At the same time as Asia's fisherfolk are urging their governments to help re-establish artisanal fisheries after last year's tsunami, an international 'tsunami-recovery' consortium is suggesting that they should abandon their livelihoods and find employment elsewhere. The fisherfolk also face other challenges – from growing pressures to switch over to industrial aquaculture and fishering, and the introduction of genetically modified fish.

Blue fishers, blue genes

Fishy undercurrents in post-tsunami Asia

GRAIN

A new consortium is challenging the tsunami rehabilitation efforts to build boats for local fisherfolk to reclaim their lost livelihoods. In its recent policy brief[1], the Consortium to Restore Shattered Livelihoods in Tsunami-Devastated Nations (CONSRN) argues that replacing lost boats and fishing gear is over-simplistic and not a sustainable way of rebuilding devastated communities. It cites Indonesia's severely depleted coastal fisheries resources as the main impediment to successful rehabilitation efforts. The urgent need, it seems to the group, is not to reinstate the fishermen but create employment opportunities for them to do something else.

The consortium includes the Asia Pacific Fisheries Commission, the Bay of Bengal Program, the Network of Aquaculture Centers in Asia-Pacific, the SouthEast Asian Fisheries Development Centres, the WorldFish Center (formerly ICLARM) and the UN Food and Agriculture Organisation (FAO) through its Regional Office for Asia-Pacific. The FAO was appointed as the technical lead in fisheries rehabilitation.

The call is seemingly well-heeded – except by the fisherfolk, who have other ideas. Several organisations of small-scale fisherfolk in Sri Lanka, India, Thailand and Indonesia are demanding that relief efforts should focus on re-establishing the artisanal fisheries sector as a priority. They are also urging their own governments, as well as donors, to accompany it with a change in approach and policies that will put a stop marginalising fisherfolk communities.

Shrinking diversity

In Asia and throughout the globe, marine biodiversity has shrunk considerably over the years. The question is whether driving fisherfolks away from their own communities will bring back that lost diversity. A recently published map[2] which looks at the hot spots of marine diversity

[1] CONSRN (2005), "Rebuilding Boats May Not Equal rebuilding Livelihoods", *Policy Brief No. 1,* www.worldfishcenter.org/news/CONSRN_PolicyBrief1.pdf

[2] "Strange Fish", *The Economist,* July 26, 2005. A map of tuna and billfish diversity in the world's open oceans produced using Japanese longline fishing records. The authors say the pattern of diversity (with tuna and billfish) is likely to hold for many other marine species as well.

shows a 10-50% decline in diversity between the 1960s and the 1990s – with the largest reduction of species density in Atlantic and Indian oceans – corresponding to fishing pressures. As early as 1997, FAO has acknowledged major declines in wild fisheries due to overfishing and habitat destruction, but optimistically suggested that the projected shortfalls in fish supply "will be met by expansion within the aquaculture sector."[3]

"The reason for the immense destruction of the coast was aquaculture, development and tourism", according to Father Tom Kocherry, an Indian activist priest who leads the 10 million-strong National Fishworkers Forum.[4] He was furious at the suggestion of some European development charities who, just a fortnight after the tsunami, were quick to suggest that it might not be sustainable for all fishermen to return to the sea. "I am speaking for the 10 million traditional fishermen who go out in small boats and who practise sustainable fishing, not the giant trawlers that ruin the fish and the environment. My people have carried out this livelihood for centuries. Where are they to go if not back to the sea?"

The fast-growing 'Excel' tilapia, an Egyptian-Kenyan tilapia hybrid, is being widely promoted in the Filipino aquaculture industry.

It is estimated that about 85% of the world's fishers are in Asia, led by China, India, Vietnam, Indonesia, Bangladesh and the Philippines. With shrinking land for agriculture and continuing poverty in the cities, uprooting fisherfolk from the shore looks misplaced. But given the kind of post-tsunami rehabilitation that CONSRN wants for the affected communities, and with FAO and Worldfish Center at the helm, the answer to Kocherry's question might well be inland aquaculture.

A gift of fish

Aquaculture production accounts for about 20% of the total world seafood supply. Asia contributes 25 million tonnes (valued at US$35 billion), or 82% of world aquaculture production.[5] To meet the expected global increase in demand for fish protein, more aquaqulturists are needed, as are "improved strains of fish that are faster growing, resistant to disease, and suited to a variety of pond farming conditions."[6]

The WorldFish Center is one of the leading research centres focusing on such research. From 1988 to 1997, it ran the Genetically Improved Farm Tilapia (GIFT) Project, with funding from the United Nations Development Programme and the Asian Development Bank. This collaborative project involving a Norwegian research institute and three national fisheries agencies in the Philippines worked on cross-breeding several different populations of wild African tilapia "to produce new strains designed to mature quickly and adapt easily to pond-farming conditions in Southeast Asia."[7]

The project wrapped up with the establishment of the GIFT Foundation International whose mandate, among other things, is to "provide the GIFT system with brand development and marketing support."[8] WorldFish also gave birth to the International Network on Genetics in Aquaculture (INGA) in 1993, a network of 13 countries in Asia-Pacific and Africa, 11 advanced scientific institutions, four regional or international organisations, and one private sector institution. The network facilitates transfer of genetic material among member countries and initiates regional resarch programmes for the genetic improvement of carps and tilapias. Successes have been reported in Bangladesh, China, Sri Lanka and Philippines in using commercial strains of tilapia that came from the GIFT project. WorldFish and Malaysia's Department of Fisheries are continuing with selective breeding work focusing on yield, flesh quality and growth rates.

The Blue Revolution begins

The application of biotechnology to aquaculture has sparked tremendous interest. "The use of fish hatcheries to supply farms and enhance wild stocks is now commonplace, and we are now well into the second stage of the revolution, namely the use of genetic engineering – including splicing genes from one fish strain or species into another – to produce desired characteristics" observe fisheries specialists Brian Greer and David Harvey.[9]

Close to 40 kinds of transgenic fish have been researched and developed in several laboratories

[3] KJ Rana (1997), "Global overview of production and production trends 1984-1995". In: *Review of the State of World Aquaculture.* FAO Fisheries Circular no. 886 FIRI/C886 (Rev.1), www.fao.org/docrep/003/w7499e/w7499e05.htm

[4] Mari Marcel Thekaekara (2005),"Corrupted defence", *The Guardian* (UK), January 5.

[5] *Review of the State of World Aquaculture* (1997), FAO Fisheries Circular no. 886 FIRI/C886 (Rev.1), www.fao.org/documents/show_cdr.asp?url_file=/docrep/003/w7499e/w7499e02.htm

[6] David Greer and Brian Harvey (2004), "Genetic Improvement of Farmed Tilapia: Lessons from the GIFT project", in *Blue Genes: Sharing and conserving the world's aquatic biodiversity,* IDRC, Canada, www.idrc.ca/en/ev-64749-201-1-DO_TOPIC.html

[7] *Ibid.*

[8] *NAGA Worldfish Center Quarterly* (2004), Vol 27 Nos. 3&4, Jul-Dec, p11.

[9] David Greer and Brian Harvey (2004), *op cit.*

across the globe since the first transgenic fish was reported in China 20 years ago. Interests range from studying gene flows in fish to making novel aquarium fishes to rearing 'pharma-fish' useful to pharmaceutical industries. But most research focuses on speeding up the growth rate of commercially important species for the aquaculture industry, such as salmon, trout, catfish, carp and especially tilapia.[10]

Darwin in reverse

Introducing transgenic fish in aquaculture poses many risks. When the British government decided in 2001 to provide funding for the development of transgenic fish, some scientists immediately raised concerns about gene flow and the possibility that these fish would outcompete with wild species for food and other resources. They cautioned against the inevitability of novel traits from genetically modified (GM) fish spreading into wild populations and seriously harming the resilience of aquatic ecosystems.

Two scientists at Purdue University in the US went even further, indicating that transgenic fish might even put Charles Darwin's theory of evolution (which espouses the survival of the fittest) in reverse. William Muir and Richard Howard investigated a Japanese madaka fish that had been genetically engineered to produce human growth hormone so that it grows six times faster when it was released into the wild. They found out that the release of 60 of this transgenic fish into a wild population of 60,000 would be enough to extinguish the very species in 40 generations! "You have the very strange situation where the least fit individuals get all the matings", the researchers say. This is because the fast growth of the transgenic fish makes it reach the right size for mating in a short period of time without reaching sexual maturity. One result of this is an increased mortality in the GM fish's offspring. But because of their size, they get to compete more with the wild population as well as dominate the mating process. This enhances the passing of such increased mortality trait to the wild population. "Sexual selection drives the gene into the population and the reduced viability drives the population to extinction" the authors observe.

The shape of things to come

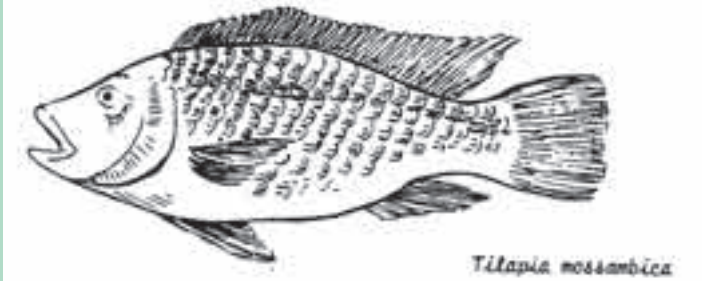
Whether it's the drive to uproot fisherfolk from their livelihood to pave the way for tourism and resort development, or to create a hostaged market for transgenic fish, one thing is clear. The future looks bleak for the communities affected by the tsunami. What the Consortium has might just be a policy brief, but it probably reflects the shape of things to come. Fisherfolk communities were marginalised before the tsunami, and rebuilding their lives after it is enormously challenging. Now they have another fight on their hands on top of everything else. It might just be a matter of time before another tsunami hits Asia. This time, it won't be nature's wrath, but the fisherfolks'.

Beware the aquatic chicken

Tilapia is a fish native to the lakes of East Africa, where more than than 100 sub-species have been identified. It is one of the most important species in aquaculture today, being cultivated in no less than 85 countries around the world, with world-wide production exceeding 300,000 tonnes per year.[11] Tilapia has been nicknamed "the aquatic chicken", reflecting its ability to grow quickly with poor-quality inputs.

The Tilapia species is highly carnivorous of the eggs and young of other species, particularly outside its natural ecological niche, Its continued large-scale introduction could contribute to the extinction of less aggressive, indigenous fish throughout the world. Aquaculturists recognise this and research universities and institutes like the Consultative Group on International Agricultural Research are experimenting with better techniques and hybrids, while development agencies such as the US Agency for International Development and the World Bank continue to push for the spread of tilapia throughout the world. But a lack of international and industry-wide regulation, coupled the pressure for increased production and implementing agencies' relative lack of concern over species loss does not inspire confidence. It could mean that the destructive fish wins out in a perhaps unnecessary trade-off between environmental, economic, and food production concerns.

Tilapia is now the subject of extensive GM research. In 2001, the government of Britain gave at least £2 million ($US 3.6 million) to develop genetically modified carp and tilapia in India, Bangladesh, Vietnam, Thailand, Philippines and Africa.[12] There is even a Tilapia Genome Project now at the University of New Hampshire in the US to facilitate the improvement of strains with respect to traits of commercial importance, such as growth rate and flesh quality, through marker-assisted selection.



[10] Luke Anderson (2005), *Genetically Engineered Fish – New Threats to the Environ ment*, Greenpeace, Amsterdam, The Netherlands, www.greenpeace.org/international/press/reports/genetically-engineered-fish

[11] Cichlid Genome Resources, Hubbard Center for Genome Studies, http://hcgs.unh.edu/BAC/Tilapia

[12] *Independent on Sunday* (UK), April 1, 2001.