was also being approached on this subject. The Central

Fisheries Research Institute and the Fisheries Department of the Bogor Agriculture University were to be involved in the translation.

Summing up, the DGF said that the project had been very useful. The Asian Development Bank's project on CBFM had originated from the community-based participatory approach adopted in the BOBP Project. The Government has just acted as a facilitator. The time-scale in which the project has operated could be considered as a limiting factor, and staff shortage affected the Project. It would be very good if the Programme were to continue. However, local budgeting would be difficult to come by due to the financial crisis in the country. It would have been better if there was a local representative or a national consultant to assist the project in day-to-day management. In future, the Programme should include a national expert.

DGF identified mariculture as an important programme to be promoted in Indonesia. Corals are being destroyed for ornamental fisheries, and mariculture can be a suitable alternative avocation for preventing the corals from destruction. A combination of public awareness, CBFM and enforcement can be useful in this direction. Mariculture is just beginning in Indonesia and it would be advisable to have some demonstration or pilot projects undertaken. The Mission was informed that Indonesia is also looking for donors for an Integrated Mariculture Programme (Integrated Coastal Area Management).

The new law in Indonesia empowers the local Government to manage the resources. Certain areas are already managed by the community. A legal framework for aquaculture is also being prepared. Concurrently, regulations for sea farming are required, and a master plan for sea farming could be spelt out. Seaweed culture supports small-scale fishermen and this activity could be extended. With zonation and better planning and provision of backward and forward linkages, fisheries management and production can be improved in the country.

The DGF strongly recommended the continuation of BOBP as a regional concept. "BOBP can be a short-cut to

us for learning from other countries like Thailand, Sri Lanka, etc. BOBP is very much needed in the future, although the priorities can be discussed."

The Mission visited the Ministry of Agriculture/ADB Project on Coastal Community Development and Coastal Fisheries Resource Management in Jakarta and held discussions with the Project Director and other officials. This is a joint project (1998-2003) between the Government of Indonesia and the Asian Development Bank. The primary objective of the project is environment, the secondary objective is poverty reduction. It is a non-revenue project; the entire assistance received from ADB is in the form of loan. The inspiration for this Project has come from the BOBP. The Project co-operates closely with the Coral Reef Management Programme.

The Project seeks to tackle the problem of depletion of coastal fisheries resources, in the context of the pervasive poverty of coastal communities. The Project consists of two phases: a first phase of 1 to 2 years, a second phase of 2 to 5 years. The Project has networked with universities and NGOs. Major activities under the Project are resource assessment, socio-economic survey and market analysis. Local Project Advisory Committees have been set up. Post-harvest activities like use of ice, etc. are being strengthened to optimise fish production. The Mission suggests that activities under BOBP3 and the DGF/ADB should have strong linkages and the activities dovetailed so as to avoid duplication of effort.

The Mission met Dr. Mohammed Prakosa, acting Head of the FAO Mission in Indonesia. According to Dr. Prakosa, the BOBP activities in Indonesia have been very promising and in future it may be necessary to draw more stakeholders, such as universities, into the Programme. He was of the view that there are distinct advantages in a Project being regional, since the work done in other countries can be shared. BOBP could also involve itself in a more upstream policy issue. It could consider assisting the National Government in preparing the Deep Sea Policy. 'With more autonomy being given to the Provinces now, they would need more assistance in preparing their policies and development programmes,

and the expertise of agencies like BOBP would be useful.

Dr. Prakosa suggested that FAO should be informed of developments at all stages. FAO is sometimes not aware of BOBP activities, since communication with the concerned departments is mostly direct. The Project in future should aim at strengthening national capacities and give more authority to the National Government in carrying out its activities. National Governments too should be stimulated to participate in the TORs to be prepared for any future programme. There should be an MOU between the BOBP and the National Government in the beginning to spell out more clearly what is to be done by each side. FAO will support further continuation of the Project.

In conclusion, the Mission is of the view that notwithstanding delays due to the political situation and difficulties in identifying and assigning consultants, considerable groundwork has been done, which has given DGF and BOBP a better understanding of the problems. The DGF is interested in the progress of activities, and has given high priority to solving the problems of mariculture, anchovy lift-net fishery and small-scale fisheries. Training activities have generated much interest. Stakeholders are aware of this Programme.

Linkages between DOF and the Provincial Government were felt to be "soft" in spirit as well as in the budget. The Fisheries Department in the Provincial Administration needs to be strengthened. The financial crisis the country has passed through has also constrained the project's performance in Indonesia. The Department could not handle the Programme in a better manner due to logistics problems. Involving NGOs could have helped project implementation. The Mission was informed that BOBP did try to involve some NGOs, but the effort did not fructify. Field level activities were affected by the economic and socio-political situation, and discussions are under way to figure out means of accelerating efforts to make up for lost time. However, the success of these efforts depends on circumstances beyond the control of DGF and BOBP.

# Linking the Code of Conduct and Sustainable Livelihoods

By Ronald A Maine and Richard Coutts

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*The authors describe and discuss a new approach to development in fishing communities, the “Sustainable Livelihoods Approach.” With funding support from the UK’S Department for International Development (DFID), the FAO seeks to implement this approach in 25 countries of Africa where the DFID is working with fishing communities. The new approach will be linked with the Code of Conduct for Responsible Fisheries.*

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The Fisheries Department of the FAO is now the executing agency for the Sustainable Fisheries Livelihoods Programme (SFLP), funded through the United Kingdom’s Department For International Development (DFID) and presently being implemented in co-operation with FAO in 25 countries of Western Africa. In this programme, Sustainable Livelihoods Approach (SLA) is being linked to the Code of Conduct for Responsible Fisheries (CCRF) for application in communities where fisheries contribute to the means of livelihood.

The SLA is a particular way of thinking about the development potential, the objectives and the priorities as these pertain to each fishing community. “A specific livelihoods framework and objectives have been developed to assist with implementation of SLA, but the approach goes beyond these. It is a way of putting people at the centre of development, thereby increasing the effectiveness of development.”

The CCRF is a voluntary Code which can be incorporated into national legal frameworks to provide a basis for national enforcement of practices designed to protect and sustain both marine and freshwater fisheries resources. The CCRF and its associated guidelines set out principles and international standards of behaviour for responsible practices with a view to ensuring the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity. In this way, the CCRF, in providing the basis for utilising aquatic resources rationally can make a significant contribution to the sustainability of livelihood activities carried out in fishing communities.

What is a livelihood? “A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.”<sup>2</sup>

These shocks or stresses may include any or a combination of the following:

- trends – meaning a prevailing tendency for some facet of the livelihood cycle to be changing over time; for this purpose, that change would be negative thus resulting in a stress on the activities supporting the livelihood means;
- shocks – normally taking the shape of a natural disaster such as a flood, typhoon, earthquake, drought, etc. but could include a regulatory shock due to a legal decree which results in a negative effect on the livelihood means;

seasonality effect – a monsoon season which makes fishing difficult for small vessels, a migratory season when the primary stock is not on the fishing grounds, etc.

All points contained in the above three bullets would be classified as being part of the “Vulnerability Context” which is a major element of the SLA framework as it is assumed by the SFLP. This framework is demonstrated in Figure 1.

Starting from the left we find the box labelled “Vulnerability Context”. As the diagram shows a link to the Vulnerability Context from the box labelled

“Transforming structures and processes”, which would include policy and regulations, we can consider that the Vulnerability Context would comprise the ‘non-asset’ constraints<sup>3</sup> to the livelihood system. The SFLP framework presents the vulnerability context as an up-front item to be considered early in initiating the sustainable livelihoods approach. Initial understanding of the shocks and stresses that a community may have to face is important to the development of livelihood strategies and will help to mitigate the devastating effect that shocks can have when they impact a community that has not undergone any attempt to develop appropriate coping strategies or at least awareness-raising with regard to the potential danger.

Moving on into the framework, we meet the pentagon depicting the “Livelihood Assets”. These being Human, Social, Physical, Financial and Natural resources comprise the assets usable by the community in attaining livelihood goals. The lack or insufficient quantity of any one or more of these assets would give rise to a situation where, if left uncompensated, would comprise a substantial constraint to attaining livelihood goals. It is for this reason that the asset inventory is taken at an early

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1 DFID Sustainable Livelihoods Guidance Sheets.

2 DFID Sustainable Livelihoods Guidance Sheets, quotation adapted from Chambers, R. and G. Conway. 1992. Sustainable Rural Livelihoods: Practical concepts for the 21st century. IDS Discussion Paper 296. Brighton: IDS

3 A non-asset constraint would be a constraint that is not composed of a lack of some livelihood asset such as financial, natural or human resources.

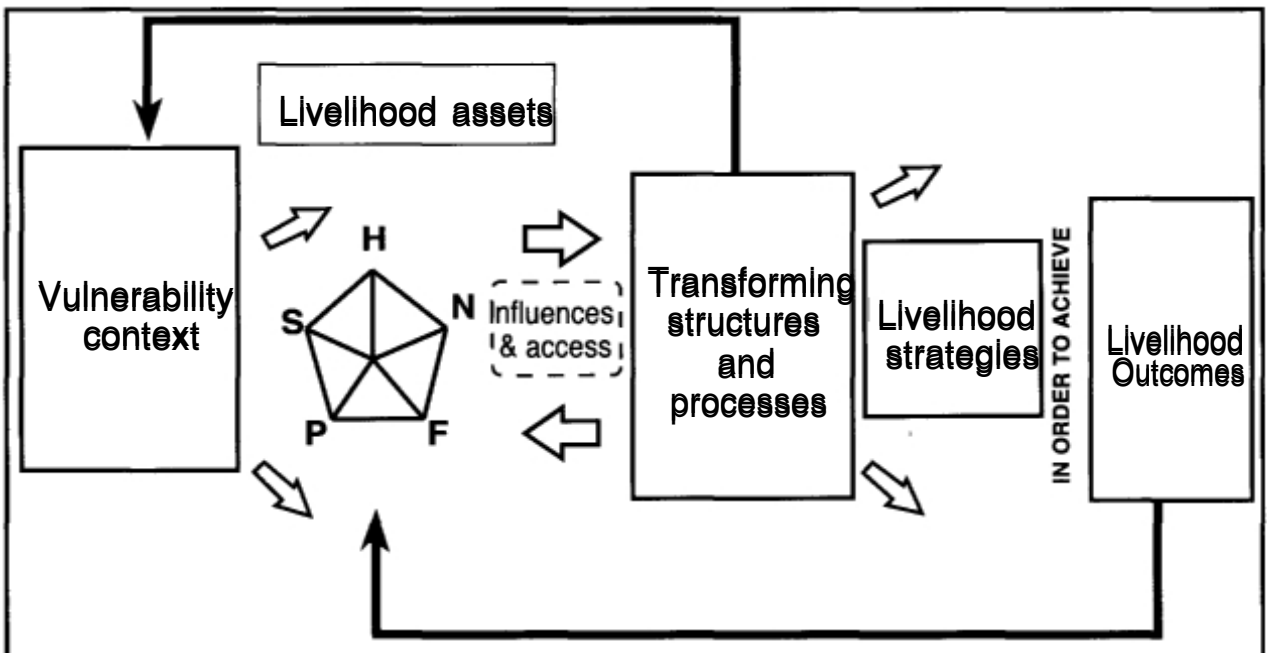
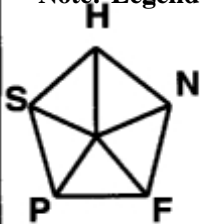


Figure 1: The Sustainable Livelihood Framework consisting of the five major elements included in the SLA model.

Note: Legend for the Livelihoods Assets Pentagon



- H** = Human Resources (workforce, skills, knowledge, etc.)
- S** = Social Resources (social, cultural, religious)
- P** = Physical Resources (equipment, boats, buildings, etc.)
- F** = Financial Resources (income sources, credit, banking)
- N** = Natural Resources (fish stocks, forests, potable water, arable land, etc.)

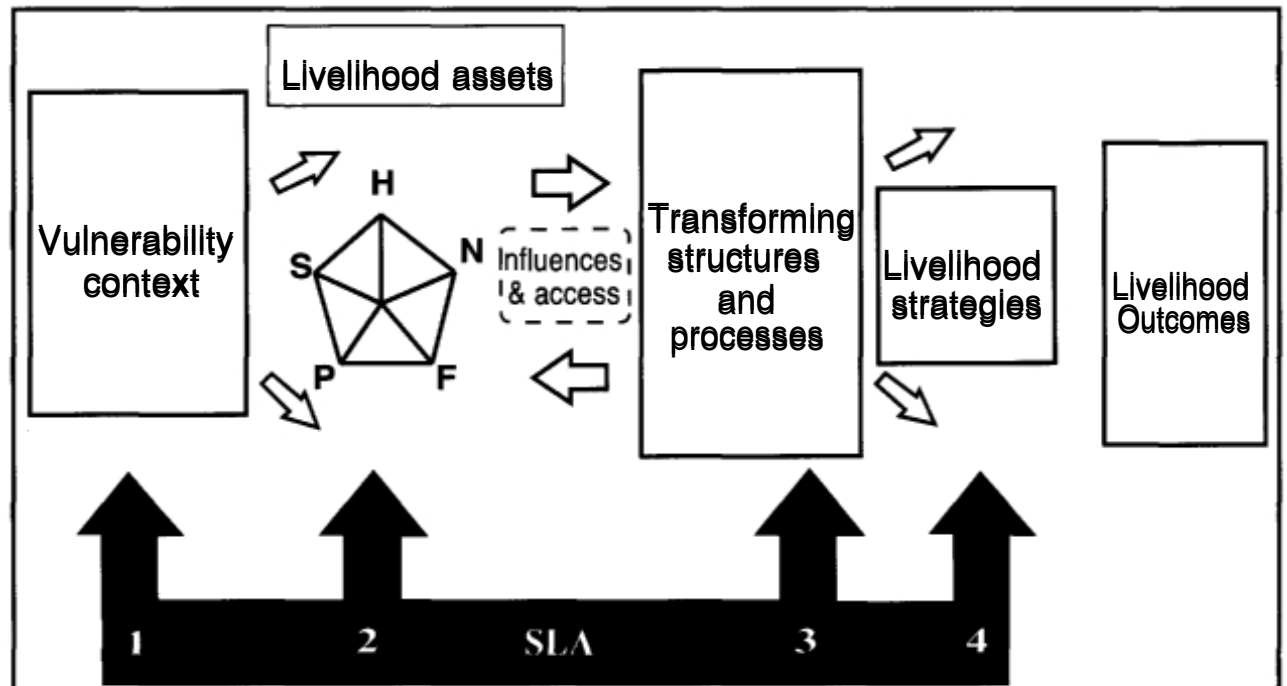


Figure 2: Intervention Points of the Sustainable Livelihood Approach with points 2 & 3 being the most effective entry points for SLA.

stage, before strategies are developed, thereby working to prevent community members following a favoured strategy that has no chance of success due to the lack of a particular prerequisite.

**Our next element in the framework** is the block entitled “Transforming structures and processes”. Here are contained all of the potentials for both support and impediment that may result in policy, regulatory systems, legal frameworks and institutions that are **or may be put in place** by government, private sector or the cultural society. These may have a negative effect on the ability of a community to make the best use of its assets in the development of effective livelihood strategies. However, they also represent an area where enlightened inputs can make the greatest contribution to bringing about alterations in policy and practices, thereby allowing the formulation of livelihood strategies appropriate to the conditions at hand and the potentials within reach.

The “Livelihood Strategies” themselves, being the next item as we move to the right in the framework, represent a dynamic planning paradigm that is constantly testing the supporting or restricting conditions. The successful orientation of the livelihood strategies requires a continual monitoring of the elements in the framework, “Vulnerability Context”, “Livelihood Assets” and “Transforming Structures and Processes” which have been assessed prior to arriving at the point of developing strategies. This process of monitoring, reassessing and making adjustments to the livelihood strategies is a never-ending process. Should these actions fail to be taken, and a stagnant situation be allowed to develop, the potential for the failure of any particular livelihood strategy is greatly increased.

Looking at the SLA framework, it is possible to identify the major areas of potential impact that can be realised by the SFLP as it is implemented. These points are indicated in Figure 2.

As can be seen, there are four intervention points. However, points 1 and 4 are being represented by a slightly less dense pattern as those points have a lessened potential for impact than do points 2 and 3. In any event, it is important to remember that SLA is an evolution of the participatory

development process, that has been taking **root over the** past twenty years, and primarily targets people and communities.

The SFLP is in fact a programme that links the Code of Conduct for Responsible Fisheries (CCRF) to SLA. The purpose of establishing this linkage is to provide a basis that will allow those communities dependent on marine and freshwater fisheries resources to develop livelihood strategies that will be in line with eventual responses from the “Transforming Structures and Processes” as governments and societies undertake the implementation of the CCRF. In this context it is important to recognise the basic differences in the two processes, SLA and the CCRF, which are being linked.

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*“The individual livelihood strategies therefore tend toward sustainability as they are based on the CCRF where appropriate and the CCRF becomes a functional reality as it is incorporated within the strategies. It is a good partnership.”*

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In contrast to the SLA, which we said targets people and communities, the CCRF is primarily aimed at governments and the various processes that control the exploitation and utilisation of marine and freshwater fisheries resources. In that respect the CCRF has a much more limited impact range than does the SLA. The prevalent statements in the CCRF begin with the phrase “States or “States should . . . This appears in 16 of the 19 general principles, and regulatory action is implied in the other three. The CCRF and its implementation is of extreme importance to the survival of the fisheries sub-sectors and to small-scale fisheries in particular. In this regard, it must be realised that management measures are much easier to establish and enforce on an industrial basis where one has a smaller total **number of operators, than on an artisanal or small-scale** basis where there are large numbers of operators from diverse coastal areas, all in direct competition with each other and the industrial fleet. Consequently, the CCRF is a tool designed for States to adapt and

implement on a national basis. To look at how the CCRF will be able to intervene at the grassroots level reference can be made to Figure 3, below.

From Figure 3, the direct entry point, through national institutions, government, private sector etc. can be easily seen. There is of course the opportunity for indirect intervention at the local level but this is after the CCRF has been adapted and interpreted for local implementation by national systems of a higher order. Of great importance in this partnership between SLA and the CCRF is the fact that SLA provides a framework for delivering the CCRF to the local level in a manner that will integrate the CCRF with other local priorities to be considered in developing effective livelihood strategies.

A graphic depiction of how the whole system can work is shown in Figure 4. The various direct support and feedback loops existing within the SLA framework are combined with the single direct CCRF input point and the interventions of the “Transforming Structures and Processes” as they respond to CCRF input. The CCRF as a package has been designed for a programme of national implementation comprised of locally executed activities. The Sustainable Livelihoods Approach allows those local activities to take place and employs the results as a direct input to the formation of livelihood strategies. The individual livelihood strategies therefore tend toward sustainability as they are based on the CCRF where appropriate and the CCRF becomes a functional reality as it is incorporated within the strategies. It is a good partnership.

Note: The authors acknowledge that the figures included in this article are taken either directly, or in modified fashion, from various DFID Publications on SLA or from work prepared for the DFID/FAO SFLP by Jock Campbell, DFID/FAO consultant.

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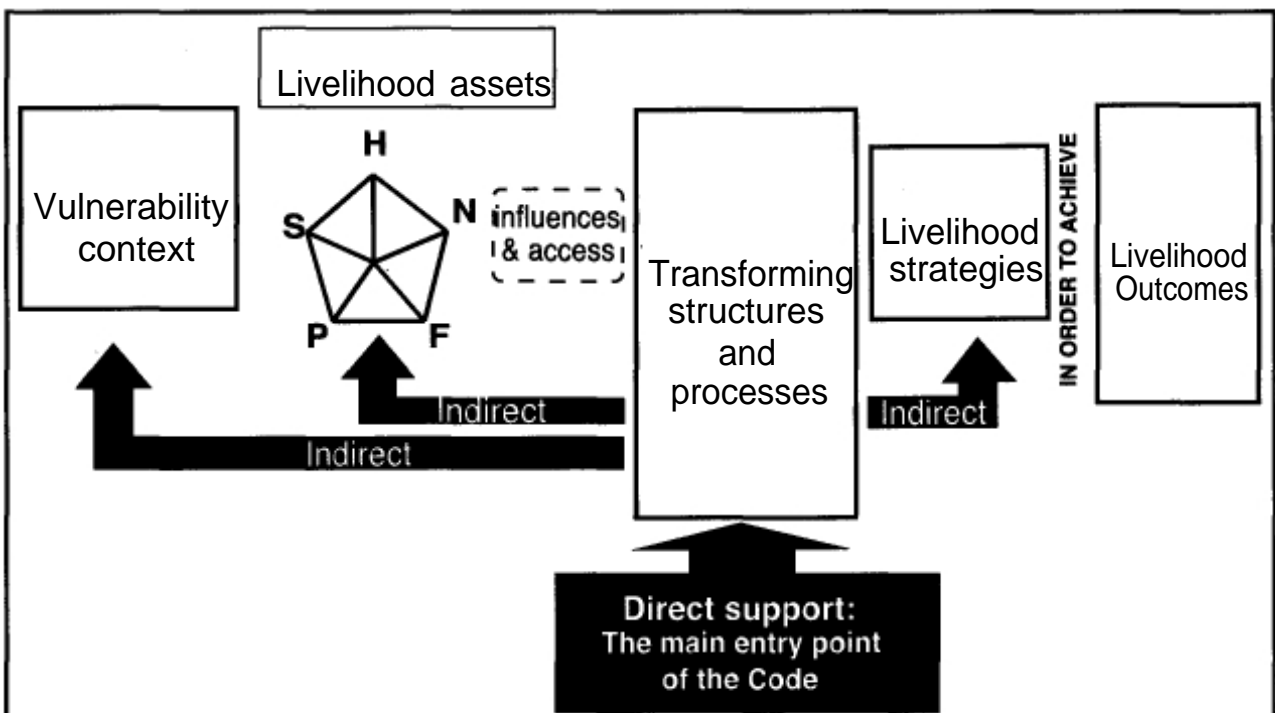


Figure 3: The SLA Framework and the single Entry Point of the CCRF. The paths for interventions from “Transforming structures and processes” as a result of CCRF inputs are indicated by the greypaths marked ‘indirect’.

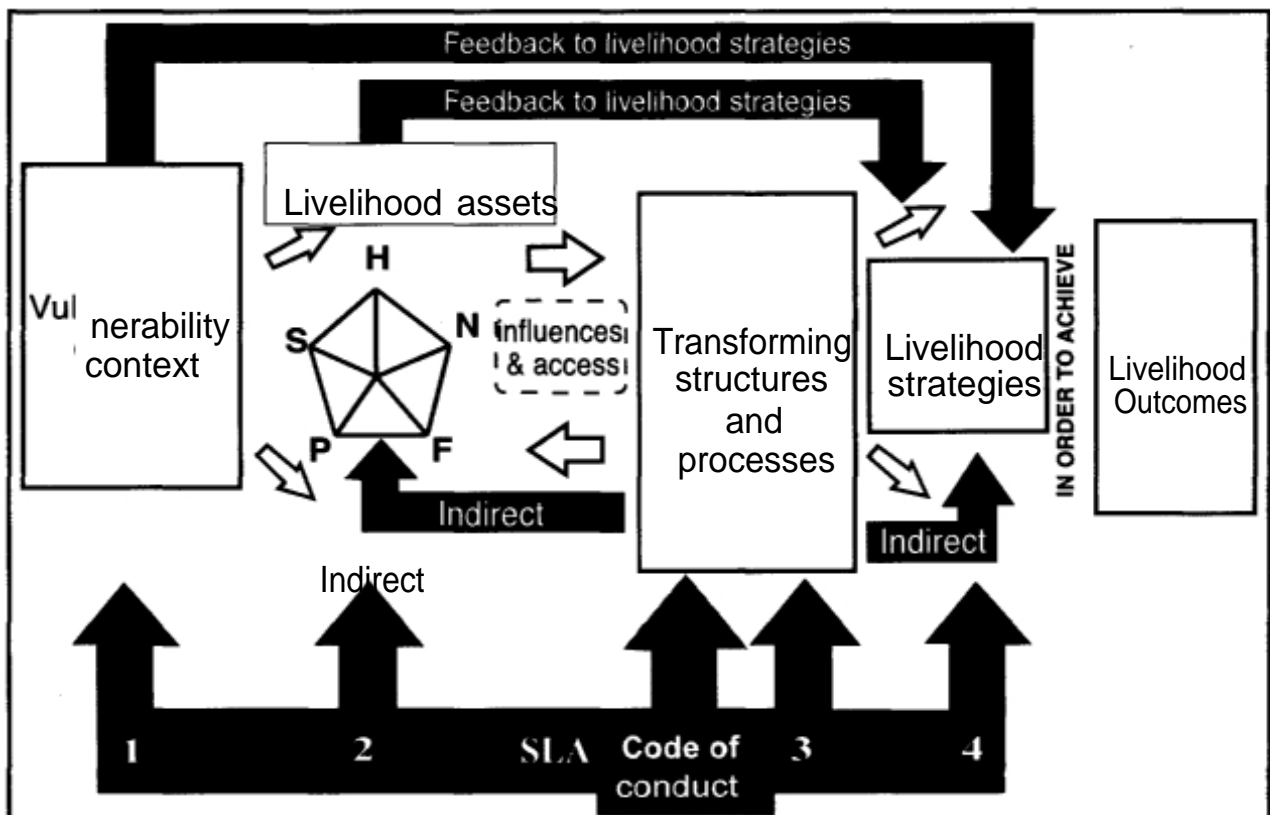


Figure 4 The combined elements of the SLA and the CCRF at work, including the SLA feedback paths from the Vulnerability context and the Livelihood assets to the Livelihood strategies. These feedback paths carry inputs, resulting from both SLA and CCRF interventions, to the Livelihood strategies. This provides the basis for adjusting grassroots activities in accordance with changing constraints and asset conditions as they affect the local potential for achieving desirable Livelihood Outcomes.

# Some Thoughts on Coastal Community Development and Fisheries Resource Management in Indonesia

by Suseno

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*The author outlines some of the problems that afflict fisherfolk and other coastal communities. He says that solving these problems requires concerted effort on the part of experts and individuals outside fisheries. He discusses the work of an ADB-supported project in four provinces of Indonesia that mobilizes such effort.*

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Coastal areas are critical for the management of fisheries resources. It is estimated that about 90% of the world fisheries production depends on coastal habitats (FAO, 1997). But these habitats are fast degrading. The World Resource Institute (WRI) reports that in 1996, 34% of the world's coasts risked degradation.

The development of people-oriented fisheries – particularly when it relates to the welfare of the coastal community – requires the support of non-fisheries individuals, NGOs and development organisations. The active and proactive participation of anthropologists and sociologists is a *sine qua non*. Such participation should include research – not merely on marginalised coastal area communities but also on those who have marginalised them. In other words, scientists should take part in the process of policy-making, decision-making and implementation. Their participation will encourage development in harmony with the values of the coastal community, particularly those of fishermen.

## Fishermen and development

Fishermen generally live in remote coastal areas difficult of access, which are densely populated. A recent survey says that some 56% of the coastal community consists of fishermen. Half of the respondents said they are content with their occupation.

The fishermen are so far from power and communication centres that they are unaware of day-to-day developments. They feel marginalised. They are powerless against the onslaught of new economic products, new technologies and policies which threaten them with competition.

Fishermen are accused of causing environmental damage and generating conflicts. But it is often the fishermen who end up as victims of others' actions. Examples are sea oil spills, estuary and inland industrial waste, etc.

Rapid changes are sweeping away the innate values of fishing communities. While their fish catch is decreasing, hope is diminishing. Their motivation to fish, their self-confidence, their livelihood, their fishing methods, are all under threat and challenge. Why has change occurred so fast?

## The Four Paradigms of Development

**The social needs of fishermen do not get** enough attention. More attention is paid to macro-economics and politics than the specific needs of fishermen. As for their economic needs they are dealt with commercially. Fishermen who do not have collateral, find it hard to get loans. Politically, the authorities are more concerned with production of food than the productivity of the fishermen, which suffers neglect. This approach leads to investment on research and on new technology to produce food efficiently. Eventually, the role of human beings in the production process is replaced by machinery. This reduces work opportunities for fishermen.

Fishermen are now competing with one another to access fishing grounds and capture ever-diminishing fisheries resources. They should be helped to adjust to change, to the erosion of traditional values and to the impact of new technologies and policies.

There are four major paradigms used to analyse under-development: the technology paradigm, the economic

paradigm, the structural paradigm, the value paradigm (A.G. Flor 1999).

*The technology paradigm:* is based on the belief that the west became rich on account of modern technology. The root cause of poverty is the absence of technological know-how in developing countries.

*The economic paradigm:* Poverty or development lag is caused by the absence of competent government fiscal or monetary policies.

*The structural paradigm:* is based on the radical view that poverty is a function of the social structure. The only solution to eradicating poverty is to change the system of government. The structural paradigm divides the elite and the common people, the central government and the local government. A conflict of interests exists, so does harmony of interests. The expressions "top down" and "bottom up" emanate from this paradigm.

*The value paradigm:* is based on the view of some anthropologists and sociologists that poverty is a function of cultural and social values. For example, 10 years ago the Asian tiger economies (i.e. Singapore, Taiwan, Korea, etc) had predominantly Chinese populations influenced by Confucian teachings. The countries that lagged behind were predominantly Malay (i.e. Malaysia, the Philippines and Indonesia).

I believe that the application of these paradigms must take note of and include local conditions and sensitivities. Those who know most about local conditions and sensitivities are the local people (including local community organ-

isations and the government). It seems that the most suitable paradigm is a combination of all four paradigms in the context of the local environment.

### Coastal Fisheries

Seventy per cent of the fishing fleet in Indonesia is devoted to small-scale fishing activities. Small-scale craft are confined to coastal areas because of constraints on technology, fishing capital and skills. The large number of fishing craft raises the prospects of resource conflicts and resource sustainability.

The Directorate General of Fisheries has been a development partner with BOBP since 1985. The Programme has sought to develop fisheries in co-operation with the local coastal community. The ADB-supported Coastal Community Development and Fisheries Resources Management Project or Co-Fish, started in 1998, is based on the same concept as the earlier BOBP-supported Coastal Fisheries Management Project in Indonesia. The new project operates in four provinces – Riau, East Java, Central Java, West Nusa Tenggara. It has two main aims – improving the environment and reducing poverty. Activities include:

- (i) promoting community-based management of coastal resources
- (ii) increasing incomes and improving the living conditions of coastal fisherfolk including the social infrastructure
- (iii) promoting alternative income-generation activities such as small-scale enterprises
- (iv) rehabilitating physical fisheries facilities
- (v) strengthening the capabilities of the coastal community, NGOs, co-operatives, associations and government agencies concerned with coastal fisheries resources.

These agencies include the Directorate General of Fisheries, and the Provincial and Regency Fisheries Offices. The project pays special attention to the role of women in the development of the coastal community.

In the four project locations, coastal fisheries resources have been under serious threat. In addition, 44 per cent of fishermen's households suffer from pervasive poverty (ADB, 1997). The damage to coastal habitat has the

following consequences: loss of food productivity and food security; pollution of fisheries products; decrease in economic viability; increase of conflicts between fishermen; loss of trading opportunities. The restlessness of the people has generated conflicts and physical violence.

The project adopts the following approaches:

- (i) *participatory* – helping coastal communities to organize themselves (in co-operation with local institutions), identify their specific needs, plan and implement the management of fisheries resources and create business programmes appropriate to the specific needs of the local coastal community.
- (ii) *flexible implementation* - alternative approaches based on the needs of local coastal communities.
- (iii) *capacity building* - increasing the competence of local or national government institutions in the fisheries sub-sector as well as local organizations and the coastal community, thus meeting the development needs of the coastal community.

*“Fishermen should be helped to adjust to change, to the erosion of traditional values, and to the impact of new technologies and policies.”*



(iv) *establishing closer co-operation and coordination* - between local and national government institutions, and local community organizations.

A participatory resource and ecological assessment (REA) exercise is being undertaken to prepare local area management plans and coastal resource management plans in the project's four locations. These activities are carried out in co-operation with local universities and local contractors. The main objectives are to provide information describing the status of resources, increase community awareness of fisheries resources and their rational use, establish a detailed information base to update the area management plan and evaluate critical issues and problems related to management of coastal resources. This is done through rapid site surveys, participatory workshops, and REA field studies. Data collected under the REA exercise will cover coral reefs, sea grass beds, and mangrove forests, monitoring of water quality, assessment of fish supply and data on fish capture.

In the area of Socio-Economic Assessment (SEA), also a part of RRA, the expected outputs are:

- (i) baseline data on the economic and demographic profiles of fishing community
- (ii) baseline data on the social and cultural activities of the fishing community

(iii) documentation of existing legal and institutional structures in the fishing community

(iv) inventory and assessment of potential alternative or supplementary livelihood opportunities

(v) pre-feasibility study for employment-generating projects/economic opportunities and micro-credit schemes and

(vi) recommendations on coastal resources management, including the establishment of local laws related to coastal resources management.

### Conclusions

World fishing is characterised by rising demand and falling supply of fish. Ninety per cent of the world's marine fisheries production depends on the coastal habitat. Thirty four percent of the world's coast is degradation-prone, while 17% faces moderate risk of degradation.

Coastal areas pose management problems – because of resource conflicts and fish hunting based on open-access fishing. Increase in coastal populations will further stress coastal communities.

People outside fisheries – anthropologists, sociologists, NGOs, international organisations – must play an active and proactive role to attack the

poverty of coastal communities. They should carry out research not merely among marginalised communities but also on the process of decision-making and implementation.

All four paradigms of development – technological, economic, structural and values – should be probed to deal with the root cause of underdevelopment.

The primary objectives of the ADB-supported Project for Coastal Community Development and Fisheries Resource Management are to:

- (i) promote sustainable management of coastal fisheries resources; and
- (ii) reduce poverty in coastal areas. These objectives can be successfully achieved only with the active participation of all parties concerned with the development of the coastal community and the management of coastal fisheries resources.

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*Small-scale fishers operate 70 per cent of Indonesia's fishing fleet.*



# Documentation of Learnings - Malaysia

By Raja Mohammed Noordin bin Raja Omar  
Department of Fisheries, Malaysia

Three types of activities were assisted by BOBP in Malaysia during the Third Phase.

- a. The Special Area Management Plan for the Pulau Payar Marine Park, a local-level activity.
- b. Coastal Fisheries Management, a national-level activity.
- c. Miscellaneous Projects

## *The Special Area Management Plan (SAMP) for Pulau Payar*

To help implement the Department of Fisheries, Malaysia (DoFM)/ BOBP's Third Phase, a Situation Analysis was undertaken in Malaysia in 1994. It identified several factors that have contributed to degradation of coastal resources – including destruction of mangroves for various uses, siltation, sedimentation, agricultural development, rapid expansion of tourism, and destruction of seagrass beds and corals reefs. It recommended that the Programme emphasize marine parks as productive ecosystems enriching fisheries and biodiversity.

The Pulau Payar Marine Park, near Langkawi island off the coast of Kedah state, was identified for a pilot activity. It was to enable development and testing of methods and approaches to improve the management and conservation of marine parks. A Special Area Management Plan (SAMP) was to be developed for the park, for the benefit of all stakeholders of the area.

The project was meant to start in 1995 but it took off only in 1996. Yet, the project managed to carry out many activities, providing results useful in formulating a management plan.

### *Activities carried out under SAMP:*

- a. Training, including DoFM staff and scuba training of fishers/fisherfolk.

- b. Organizing local Coastal Zone Management workshops in Kedah, aimed at establishing a consensus on objectives and issues.
- c. Developing a SAMP for Pulau Payar Marine Park. This entailed additional collection of scientific data, socio-economic studies, determining the “carrying capacity” of the park, establishment of committees, and a final SAMP draft.
- d. Implementing management strategies in SAMP which included organising a local workshop (to adopt the final SAMP); presentation of SAMP to the State Executive Council and government; development of education/information materials; dissemination of information; education and training of fisherfolk.
- e. Getting feedback and assessing lessons learned from SAMP development and implementation.
- f. Proposing a national Integrated Coastal Area Management framework.

### *Coastal Fisheries Management*

Coastal Fisheries Management was considered a programme that could support a national integrated coastal area management programme. This category was initiated in 1997 in the course of implementation of SAMP. Two workshops were planned.

- a. Orientation Workshop on the Precautionary Approach to Fisheries Management (PA2FM)
- b. Stakeholder Approach to Fisheries Management.

### *Miscellaneous Projects*

These included activities in which the DoFM officials had taken part at

regional forum, and national-level activities that were planned but were yet to start.

### **Project Implementation**

#### *a. The Special Area Management Plan*

This was the largest BOBP-assisted project, involving many sub-projects. The aim was to determine whether the marine park under the fisheries and eco-tourism management regime could increase the fisheries resources in the vicinity of the protected areas or sustain them at existing levels.

The project started by compiling data on the status of the marine park, to determine issues that could bring about a better management plan. The following planned activities were implemented:-

- (i) (a) Two officers were assigned to attend the Summer Institute in Coastal Management at the University of Rhode Island, USA, from 3 to 28 June, 1996. Only one attended. The course would teach and train participants on how to determine issues in coastal zone management, and how to plan and implement a programme to address the issues (b) Ten fishers were given training in diving during 8-12 December 1996, and received diving cards. The course gave fishers who wished to leave the fishing industry an opportunity to do so, thereby reducing fishing pressure in the park.
- (ii) The planned coastal zone management workshop was successfully conducted on 20-22 October 1997. Many officials from the relevant state and federal departments attended. This workshop provided the participants with the findings of the scientific and socio-economic characterization studies mentioned below.
- (iii) Sub projects included (a) carrying capacity assessment of the Pulau



*Many activities were carried out at the Pulau Payar Marine Park to test methods and approaches to improve management and conservation of marine parks.*

Payar Marine Park (b) hydroacoustic survey of the marine park area (c) socio-economic studies of the fisher community in Kedah state. These sub-projects sought to fill in gaps, update information or add to available knowledge. The carrying capacity study was implemented by the Worldwide Fund for Nature, Malaysia (WWF Malaysia), from 28 May 1996 until 30 September 1996. The hydroacoustic survey was conducted to provide a mapping of the underwater biodiversity in the marine park area.

(iv) Establishment of the Tier I Committee: The Marine Park Council has agreed to function as the Tier I Committee. This council is chaired by the Secretary-General of the Ministry of Agriculture. This committee will yet implement and monitor projects and eventually present SAMP to the next level committee known as the Tier II Committee. This committee will include members of the State Executive Council that will evaluate SAMP and decide on the recommendations made.

#### *b. Coastal Fisheries Management*

Two workshops conducted during 11-14 August 1997 were found to be very informative. A possible spin-off project

arising from the workshops was the inception of the Community-Based Fisheries Management (CBFM) project of the Selinsing mangrove mud-crab fishery. It aimed at managing the mangrove mud crab at a sustainable level. Prior to the start of the project, the landings of mud crabs had dwindled. The cause was found to be the rampant catch of berried crabs. This project started in January 1999. It will go on till 2000 A.D using funds from DoFM.

#### *c. Miscellaneous Projects*

DoFM officials took part in a Regional Workshop on Monitoring, Evaluation and Impact Assessment for Fisheries Development and Management. It was held in Sri Lanka from 23 to 26 March, 1999. During the course of the workshop three projects were planned.

- (i) A National Workshop on Monitoring and Evaluation of the Fisheries Planning and Management System.
- (ii) A National Workshop on the Implementation of the Code of Conduct for Responsible Fisheries.
- (iii) An International Workshop on Marine Protected Areas.

#### **Project Implementation: Assessment and Lessons Learned**

A questionnaire was distributed to all those who had taken part in BOBP-

assisted projects, mainly to obtain feedback about these projects.

#### *Project Management*

- (i) A visitors' survey on the perceptions of the Pulau Payar Marine Park was conducted through interviews and questionnaires, along with the literature review and desk research relating to carrying capacity determination. Before any decision and action are taken on the basis of the survey and the literature review, all aspects of visitor management should be considered. Consultations with stakeholders, particularly the State Government, are vital. Any awareness programme should be continued. It would be useful to determine the number of visitors to the park (Lim Li Ching, WWF, Malaysia).
- (ii) Officials from NGOs and universities, apart from the DoFM, could provide more suggestions and perhaps assist in resolving major issues arising from the projects (Zulfigar Yasin, Universiti Sains Malaysia).
- (iii) More in-depth discussions should be held at the planning stage. The project should be more cohesive so that the direction is clear. This will

strengthen team spirit, and enable team members to realise the action to be taken. Inputs are needed from all participants. The project should emphasise the relationship among members. They should share problems, objectives and vision (Chee Phaik Ean, Fisheries Research Institute of the DoFM).

(iv) Workshops held on ICAM have instilled awareness in DoFM officials about the potential of Community-Based Fisheries Management (CBFM). It was believed that CBFM would be more successful in areas where conflicts between fishers using different gears were very few. (Ali Ismail, Corporate Planning Division of DoFM). It was proposed that an advanced workshop be held to include local fishers and society. This participatory stakeholder consultation and analysis was completed during 13-15 February 2000. A pilot project should be initiated on CBFM. As for the workshops on coastal fisheries management, information on sustainable management of mangrove mud crab is perhaps still insufficient.

(v) The Regional Workshop on Monitoring, Evaluation and Impact Assessment (held in Sri Lanka) was a success because of active participation and a topic relevant to current issues. Resource persons were available for guidance. The participants showed keen interest and displayed positive learning attitudes. Lessons from the workshop: (i) Project development planning and implementation must involve the target groups (ii) Any development must first be planned and for more effective implementation, be monitored (iii) The objectives of management and development must always be emphasised. (Ahamad Sabki Mahmood, Corporate Planning Division of DoFM).

#### *Manpower and Human Resource Training*

(i) The Summer Institute Course was timely. As most participants were

involved in coastal zone planning and development, there was a fluent exchange of ideas, information and experiences. Officials who took part in the course are in a better position than others to undertake a coastal management project in fisheries.

(ii) All 10 fishers who worked as crew of local fishing vessels were trained under the SAMP activity. They are now dive guides in the boats of tour operators. This activity has given fishers the opportunity to use the marine park to increase their incomes. They have also become diving buddies for hotel guests.

(iii) The high staff turnover at both national and state levels has delayed project implementation. It has resulted in additional time being taken up by staff to familiarise themselves with projects. Four senior officers held the post of project coordinator within the third phase.

(iv) Often, a single officer has to implement two or more projects. The DoFM could contract out the job, but then it would lose the experience it would otherwise gain.

#### *Financial Arrangements*

(i) The BOBP/FAO office provided banking facilities, but these were not utilised because of the reporting formalities they entailed.

(ii) Having a Marine Park Trust Fund was an advantage – it made management of funds much easier. But it is time-consuming because purchase procedures must still be governed by the government manual.

#### *General Comments*

(i) All officials involved in project work should use accepted project titles. A profusion of project titles, some coined by those receiving documents, is bound to be confusing. Even officials who were implementing projects seemed confused.

(ii) Too many projects were implemented in a short time. An effective procedure would be to start

a new project only after earlier projects have been successfully implemented.

(iii) Activities were proposed and imposed by managers in a top-down manner, without due consultation with stakeholders. It was assumed that they would benefit fisherfolk. In such a set-up how could a joint-management plan be conceived, accepted and implemented with commitment?

(iv) It will help if project participants get an advance against their allowances. This will help them meet their daily subsistence needs.

#### **Conclusion**

It is now time for all fisheries stakeholders to meet and openly discuss the fate of the resources and their own interests that are at stake. There is a need to compromise on contentious issues and agree on common matters so that sustainable management of resources, both on land and in the sea, may be achieved.

It would be ideal if representatives of all stakeholders in the fishing industry take part in all stages of projects, starting from planning and inclusive of monitoring and evaluation. This way the project will effectively achieve its objectives, and the process of decision-making will be shortened.

#### *Acknowledgements*

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# Video Film on Code of Conduct for Responsible Fisheries

The BOBP has made a video film to promote the Code of Conduct for Responsible Fisheries (CCRF). The 20-minute film carries brief interviews with the Tamil Nadu Director of Fisheries, Mt Ansar Ali, and BOBP Director Kee-Chai Chong about the CCRF. But it is based mainly on a road show and street plays staged recently in several fishing villages of Thiruvalluvar and Kancheepuram districts in Thmil Nadu by the Department of Fisheries (DOF) with BOBP support. The DOF engaged a Chennai dramatic troupe to organise the play after briefing the troupe about the CCRE

The play is set in a fishing village. Its messages about CCRF are conveyed through an educated and enlightened fisherman, who is the play's central character. The

messages are woven into a story that is strong on song, dance and entertainment.

Predictably, the play attracted large audiences wherever it was shown – Gunankuppam, Thirumalai, Ennore, Kathivakkam, Kothivakkam, Perianeelangarai, Injambakkam, Kovalampakkam, Mahabalipuram, Sadraskuppam and Kanathur Reddikuppam. The audience included children, men and women, all of whom had a great time. They seemed to identify themselves with the fortunes of the play's characters; they hugely enjoyed the play's funny moments, the songs and the dances.

DOF officials and BOBP agreed that nothing can match street theater as a medium of communication with rural populations.



# Miscalculation causes sea turtle deaths

By Aaron Davis and John Tuohy

Miscalculation by US marine regulators may be responsible for the deaths of thousands of endangered sea turtles, a National Marine Fisheries Service study has found.

The study recently concluded that the service's own mistakes in designing turtle safety chutes for shrimping nets has allowed more of the endangered turtles to drown than anticipated.

But what the government has in mind to save more turtles could drive some shrimpers toward extinction. The agency wants shrimpers to widen their nets' safety chutes, which already cause them to lose 15% of their catch. Shrimpers say enlarging the Turtle Excluder Devices will reduce shrimp harvests even more, possibly knocking some of them out of business.

"if it is a significant change, it could be a big blow to the shrimpers," said Jerry Sansom, president of Organized Fishermen of Florida. "They already make as many runs as they can, and some are barely getting by."

Scientists think shrimp nets contribute heavily to a declining leatherback population. Worldwide numbers of the species have dwindled from 115,000 to 22,000 during the past two decades,

The safety chutes, introduced in 1987, were supposed to save 97% of the turtles in shrimpers' paths. Researchers now say the openings were made too small and save less than half the larger species of turtles.

A three-year study of thousands of turtle carcasses found nearly 40% were too large to exit the current safety chutes. Autopsies conducted on some turtles further bolstered researchers' claims by showing many of the turtles had drowned – a fate most common to run-ins with shrimp nets.

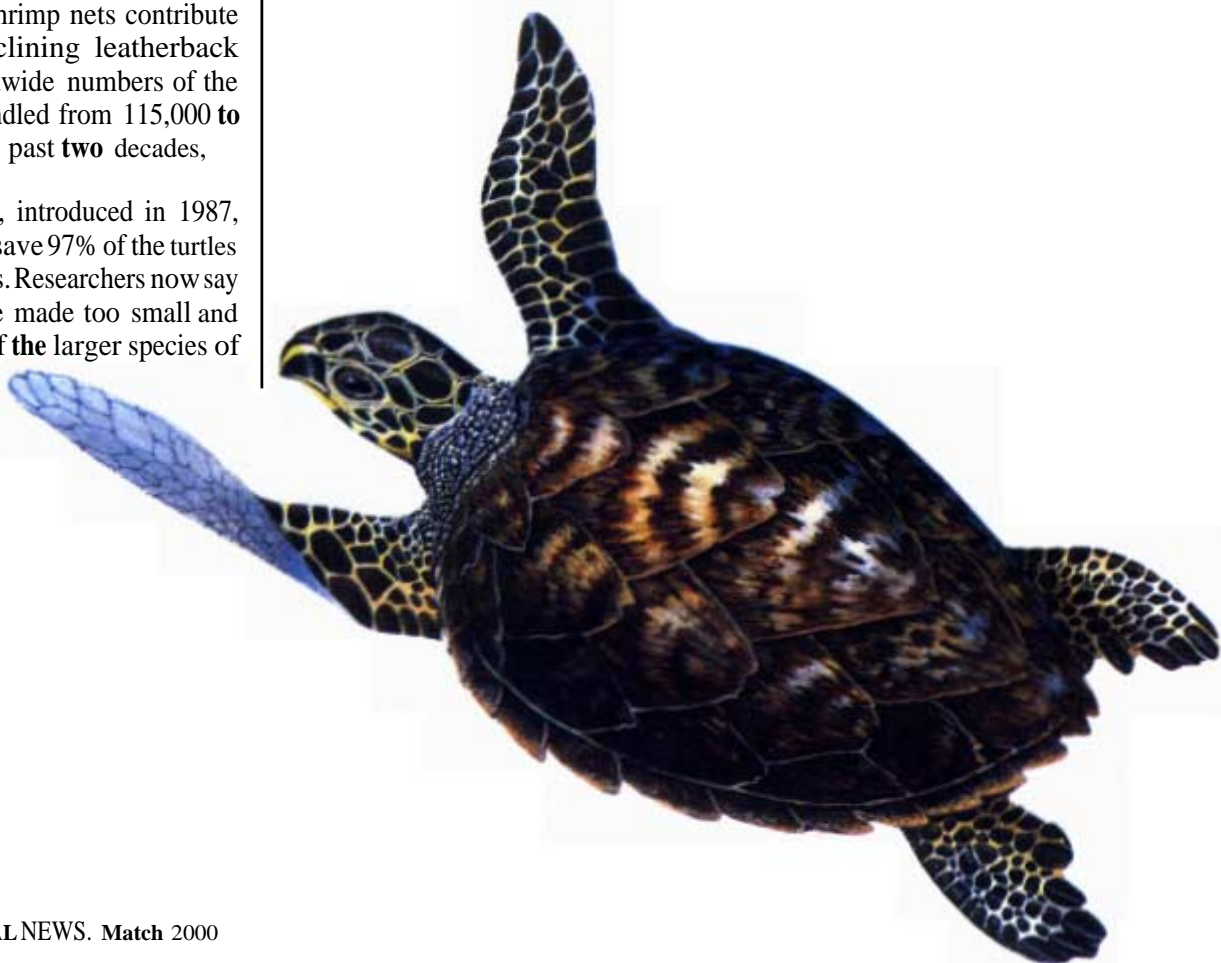
The chutes are sewn into shrimp nets to give turtles a way out before they are entombed with the catch. But thousands of turtles grow too large to make it through the chutes and others simply can't maneuver through the devices as designers had thought they could.

The leatherback can grow to 1.8 m in length and weigh up to 900 kg, about the size and shape of a Volkswagen Beetle.

Essentially regulators did not account for the height of some turtles, they say, meaning 30% to 40% of the loggerheads they had planned on saving do not fit through the current openings.

"For years, we only measured the length and width of turtles," said Llew Ehrhart, a sea turtle expert at the University of Central Florida in Orlando. "Only in the last couple of years have we realized how important the depth measurement is to their ability to escape the nets."

The Marine Fisheries Service's 31-page report concluded that "to decrease the mortality on large turtles caused by trawling, the opening dimensions of TEDs (Turtle Excluder Devices) need to be larger." – Courtesy : USA Today.



# How the fishing trade started

*An old Chinese story with a moral: Fish with restraint*

He caught a huge carp and ate it. It was sweet.

He, therefore spread the news happily among his people that when anyone was hungry, he could fish in the river.

This, of course worried the sea animals. They sought help hastily from their sovereign, the Dragon King. The king was infuriated and approached Fuxi for an explanation.

“If your people continue to fish,” the king said, “I’ll flood the land with water and drown all of you”.

Fuxi, however, as son of the Heavenly Dragon, was not intimidated.

“If you do that, I’ll stop heaven from raining and dry up all the lakes and seas. You’ll be sorry then,” he replied.

The incensed Dragon King lunged at him and Fuxi turned himself into a dragon to meet his attack. They fought bitterly on land and in Heaven, and eventually went to see the Jade Emperor.

The Emperor, however, was not keen to hear their dispute. He ordered both of them to be beaten 50 times before he passed his verdict.

“I don’t care who eats whom. This is very common on earth,” the emperor said.

“If man likes to eat fish, let him do so. It is none of the Dragon King’s business. However, since man belongs to the land, he may fish so long as he doesn’t use his hands,” he added before sending the two back to Earth.

The Dragon King was pacified. “Without using his hands, man will not be able to fish,” he told himself, and returned to his palace with a sigh of relief.

Fuxi, on the other hand was baffled. If man could not fish with his hands, what

could he do to supplement his food supply?

He then saw a spider weaving a web on a branch. This gave him an idea.

He wove a net with vine and twigs and placed it in water to see if it could trap fish. It worked! In fact, this was a much better way than using one’s bare hands.

Without breaking the rule laid down by the Jade Emperor, man could fish again. The Dragon King was speechless.

Fuxi taught his people how to use the net and they were elated.

The sea animals again went to the Dragon King for help. But there was nothing he could do.

“I can’t help you this time,” he said.

The fish and prawns were so infuriated that their eyes protruded.

The fishing trade was established. As the use of fishing net was designed and promoted by Fuxi, he has been revered as the forefather of the fishing trade.

The angry Dragon King, however, waited for opportunities to take revenge.

He could not do a thing if humans fished with nets from the shore. However, if they used their hands or fished from the boats, he could create huge waves to drown them.

The fishermen, therefore, had to be extra careful. Casualties were, unfortunately inevitable.

It was for this reason that fishermen worshipped the Dragon King to beg for his mercy.

He was even thought of as a “part-forefather” of the trade. – *Legends of Forefathers of 72 Trades*, translated by Zhao Jianzi.

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