

Shrimp -
The Devastating
Delicacy

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1. Overview

Shrimp, once regarded as a luxury food by most people, has become more affordable and available as demand for it steadily rises in the major consuming markets of Japan, the United States, and various European countries. But obscured by a thin veneer of delicacy and culinary refinement is a story of environmental destruction and social upheaval that few consumers know about. Much of the shrimp sold in restaurants and supermarkets today is produced on factory-style 'shrimp farms' which are causing devastating ecological damage and social disruption. Tropical coastal ecosystems that once provided habitats for an immeasurable diversity of flora and fauna, and life support for scores of millions of coastal inhabitants, have been turned over to the monoculture cropping of one high-value product for consumers in the United States, Europe and Japan.

While landings of wild shrimp from capture fisheries have hovered around two million tons a year since the early 1980s, shrimp farms have sprung up along vast stretches of tropical coastlines of many developing countries where shrimp output exploded from under 84,000 tons in 1982 to more than 712,000 tons in 1995, a nine-fold increase. Today, more than one-quarter of the shrimp consumed worldwide is produced this way, and the proportion is predicted to rise to 50 percent as shrimp farming expands and wild catches from overfished shrimp fisheries decline.

In the U.S., the world's leading shrimp consuming country, shrimp competes with tuna as the most popular seafood. The United States imports up to one-half of the total world production of farmed shrimp and restaurant chains such as Red Lobster, Bubba Gump, Shoneys, Long John Silvers and Sizzler build reputations and market share by selling shrimp to the millions of Americans who occasionally dine out. Indeed, Red Lobster alone sells almost five percent of the farmed shrimp produced worldwide. According to the President of ICEC Seafood Corporation, "Red Lobster's advertising of shrimp has stimulated all consumption and in large part made possible the 250 percent increase in US shrimp consumption since the advent of aquaculture". But the fact that 'ordinary' American, or European or Japanese consumers can afford to eat more and more shrimp costs others, and the environment, dearly. The true costs of markets for "all the shrimp you can eat" in America, Europe or Japan are being paid by poorer people living in coastal areas in countries like India, Bangladesh, Thailand, Honduras and Ecuador.

The 'overnight' wealth to be made in shrimp farming has attracted get-rich-quick developers all along the marketing chain, from the 'farm gate' to the restaurant plate, but in its wake lies unprecedented environmental destruction, pollution and social disruption. As the UN's Food and Agriculture Organization (FAO) recently characterized the shrimp farming situation in its 1995 review of the state of world aquaculture:

"The inexorable global expansion of marine shrimp farming generated by market demand, short-term gain and government support because of export earnings has brought with it super-intensive systems, nomadic farmers, environmental and sociological disputes, water quality and disease problems and crashes in the production of some countries."

Modern shrimp farming has caused so many environmental problems and social impacts that an increasing groundswell of social discontent has risen in Asia and Latin America - often resulting in violent confrontation and, in some instances, the harassment and even murder of local people who have attempted to defend their lives and livelihoods against encroachment by shrimp farming.

2. Shrimp Farming - Production and Consumption

2.1. The Basics of Shrimp Farming

Cultivating edible fish and other marine species in both freshwater and marine environments is a traditional food production method, particularly in southeast Asia where 'backyard' fish ponds provided valuable protein to complement vegetables, rice and other grains produced on the surrounding lands. In some countries, such as India, Bangladesh and Thailand, there is a tradition of a rice/shrimp rotating system, with rice grown part of the year and shrimp and other fish species cultured the rest of the year. In such low-yielding, 'natural' ponds the harvest was small but sustainable over long periods. The 'catch' most likely, was for family consumption or sold in local markets. Such systems have become known as extensive systems, and contrast starkly with the modern mode of production which rely heavily on chemicals, antibiotics and processed feeds.

Long standing, sustainable tradition is being transformed by modern, commercially oriented, high-output, intensive culture processes that are causing severe environmental damage. Although there are still many of the

more traditional style aquaculture farms in production in such countries as India, Indonesia, Vietnam, Bangladesh, the dominant trend during the past decade has seen most farms built as either semi-intensive or intensive operations. As the extensive style has given way to intensification and industrialization, the degree and extent of environmental damage intensifies too. Because the species of shrimp being mass-cultivated on farms live naturally in warm-water marine environments, commercial shrimp farms are located along tropical and subtropical coastlines within easy pumping distance from the ocean or tidal inlets. Indeed, site selection is one of two principal management considerations in shrimp farming, the other being concerned with how to maximize the efficiency of rearing juvenile shrimp to market size. The outcomes of both these decisions have tremendous effects on the type and extent of consequent environmental damage.

Shrimp are farmed in large ponds, usually dug to a depth of at least one meter, and the pond levees are formed either by hand or by earth moving equipment. Normally the site will be on an estuary or next to a coastline to provide a source of brackish or saltwater. A shrimp culture pond can be a converted extensive coastal fish pond, a large rice paddy area or land producing other agricultural crops, salt flats, or a newly excavated site in a clear-felled mangrove forest. It is in situations like these where the construction of shrimp ponds does the initial damage to the environment, stripping natural or existing farmed landscapes bare.

Lured by profits, investors in shrimp farming have been moving to even greater levels of intensification in order to dramatically increase rearing of juvenile shrimp to market size. Instead of relying on natural tidal flows to stock ponds, as the traditional aquaculture systems have, the more intensive methods of shrimp farming rely on industrialized processes - for example, the manual stocking of ponds with either wild-caught or hatchery produced 'post-larvae'. Shrimp post-larvae are crammed into these intensive ponds at density rates up to 100 times greater than the stocking rates of the lower-yield, systems. The higher intensification requires ponds to be 'fertilized' with urea and triple superphosphate to stimulate algae growth as food for growing shrimp, but supplemental feeds have become the norm. Maintaining favorable water quality is an essential aspect of pond shrimp aquaculture. Shrimp are particularly sensitive to low concentrations of dissolved oxygen in the water. In order to maintain favorable dissolved oxygen concentrations, intensively cultivated ponds must undergo frequent flushing. Sea and ground water must be also continuously pumped into the intensive ponds, and polluted water flushed out. Intensive pond systems may need water exchange rates of between ten to fifty-five per cent of the pond volume each day just to keep dissolved oxygen concentrations above critical levels. This water demand places a tremendous burden on local ground water supplies, rapidly depleting local freshwater resources. The flushing of brackish and polluted pond waste-water ends up contaminating adjacent lands and coastal waters.

2.2. The Producing Countries

The world's production of farmed shrimp is dominated by developing countries located in the tropical latitudes. Seven countries produced about 86 percent of the farmed shrimp production in 1995 - six Asian and one Latin American. Regionally, Asia produces nearly four-fifths of the world's farmed shrimp output, with Latin American countries providing most of the remainder. Shrimp farms throughout Asia harvested 558,000 tons in 1995, accounting for 78 per cent of the world's farmed shrimp production. By comparison, the shrimp farming industry in the western hemisphere, led by Ecuador's annual output of 100,000 tons, produced a regional total of 154,000 tons. In total, about 712,000 tons of shrimp were produced in farms in 1995, roughly 26 percent of the world's total shrimp production, from by capture fisheries and farming combined, which exceeded 2.6 million tons in 1995. Thailand has been the world's leading producer of farmed shrimp for the past few years, producing 220,000 tons of farmed shrimp in 1995, twice as much as it produced in 1990, and nearly one-third of the world's entire 1995 farmed shrimp production. The people along Thailand's coastline, however, have paid an enormous price in terms of environmental loss, however. With production space along Thailand's coastline now at a premium, there are a number of countries in Latin America and Africa that are being eyed by greedy investors as the "sleeping giants", seen to possess enormous potential for building shrimp farms in the next few years.

2.3. The Consuming Countries

Roughly one third of the global shrimp harvest (from capture and culture) is traded internationally - about 900,000 tons. That's less than one percent of global fisheries production by weight, yet shrimp is the single most valuable seafood product that enters into world trade today. Worth about seven billion dollars a year, shrimp traded internationally contributes about 18 percent of the value of all global fisheries exports, which are valued at about 40 billion dollars a year.

The value of shrimp imports into the United States in 1995, for instance (valued at \$2.7 billion), accounted for 40 percent of the value of America's total edible seafood imports. And although farmed shrimp represents about one-quarter of all shrimp harvested each year, it constitutes nearly half of all shrimp traded internationally.

Over 90 percent of all shrimp traded on the international market are consumed by just a few importing countries - Japan, the United States and countries comprising the European Union (EU). Japan and the U.S. are the major consumers of farmed tropical shrimp. While European consumers still prefer coldwater species harvested from the wild they are warming to tropical, farm reared shrimp varieties.

While Japan is the largest warm water shrimp importer, the U.S. is the world's leading consumer of shrimp. The U.S. consumes some 600,000 tons round weight, or 360,000 tons processed weight of shrimp each year. This compares to a Japanese consumption of about 318,000 tons (processed weight), while shrimp consumers in the European Union buy close to 200,000 tons (processed weight) annually. Between one-half and two thirds of the shrimp consumed in the U.S. comes from shrimp farms located in Asia and Latin America. Wild caught shrimp makes up the rest, and most of this comes from the US domestic shrimp fishery in the southeastern U.S. and the Gulf of Mexico or from the neighboring Latin American or Caribbean countries.

Shrimp has a high profile with American consumers, due to substantial promotion and advertising by the seafood industry, and growth in demand for farmed shrimp in the short term is expected to be significant. Europe should experience the most substantial long term growth since current low consumption levels of farmed, tropical shrimp have great expansion potential. With an anticipated doubling of farmed shrimp production forecast over the next decade there is justifiable concern that past mistakes made in the stampede to shrimp farming will be replicated as investors rush to profit from this the growing market demand.

Figure 3: World Production of Cultivated Shrimp
Source: UN FAO

Figure 4: U.S. Market for Farmed Shrimp

World production of farmed shrimp in 1995: 712,000 metric tons
United States imports of farmed shrimp in 1995: 260,000-420,000 metric tons
Percentage of total world production of farmed shrimp imported by U.S.:
36 - 58 %
Percentage of farmed shrimp (compared to wild caught shrimp) on U.S.
market in 1995 40 - 65 %

Note: These are approximate figures based on the following statistics and calculations: U.S. supply of all forms of shrimp 1986-95, pg. 75- "Fisheries of the United States, 1995", U.S. Dept. of Commerce 1996. All figures in round weight; Conversion factor - heads-off to round weight - 1.6. Range of figures for farmed shrimp as a percentage of U.S. imports derived from several sources- Bob Rosenberry, personal communication; Shrimp Council - U.S. National Fisheries Institute; Greenpeace research.

3. The Environmental Damage Caused by Shrimp Farming

3.1. The High Cost of Factory Farming Shrimp

The tendency of shrimp farming systems to be too profit-oriented exacts a high social cost and creates a host of new complex environmental problems. As with agriculture and fishing, the rapidly growing world demand for the products of modern aquaculture has resulted in development of technologies and production systems that accelerate increasing scale and intensity of operations until they outstrip the carrying capacity of the environment. Factory farming has led to depleted and eroded soils, reduced genetic stock, and widespread crop failures; Factory fishing has created global overfishing and the collapse of several commercially important fishery stocks, and even entire marine ecosystems; and now "factory" aquaculture is headed in the same direction. Shrimp aquaculture provides a particularly disturbing example: as the intensity of operations and the density of shrimp farms has exploded along tropical coastlines, there has been degradation of coastal ecosystems and hardships suffered by neighboring communities; wild stocks of shrimp, and

now even the cultured stocks, are collapsing due to rampant disease and other problems.

3.2. Shrimp Farming's 'Ecological Footprint'

The extent and nature of the negative environmental impacts of shrimp aquaculture arise primarily from two aspects: pond construction and operation. The severity of environmental threats increases as the number of farms increase in an area, and intensity of cultivation per farm rises.

In general, modern shrimp farming is clearly unsustainable ecologically because its operational requirements vastly exceed the carrying capacity of surrounding ecosystems. Extensive, low-input shrimp ponds are typically stocked at rates between 5,000 - 20,000 postlarvae (PL) per hectare (1 hectare = 2.5 acres), and can provide harvest levels ranging from 75kg/ha to 1000 kg/ha in a year. By contrast, intensive shrimp farmers stock ponds at 250,000 to 600,000 PL per hectare, and yield from 10 to 16 tons of shrimp annually. At low density, shrimp do not require additional inputs for feeding, generally being able to forage on available nutrients. Because the density of shrimp is relatively low, water quality is better and shrimp are less prone to disease and, hence, loss. The environmental impacts associated with the operation of these extensive systems are, thus, minimized. On the other hand, intensive, industrialized shrimp farms, while yielding higher output, are also far more costly to operate and risk prone due to high stock densities, heavy feeding rates, and the difficulty of maintaining adequate water quality and disease control. Environmental impacts are also vastly greater and more pervasive in comparison to low density operations.

The environmental pressures from industrialized shrimp farms have impacts well beyond the boundaries of the immediate site itself. The additional ecological or biophysical "costs" have become known as the "ecological footprint". This "ecological footprint" is the minimum area of productive ecosystem required to sustain resource inputs to and assimilate waste outputs from an aquaculture operation.

For instance studies have shown that a one hectare (2.5 acres) semi-intensive shrimp culture system in Columbia (producing about 4000 kg of shrimp annually) requires the productive and assimilative capacity of between 38 and 189 hectares of natural ecosystem per year. Higher intensity farming operations require even greater levels of support from the surrounding environment. Such systems are extremely inefficient from an ecological energy standpoint, using approximately 295 Joules of ecological work in order to produce just one Joule of edible shrimp protein (that includes inputs such as fish meal, agricultural products in feed and pond productivity plus industrial energy such as labor, energy to catch and produce feed, fuel, fertilizer, maintenance and harvest costs, etc.).

A related aspect of the ecological footprint is the threat to the world's fisheries linked to the fact that many of the prime commercial aquaculture species, like shrimp and salmon, are carnivorous. Intensive modes of shrimp farming rely heavily on compound aquafeeds made largely from fishmeal, because they mimic the composition of the natural food of carnivorous fish and crustaceans and are the simplest means of providing the nutritional requirements needed by these species on a daily basis.

Assuming that intensively cultured, carnivorous fish and crustaceans will depend largely on fishmeal in the future, this will lead to even greater fishing pressure globally as demand for fishmeal increases.

Currently about 35 million tons of fish caught from the world's oceans are being ground into fishmeal, oil and other non-food products annually. That is more than 40 percent of all fish caught from the world's oceans and seas. Aquaculture used 10 percent of the global fish meal supply in 1988, but by 1995 it had risen to around 15 percent. By the year 2000, however, aquaculture's share of global fishmeal production is expected to be 20-25 percent, creating what has been called a "fish meal trap."

Already a disturbing trend to 'biomass fishing' is occurring, particularly in Asia, because of the rise in shrimp farming. Biomass fishing uses boats that pull large nets with extremely small mesh so that nothing escapes for the sole purpose of catching as many marine organisms as possible; after the higher valued commercial component of the catch is removed for sale, the remaining catch is converted to fishmeal to feed farmed shrimp and other farmed fish species. This contributes to the already unsustainable fishing pressure that is pushing many fisheries in the developing coastal countries into quite serious declines. This in turn threatens the food security of hundreds of millions of coastal people who rely on fish as the main source of protein and other vital nutrients in their diets. The increasing use of aquafeeds made from fishmeal will mean increasing competition for fish that might otherwise be used to provide food for direct human consumption.

3.3. Construction Impacts: Clearcutting the Rainforests of the Sea

In order for shrimp ponds to maintain intensive yields and high returns the wholesale conversion of surrounding land areas is required. Aquaculture production of shrimp (and also some types of farms producing fin fish) has become the most relentless destroyer of large areas of pristine tropical wetlands. Mangrove forests are the most notable ecosystems that have fallen prey to shrimp pond construction, with the massive destruction of mangrove forests in Latin America and Asia.

Most shrimp farming in Southeast Asia, for instance, has occurred or still takes place on reclaimed mangrove forests. The mangroves are the coastal equivalent of the terrestrial rain forests, unique and irreplaceable ecosystems containing incredibly diverse species of flora and fauna and are amongst the world's most productive ecosystems. Shrimp developers and government officials turn a blind eye to the fact that mangroves sustain the ecological integrity and productivity of adjacent coastal waters, and are important breeding and nursery grounds for many fish, shellfish, and a wide range of other wildlife species.

The beneficial influence of mangrove forests is not limited to the immediate geographical area in which they grow. They exert balancing ecological influences that are felt far beyond their immediate boundaries. The fallen leaves and branches of the mangroves provide important nutrients for the surrounding marine environment, supporting immense varieties of sea life that feed on this decaying forest matter. Besides protecting vast areas of coastlines from erosion - particularly storm surges, they are vital for coastal fisheries, wildlife habitat, and sustainable wood-products industries. The loss of the mangroves sets in motion the destabilization of entire coastal zones, with sometimes

dramatic effects on coastal communities. The erosion and heavy siltation that occurs in places where extensive mangrove clearance has occurred can also destroy other important coastal habitats such as sea grass beds and coral reefs, further diminishing the habitat for rare migrating birds, sea turtles, dolphins, the manatees, including the related endangered dugongs, otters, monitor lizards and a host of fishes, shrimps, mollusks and crustaceans relied upon by local people for food.

Very importantly, mangroves are breeding and rearing grounds for a substantial part of the planet's populations of fish and shellfish upon which a hungry world depends. The shallow, inter-tidal reaches which comprise the mangrove swamplands, offer a refuge for developing fish fry and larval stages of marine life, such as crabs, mollusks and shrimp. There is a direct relationship between declining mangroves and declining fish catches, where mangrove destruction is extensive. Much of the tropical world's vast diversity of marine life gets its start within the tidal waters of the mangrove swamps, and mangrove destruction could see a catastrophic ripple effect on the biological diversity in the world's oceans.

Though there are no precise figures specifying just how great the mangrove loss to shrimp ponds actually is, there is sufficient evidence pointing to a loss of around one million hectares (2.5 million acres). This figure includes mangrove loss to shrimp farms currently operating in addition to those earlier shrimp farms that occupied cleared mangrove areas that have since been abandoned. The extent of mangrove destruction in Thailand and Ecuador provides an indication of the extent of the problem globally.

While Thailand has become the world's leading shrimp aquaculture producer the environmental cost has been high. The Thai National Economic and Social Development Board, says about 253,000 hectares (634,000 acres) of the country's 380,000 (950,000 acres) of mangrove forests have been destroyed by shrimp farms.

In Ecuador, the second largest shrimp aquaculture producer, shrimp cultivation began in 1968. By 1988, shrimp farm installations had destroyed 20 percent of existing mangrove forests and 80 percent of existing salt marshes -- the equivalent of more than 40,000 hectares of each ecological system. But, that has not been the end of end. Since 1988, more wetlands and mangrove forests have been lost and in particular sites along Ecuador's coastline where shrimp farms are prolific, as much as 80 percent of wetland ecosystems have been demolished. Similar high percentages rates of destruction of mangroves and other types of wetlands have occurred in Indonesia, Vietnam, Bangladesh, India and Honduras in the Gulf of Fonseca. Even though the ecological and economic importance of mangrove forests and other coastal wetlands are now well known, their destruction continues as more and more of the remaining mangrove areas have been set aside for conversion to shrimp ponds.

Some argue that the loss of more than a million hectares of mangrove forests to shrimp farms is a small portion of the 20 million or so hectares of mangrove forests remaining worldwide; however, this ignores the fact that the destruction of a million hectares occurred over the course of just the past decade or so, and that shrimp farming is still rapidly expanding, pushing into new coastal areas at a rate that threatens even greater loss of mangroves in

future. And while the one million hectare loss represents five percent of the world's total mangrove resource, the destruction in particular areas where shrimp farming has boomed in recent years has been as high as 90 percent. What is more, shrimp farming is one of several major threats to the survival of the world mangrove resources - clearcutting of mangroves for the wood pulp industry, used for example in the manufacture of rayon, is another major threat, adding to the damage caused by aquaculture and a host of other threats.

3.4. Poisoning the Environment: Impacts of Shrimp Farm Operations

Once shrimp ponds become operational, there are a host of ecological impacts generated with devastating consequences for the effected environment and human communities in the area. Pollution from shrimp farming has severe side effects for local people who inhabit and use the surrounding environment to maintain their food supplies and subsistence economies. Shrimp ponds demand large and continuous supplies of fresh and salt water and thus use local water resources with great intensity. Shortages of fresh water have resulted in many shrimp producing areas such as southern Thailand and Tamil Nadu, in India. In Taiwan, substantial land subsidence causing tens of millions of dollars of property damage occurred due to extraction of well water used to dilute coastal shrimp ponds.

To maintain the overcrowded shrimp population in intensive production systems, and attain higher production efficiency, copious amounts of artificial feed, pesticides, chemical additives and antibiotics must be continuously added. These compounds, together with excrement from the shrimp, makes the wastewater from the ponds poisonous. The polluted wastewater is generally pumped back into the surrounding environment in order to save costs, poisoning coastal waterways and the sea, fresh groundwater supplies, native flora and fauna, and adjacent communities. In addition shrimp pond effluents are often high in organic matter, with a resulting high biological oxygen demand that can cause oxygen depletion in receiving waters. The combination of surplus organic matter and increased salinity from pond effluents can cause severe problems, especially for fish populations and other sea life that inhabitant the receiving waterways. Saltwater in the ponds also seeps into the local groundwater and the increased salinity damages drinking water supplies and surrounding agriculture land, making alternative cropping (such as rice) nearly impossible.

As with other types of farming, shrimp farming frequently uses exotic species and varieties that are not indigenous to the local area. What effects the introduction of new species will have on the local ecosystem is not yet known. Even if an exotic species of shrimp can be contained in the ponds to which they were introduced, and even though it may appear to be innocuous, there is always the danger of diseases and parasites spreading to local shrimp species. Cultured shrimp, especially in intensive cropping systems, are highly vulnerable to a wide assortment of parasitic fungi and virulent bacteria and viruses, and if these pathogens spread to a local shrimp or invertebrate fishery they can produce serious economic and ecological consequences.

Perhaps most significantly, the conversion of coastal ecosystems into monoculture production areas can have disastrous long term effects. The lifespan of an intensive shrimp farm is between five and ten years (many

are forced to shut down within 3-5 years after choking on their own self-generated pollution) - once the farm is abandoned it is expensive and difficult, if not impossible, to rehabilitate the land for any other purpose (e.g., farming, replenishment of destroyed mangrove forests). This, in itself, is an immense problem. In Ecuador 15 percent of shrimp farms are now unusable while in Thailand less than five percent of the initial farms set up in the Gulf of Thailand (Thailand's first shrimp growing region) remain in operation today. The bottom soil of an abandoned shrimp pond that has been used for intensive culture is usually too saline for agriculture or other uses, so the destruction of land by shrimp farming, may for practical purposes, be irreversible.

The treatment of bacterial infections in shrimp ponds with doses of various antibiotics added to shrimp feed could lead to the occurrence of high levels of antibiotics in marketed shrimp, and this could conceivably increase antibiotic resistance in human consumers. As a result, the U.S., for example, has imposed tight inspection controls on imported shrimp, turning back shipments that register excessive levels of antibiotics. A related environmental issue with potential implications for humans is that since shrimp ponds are downstream from agricultural lands, pesticides may accumulate in shrimp tissue as well. Harmful pollutants that are frequently present in estuaries where shrimp farms operate -- for example, radioactive isotopes and heavy metals - can also occur in shrimp tissue.

The environmental impacts of shrimp aquaculture do not occur in isolation, but are a part of a complex of coastal threats emanating from industrialization, urbanization, increased use of agricultural chemicals, recreational and tourism development and petroleum exploitation. Coastal areas are especially susceptible because they are downstream from sources of urban and agricultural pollution. In addition, large urban centers are often on or near the coastline, and the compounding environmental stresses reduce the capacity of the coastal environment to absorb the damaging effects of shrimp farming.

4. The Social Damage Caused by Shrimp Farming

The spectacular growth of shrimp farming over the past 10 to 15 years occurred because governments and international development agencies promoted it, lured by enormous profits to be made. Investors were quick to cash in on the lucrative business, but, it is largely only a relatively few investors that have received the lion's share of benefits, while large portions of society, particularly the rural poor, have become disenfranchised and marginalized into severely degraded environments.

In the Philippines, for example, there was a marked shift from extensive aquaculture for production of milkfish largely for domestic food supplies to the more lucrative export-oriented shrimp. The result has been the not only the loss of a valuable protein source (i.e., milkfish) but also of valuable riceland due to conversion into, or salinisation by, shrimp ponds, both detrimental to the goal of national self-sufficiency in food.

Competition between traditional fishermen and family (peasant) farmers, and entrepreneurial shrimp farmers for the use of good quality land, coastal fisheries habitats like mangroves, and other critical areas along the coastline increases in direct response to higher demand for both

local food and export crops. Communities are often dispossessed by shrimp farms of several vital resources over which they have held traditional rights based on long-standing patterns of use - among them, ricelands and the mangrove forests. Clearcutting mangroves for shrimp ponds destroys what was once a potentially sustainable resource, so that it ceases to provide a wide range of products for local communities such as building materials, food, fire wood, charcoal and the like.

Agricultural 'modernization' like this strikes women particularly hard in affected communities, as they are among the first to be overshadowed when commercialized farming overtakes self-provisioning. The shrimp farms consume several important resources in their operation, particularly local freshwater supplies which serve human communities for drinking water supplies, other household domestic needs, and farming purposes such as crop irrigation.

Though the shrimp industry tries to promote itself as a boon to the local economies, it benefits mainly the wealthy investors, at great loss to local people. Modern shrimp farming is, like other forms of intensive agriculture, capital rather than labor intensive. Modern, intensive shrimp aquaculture provides limited employment opportunities for coastal residents and most of those are typically poorly paid seasonal and non-skilled jobs, offering no long-term job security.

An economic study conducted by researchers at Chittagong University in Bangladesh revealed that shrimp farming displaces more jobs than it creates. Cultivating 100 acres of land with rice employs 50 workers, the study found; cultivating shrimp on the same land employs just five workers. As a result, shrimp farming in Bangladesh's coastal Satkhira region displaced 40 percent of the area's 300,000 inhabitants into the country's overcrowded cities, the university study found. While a one hectare salt-water fish pond might produce a profit of \$32,000 for investors in shrimp and prawn exports to Japan and North America, little trickles down to the people in neighboring communities who are being badly affected.

The environment suffers greatly as social disruptions ripple out through the society. Increasing numbers of displaced families (traditional fishers and farmers), for instance, are forced to resort to destructive fishing methods or improper methods of husbandry themselves in order to extract a livelihood from lands and coastal areas that are diminishing in area and deteriorating in quality due to the appropriation of lands and ecosystems, and the over-use and improper husbandry by shrimp farmers. Otherwise, displaced people are forced to leave their traditional homes and migrate to cities hoping to find jobs. But jobs a few, and most people are unskilled laborers anyway, so contributing to the growing urban migration crisis being confronted in the developing world, and compounding already complex urban-related environmental and social problems.

In India, where in the last few years 80,000 hectares (200,000 acres) of coastal wetlands and agricultural land have been converted to shrimp farming, thousands of subsistence farming and fishing families have suffered dispossession because of the shrimp farm explosions. Rice production has been seriously affected in some areas by seepage of saltwater and pollutants from the shrimp ponds. In the Indian state of Tamil Nadu,

where 60 percent of the population is landless, thousands of hectares of land have been set aside for shrimp farms despite concerns over threats to the livelihoods of 25,000 families. In some areas there have been reports of people being forcibly evicted from their lands at gunpoint in order to allow shrimp investors to come in to construct shrimp ponds. While farmers are being run off their lands to make way for shrimp aquaculture, fishing communities are finding their access to the sea blocked from their villages by huge shrimp farm complexes. Fisherfolk can no longer land their boats and spread their nets. Even their catches are declining as once abundant fish populations drop off as a result of mangrove clearance and pollution from the ponds.

In a landmark case decided in December 1996, the Supreme Court of India ruled that an estimated 100,000 acres of intensive and semi-intensive shrimp farms will have to be shut down by the end of March, 1997. The decision also asserts the precautionary principle and polluter pays principle involving compensation to people adversely affected by shrimp farming. The Supreme Court ruled that no new shrimp aquaculture operations can be situated in areas of prime agricultural land, wetlands, mangroves, estuaries, saltpans, public land and government land, nor within 500 meters of the coast, and cannot cause salinity or chemical pollution of fresh water. While an important legal victory, and the first of its kind, it remains to be seen whether the decision will be effectively implemented.

Another damaging effect that impacts local fishing communities is the capture of young shrimp by the aquaculture farms for their hatcheries. Farmers in Ecuador and Bangladesh, for example, still depend on wild shrimp postlarvae to stock their shrimp ponds, and this harvesting can deplete local populations of shrimp postlarvae. The harvesting of wild postlarvae to stock shrimp ponds may have changed the dominant species of shrimp caught by fishermen in coastal Ecuador. In Bangladesh, and in other Asian and Latin American countries, there are numerous reports of collectors of shrimp postlarvae also catching fish larvae and small invertebrates. This bycatch is left to die on the beaches. Practices such as this may adversely affect populations of other fish and invertebrates in the area, and filter through to declining catches for local people, who rely on these species for food and livelihoods; such impacts can have an extremely damaging effect on local food security.

It is not only in the construction of ponds, but also their operation that makes them an environmentally damaging and socially destructive timebomb. Impacts on human health are yet to be determined, but many toxic substances used in large-scale shrimp farming, including a wide variety of pesticides such as malathion, parathion, azodin, paraquat, endosulfan and butachlor, mix with antibiotics such as terramycin, erythromycin and oxytetracyclin (used heavily to prevent shrimp diseases), shrimp excrement and other substances to form a chemical soup. This poisonous effluent from the shrimp ponds is commonly dumped onto the surrounding land and into waterways where its chemical mix can pose health risks to people in local communities.

In summing up the social impacts of export-oriented shrimp farming it can be said that its benefits accrue substantially to a minority directly involved in exploitation of coastal resource systems, while a series of direct costs are paid by the majority who reside in these areas and who make their daily living from the resources that may be found there.

Neither the social nor the ecological costs of shrimp culture development are paid by the investors, who pocket the extremely high profits during the growth phase of the industry, but socialize the costs as society at large is left with the bill for the considerable environmental and social damage.

5. Shrimp Destruction and the Global Fisheries Crisis

The money, the environmental devastation, and the toll on affected human communities being caused by shrimp production are driven by a much greater force; worldwide the world's oceans are being plundered in order to maintain supplies to markets where a virtually insatiable ongoing demand for seafood is intensifying. The booming shrimp market is just one destructive manifestation of the overarching concern that in meeting ever increasing market demand in Japan, the U.S. and Europe, nature and other dependent human communities must suffer the destructive consequences. Increasing market demand for fish and other fish-based products have led to a massive intensification and industrialization of fishing worldwide, to such an extent that fish populations in virtually every major fishing region of the world are considered to now be fully fished, overfished depleted or collapsed. This is particularly true of the high-valued commercially exploited species, such as wild shrimp. Virtually all of the world's major stocks of wild shrimp are considered to be either fully or over-exploited.

The resulting uncertainties surrounding the future availability of fish in a world where fish stocks are declining while demand continuously increases have motivated many governments, corporations, and entrepreneurs to intensify development of various systems to raise aquatic organisms in more controlled environments. Aquaculture, as the process is generically known (mariculture is the term applied to farming in the marine environment), is being held out as the hope for sustaining the level of fish supplies to meet rising market demand in the face of a deepening global fisheries crisis.

Not all forms of aquaculture are so destructive as shrimp farming has proven to be; indeed, some types of aquaculture offer great hope for enhancing the lives of hundreds of millions who are nutritionally insecure, low-income people. Unfortunately, international assistance to improve this prospect has paled in comparison to support for the production of farmed shrimp for export. Money from the Asian Development Bank, the World Bank and other development assistance agencies of Japan, the U.S. and European countries have provided vastly greater support, as measured in capital and staff, to capital-intensive shrimp production for export, distracting attention and resources away from, for instance, inland freshwater aquaculture which has far greater potential to solve the problems of underdevelopment, poverty and malnutrition which occurs in rural areas of many tropical Asian nations. Putting faith in a global strategy to promote the expansion of coastal and marine aquaculture, hoping to make up the projected shortfalls in future world fisheries supplies, is a woefully misguided strategy.

For one thing, such an approach glosses over the very grave environmental dangers and excessive demands on natural resources associated with the wholesale expansion of commercialized coastal and marine farming systems. Furthermore, it is the cornerstone of a longer term plan that ultimately aims at the wholesale conversion of the oceans' biological diversity into monoculture cropping systems geared to the exclusive production of high-

value commodities, like shrimp, for the world's wealthy few. An analogy can be drawn in the terrestrial environment with the destruction of the Amazon's rainforests and all the complex biodiversity they contain in order to make space for grazing cattle. Such a strategy also creates a disincentive for governments which should be hard at work on the urgent need to push back the global fisheries crisis, by instituting fundamental, wide-ranging reforms to rid the oceans of the vast fishing overcapacity and destructive fishing practices that underpin overfishing on a global scale. Instead of focusing on solving the problems of world fisheries and putting them on the path to sustainability, governments and industry have grabbed hold of a convenient escape hatch in aquaculture - one that allows business as usual to be maintained, at least in terms of maintaining supplies of fish to northern markets where consumers can afford to pay higher prices for luxury products, even though the practices that underpin production are environmentally destructive and unsustainable economically.

While it may be that investment in appropriate forms of aquaculture could do a lot to help alleviate malnutrition in some developing countries, the current emphasis on the production of high-value species for export is leading in an entirely different direction. This emphasis is not on how to provide a readily accessible source of protein for the world's malnourished through integrated fish farming systems that are ecologically sound, even environmentally beneficial; it is instead being directed largely at the production of high-value species for export to wealthy overseas markets where people can afford to pay high prices for such luxuries as farmed shrimp and salmon.

The resulting technological advancements in breeding and nutrition of such high-value, farmed aquatic organisms, combined with favorable government policies that encourage rather than limit expansion, massive investment flows and financial incentives, and increasing market demand for seafood have provided an explosive set of conditions for the dramatic expansion of the shrimp farming industry in Asia and Latin America. But the developing global shrimp industry is environmentally destructive, intrinsically unsustainable, and inequitable in social terms. It has become a destructive force in a world where more effort and investment should be directed to solving the environmental and social crisis in world fisheries in a manner that ensures sustainable employment and food security for the hundreds of millions of people who rely on fish and fishing as their basis for life and livelihood.

6. Global Struggle as the Dispossessed Fight Back

The explosion of shrimp farming in the late 1980s and early 1990s has seen dramatic transformation in the livelihoods of coastal dwellers and rural inhabitants. Desperately concerned about the threat to their lives and livelihoods, rural community people affected by the encroachment of shrimp farmers have struck back at aquaculture owners. From India to Ecuador, shrimp farming has met with significant resistance by local communities to its further expansion. Protests have centered around issues of pollution, takeover of lands, access to water resources, destruction of mangroves, and the deterioration of surrounding soil quality.

Sometimes violent clashes occur, some ending in beatings and even death for some protesters. In one incident in Bangladesh two villagers lost

their lives - one of them killed by a bomb attack arranged by shrimp-farm owners. Similarly, in India, a strong grassroots movement has developed where angry communities have organized to prevent the building of shrimp ponds, and have even attacked aquaculture farms. In Honduras, women from local villages have formed human road blocks, placing their bodies in front of intruding bulldozers hired to clear the mangroves for shrimp ponds.

Worldwide efforts are needed to put an end to the destructive environmental and social impacts caused by export-oriented shrimp aquaculture. While enforcement of strict regulations to protect the environment and curbs on the destructive expansion of intensive shrimp aquaculture are urgently needed, pressure to curb the rampant expansion of shrimp aquaculture may lie with the market itself.

Many of those who are directly feeling the ecological and social impacts being generated by the spread of shrimp aquaculture speculate that curbing the expansion of this destructive industry will mean curbing the appetite for shrimp in the big consumer markets of Japan, the United States and Europe. "People who enjoy eating shrimp don't know that natural resources are being destroyed to bring it to them. If we explain that the price of the shrimp they're eating is the death of many marine species and even the whole gulf [of Fonseca in Central America], they'll understand that they should oppose the shrimp industry's destructive activities." [Saul Montufar, president of the Honduran Committee to Defend the Flora and Fauna of the Gulf of Fonseca, describing their campaign to raise consumer "awareness" about the environmental damage that goes into providing a plate of shrimp.]

And many people in Third World tropical countries who are directly feeling the ecological and social impacts being generated by the spread of shrimp aquaculture respond to the words of India's Shri Banke Behary Das, who is a member of the Peoples Alliance Against the Shrimp Industry: "I say that those who eat shrimp -- and only the rich people from the industrialized countries eat shrimp -- I say that they are eating at the same time the blood, sweat and livelihood of the poor people of the Third World."

7. Putting Demands on the Table

Alarmed at the rapid growth of destructive types of aquaculture, like shrimp farming, non-governmental organizations (NGOs) from shrimp producing and consuming countries around the world are organizing to halt the spread of destructive shrimp farms, since their governments are failing to act. In May 1995, Greenpeace and 24 other NGOs, some representing people living in the communities that are directly feeling the impacts of the shrimp farming boom, submitted an unprecedented "NGO Statement on Unsustainable Aquaculture" to the Commission on Sustainable Development (CSD) meeting in New York at the United Nations. The group urged their governments to move quickly to ensure the development of aquaculture that is compatible with the social, cultural and economic interests of coastal communities, and ensure that in future such developments are sustainable, socially equitable and ecologically sound.

The NGO statement to the United Nations was followed up more recently in an NGO Forum on Shrimp Aquaculture held in Choluteca, Honduras (Oct. 13-16, 1996), organized by Greenpeace together with Coddeffagolf, a Honduran

grassroots group. Twenty-one NGOs from Latin America, India, the US and Sweden concluded the meeting with the adoption of the Choluteca Declaration. The Choluteca Declaration reaffirms the demands contained in the NGO Statement on Unsustainable Aquaculture submitted to the United Nations earlier in the year, but went further in some aspects. The most important of these is that the Choluteca Declaration calls for a GLOBAL MORATORIUM on new shrimp farm construction. Additionally, it calls on governments and the industry to put a halt to human rights abuses in the shrimp aquaculture industry and amplifies several of the demands contained in the NGO CSD Statement. A 'plan of action' accompanies the Choluteca Declaration and outlines the course of action for the implementation of the Declaration that the Latin American NGOs involved in the meeting agree to pursue both individually and collectively.

Generally speaking, these concerned non-governmental organizations are insisting that governments apply the precautionary approach to aquaculture development, which includes integrated approaches to development planning in coastal areas and the use of environmental and social impact assessments prior to aquaculture development, with ongoing monitoring of the environmental and social impacts when, and if, such operations are approved. The NGOs also seek assurances from their governments that coastal fishing and farming communities are not adversely affected by aquaculture development or operations. This requires protection of mangrove forests, wetlands and other ecologically sensitive coastal areas, and assurances that abandoned or degraded aquaculture sites are ecologically rehabilitated and that the companies or industry responsible bear the cost of rehabilitation.

The NGOs are also demanding that governments enforce prohibitions on the wholesale conversion of agricultural or cultivable land to aquaculture use, the use of toxic and bioaccumulative compounds in aquaculture operations, pollution of surrounding areas, the development and use of genetically modified organisms in aquaculture and the use of exotic/alien species. The NGOs also call on governments to prohibit aquaculture practices that cause the salinization or depletion of fresh water supplies, and ban the use of feeds in aquaculture consisting of fish that is or could be used as food for people.

There is also a need to ensure that the collection of wild larvae to stock shrimp ponds does not adversely affect species biodiversity in the areas where collection takes place. Another key demand of the NGOs is put to the multi-lateral development banks, bilateral aid agencies, the UN Food and Agriculture Organization and other relevant national and international development assistance organizations that they stop funding or otherwise promoting aquaculture development that is inconsistent with the above criteria.

8. Greenpeace Action and Demands

Greenpeace is in full accord with all of the demands set down in the NGO Declaration on Unsustainable Aquaculture at the CSD and the Choluteca Declaration. Greenpeace is working at all levels, from the grassroots to the United Nations, employing diplomacy as well as direct action to

expose and put the brakes on the spread of destructive shrimp aquaculture. On the diplomatic front, Greenpeace is working with other environmental and social activist groups, North and South, to help globalize the voices of concern of the local communities whose natural environments, lives and livelihoods are being hammered by the destructive impacts of shrimp farming. Greenpeace maintains ongoing lobbying activities at various UN related conferences and assemblies dealing with sustainable development and oceans protection issues seeking recognition and resolution of the problems being caused by shrimp aquaculture particularly, and fisheries-linked environmental problems more generally.

While some progress has been made on the diplomatic fronts, the most effective challenge often takes the form of direct action. Twice in the past two years, Greenpeace has sent protest vessels -- the MV Greenpeace in September 1994 and the MV Moby Dick in March 1995 -- to the Gulf of Fonseca, on the Pacific coast in Central America, to support protesting local communities and the environment that are being ravaged by the uncontrolled proliferation of shrimp farms.

Shared by Honduras, Nicaragua and El Salvador, the Gulf of Fonseca is regarded as one of Central America's natural treasures with rich fisheries and diverse marine life. The 1,000 square kilometers of waterways includes mangrove forests, streams, flood plains, and winter lagoons but, in the last 10 years, the natural wealth of the area been depleted by the farmed shrimp industry operating out of Honduras, where shrimp farming is now widespread. Not content to simply research and document the shrimp farming threat in the Gulf, Greenpeace activists joined with people from local communities in direct actions to stop bulldozers from mowing down mangroves to build more shrimp farms.

Such pressure has forced the Honduran government to declare a two year moratorium on new shrimp farm construction along its part of the Gulf of Fonseca coastline. But this may only be a temporary victory for local communities and their environment - in the past the Honduran government has bowed to industry pressure and it could easily happen again. Secondly, shrimp farm investors, backed by foreign capital from the U.S. and elsewhere, will be seeking 'greener pastures' in which to build shrimp farms in other parts of the Gulf of Fonseca outside Honduran jurisdiction, in Nicaragua, El Salvador, or other neighboring countries such as Mexico unless concerted regional action can be brought to bear to thwart their expansion plans.

The Greenpeace campaign to expose and change the destructive practices of shrimp farm developers is globally oriented, taking in the major producing and consuming countries, and is focused around two key objectives:

Objective One: an immediate halt to the expansion of new shrimp farm construction that fails to comply with the criteria set down in the NGO Statement to the United Nations on Unsustainable Aquaculture, and in the Choluteca Declaration.

Objective Two: a broad, worldwide commitment by governments and the private sector to a transition over the next few years to ecologically responsible and socially sustainable shrimp aquaculture. This would involve the closure of all current shrimp farming operations worldwide that fail to comply within a five to ten year time frame with the requirements set down in the NGO and Choluteca declarations, and

government programs funded, in part by the industry, to rehabilitate coastal areas that have been degraded by shrimp aquaculture.

The realization of these two key objectives is not an impossible dream by any means. Given that 86 percent of global farmed shrimp production comes from just seven countries, and that the major shrimp consuming countries - Japan, the U.S. and a few countries in the European Union - import the vast majority of the world's farmed shrimp supplies. These relatively few countries provide a clear field of action on specific demands.

Clearly, the governments of these producing and consuming countries have a fundamental responsibility to enact legislation and enforce regulations to protect coastal and marine environments from destructive aquaculture practices. All nations made a firm commitment to act to ensure sustainability at the 1992 Earth Summit - the United Nations Conference on Environment and Development. Greenpeace has called on the United Nations Food and Agriculture Organization to conduct a full review of the environmental and social impacts of existing shrimp farming operations in consultation with NGOs, governments, international agencies and other interested parties. Greenpeace is further calling on countries and the industry to provide guarantees that corrective action will be taken in compliance with the various demands expressed in the NGO declarations.

In a similar vein, the multilateral development agencies such as the World Bank and the UN Food and Agriculture Organization, along with various national foreign aid programs, which have promoted and/or helped finance the destructive shrimp farming industry in Asia and Latin America, must review and change their policies in this field, and redirect their support into rectifying the damage done thus far, and into supporting ecologically responsible forms of aquaculture that prioritize the food security needs of the rural poor in the developing world.

Beyond this, it is the rising market demand for shrimp in Europe, Japan and the U.S. that drives the destructive shrimp farming industry. The companies that invest in shrimp farm development and the seafood traders that buy, sell and profit from shrimp must be held accountable for the damage this industry causes if they continue to invest and trade in it. Such accountability should emerge as more and more consumers become aware of the true costs of eating shrimp and decide that it's one luxury they can easily live without. Companies involved in the trade of farmed shrimp (including the retail outlets that sell it to the final consumer) would be wise to accept responsibility for the problem now and set down purchasing criteria and practices that are consistent with the demands set down in the NGO declarations on unsustainable aquaculture.

Ultimately this is an issue for consumers to decide. Peoples suffering from the destructive environmental and social effects of shrimp farming from throughout Asia and Latin America have organized, and their call to consumers in the United States, Europe and Japan is clear - think twice before you eat the next plate of shrimp!

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