CHAPTER 1

AQUACULTURE AND THE GLOBALIZED FOOD CHAIN

> Despite the increase in the environmental and social impact of resource extraction, economists and activists in both the North and the South are challenging economic models that base development on the extraction of non-renewable resources. . . . For a variety of reasons, these countries simply have not converted their resource wealth into real improvement in the lives of the majority of their citizens. Despite these failures and the challenges made to the "extractive paradigm," national governments and the international financial institutions such as the World Bank continue to promote these industries for poverty reduction purposes (Michael Ross 2001: 3)

Born after World War II as part of the Cold War agenda of the United States and western Europe (Baber 2001), the western development model which aimed at bringing progress to peripheral countries was grounded in Keynesian economic ideology (Wood 1997). Early in this era, the United Nations, the World Bank, and the International Monetary Fund were created as Keynesian institutions designed to funnel development expertise, foreign aid, and economic development loans to poor nations (*New Internationalist* 2000). Keynesian development policies of the 1950s to 1970s prioritized foreign aid to expand Third World participation in capitalist trade (Luke 1990). John Maynard Keynes contended that capitalism could not survive if it did not generate household incomes that were sufficient enough to permit consumption of goods (Reich 1999). For that reason, Keynesian policymakers were convinced that publicly-funded *social safety nets* were necessary to insure capitalist economic growth (Tabb 2001). In addition, Keynesians recognized that capitalism is characterized by periodic downturns that are threats to stable national governance and to adequate employment of citizens. So they advocated public regulation

and intervention and the creation of government-sponsored entities to buffer the worst side effects of recessions (Galbraith 2002). In times of crisis, Keynesians also called for running temporary national budget deficits which would keep sufficient funds flowing to boost economic growth and consumption (Tabb 2001). In rich countries, Keynesians entrenched protective tariffs, direct and indirect subsidies to business and agriculture, tax breaks to increase periodic consumption, full employment goals, publicly-funded infrastructure (such as highways, public utilities, education), and public services for the poor. In peripheral countries, Keynesian policies also included forms of state capitalism in which governments either owned outright or invested heavily in nationalized industries (Galbraith 2002).

Impacts of Global Neoliberalism on Peripheral Nations

The advent of global neoliberalism in the late 1970s and early 1980s brought an end to the Keynesian era of development policies (Brohman 1995). In sharp contrast to the earlier decades, neoliberal policies focused on shifting national resources into economic growth strategies by implementing policies that (Brohman 1995):

1. Cut national budgets, state employment, and public services for poor and middle classes;
2. Privatize public services and public enterprises;
3. Liberalize trade and finance so that national borders are open to foreign investment and will encourage the flow of commodities to and from the world economy;
4. Deregulate national legal constraints that act as barriers to trade and finance liberalization;
5. Reorient the national economy to export production for world markets;

6. Devalue and standardize peripheral national currencies against the most stable core currency.

In addition, the World Bank and the International Monetary Fund were privatized into groups of shareholder investment banks, the World Trade Organization was formed to develop and mediate international trade agreements, and the United Nations has shifted its development focus to advocate neoliberal market strategies and economic growth as the development path to human and social development (Paul 1996).

Neoliberals have promised peripheral nations that such austere policy changes will stabilize their economies and generate wealth accumulation that will eventually benefit all sectors of society (Brohman 1995). Despite temporary economic growth rates in a few countries over the last two decades, a majority of peripheral counties have experienced serious negative impacts from neoliberal globalization. The economic and social gap between the rich core and the periphery has widened dramatically since 1985, even though world wealth has increased dramatically. That expansion of wealth has not benefitted most of the world's poor because it has been concentrated into the large multinational corporations which have controlled international trade (Madeley 1999). In terms of living conditions, most of the world's households have lost ground since 1985, and there is little probability that the United Nations will reach its minimal Millennium goals with respect to sanitation, clean water, or education. One-third of the world's people now struggle to survive on less than $1 a day while more than one-half live on less than $2 a day (United Nations 2002).

National budget cuts have eliminated the kinds of public services that Keynesians advocated. Advances made by many peripheral countries over previous decades in providing free

public education and health care have been swept away, so that a majority of the world's people cannot take for granted a primary-level education or minimal-level health care. While rich countries tout the high percentage of their youth who attend college, the typical poor nation cannot yet make available three years of public schooling to a majority of its children. While rich countries offer medical technology to save the lives of severely handicapped infants, half the children of peripheral countries die before age ten from diseases linked to malnutrition and contaminated water. Despite scientific advances in medicine, mother and infant mortality– which the United Nations identifies as the most significant indicators of quality of life– have either stayed at 1970s levels or risen since 1985 for most peripheral countries (United Nations 2002, Weisbrot and Baker 2002).

Privatization has resulted in four negative outcomes for poor countries. First, public services that are readily available to core citizens, especially education and health care, have been increasingly changed to subscriber-fee basis in peripheral countries, putting those services out of the reach of the poor (Brohman 1995). Second, public lands and commons that were once open to citizens have been privatized, shifting control of natural resources of peripheral nations to a tiny local elite and to core-based corporations (Shiva 2000). For globalization agendas such as aquaculture, large coastal commons and mangroves have been privatized, criminalizing use of ecosystems by poor fishing households that traditionally used them (Third World Network 2002). Third, government subsidized enterprises and industries have been privatized, most being sold to multinational corporations. Subsequently, unemployment has risen, as new external owners either closed those facilities or automated them (Galbraith 2002). Fourth, local people have been removed from lands to make way for new economic growth agendas. To initiate tourism and

ecotourism projects, national governments in many peripheral nations have set aside reservations, barring local people from their traditional uses of those ecosystems. In other instances, people have been relocated from areas in which dams and infrastructure projects are to be constructed, as in China, the Philippines, Thailand, and Australia. Probably the gravest threats to the survival of indigenous peoples over the last two decades have been the neoliberal economic projects of national governments which target rainforests, waterways, or mineral deposits for development in peripheral countries . [1]

Rather than bringing the wealth and improved living conditions promised by neoliberals, liberalization of trade and finance have opened peripheral countries to greater interference from outside and weakened the autonomy of those nation-states (Berger 2001). In order to eliminate trade barriers and recruit foreign direct investment, poor nations have taken on increased external debt. In fact, the external debt of most poor nations has doubled or tripled since 1975 (*New Internationalist* 1999). In the current debate on globalization, a central concern is that foreign direct investment (FDI) has relocated jobs from high-income countries to labor-abundant economies, forcing a competitive downward decline in real wages worldwide, known as a "race to the bottom." According to Mehmet and Tavakoli (2003: 133), "FDI inflows increase the elasticity of demand for labor. This is a necessary condition for pushing wages downward toward minimum or subsistence levels in the global labor market."

Neoliberal policies have spurred expansion of the informal sector throughout the periphery. In most peripheral countries, the informal sector is a far more significant source of

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[1] The Cultural Survival Project based at Harvard University has documented hundreds of such impacts on local peoples through its journal *Cultural Survival* and its website.

income and resources than waged jobs. Rural household members migrate to towns and cities to engage in economic activities int the informal sector. The neoliberal force propelling this change is "the massive expansion of commercial agribusiness activity which is robbing the peasantry of its traditional means of subsistence– access to farmland and pastureland" (Stuckey and Fay 1982: 12). While multinational corporations control the world-economy, they employ only about 1 percent of all the world's workers. Instead of hiring large numbers of poor workers, corporations capitalize on the informal sector by outsourcing stages of the production process to the informal sector or to *casualized* female laborers who subcontract piece work in their homes (Klerk 1994). In India, for instance, only about 10 to 15 percent of industrial workers:

> lead a formal sector existence. . . . The remainder can be roughly divided into two categories: first, those who are unprotected, regular workers in small-scale workshops, under constant threat of dismissal (approximately 60 percent of workers) and, second, casual workers and nomadic labor (approximately 25 to 30 percent of the total). . . . Formal sector employment has only a minute share in almost all important branches of the economy (Breman 1999: 427-28).

Moreover, trade liberalization has been followed by ecological degradation (Mies and Shiva 2001), growing poverty, increased malnutrition, worsened living conditions (Weller and Hersh 2002), and rising infant and child mortality (Wimberley 1992, Burns *et. al.* 2003). Peripheral domestic markets have been inundated with core imports, threatening local artisan crafts, businesses, cultures and religions (Weisbrot and Baker 2002). There is growing evidence that supporters of increased trade and foreign direct investment have exacerbated local ethnic conflicts (Andersen 2000, Dunaway 2003) and have displaced thousands of indigenous people

(Clarke 2001).

In peripheral countries, the neoliberal shift to export production has had the greatest impacts in agriculture and extractive industries. To capture natural resources for core consumption, multinational corporations have destroyed a majority of the world's rainforests in less than two decades. Timbering and mining have left a trail of life-threatening ecological degradation in most of the poor countries that have started new extractive industries since 1985 (Foster 2000). While a majority of peripheral nations have shifted toward export agriculture, fewer of those countries are food self-sufficient today that in 1985 (Food First 1998). In many poor countries, food imports now comprise a considerable percentage of the government's external debt (*New Internationalist* 1999). Moreover, small independent farmers are disappearing worldwide, displaced by giant agribusinesses which centralize control of global food chains into a few corporations (Shiva 2000). Contract farming for agrobusinesses has displaced many earlier forms of agricultural labor and:

> marks a critical transformation and decomposition of the family farm sector as capital saturates the entire agro-industrial complex without directly taking hold of production. . . . Contract production among peasants aims to exploit household labor through dense networks of dependence and subordination (Berstein et. Al. 1990: 151,157).

The shift to export agriculture has been followed by:

1. threats to the traditional agricultural roles of women (Mies and Shiva 2001),
2. prioritization of agricultural exports for core luxury consumption (e.g., a year-round supply of tropical fruits) rather than for local households (Third World Network 2002),

3. reallocation of limited arable lands away from local food crop cultivation toward production of beef cattle and inedible crops, such as cotton (Halweil 2000),
4. the elimination of public food subsidies and inflated food prices (Shiva 2000), and rising malnutrition in most peripheral countries (Food First 1998, United Nations 2002).

Indeed, there is a higher incidence of chronic hunger and malnutrition among agricultural laborer households than any other group (Shiva 2000). Increasingly, export agriculture is draining food away from peripheral countries to supply core countries at a luxury levels while half of peripheral households struggle to meet minimal caloric requirements for their members (Mies and Shiva 2001). Some of the countries which have exhibited the highest level of agricultural exports since 1985 also have exhibited the highest malnutrition rates for children (Food First 1998). To complicate matters, there is little hope that export agriculture will help peripheral nations rise out of poverty. Most of the profits from export agribusiness accrue to external corporations, less than 5 to 10 percent of the accumulated wealth remaining in the producing nations (Weisbrot and Baker 2002). In addition, agricultural produce sells at the lowest prices in the world-economy, so that peripheral nations remain handicapped by high trade imbalances that result from exchanging cheap raw materials for expensive core imports and technology. Introduction of Green Revolution techniques of intensive farming through artificial inputs has led to greater ecological degradation (Shiva 2000), most specifically the increasing pollution of water that has fueled rising infant mortality rates (Burns *et. al.* 2003).

Neoliberal demands for deregulation have led to elimination of local protective tariffs and food subsidies in poor countries while rich countries maintain their own tariffs and hidden subsidies (Brohman 1995). Regulations to insure the human rights of workers and to protect the

environment have been dismantled as part of the pressure to liberalize trade and finance in peripheral nations (Shiva 2000). Minimum wage ceilings have disappeared in most peripheral nations while core countries shelter their workers with minimum wage standards (Tabb 2001). Local restrictions that conflict with intellectual property rights standards set by the World Trade Organization have also been eliminated, laying open to corporate control and patenting many indigenous forms of knowledge (Shiva 2000). Neoliberal demands for devaluation and standardization of poor nation currencies has been followed by price inflation and increased poverty (Weisbrot and Baker 2002). Most peripheral countries are now trapped in a vicious cycle of national globalization agendas fueled by external debt. When those neoliberal agendas have not fostered the promised economic growth necessary to repay that indebtedness, structural adjustment programs have been mandated by the revised neoliberal International Monetary Fund. The negative effects of austere adjustment measures on peripheral economies, nation-states, the poor, and women has been well-documented (McGowan 2002). Pressured by the World Bank, IMF, World Trade Organization, and the United Nations, every peripheral country now has its own globalization agenda which incorporates the elements prized by neoliberals, such as export agriculture, ecotourism, capture of natural assets for world markets, and the construction of large infrastructure projects to attract foreign direct investment and industry (United Nations 2002).

Globalized Aquaculture:

The Blue Revolution from Boom to Bust in Peripheral Countries

Between 1974 and 1985, financial aid to tropical poor countries for a “Blue Revolution”

in aquaculture tripled to US$417.4 million. Three-quarters of these funds went toward increasing export capacity of the fishery sector, especially infrastructure development (Bailey 1988a: 39). The successful development of mass production of shrimp seed in controlled hatcheries and of formulated feeds encouraged private investors and corporations to embark on export-oriented shrimp farming. Recognizing their potential for attracting foreign revenues, many poor countries in Asia, Latin America, and Africa joined the bandwagon of the aquaculture boom (Chong 1990). Their adoption of the needed expensive western technology was made possible by massive investments from international development agencies (such as the World Bank and the Asian Development Bank), by bilateral support from Japan, Belgium, England and the USA, and by private sector initiatives of multinational corporations (Bailey and Skladany 1991). Japan, the world's number one consumer of shrimp, invested in neighboring Asian countries that could supply prawns on a year-round basis. It was at this historical point that small farms began to disappear, and corporate control over the production, marketing and distribution of Asian aquaculture was cemented (Chong 1990).

The Peripheral Boom in Aquaculture

The International Monetary Fund (IMF) and the World Bank touted export-oriented aquaculture as a method for peripheral countries to solve their debt crises (Talbot 1995). In many developing counties, globalized aquaculture is part of the general package of Structural Adjustment Programs mandated by the International Monetary Fund (Kurien 2002). The subsequent "shrimp fever" involved the construction of massive fishponds, hatcheries, feed mills, and cold-storage facilities; and peripheral governments promoted modernized aquaculture through

various forms of economic incentives to corporations and local producers. Within a decade, small-scale, family-owned, polycultural aquaculture evolved from a industry catering to domestic peripheral markets to a corporate-controlled *food extractive enclave* that uses western technology and capital to supply distant markets all over the world (Primavera 1995). [2]

Aquaculture is heralded by leading international development agencies and governments as the most significant advance for 21st century food production. Despite declining marine catches, the globalization of aquaculture industry and trade has dramatically increased the world supply of fish. With the world market as target for aquaculture production, fish and other fishery products cease to be staples of subsistent livelihoods in poor coastal communities. They have become profitable global commodities, thus, important sources of foreign exchange for many poor countries. In fact, the desire to increase foreign exchange earnings has become the dominant motivating force behind national aquaculture development policies in developing countries (Bailey and Skladany 1991). Between 1982 and 2002, net receipts for fishery commodities of developing countries quadrupled to US$17.4 billion (Vannuccini 2004). Between 1970 and 1995, peripheral exportation of fishery products doubled to 12.6 million tons. The value of aquaculture products in the world market outstrips pork, chicken and beef (Weber 1994: 39) while net revenue from the fish trade of developing countries surpasses the combined revenues from their tea, rice, cocoa and coffee exports (Food and Agriculture Organization 2004). Aquaculture now supplies four times more world fish output than it did in 1984, and the industry now accounts for 35 percent of all fishery products (World Bank 2004).

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[2] I am grateful to Professor Wilma Dunaway for suggesting the conceptual term *food extractive enclave.*

The World Bank (2004) contends that aquaculture will contribute two-fifths of the world's total food fish production by the end of the second decade of the 21st century, 79 percent of which will be produced in developing countries. Since 1984, fish productivity in rich countries has consistently declined while it has steadily increased in poor countries, due largely to mass-producing aquaculture (Grainger 2001). In 2002, developing countries accounted for 49 percent of total fishery exports by value and 55 percent by quantity (Vannuccini 2004). Nearly three-quarters of aquaculture production is used as human food, half of which is still produced by small scale-fishers. The rest is absorbed as formulated feeds for aquaculture facilities (Consultative Group on International Agricultural Research 1995).

Despite their own national malnutrition problems, several low-income food-deficit countries prioritize the export of shrimp because they are the highest-revenue producing fishery products (McGinn 1998, Food and Agriculture Organization 1996). Technological advances in breeding and nutrition, favorable state policies, investment and financial incentives, and rising market demand in the United States, Japan and Europe have all contributed to the explosive boom in the Asian shrimp industry (Skladany *et. al.* 1995). Japan is the most influential country in the development of the global shrimp industry. In most decades since 1975, Japan has invested more in export-oriented fisheries and shrimp culture development than either the World Bank or the Asian Development Bank (Bailey 1988a: 40). In 2004, shrimp was the primary global fish commodity, accounting for 18 percent of the total value of internationally traded fishery products (Vannuccini 2004).

Though a low-value commodity in international markets, seaweed is a major export for several developing countries. Japan and the US import more than half the world's seaweed

outputs while the Philippines, Indonesia, Thailand and China are the world's top producers. From 1948 to 1974, Canada was the world's top producer of seaweed, and production was characterized by seasonal harvesting of "Irish moss"by fishing households. By 1978, however, Philippines production of seaweed surpassed Canadian output. In both countries, Marine Colloids, Inc., a U.S.-based carrageenan processor, controlled production and marketing (Blanchetti-Revelli 1995). [3] Seaweed enters the global market in the form of *carrageenan*, a substance that is used as a thickener, emulsifier, or binder in many pre-packaged foods and in several non-food items, such as toothpaste (Seaweed Industry Association of the Philippines 1996a).

The Boom-to-Bust Cycle of Aquaculture

Many, if not all, economies of poor countries are dependent on export-oriented extractive industries which include gas, oil, and mining ventures, logging, and agro-industrial aquaculture and plantations. Such extractive enclaves:

1. are capital-intensive;
2. are generally run by the state or by large corporations, in ways that lead to high rates of corruption, repression and conflict;
3. use little unskilled or semi-skilled labor;
4. are geographically concentrated and create small pockets of wealth;
5. produce social and environmental problems that disproportionately impact the poor;

[3] In the early 1960s, the American-based Marine Colloids, Inc. and a US grant funded experimentation at the University of Hawaii. By the late 1960s and early 1970s, the corporation had selected Sulu, in the southern Philippines as the most ideal area for the mass production cultivation of seaweed. .

6. follow a boom-and-bust cycle that creates economic insecurity (Ross 2001).

Many of the peripheral countries that are most highly dependent on extractive industries are classified as “highly indebted poor countries” (Ross 2001)-- demonstrating the degree to which these enterprises have failed to fuel either healthy economic growth for the nation or alleviation of the impoverishment of citizens.

Aquaculture is one of those peripheral extractive industries which booms only as long as ecological resources and market prices are at supportive levels. When environmental degradation threatens the supply base or new producers enter the market and cause price drops, aquaculture operations tend to “bust” very quickly. Export-oriented shrimp ponds typically bust only after five to ten years of intensive farming, primarily because of shrimp diseases and ecological degradation (McGinn 2002). Only a few investments are directed toward reinvigoration of abandoned shrimp farms while most corporations transfer to other promising areas, leaving behind land and waterways that will be unsuited for cultivation for several centuries (Skladany *et. al.* 1995). While ecological degradation accounts for the bust cycle in shrimp production, competition from synthetics and from alternative agricultural commodities (such as corn starch) are much more likely to trigger bust cycles in seaweed production. Between 1978 and 1984, the Philippines was the top producer of seaweed. By 2000, China was the number one exporter, followed by the Philippines and Chile (Trade Data International 2003).

The Global Food Chain and Food Insecurity

We should more accurately think of commercial aquaculture as an *extractive food enclave*. Worldwide, fish comprise 17 percent of the animal protein in the human diet, and fish are the most

important source of animal protein in the diets of peripheral populations. According to Shiva (2000: 43):

> The two primary justifications for industrial aquaculture are the crisis of depletion of marine resources and the crisis of malnutrition among the poor in the Third World. . . . Though pushed by both national and international organization as an answer to world food scarcity. . ., shrimp contributes little to the nutritional needs of the world's population, being a luxury item that is consumed mainly by the rich in the developed world.

On the one hand, aquaculture has vastly expanded world output of fish and marine foods. On the other hand, aquaculture has now integrated into global commodity chains peripheral fish and marine resources, resulting in two impacts on the food chains of those poor countries that undertake aquaculture projects.

1. Aquaculture removes fish and marine resources from local consumption chains and exports those foods to rich countries– thereby threatening traditional food chains in producing countries.
2. Because less fish is available to peripheral populations, malnutrition and hunger are on the rise, especially in those countries with large aquaculture and fishing sectors (Shiva 2000).

Despite all its purported advantages, the Blue Revolution is really "food imperialism" (Yoshinori 1987). Aquaculture is an industry controlled by core-based transnational corporations, and it has concentrated control over the world's fish and marine foods into the hands of a few companies. Rather than eradicating hunger or expanding resources to feed peripheral populations, aquaculture has further polarized world food distribution and consumption. At the turn of the 21st

century, the richest fifth of the world consumes nearly half of all meat and fish, the poorest fifth only 5 percent. [4] While poor countries supply 85 percent of the internationally traded fishery products, core countries consume 40 percent of the world total supply of fish (McGinn 1998). [5]

Core citizens have benefitted greatly from the new global food chains stimulated by the Blue Revolution, and they now consume three times more fish than people in the developing countries. However, the horrible irony is that peripheral populations cannot afford the luxury meats available in abundance to core citizens, so they must rely on fish for animal protein. While North Americans and Western Europeans acquire more than 90 percent of their animal protein from beef, pork, and chicken, Africans and Asians are dependent on fish for about one-third of their animal protein (McGinn 1998). Aquaculture also drains away peripheral fish supplies for uses outside the human food chain. Non-food uses of fish in rich countries (such as animal feed and oils) is greater than the total human consumption of fish in Latin America, Africa and India combined. [6]

In reality, fish resources are drained away to rich countries and threaten the local food chain in two ways. First, the aquaculture outputs overwhelmingly are exported to the core as luxury foods. Second, the production of those exports and of non-food uses of marine resources requires high levels of inputs of other smaller fishes. Aquaculture and agro-industrial fisheries redirect resources from the human food chains to fishponds of producing countries (Shiva 2000:

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[4] United Nations Development Program, 1999, online at www.undp.org

[5] In addition, two-thirds of seaweed export are destined for only two countries: Japan and the United States.

[6] Worldwatch, 20 June 1998 press release, available online at www.worldwatch.org

43). Consequently, less fish are now available to poor Asian consumers because aquaculture requires such high levels of inexpensive small fish as pond feed (Food and Agriculture Organization 2004). To complicate matters, agro-industrial fisheries consume more resources than they produce, thereby threatening food security even further. In 2000, 5.7 million tons of cultured fish were produced in Asia, requiring 1.1 million tons of feed, derived from a staggering 5.5 million tons of wet-weight fish (Shiva 2000: 43). Thus, one ton of smaller fish that are typically a significant part of the diets of poor households are absorbed to cultivate every ton of export fish that will provide luxury sea cuisine for rich households.

Peripheral food security is threatened in another way. While core consumers enjoy declining prices that result from the expanding supply of tropical shrimp and deep-sea specialty fishes, the cost of fish rises in peripheral countries that engage in export-oriented aquaculture (Public Citizen 2004). [7] In Indonesia, world demand for prawn has pushed up local prices for small fish, such as sardines, that were traditionally consumed by the poor. Ordinary consumers in Malaysia can no longer afford one kind of prawn (*Panaeidae)* because aquaculture producers prefer to export this commodity at higher prices to Japan. [8] In Sri Lanka, the traditional shrimp curry has disappeared from the diets of poor families because the pressure to export has driven up prices (Yoshinori 1987).

Ecological Degradation

[7] For example, the US price for shrimp dropped from $5 per pound to $3.38 in 2003 (Public Citizen 2004).

[8] In Malaysia, the high demands of prawn farms for fish feed has also caused a shortage of fish for the salted fish industry (Wilks 1995:122).

In every peripheral country where aquaculture has been prioritized, "satisfying the huge export market for cultivated shrimp has led to significant environmental damage" (Aksoy and Beghin 2005: 277). The core can pay cheap prices for peripheral fish and marine resources because most of the real costs of production are externalized to the ecosystems and communities of the Global South (Public Citizen 2004:1). Fishpond systems deprive local people of their traditional sources of fish, shellfish, timber, and charcoal, and they weaken the natural capacity of coastal ecosystems to filter and purify water, cycle nutrients, remove contaminants, and buffer the land from coastal storms and severe weather (McGinn 1998: 49, Primavera 1991). Through the privatization of mangroves, large aquaculture operations expropriate from the public commons many ecological resources which local residents have historically used for subsistence and for small-scale enterprises (Bailey 1988). Poor coastal communities lose access to ecological goods (such as shells, oysters, weeds, and other types of fishes) which form a significant part of their traditional diets and their cash-earning capacity. Many subsistent fishing households that once gathered food resources from mangroves or shallow seas are shoved out of those ecosystems when those natural resources are reoriented for export production (Wilks 1995). In Malaysia, for example, several thousand fishermen have suffered big declines in fishcatch due to destruction of mangroves and river pollution caused by aquaculture ponds along the coast. The aquaculture industry has destroyed most of the mangroves in Ecuador's coastal regions. [9] Commercial fishponds and seaweed operations also compete with agriculture for fresh water and introduce salt water into waterways and navigation canals. In Bangladesh, for example, many farms have been

[9] Online at www.sos-arsenic.net, 2004.

damaged by the flow of salt water from the shrimp ponds to the rice-fields, greatly reducing the farm output. [10] Aquaculture also draws high levels of water from underground aquifers upon which farms are dependent for irrigation. As the water level declines and the aquifer compacts, land subsidence occurs over time and the area becomes vulnerable to flooding (Primavera 1991).

Export-oriented aquaculture also threatens ecological biodiversity. On the one hand, aquaculture ponds engage in mass *monocultural* production, using up the space that was once occupied by hundreds of different species. On the other hand, that export species must devour high levels of smaller adjacent species if it is to be produced at high export levels. For instance, 36 million tons of wild fish is needed to produce 7.2 million tons of shrimps. [11] In addition, export-oriented shrimp production requires high inputs of antibiotics and other chemicals. It is common practice for fishponds and hatcheries to flush into nearby seas, mangroves, and rivers excess lime, organic wastes, pesticides, chemicals and disease microorganisms (McGinn 1998). These waste outputs:

1. build up as silt and sedimentation in rivers, bays, and along coasts, threatening all the species in that habitat and all the human occupations dependent on that ecosystem (McGinn 1998),
2. can trigger harmful algae blooms (World Resources Institute 2001),
3. or can cause the emergence of resistant new strains of pathogens (Primavera 1991).

Moreover, escapes of genetically-modified fish can invade the gene pool of wild fish and displace

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[10] Online at www.sos-arsenic.net, 2004.

[11] Worldwatch Institute, 1998, online at www.worldwatch.org

them altogether (McGinn 1998).

Unemployment, Poverty and Displacement

While the Blue Revolution has expanded food outputs, it has led to the elimination of employment opportunities for peripheral coastal populations. On the one hand, aquaculture has destroyed small-scale, family owned farms and enterprises to pave the way for corporate-owned agribusiness enclaves (Bailey and Skladany 1991). In the global shrimp chain, for instance, small-scale traditional ponds have been aggregated to form larger, export-oriented, corporate-owned prawn farms. “International agencies help create a dualistic pattern of development, with benefits skewed towards a limited number of large-scale fishing enterprises rather than towards the far more numerous small-scale sub-sector,” which often comprises 90 percent of the households located in the areas where commercial aquaculture is entrenched (Bailey 1988b: 36). On the other hand, export-oriented aquaculture industries employ far fewer laborers than do small-scale fishing operations. The net result has been that unemployment has risen among fishing households in peripheral countries that have converted to Blue Revolution production strategies (Kurien 2002). In the case of shrimp aquaculture, there are very few laborers involved in the entire production process (Bailey and Skladany 1991). One of the social impacts of globalized aquaculture is the displacement of people and small local businesses, thus depriving them of their traditional sources of livelihood (Kurien 2002). Bangladesh provides an enlightening example. Large landowners and city-based absentee owners dominate shrimp culture in the southern districts of Bangladesh. To aggregate the natural resources essential to agro-industrial production, poor rice farmers have

been forcefully dislocated by the state and by invasive gangs controlled by shrimp-farm owners. [12]

Little wonder, then, that export-oriented aquaculture has exacerbated existing social inequalities in poor countries. Because large aquaculture operations require high capital investments for infrastructure, only the rich can engage in this venture. Small entrepreneurs are effectively shut out (Primavera 1991) because big businesses in joint ventures with foreign investors monopolize the industry and the credit offered by banks and financial institutions (Kurien 2002). Shrimp farming has also been linked to widespread human rights abuses. In Thailand, China, Indonesia, India, Vietnam, Bangladesh, and the Philippines aquaculture has been accompanied by land seizures, the displacement of tens of thousands of people, and the depletion, salinization, and chemical pollution of drinking water.

> The requirement of certain shrimp species for brackish water means that, over time, salts penetrate the water table, while water exchange practices associated with more intensive shrimp farms typically involve pumping water in from surrounding rivers or groundwater supplies (thus depleting fresh water sources) and then pumping out water from the ponds into canals, rivers and near-shore waters. This process can lead to contamination of groundwater supplies and rivers by pollutants (including pesticides, antibiotics and disinfectants) and saltwater. . . . (Environmental Justice Foundation 2003: 10).

After the advent of export-oriented shrimp farms, 20,000 fishers in Sri Lanka's Puttalam District were forced to migrate because their small-scale fish catches declined to levels that would not support their households. From Satkhira, Bangladesh and Andrah Pradesh state in India,

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[12] Online at www.sos-arsenic.net, 2004.

168,000 people have been displaced from rural areas to overcrowded cities. Child labor supports the aquaculture industry in many peripheral countries. In Bangladesh, for example, children collecting shrimp fry to stock shrimp farms work 13 hours a day in and around water, leaving many with skin and respiratory disorders. In addition, shrimp farming has been tied to murders of activists and laborers in five Latin American countries and in six Asian countries, including the Philippines (Environmental Justice Foundation 2003). On the one hand, export aquaculture has not proven to be a capitalist technological advance that has positively impacted world hunger. On the other hand:

> Where shrimp aquaculture has expanded. . . many local peoples have seen their ways of life destroyed, their economic system undermined, their access to essential resources cut off. They had no voice in what has been happening to them. This is an invisible type of human rights violation (Environmental Justice Foundation 2003: 26).

CHAPTER 2

GLOBALIZED AQUACULTURE FROM BOOM TO BUST IN THE PHILIPPINES

> Where shrimp aquaculture has expanded. . . many local peoples have seen their ways of life destroyed, their economic system undermined, their access to essential resources cut off. They had no voice in what has been happening to them. This is an invisible type of human rights violation (Environmental Justice Foundation 2003: 26)

Nestled along the Pacific Rim a few degrees above the equator, the 7,100-island Philippines possesses one of the world's best natural endowments of tropical marine and coastal resources. The country's coastlines include 200 million hectares of marine waters, a 200-mile Exclusive Economic Zone, 260 million hectares of coastal waters, and 193.4 million hectares of oceanic water. The Philippines has one of the world's largest coral reef areas, the world's second highest sea grass diversity, and 840,000 hectares of inland waters (World Bank 2000). Coral reefs around the Philippines contain 500 of the world's 700 known coral species (*Philippines Environmental Monitor* 2000). The country also has the largest area of developed estuarine fishponds associated with mangroves (Hodgkins 1988). [1] Despite these natural marine endowments, fishing and aquaculture are not top contributors to the country's GDP, and this agri-industry employs only 1 million out of the 30 million labor force. [2] Fishing and aquaculture have

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[1] Estuarine fishponds are those lie at the interface between freshwater and marine ecosystems and are subject to tidal movements. Many of the fishponds in Panguil Bay , the site of this project, are estuarine fishponds.

[2] Horacio Morales, online at *Municipalities of the Philippines*, 27 May 1999, *Online Magazine for Sustainable Seas*, June 1999 2:6. http://www.oneocean.org/overseas/jun99/dar.html

developed in the Philippines through four historical stages:

1. Small-scale traditional fishing and polycultural fishponds before 1940;
2. Nationally-subsidized polycultural fishpond expansion after the 1950s to feed local consumers;
3. Monocultural fishponds for export after the late 1970s, with the boom occurring in the 1980s;
4. The aquaculture bust stage after 1989. [3]

Polycultural Fishponds for Local Markets

Fish farming has existed in the Philippines for many decades. The country's first fish pond was recorded in 1863, and small-scale pond fishing was common at the turn of the 20th century. These early fishponds were surrounded by earthen dikes in which abounded tailings of *mangla,* a kind of crustacean that bored holes and pushed up the soil to the surface. Milkfish or *bangus* (small shrimp fry) were the main cultured fish in these ponds. This early stage was far less ecologically destructive than the new technologies of later decades. In 1920, the country had 450,000 hectares of mangroves which were slowly developed into fishponds at the rate of about 760 to 1200 hectares per year between 1920 and 1940. In the 1940s, the mangrove conversion rate increased to about 1,176 hectares annually. In 1947, fishpond development was further

[3] Primavera (1997: 47) argues that Philippines shrimp production reached its peak in 1989, then production declined, peaked again in 1992, and subsequently declined steadily. Yap (1999) contends that the "shrimp fever" was over in 1989 when prices collapsed and bank lending rates rose to 25 percent.

spurred by the formation of the Philippine Bureau of Fisheries and Aquatic Resources and a US$23.6 million loan from the International Bank for Reconstruction and Development (Primavera 1995).

Fishpond construction expanded at 5,000 hectares per year in the 1950s and 1960s. In this period, the Philippine government prioritized aquaculture as a strategy to feed its own citizens, and there were national *import substitution* restrictions to protect this fledgling industry. In 1965, the Philippine Fishery Commission was established to help stabilize the national economy by conserving natural fishing resources for domestic consumption and to restrict importation of fish. In 1967, there were 140,055 hectares of fishponds, about 40 percent privately-owned, the rest operating on long-term leases from the government (World Bank 1976). [4] In 1968, the total hectarage rose to 165,873 of which 53 percent were privately-owned. The first exportation of prawns to Japan was recorded in 1968 at 179 metric tons valued at US$149,000 (Primavera 1993).

In 1975, the Philippines government enacted its 1975 Fisheries Code, which placed administration of mangroves under the public fishery and forestry bureaus, prohibited private ownership of mangroves, and required fishpond developers to retain mangrove buffer zones. As a result, fishpond construction slowed in the early 1970s. However, the 1975 act defined mangroves as “swamplands available for development” (Primavera 1995), and it provided far less support to indigenous small fishers than to foreign commercial investors (Illo and Pollo 1990). Throughout the 1960s and 1970s, most of the country’s fishponds relied on traditional

[4] These government leases were for 25 years and were renewable for another 25 years (World Bank 1976).

polycultural methods which relied on the natural inputs from tidal waters to feed *bangus*, shrimps, and natural stockings. In 1971, smaller-scale polycultural municipal and commercial fisheries still accounted for most of the country's fish output while private larger aquaculture ponds provided only about 10 percent. Aimed at local markets, *bangus* constituted 95 percent of the productivity of Philippines fishponds in this period (Primavera 1995). Throughout the 1970s, the Fishpond Development Program encouraged the production of milkfish, oysters, and carp, through leasing of "swamplands." The program also developed "family-owned" fishponds through long-term lease agreements with participants in reform areas. One objective was to establish modern fishpond villages run on a cooperative basis with government supervision and financial assistance (World Bank 1976: 145).

The Boom in Monocultural Ponds for World Markets

Between 1965 and 1975, Philippine fishery production more than doubled while per capita consumption increased by almost 50 percent (World Bank 1976). During this decade, most of the expansion of food fish output derived from polycultural fishponds, and commercial monocultural aquaculture grew very little. Despite its increased fish production, the Philippines was still falling short of the food needs of its growing population and was importing about 40,000 metric tons of fish annually (Bureau of National and Foreign Information 1976). The World Bank used this shortfall to advocate to the Philippines government the need for the country to expand commercial aquaculture and to develop more intensely its mangroves for expansion of inland fisheries. Following World Bank advice to increase export-oriented fish productivity, the

Philippines established its Fishery Development Authority in 1976 (World Bank 1976). In 1979, the Philippines Bureau of Fishing and Aquatic resources accelerated pond development by extending government leases from ten years to 25 (Primavera 2000). At the same time, Japan began to encourage neighboring Asian nations to embark in shrimp culture production (Bailey 1988a) by offering attractive prices (Chong 1990). In the early 1980s, new technologies in seedling hatcheries and formulated commercial feeds permitted the country to move quickly into the development of monocultural shrimp ponds that were jointly financed by the government and private investors (Primavera 1995). When the Asian "shrimp fever" in aquaculture was fueled by external loans and Japanese investments in the early 1980s, the Philippines government sponsored an 8,000-hectare new pond for export-oriented shrimp culture (Chong 1990: 41). In 1984, the Philippines began to expand its indebtedness for aquaculture, by soliciting a US$21.8 million loan from the Asian Development Bank to construct hatcheries and ponds (Primavera 1995).

Alongside the 1985 push toward export-oriented monocultural prawn culture, there were still in operation 176,000 hectares of fishponds doing extensive shrimp polyculture (Bailey 1988a). Between 1970 and 1990, these small polycultural operations disappeared, as commercial fishponds expanded 137 percent (Nickerson 1999). In 1981, the cash crop in shrimp accounted for less than 1 percent of the country's total pond production. By 1990, export shrimp output had risen to two-thirds of total output (see Table 2.1). More than 80 percent was being shipped to Japan, the second largest importer being the United States.[5]

The transformation of subsistence or small-scale shrimp culture into an export-oriented

[5] www.pcamrd.dost.gov.ph/dataseries/

Table 2.1

Philippines Prawn Production by Sector, 1976-1997 (in metric tons)

Year	Export Aquaculture	Local Consumption: Municipal Artisan Fishers	Local Consumption: Commercial Producers	Total
1976		27,608		27,608
1980	1,360	19,766	6,007	27,133
1985	27,039	29,911	3,451	60,401
1990	53,989	28,014	4,750	86,573
1995	90,456	27,339	9,027	126,822
1996	78,064	27,913	8,741	114,718
1997	41,618	25,334	7,153	74,105

Source: Collected from annual statistics provided at www.pcamrd.dost.gov.ph/dataseries/

activity can be traced back to 1980s structural adjustment policies imposed on the Philippines. by the International Monetary Fund (Bello 2004). In 1988, the Philippines enacted its Comprehensive Agrarian Reform Law, an IMF-mandated structural adjustment policy which permitted privatization of publicly-controlled mangroves and established fiscal policies that made it easier for land owners to convert their holdings into shrimp fishponds (Yap 1999). Because this legislation exempted fishpond areas from land redistribution, it was a means of further expansion of foreign agribusiness control over Philippines natural resources and workers (Kilusang Magbubukid ng Philippines 2000). Such neoliberal policies were designed to create an environment that was conducive to a shift to export-led economic growth strategies. According to Cabanilla (1997: 9-10):

> the export promotion measures included improved export financing facilities, duty-free or low tariff access to inputs by export producers, tax holidays and other fiscal incentives for export production and trading, elimination of export tax on all products except logs, and restructuring the investment incentive system to encourage export ventures. Taken together, these policy reforms. . . stimulated investments in export-oriented activities. . . . The emergence of shrimp cultivation as an export-oriented activity has [led to] the use of intensive shrimp farming methods, in order to quickly recover investments and amass vast profits in the shortest possible time.

The Philippines needed a fast return on these aquaculture investments because the government had taken out a number of loans to finance its neoliberal export agenda. By 1994, Philippines external debt had skyrocketed to more than $US 39 billion, amounting to nearly $656

debt per capita (*Third World Guide* 1999).

The Shrimp Aquaculture Bust of the 1990s

Through vast exports to Japan and the United States, Philippines export shrimp production boomed in the 1980s, reaching its peak in 1989 (Primavera 1995). After only about a decade of export-oriented monocultural farming, the Philippines had depleted its fish resources to the point it was no longer competitive in the world market.

> In terms of livelihoods, species diversity, and future sustainability, the technologies of industrial fisheries, which aim to maximize the commercial catch in the short run, are rather inefficient. Over-capitalized fisheries are collapsing in region after region. None of the world's major fishing grounds [including the Philippines] are threatened. Four have been "fished out" commercially. . . . Trade sources also point to a shift in the composition of the export mix of prawns over time from the large species. . . to the smaller varieties (Shiva 2000: 40).

A decade ago, the UN Food and Agriculture Organization (1996) warned that nearly 70 percent of global fish stocks– including those of the Philippines-- have been "depleted" and that "the oceans' most valuable commercial species are fished to capacity."

Moreover, overproduction of shrimp and fish by so many Asian countries led to falling prices. Simply put, world prices "crashed in 1989 because the world market was flooded with Chinese shrimp" (Chong 1990: 42). Between 1985 and 2003, the Philippines almost quintupled its shrimp exports, but the market value of those exports did not even double (Food and Agriculture

Organization 1996). For the Philippines and many other poor Asian countries, the thrust toward export-oriented aquaculture became a swinging door of export/import flows through which the country's ecological resources and financial wealth ended up far away in one of the rich core countries. The costs of external loans, of foreign technology and fishfeed inputs, and of the rice imports needed to replace crop outputs eliminated to make space for aquaculture amounts to a net trade imbalance for the Philippines (*Third World Guide* 2001).

In 1994, the World Bank congratulated the Philippines as one of the most deregulated economies in Asia, claiming that the country's economy was on track for full economic recovery by the year 2000. [6] To cope with its declining aquaculture outputs, the Philippines established its Fishery Sector Program and its Fishery Resource Management Program, using loans from the Asian Development Bank and Japan's Overseas Economic Cooperation Fund (Asian Development Bank 1999). In the face of bust conditions, the Philippines shifted its focus toward fisheries resource protection, conservation, sustainable management, and has tried to identify alternative aquaculture methodologies, such as seaweed farming. The country also criminalized several forms of "illegal fishing" that are done primarily by poor fishermen. In 1995, the land reform law was amended to exclude fishponds. This act of support for the fishpond operators is prompted by the large dollar earnings from shrimp export and the strong competition among neighboring countries (Yap 1999). In 1997, the Agriculture and Fisheries Modernization Act was enacted to put in place emergency measures intended to modernize fisheries to make them more

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[6] By 2000, external debt skyrocketed to $52 billion from $39 billion in 1994. The peso rose only to 49.90 in 2000 from 26.40 in 1999. *Asiamoney Magazine* (March 1996), http://www.oneocean.org/overseas/jun99/dar.html

profitable in the face of the challenges of trade liberalization and current international competition. That same year, the Department of Environment and Natural Resources banned the use of mangroves for fishpond development (Bureau of Fisheries and Aquatic Resources 2003). [7] At present, the government is pursuing a Ten Point Program to try to increase export production to levels that will generate the ratio of foreign reserves mandated by the International Monetary Fund. Despite these government efforts to bolster its faltering aquaculture industry, the Philippines supplied only 4 percent of world output of shrimp in 2000 while Thailand and China account for 48 percent (Aksoy and Beghin 2005: 277). Of the 222,907 hectares of brackish ponds established in the country for shrimp aquaculture, only around 50 percent are still functioning (Primavera 1995). Following the decline in shrimp production, Philippine aquaculture resorted to production of less sensitive pond species, like milkfish and *tilapia* which are now exported in much greater quantities than shrimp (see Table 2.2).

Following the decline in shrimp production, the Philippines prioritized expansion of seaweed production, and this type of mariculture increased 64 percent between 1992 and 1997. [8] In 2000, seaweed comprised two-thirds of the metric tons of aquaculture exports, but the lowered

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[7] Despite the ban, the private Diapitan Resources Development Corporation has continued to expand its shrimp farm into mangroves (Orejas 2000).

[8] Statistics online at Philippine Fishery Resource Management Program, 2003, www.frmp.org. Seaweed farming of the *Euchema* specie originated in the southern Philippines, particularly Sulu, in the mid-1960s under the auspices of the American-based Marine Colloids, Inc., the world's largest carrageenan processing company, which had exploited Canada's Irish Moss from the 1940s until the 1970s. In 1966, the Philippines exported 800 metric tons of dried *Euchema* In 1978, Philippine production unseated Canada as the world's top producer of seaweeds. Since then, the Philippines has continued to be the world's top producer of seaweeds and its by-product, carrageenan (Trade Data International 2003).

Table 2.2

Aquaculture Production in Metric Tons, 1980-2002

Commodity	1980	1985	1990	1995	2000	2001	2002
Shrimps	1,360	27,039	53,989	90,456	36,749	46,450	41,961
Seaweeds	114,305	182,946	291,176	579,005	707,039	785,795	894,856
Milkfish	171,775	193,650	210,882	151,116	209,994	225,337	203,512
Tilapia	16,951	43,780	76,142	81,945	92,579	106,746	122,390

Sources: Collected from statistics provided by www.pcamrd.dost.gov.ph/dataseries. Office of Commercial Affairs, Royal Thai Embassy, Manila, 2004, online; Platon and Israel (2001); Sugiyama *et. al.* (2004)

production of shrimp still netted a far higher total export value. [9] These seaweed are processed into *carrageenan* which is an additive used in many food (such as poultry, ham, sausage, and dairy items) and nonfood products (such as cosmetics, pharmaceuticals, shampoos, lotions, creams, air fresheners, toothpaste). The greatest demand for Philippine seaweed exports comes from China, the United States, France, Great Britain, and Germany. Because seaweed farming does not require capital-intensive technology, at least 500,000 farmers are involved in seaweed production. While Western Mindanao supplies 70 percent of the country's output, every region of the Philippines is involved in seaweed production. At present, there are eleven Filipino-owned and four foreign-owned carrageenan refining plants in the country, employing 12,000 Filipinos full time (Seaweed Industry Association of the Philippines 1996b). However, this "bust-strategy" industry is already showing signs of crisis. Production declined after 1999 (see Table 2.2), followed by increased Chinese demand for dried seaweeds. These two trends have resulted in raw material shortages for Philippine-based processing plants, leading to lowered carrageenan processing and worker layoffs. [10]

Ecological Impacts of Philippines Aquaculture

Aquaculture's *food extractive enclaves* in the Philippines have generated the same types of inequalities as other types of extractive enclaves around the world:

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[9] Philippine Fisheries Profile, 2000, Online at www.frmp.org

[10] IBON Foundation, "WTO: Grim Threat to RP Industries, Workers," May 2005, online at www.ibon.org.

1. Extreme degradation and depletion of ecological resources.
2. Rising poverty, especially among fishing families;
3. Low economic growth, especially after the extractive operations go “bust;”
4. High infant and child mortality;
5. High child malnutrition, as well as malnutrition among pregnant women;
6. Low health spending by the national budget;
7. Low school attendance by children in poor fishing households;
8. Low adult literacy among poor fishing households;
9. High income inequality, with living conditions of the poor polarized from those of the middle class and rich elites;
10. Vulnerability to economic shocks caused by competition in the world-economy.

Export-oriented monocultural shrimp farming has had several negative ecological impacts on the Philippines. Organic waste from shrimp farms smothers coral reefs and seagrass beds, and high levels of sedimentation build up in seas, bays, and rivers.

> Shrimp farming requires four to six tons of feed per hectare (per cropping). Only 17 percent of this feed is converted into shrimp biomass. The rest becomes waste, heavily contaminated with pesticides and antibiotics, which is flushed directly back into the sea or onto neighboring mangrove and agricultural lands. The shrimp pond is then refilled with new sea water. The high level of pollution resulting from this open drainage of effluents into both irrigation channels and the sea has resulted in fish mortality, the contamination of groundwaters, and various health hazards (Shiva 2000: 46).

The salinization of groundwater is also creating a major drinking water crisis in coastal communities throughout the country.

> Shrimp farming requires the pumping of sea water into ponds, since most of the shrimp species farmed require a salinity between 25 to 30 parts per trillion. A one-hectare industrial shrimp farm, for instance, requires 120,000 cubic meters of sea water every year. During the shrimps' growing period-- between 120 and 150 days-- salt water from the ponds seeps into the neighboring agricultural farms and the water table. The fact that fresh water from underground aquifers must be extracted for salinity control in the ponds intensifies the problem. Over the four-month growing period, roughly 6,600 cubic meters of fresh water are needed to dilute the sea water in a one-meter-deep, one hectare pond. The aquifers left empty after these massive extractions are especially vulnerable to salt-water intrusion (Shiva 2000: 46-47).

In the Philippines, "overextraction of ground water for prawn farms has caused shallow wells, orchards and ricelands to dry up, and land to subside and saltwater to intrude from the sea" (Wilks 1995:122).

Monocultural fish and seaweed farms have caused loss of biodiversity, eliminating hundreds of fish, crustaceans, mollusks, and grass species. More than 400 plant and animal species found in the Philippines are currently threatened with extinction (*Philippines Environmental Monitor* 2000). Salt-water contamination by adjacent shrimp ponds has made agricultural land barren, causing loss of valuable ricelands (Primavera 1997). In addition, prime agricultural land has been converted into shrimp ponds, endangering the country's outputs of rice

and sugar (Chong 1990: 47). [11] According to the *Philippines Daily News* (22 April 2003), export aquaculture has taken a serious ecological toll on the country. In 2002:

> merely 10 percent of the Philippines' fish stocks was left in the seas and coasts. . . . About 80 percent of the country's coral reefs, the breeding and feeding grounds of fish, are severely damaged. Fifty of the country's 421 rivers are already dead and many lakes are ecologically endangered. From 500,000 hectares in the 1920s, mangrove areas, the nurseries of most marine life, have gone down to only 120,000 hectares.

In Mindanao, more than half the rivers are polluted, and only about 5 percent of the coral reefs are in good condition (Balane 2003). According to Cabanilla (1997: 10):

> The reduction of fishing grounds and fish carrying capacity. . . has led to dwindling total fish stocks (both in number of species and in terms of volume), diminished fish catch and, therefore, eroded income. [Shrimp aquaculture] also damaged and reduced crop areas and limited the capacity to engage in traditional economic activities, leading to increased income erosion and growing income inequality. The low level of income, in turn, has reinforced the use of illegal fishing methods and encouraged overfishing, which have further depleted local fish resources.

Between 1951 and 1990, the hectares in brackish ponds for shrimp production almost doubled, with some regions experiencing far more damage than others (see Table 2.3). In this same period, the country lost two-thirds of its mangroves (see Table 2.4), more than half those

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[11] Philippine rice production is further threatened by the shift to nonfood crops. While Philippines acreage in rice is declining, the area in cut flowers for export is increasing. 350,000 rural livelihoods have been diminished by the shift from corn, rice and sugarcane to cut flowers for export (Third World Network, online www.twnside.org.sg).

losses caused by deforestation for fishpond construction (McGinn 1998). Mindanao, the island on which this study was conducted, lost three-quarters of its mangroves in that time period. In addition to being the habitats for hundreds of plant and animal species, mangroves supply timber and wood products used for fishing, construction, furniture, firewood and charcoal, fish, shrimps, crabs and mollusks for food; and minor items like tannins, dyes, medicines, and fodder for livestock (Primavera 1995:304). The leaves of the nipa palm are used for wrapping foods, the midribs are bundled into brooms, and the immature kernels are eaten. Fronds are also processed into thatch and shingles used in roofing and walls of rural houses (Primavera 1995: 304).

While it is far more sustainable than export-oriented shrimp production (Sugimori 2001), seaweed farming is not without ecological hazards. Since it is monocultural, mass production of one special threatens plant and grass diversity along coasts (Lindstrom 2004). The seaweed is cultivated in tightly-packed parcels, changing the feeding habits of snails, oysters, and small fish that naturally utilize sea grasses and plants as their habitat. [12] Seaweed farmers also attempt to limit the mollusk populations that normally feed around such plants, thereby disturbing their natural habitats and threatening their survival (Feng *et. al.* 2004). Toxic substances, such as ammonia, arsenic, and iodine, that are naturally excreted by *Eucheuma*– the seaweed species grown in the Philippines-- occur at much higher levels in the massed seaweed farms, causing small mollusks and snails to move out of these areas. [13] Seaweed farms dominate space where corals would normally flourish (Radford 2002). Genetically-modified strains rapidly explode and destroy

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[12] *Oecologia* 140 (2) (2004): 328.

[13] *Experimental Biology and Medicine* 229 (224) (2004): 473, *Marine Ecology Progress Series* 263 (2003): 29, *Journal of Experimental Marine Biology and Ecology* 191 (117) (1995): 1068.

Table 2.3

Philippines Hectares in Brackish Ponds, 1951-1990

Region	1951	1990	Total Increase	% Increase
Ilocos	7,599	17,511	9,912	130.4
Cagayan Valley	0	1,635	1,635	1,635.0
Central Luzon and NCR	34,172	56,919	22,747	0.7
Southern Tagalog	2,238	24,429	22,191	991.6
Bicol	671	11,607	10,936	1,629.8
Western Visayas	27,741	61,863	34,122	123.0
Central Visayas	2,151	7,642	5,491	255.3
Eastern Visayas	1,135	6,400	5,265	463.9
Western Mindanao	1,399	18,460	17,061	1,219.5
Northern Mindanao	623	4,610	3,987	639.9
Southern Mindanao	3,223	7,732	4,509	139.9
Central Mindanao	1,333	4,099	2,766	207.5
Total	82,228	222,907	140,679	171.1

Sources: Calculated using statistics provided by Primavera (1995)

Table 2.4

Loss of Mangrove Hectares in the Philippines, 1951-1990

Region	1951	1990	Total Loss	% Loss
Ilocos	771	200	571	74.1
Cagayan Valley	7,322	3,400	3,922	53.6
Central Luzon and NCR	56,799	500	56,299	99.1
Southern Tagalog	77,997	51,000	26,997	34.6
Bicol	42,234	9,900	41,244	97.7
Western Visayas	49,305	2,825	46,480	94.3
Central Visayas	24,213	9,650	14,563	60.1
Eastern Visayas	36,501	24,850	11,651	31.9
Western Mindanao	91,072	19,300	71,772	78.8
Northern Mindanao	18,273	8,600	11,173	61.1
Southern Mindanao	17,158	7,100	10,058	58.6
Central Mindanao	6,647	2,400	4,247	63.9
Total	418,328	139,725	278,603	66.6

Source: Calculated using statistics provided by Primavera (1995)

biodiversity, including the expansion of these new species from their points of origin to other parts of the world (Lindstrom 2004). There is also evidence that seaweed farmers utilize pesticides which get absorbed at high levels by seaweed (U.S. Food and Drug Administration 1994: 17). In the Pacific Rim where seaweed is part of the human diet, poisonings– including eight deaths in the Philippines in 2003 – have been widespread throughout the 1990s, and hospitals have pointed to pesticides as the causative agents. [14]

Socioeconomic Impacts of Shrimp Aquaculture

Shrimp farms are capital rather than labor intensive. Since these enterprises require so few workers, they have not generated new employment opportunities to offset the job losses their construction has caused. An 8,000 hectare shrimp farm employs only five workers full-time and hires about eight laborers temporarily during harvests (Cabanilla 1997). A study of one Philippines region demonstrates that:

> the economic benefits of shrimp culture did not trickle down to the residents but remained with the farmers, entrepreneurs and traders. . . . Instead of improving living standards and village welfare, shrimp farming brought about social displacement and marginalization of fishers. . . . Employment of local people in shrimp farms was limited to low-paying, unskilled jobs such as laborers and guards, while technical and managerial positions are reserved for outsiders

[14] *Chemical Research in Toxicology* 17 (9) (2004): 1265, *Environmental Science and Technology* 38 (15) (2004): 4140.

(Primavera 1997: 820-21).

During the decades that shrimp aquaculture has boomed and busted in the Philippines, the economic conditions facing families have steadily worsened. Wealth and income have been increasingly concentrated into a few hands. The poorest 20 percent of the population has acquired only 5.4 percent of total income (*Third World Guide* 2001). Between 1994 and 2000, the income of the top 10 percent of the population increased to 23 times that of the poorest 10 percent. In 1994, the Philippines currency was devalued, resulting in a 72 percent drop in the value of the peso when standardized against the dollar (Casino 2004: 1-2). Subsequently, prices inflated at an average rate of 9.7 percent yearly while consumer prices rose as much as 27 percent in some years (*Third World Guide* 1999). Between 1995 and 2000, there was a 10 percent drop in average family incomes (Schelzig 2005). The external debt grew 47 percent in the years after 1994 to reach $US 57.4 billion in 2004. [15] For every 10 pesos of income in 2004, 5 pesos were earmarked for external debt repayment. By 2005, 71 percent of the national budget was spent on debt servicing (IBON Foundation 2005b). According to Scipes (1999: 9):

> The neoliberal economic program has made things worse for the large majority of Filipinos. . . . [T]he number of Filipinos living under the Filipino poverty line has increased. . . and a peso in 1992 could only buy 60 centavos of what it could have bought in 1988.

Since the government now only pays about 60 percent of the cost of public education, the school dropout rate has spiraled. Moreover, about one of every five adults lacks access to regular

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[15] *Asiamoney Magazine March* 1996 supplement, online at http://www.oneocean.org/overseas/jun99/dar.html

health care services (*Third World Guide* 2001). Between 1997 and 2000, poverty increased 10 percent and the ranks of the impoverished grew by 4 million, and the Philippines now has a higher incidence of poverty than its Asian neighbors (Schelzig 2005). Nearly half of all Filipino families struggle to survive on less than 57 cents a day ($US) per person, the unrealistic official poverty line set by the Philippine government (*Manila Times*, 19 February 2005). If the country's poverty line were set at the World Bank's cutoff point of $1 day per person, probably two-thirds of Filipino households would fall among the impoverished. Fishing families are among the poorest in the country, and they are less educated than households engaged in other occupations. (Balisacan 1992)-- seaweed farmers averaging only 5.5 years schooling (Yap 2000). Even though their areas provide the bulk of the country's seaweed production for export, the households of Sulu and Tawi-tawi remains impoverished (*Sun Star* 2004). "In the drive to industrialize, privatize and orient fish production towards exports, poor fishing and fish-farming communities are often left behind" (*Baltimore Chronicle*, 28 March 2005). [16]

Unemployment is also rising due to the loss of jobs after trade liberalization. Between 1994 and 2004:

> Over a million jobs have been lost in agriculture alone, with 690,000 rural families. . . thrown into poverty since 1994. . . . Unemployment is at an all time high with 4.9 million Filipinos jobless and 8.3 million having to go oversea just to earn a living. . . . In the industrial sector, local manufacturers are reeling because of the influx of imported goods (Casino 2004: 1-2).

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[16] Online at http://baltimorechronicle.com/032805Overtz.shtml

In addition, 2 million rural farm workers lost their jobs in 2000, and the agricultural sector now creates far fewer jobs than it is losing every year (IBON Foundation 2005: 2). According to Primavera (1997: 820), shrimp aquaculture also threatens food security "through (a) loss of ricelands by pond conversion or salinization, (b) shifting of culture ponds from milkfish and other domestic food crops to shrimp, and (c) declining nearshore fish, crustacean and mollusc catches associated with mangrove deforestation." Flooding and salinization of lands has resulted in loss of rice farms. While exporting high levels of fish and seaweed, the Philippines has become dependent on imports of rice and corn, and the country's agricultural sector now registers a trade deficit annually (IBON Foundation 2005: 3). According to Cabanilla (1997: 9), rice importation poses a serious threat to Philippine food security.

> The quantitative ceilings on budgetary deficits imposed by the IMF prevented adequate and necessary investments in the rice industry. As a result, the irrigated rice area in the Philippines ranks next to the last in the Southeastern Asian region. Only around 48% of irrigable land is irrigated. This can partly explain the fact that the Philippines has the second lowest yield per hectare in East Asia. . . . In consequence, the Philippines has become chronically dependent on rice imports. Whereas the country was a net rice exporter until 1983, in the period 1984-1992, it has only seen three years of positive trade balance in rice, and since 1993, it has always registered a negative trade balance.

The World Health Organization reports that protein-energy malnutrition, iron deficiency anemia, iodine deficiency, and Vitamin A deficiencies are typical of the countries that export high

levels of shrimp and fish. [17] At least one-third of the Filipino population is now chronically malnourished (*Third World Guide* 2001). In the Philippines, the bodies of large prawns are exported, leaving only the heads for purchase in local market stalls. In a country that produces iron-rich fish for export, the Philippine Food and Nutrition Research Institute reports that: [18]

1. Per capita food consumption declined dramatically between 1982 and 1993.
2. Three-quarters of households have per capita intake below dietary energy adequacy.
3. Iron deficiency anemia is a major health problem, especially for children and pregnant women.
4. Most Filipinos are deficient in calcium and Vitamin A.
5. Most Filipino diets lack adequate levels of fruits, green vegetables, fats and oils, cereals, poultry, and meats.

From Boom to Bust: Risks to Survival of Panguil Bay Households

Located in Northern Mindanao, Panguil Bay once was among the richest fishing grounds in the Philippines. Shaped like a long tooth ("pangil" in local dialect, thus the name), it is 29 kilometers wide and has a coastline that extends 112 kilometers. Two major watersheds connect to the bay while 29 major rivers and 46 minor tributaries pour into the bay. Because of these characteristics, Panguil Bay was in the past a breeding ground for many species of exotic crabs,

[17] See "Nutrition in South-East Asia" at www.whosea.org

[18] See "Statistics" at www.fnri.dost.gov.ph

prawns, mussels, fishes and shellfishes (MSU-Naawan 1991). Considered the richest shallow water fishing ground in Mindanao, the hydrological characteristics and the confined waters of Panguil Bay make it ideal for aquaculture (Guran 1995). Shrimp hatcheries in Northern Mindanao depend on the Bay to supply their prawn broodstock and spawners (Tumanda 1982). Between 1982 and 1991, shrimp fishponds expanded 18 percent annually, tripling the area utilized by export aquaculture in just a decade (MSU-Naawan 1991). In 1995, there were 16,000 hectares of fishponds around Panguil Bay, and some barangays were also engaging in export seaweed production (Israel *et. al.* 2003). Well before 1990, export shrimp farming had reached the bust stage in Panguil Bay. Most of the corporate fishponds have either ceased operations or decreased production.

After the bust, Panguil Bay now provides livelihoods for nearly 10,000 households that engage in small-scale fishing, semi-intensive prawn farming, or seaweed cultivation (Israel *et. al.* 2003). Surrounding the Bay are 76 coastal barangays that support more than 450,000 people (Loquias 1990-91). Throughout the 1990s, there has been a steady increase in the fishing population, as migrants have flowed in from the Visayas and other Mindanao provinces (MSU-Naawan Foundation 1991). [19] Small-scale fishers utilize a variety of gears, including *bungsod* (stationary fish corral or platform), hook and line, gill net, beach seine, *sudsud* (trawl), and the *sanggab* (filter net) which is the most controversial. In the 1980s, there were 322 giant and 180 medium-sized *sanggabs* in the Bay (Tumanda 1982). The filter net can haul in a higher quantity of fish than the other methods, and its widespread use could deplete fish stocks rapidly. In addition

[14] Barangay informants also noted the increased fishing population, to which they inaccurately attribute the dwindling fish catch.

to its catch capacities, the *sanggab* draws in (and subsequently wastes) massive amounts of macroplankton which are an essential part of the food chain of the entire bay (Loquias 1990-91). According to one local agency:

> The characteristic strong tidal currents of the Bay have been harnessed by fishermen in their operation of the very efficient giant stationary filter net otherwise known as "sanggab." The current brings fishes and other marine organisms into the mouth of the filter net in which they become inextricably impounded at its cod-end. As the current becomes stronger and the catch becomes heavier, the net is stretched out thereby reducing the mesh size even smaller. Thus, tiny organisms such as eggs and larvae and other macroplankton are efficiently filtered out from the water. The strong pressure caused by the on-rushing water current often leaves these planktonic organisms dead (MSU-Naawan 1991).

The motorized *sudsud* and *paboto* (dynamite fishing) are also common (Tumanda 1982). Because of the loss of species diversity and the dwindling fish populations, *sanggab*, dynamite fishing, and *sudsud* have been declared illegal. New regulations have not completely eliminated *sanggab* operations in the Bay, as the largest *sanggaberos* have transformed their gear into submarine *sanggab* which dredge the Bay floor and are even more destructive than the earlier technology. Despite government restrictions, *sanggab* is used by local fishers just as frequently as any other gear. [20] At present, the Bay is targeted by the national government for conservation efforts, and it is one of the 12 priority bays now managed by the Fishery Resource Management

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[20] In Tangub, for example, one fisher owns 15 *sanggabs*.

Program (1998-2003). This so-called conservation program focuses on identifying "sustainable" forms, and it has promoted aquaculture production of tilapia, bangus (milkfish) and seaweeds as less harmful enterprises than prawn farming. Some abandoned prawn ponds have been converted to *bangus* production, and export seaweed production has been established in some areas of Panguil Bay, like San Roque of Ozamis City, one of the barangays included in this study.

Ecological Risks to Survival

In 1985 when shrimp farming was at its peak export levels, the Philippines Bureau of Fisheries and Aquatic Resources declared Panguil Bay a critically over-fished zone. In addition, siltation due to soil erosion from the uplands has clogged the 32 major rivers and 22 minor tributaries and creeks of Panguil Bay, further destroying coastal habitats (Gauran 2003). The quantity and quality of harvestable resources from the Bay's coastal waters have declined dramatically due to export fishing and habitat degradation resulting from pollution, sedimentation, and mangrove destruction (*Philippines Environmental Monitor* 2000). Even though coral reefs provide 20 percent of animal protein consumption for Panguil Bay residents, local fishers have destroyed much reef area with dynamite fishing. In addition, six Iligan City firms discharge industrial wastes which threaten the marine life of the Bay (Loquias 1990-91). [21] Because of fishing operations and ecological degradation, there has been a steady decline in fish catches in Panguil Bay. In 1995, the average daily catch was only 5.7 kg– about 16 percent of the average daily catch in 1970 (Adan 2000). Local fishers describe their Panguil Bay average daily catch in

[21] Iligan City is a major industrial city of Mindanao. The polluting manufacturers are Mabuhay Vinyl Corporation, SMC, Iligan Coconut Oil Mill, Granex Port Manufacturing Corporation, and Pillsbury Mindanao. Their discharges included mercury, grease, oil contaminants, suspended solids and acidic wastes.

the 1960s as “abundant,” as “plenty” in the 1970s, as “few” in the 1980s and as “scarce” in the 1990s (Vicente *et. al.* 1992).

Aside from small-scale fishing, Panguil Bay residents depend on the diverse resources from mangroves (see 2.3). Many gather and sell seashells and crustaceans, like crabs, prawns, and oysters. These traditional household resources are now at risk as mangroves are lost to industrial aquaculture. In 1950, the Bay was covered by 12,590 hectares of mangroves. During the 1950s, the rich mangrove areas of Panguil Bay were first exploited for construction of a large corporate-based fishponds (Primavera 1995). Massive conversion to estuarine fishponds for prawn production reduced the Bay’s mangroves to only 2,732 hectares by 1995 (Resource and Ecological Assessment 1996, Guran 1995). In addition to aquaculture, rice and corn farming are significant economic activities in the Panguil Bay area , but agricultural lands have been damaged by the ecological risks to land and water caused by export-oriented shrimp farming.

Water, Food and Health Risks

The human residents are not faring much better than the ecosystem of Panguil Bay. More than 70 percent of Panguil Bay adults have 6 years or less of elementary education. While most fishers were born in the area, 41 percent have migrated to the Bay during the last decade. The typical fisher is 39 years old, helps to support a household of five through seasonal fishing, and she or he has been engaged in fishing for 30 years. Despite their poverty and their worsening circumstances, almost none of these fishing households will migrate, even though fewer than one in five has ever received any form of governmental financial assistance. Despite their convictions that their coastal resources have deteriorated over the last decade and will continue to do so, the

vast majority of them are dedicated to fishing as the centerpiece of their livelihoods. (Israel *et. al.* 2004). [22] Fishers live a life of unending toil, and adult women recall "both their parents endlessly toiling to feed their children. . . . their mothers bent over something." The parents of today's adult Panguil Bay fishers "were trained to work at an early age. By the age of six or seven, they were socialized to a view that their work should support the family. . . . They, in turn, introduced their own children, also at a young age, into various activities." To provide household basic needs, both husbands and wives juggle a multi-activity work portfolio, in order to have a security net that provides a "hedge against failures in any one component of their survival package" (Illo and Polo 1990: 84, 109-10).

Due to the ecological risks and the physical dangers associated with their work, fishers suffer a higher mortality rate than any other occupation in the Philippines. Moreover, females in these communities are at higher risk of dying during their child-bearing years than males of their same age group. [23] In 2003, nearly one-third of the families in Northern Mindanao, where the Bay is situated, lacked sufficient income to provide food for their households, and nutritional deficiencies are a major cause of death in this area. [24] Two of every five pregnancies are problematic or life-threatening, but most pre-natal care examinations and a majority of baby

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[22] This information about Panguil Bay fishing households is derived from an unpublished Institute for Development Studies household survey which was conducted to evaluate the effectiveness of the Coastal Resources Management Program. The survey asked questions about characteristics of fishing household members, about fisher perceptions of ecological change, about success of government-sponsored programs, and about fisher assessment of their future prospects.

[23] Feature dated 27 February 2004, www.census.gov.ph

[24] Philippine National Statistical Coordination Board, "Poverty Statistics," online at www.nscb.gov.ph

deliveries are done by trained midwives and traditional *hilots*. The outcome of such a health delivery system is reflected in the causes of infant mortality. Newborns frequently die of blood poisoning of the umbilical cord stump and low birth weight-- health problems that reflect far less than ideal delivery environments and inadequate pre-natal care. [25] Local barangay problems have followed national and regional trends toward greater unemployment, poverty, infant mortality, and health problems for women.

In 2003, the Philippine Food and Nutrition Research Institute reported that: [26]

1. More than one-third of Northern Mindanao children are underweight and under-height.
2. Two of every five Northern Mindanao children are stunted, another 8 percent suffering from *miasma* (wasting).
3. Iron deficiency anemia occurs in 20 percent of Northern Mindanao children and about one-third of pregnant and lactating women.
4. About one-third of all Northern Mindanao residents are Iodine deficient and are at risk of developing goiters. In addition, iodine deficiency is the main cause of brain damage in childhood. It results in impaired cognitive and motor development, and iodine-deficient people may lose 15 IQ points over time. Iodine is a very crucial nutrient during pregnancy since deficiencies can cause brain damage in the fetus, low birth weight, premature labor, and increased perinatal or infant mortality. [27]

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[25] Philippines Department of Health, Philippine Health Statistics, 2002, online at www.doh.gov.ph

[26] See "Statistics" at www.fnri.dost.gov.ph

[27] For more information about iodine deficiency, see www.who.int

5. Two-fifths of the Northern Mindanao children and one-quarter of the pregnant women are Vitamin A deficient, placing them at risk of blindness.

Because they routinely bathe and swim in rivers and canals, Bay residents frequently contract *shistosomiasis*, an infectious skin disease. [28]

Depressing as these trends are, life is getting even harder for Panguil Bay fisher communities. Already one-third of the illnesses among Filipinos are caused by water-borne sources. [29] Pneumonia, respiratory infections, and diarrhea are among the major causes of death in the Panguil Bay area, and all these illnesses are either water-borne or exacerbated by repeated exposure to polluted water. [30] Island countries like the Philippines and coastal communities like those along Panguil Bay are most vulnerable to the damage caused by the rising sea levels that result from global warming. According to the World Health Organization (2000: 5-7):

> A rise in sea level could result in saline contamination of estuaries and aquifers, direct inundation of low-lying areas, shore erosion, destruction of coral reefs and fisheries, and exacerbation of coastal flooding and storm damage.... For the small island states of the Pacific, the key concern will be weather extremes such as floods and/or droughts as well as more severe cyclones. . . .Many small island states rely on a single source for their water supply such as groundwater, rainwater, surface reservoirs, or shallow wells that draw from freshwater lenses

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[28] www.who.int/docstore/water_sanitation_health/agride/ch4.htm

[29] Population Reference Bureau. "Population, Health and Environment in the Philippines: Fact Sheet." Online at www.prb.org

[30] Philippines National Statistical Coordination Board (2003), online at www.nscb.gov.ph

> just beneath the surface. These sources are climate sensitive and changes in precipitation or rising sea levels will present special challenges. Rising sea levels can result in salinity intrusion into the freshwater lens (World Health Organization 2000: 5-7).

In 2000, a World Bank study declared the Panguil Bay one of the most contaminated waterways in the Philippines. The primary pollutants are:

1. fecal coliform from improper disposal of human and livestock waste;
2. accumulated chemical and other residues from export-oriented shrimp farming;
3. industrial pollutants borne by air and water from Iligan City;
4. and accumulated residues from the pesticides and fertilizers used in rice and corn cultivation (*Philippines Environmental Monitor* 2003).

To make matters worse, the Philippines neither budgets adequately for public water system nor does the national government sufficiently regulate water safety. In addition, there is widespread lack of coordination among the national, regional and local government entities responsible for public water safety (World Health Organization 1997).

In addition to the current and future shortages of safe drinking water, Panguil Bay fishing households increasingly must compete with export fishing and agro-industrial aquaculture for the dwindling marine resources that supply most of the animal protein in their diets. Export fishing and agro-industrial aquaculture drain these marine resources from the local food chain through the following:

1. Massive outputs of prawn, fish, and seaweed are exported to rich countries.
2. Two-thirds of the species swimming in rich-nation aquariums derive from the Philippines

and Indonesia, and many of these endangered species once comprised part of the local food chain of places like Panguil Bay (*Philippines Environmental Monitor* 2000).

3. Massive levels of food fishes and shellfish are fed to export prawn and fish.

4. Massive levels of food fishes are destroyed by monocultural producers of export prawn and specialty fish.

As their ecosystem becomes depleted of the basic survival needs they once drew from it, Panguil Bay fishers not only experience a higher incidence of malnutrition, unsafe water, disease, and mortality. They are also at risk of losing their traditional way of life.

CHAPTER 3

AFTER THE BUST IN PANGUIL BAY:

IMPACTS OF GLOBALIZED AQUACULTURE ON BARANGAY SILANGA

> *Mao ra ang kinabuhi! Ang problema mao ang pagmahal sa palaliton, mao nga mas lisod karon* Life is the same. The problem is the increasing cost of commodities. That is the reason why it's more difficult these days! (Silanga Household Interviewee).

Home to 232 households, Silanga is one of the fifteen coastal barangays of Tangub, a city famous for fishery products, such as *amahong* (brown mussels) and *hebi* (small-sized shrimp) which are sun-dried and sold to Philippines markets. Agriculture and fishing are the city's two largest economic sectors. There were fishponds in the area in the 1950s, but massive conversion of mangroves for prawn production did not occur until the 1970s. In 1977, there were 84.2 hectares of fishponds, of which 22 hectares were agro-industrial intensive aquaculture. At that time, intensive shrimp farming generated revenue of 24,000 pesos per hectare, and there were two harvests annually, using 66 full-time and part-time workers. [1] At present, Tangub's export aquaculture is in the "bust" stage. Even though there are still 102 hectares of fishponds, none is involved in intensive aquaculture. In recognition of the degraded state of fishing resources in the 1990s, the Philippines government implemented locally the Fishery Sector Program and the Fishery Resource Management Program (JEP ATRE 2004).

Barangay Silanga protrudes into Panguil Bay, making it the shortest distance between the

[1] www.tangub.com

two opposite sides of the bay. Until the late 1990s, Silanga's thriving port ferried fishery products and human traffic across the bay. This active port encouraged non-fishing informal sector activities, such as *carenderias* (small eating places), odd jobs such as hauling luggage, or transportation services by *motorela* (a cab attached to a motorcycle) or horse-drawn carts. However, the port was closed in 2000 when a new shipping line opened in Ozamis City, the biggest port in Panguil Bay.

State of Fishing and Aquaculture in the Barangay

Intensive shrimp aquaculture is now in the "bust" stage in Silanga, and the previous agro-industrial aquaculture operation has been closed. In 1988, a Chinese investor began construction of an eight-hectare intensive prawn farm in the community. Fully operational in 1990, the fishpond employed only one technician, five *pan-id* or feeders, and one grass cutter. During the two harvests each year, fourteen temporary laborers were hired for about a week. This pond stocked about 100,000 fries per hectare. To maximize the harvest, it used artificial feeds, antibiotics, and aeration by an electric six-paddle wheel. A nearby river was diverted to pump water into the fishpond. Even though the owner produced 15 to 24 tons of export prawn per harvest, he never paid any taxes to the barangay. After less than a decade, this intensive fishpond ceased operation in 1999. Community residents are convinced that the pond was closed because of decreasing production. One hectare of the abandoned fishpond has been converted into a crab fattening facility that is managed by one laborer who lives within the abandoned fishpond.

Households Engaged in Semi-Intensive Prawn Farming

At present, there are sixteen *semi-intensive* prawn ponds in Silanga, ranging in size from less than a hectare to more than 2 hectares. [2] In comparison to *intensive* prawn ponds which rely heavily on chemical inputs to produce extremely high yields, a *semi-intensive* shrimp farm:

1. is smaller in size;
2. is built above the high-tide line to make water pumping easier;
3. has a stocking density that is only about one-third of that of an intensive operation;
4. relies only on natural inputs.

After shrimp are harvested every three months, water is pumped through the pond to flush out the accumulated sludge. Earthen ponds, like those in Silanga, must be allowed to dry out over a two-week period. Pond dry-out and disinfection are the most effective methods for controlling epidemics of shrimp diseases. After the pond has been flushed, the soil is limed and fertilized (Lucas 2003: 386-88).

Each fishpond is managed and operated by a family. Including those hired to work for these family operators in seasonal and long-term jobs, only 21 Silanga households are involved directly in the fishpond industry. Seven of these fishponds are privately owned, but nine are leased from the government. Government lease agreements are made under legislation intended to privatize public lands for fishpond development; such leases can run for 25 years. [3] The leaseholders, mostly rich families living outside the barangay, convert the mangroves into

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[2] Locals call their prawn production "traditional"to differentiate it from intensive prawn farms. However, their so-called "traditional" method is termed semi-intensive methods in technical literature. For purposes of consistency with published literature, I will use "semi-intensive" to refer to their prawn farm technology.

[3] See www.bfar.da.gov.ph/legislation/fao/fao214.htm

fishponds, then identify local families to manage their prawn farming. In an arrangement that is strikingly similar to Philippines agricultural tenancy, these local managers pay "rent" to the absentee owner as a share of the income from the annual prawn crop. In those instances in which the leasing operator provides all the capital for production cycles, the absentee owner receives a 40 percent share of the net annual income. When the owner provides capital inputs to production, the operator receives only a 50 percent share of the annual output. Only the income from prawn production is divided with the owner. Supplemental produce like crabs, milkfish or *tilapia*, is consumed by the family operator household or shared with relatives and friends.

These semi-intensive ponds are stocked with 30,000 fingerlings per hectare, and their natural inputs include sea water exchanges, hatchery fingerlings, wild feed catches, lime, and teaseed to eliminate unwanted fish and insects from the pond. For those family operators, prawn fishpond management is a 24-hour-a-day job, if they are to prevent losses. Each day the operator must:

1. pump sea water during high tide which usually takes 2 to 3 hours; [4]
2. feed *agihis* to the fingerlings;
3. monitor the shrimp very closely for signs of disease;
4. and periodically inspect the dikes.

Prior to 1975, wild prawn fries abounded in Panguil Bay so fishpond operators fed prawns by pumping seawater. The cost of production is higher now because operators must purchase fingerlings from hatcheries and wild feed catches from small fishers. Since there is no

[4] During "ayaay" (low tide season) which is 2 weeks every month, there is not enough seawater to enter the fishpond.

hatchery in Tangub, operators buy from adjoining provinces along the Panguil Bay. In addition, they must supplement the seawater with natural feeds, like *agihis,* a kind of small shellfish purchased from local fishers who scoop them from the ocean floor in some barangays. A harvester usually must toil an entire day to fill a small boat, usually 3 sacks, with these small shellfish which are sold at 50 pesos (91 cents in $US) per sack. [5] Even though wives and children help with pond maintenance, some fishpond operators hire additional laborers to feed prawns, to repair broken dikes, and to supply *agihis*. [6] Using a "feeding tray," the operator inspects the prawns closely at daily feedings.-4 If the feeding tray empties, the prawns are assumed to be healthy because they are eating well. Leftovers in the tray are an indicator the prawn might be diseased. To prevent contamination, dead prawns must be removed immediately. If there are signs of disease or other problems, the operator might be forced to harvest early rather than risk a total financial loss. Prawn marketing is both tedious and precarious. The pond operator must book the sale of his prawn with a buyer who sets the delivery price based on an average body weight that will meet export standards. Unlike the intensive aquaculture operator who has a large enough harvest to sell outputs to the highest bidder at auction, the small family operator faces greater risk of price falls. If the prawn output does not meet export standards, the buyer will either reject the crop or lower the sale price significantly. [7] When the ponds are operating

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[5] $US1 = 55 pesos. Throughout this study, the Philippine peso is valued at the average ratio that was applicable between September 2004 and 1 June 2005. The valuation of the peso against the dollar is quite erratic and changes almost daily. The Philippines-based IBON Foundation, www.ibon.org, contends that the peso was worth only 53 cents. in May 2005.

[6] For dike repair, a laborer will typically earn about 100 pesos ($US1.82) a day over a 2 to 3 day period.

[7] Based on local information in September 2004, the price is 300 pesos (US5.25) per kilo, plus 5 pesos per gram of additional weight above the standard export body weight or minus 5 to 10 pesos (9 to 18 cents in $US) per gram of those below the standardized weight limit.

smoothly and prices do not drop suddenly, their living conditions are well above the average among Silanga fishing households. These family operators produce 300 to 500 kilos per harvest every three months. Depending on their share-ratio with the fishpond owner, some operators net 12,000 to 15,000 pesos ($US218.18 to $US 272.73) per month, providing these households $7.27 to $9.09 per capita per day.

Households Engaged in Capture Fishing

A majority of Silanga fishing households are not engaged in semi-intensive prawn farming. Rather, *small-scale capture fishing* (using gear to gather from the wild) provides the livelihoods for most. Most fishers use non-motorized boats which cost around 2000 to 3000 pesos ($US36.36 to $US54.55), but about 10 percent use motorized boats which cost about 6000 to 7000 pesos ($US109.09 to $US127.27). One of the most popular fishing gears is the *bungsod*, a stationary bamboo platform which costs about 10,000 pesos ($US181.82) to construct at a permanent site in the deep seas. Five to six workers are needed to harvest fish every other day, by lifting with rope and pulley the *bobo*, a large cylindrical net which contains the captured fish. Even though the *bungsod* is capable of high production of high-value fish, catches are now erratic and unreliable, averaging no more than five to ten kilos. More valuable fish are marketed while small fish are kept for home consumption. *Bungsod* fishers average about 20 to 70 pesos (36 cents to $1.27 in $US) every other day. At 15 cents to 55 cents per capita per day ($US), these families fall far below both Philippine and World Bank poverty lines. In fact, these households live in *absolute poverty* because they do not average enough income to afford survival essentials. To complicate their uncertain circumstances, many *bungsod* operants develop

a long-term marketing tie with a local *suki*, a preferred buyer who purchases the household fish at a discounted price and resells it a profit.

Even more Silangans engage in *pukot* fishing. Because the *pukot* (gill net) costs only about 3,000 pesos ($US54.55), this method is more common among the poorer sector of the fishing population. Fishing with *pukot* is far less complex, as it can be done by a lone fisher in a non-motorized boat. During the 1970s and early 1980s, a *pukot* fisher could make a good catch in less than two hours. At present, a fisher feels lucky to catch a kilo of fish after three to four hours. Typically, these households market daily only 20 to 50 pesos (36 to 91 cents in $US) worth of fish. At this level of income, these families fall far below both the Philippine poverty line and the world demarcation for absolute poverty. Like *bungsod* operators, they do not generate enough income from fishing alone to provide household survival needs.

While *bungsod* and *pukot* are the most popular gear in Silanga, the *sanggab* (filter net) is far more controversial. While other fishing gears provide the fisher a rare high income of 100 pesos ($US1.82) a day, the *sanggab* can generate 400 pesos ($US7.27) a day. Even though these gear are not as damaging as intensive fishponds, a *sanggab* depletes far more marine resources than other capture fishing gear. [8] Only one Silanga household owns a *sanggab* that is erected in a different barangay. *Sanggabs* were first used in the area in the 1960s, but massive proliferation occurred in the 1970s, the same time frame when there was massive conversion of mangroves to fishponds. Many Silangans attribute ecological degradation of the area to both fishponds and

[8] The Philippine government has redirected blame for Panguil Bay ecological degradation away from intensive prawn fishing and toward the *sanggab*. Thus, current conservation efforts focus on the future dismantling of all *sanggabs* in the bay, not on the elimination of intensive fishponds which do far more environmental damage.

sanggab. Tangub fishers produce *uyap*, salted small shrimp, which are harvested in large loads by *sanggab*. On the one hand, the *sanggab* is the most efficient fishing gear used in the Silanga area. On the other hand, it is also the most destructive fishing gear because it sucks up and decimates large numbers of small fish and shellfish. Positioned to face the incoming tidewater, the filter net smashes large numbers of smaller fish and shellfish in its conical-shaped tail end. Even though the Philippine government declared *sanggab* illegal in 1991 as part of the conservationist thrust of the Fishery Sector Program, local governments have not yet prohibited its use. Several of my Silanga informants are convinced that many *sanggab* owners are either government or military officials or operators who have strong protective political connections.

Along with their massive destruction of Silanga mangroves, prawn farms caused cumulative environmental degradation. Though not as destructive as the artificial inputs of intensive fishponds, the natural inputs now used by semi-intensive fishponds also cause ecological damage. Imported from Taiwan in liquid, powder, or cake form, teaseed is used to eliminate unwanted fish from the monocultural pond. This natural pesticide contains *saponin*, a toxin which causes destruction of red blood cells in organisms especially fin fish, [9] Such pesticide use in aquaculture is a major threat to biodiversity in Panguil Bay because it kills off tilapia and other fishes depleting them and eliminating them from the local food chain. After draining of pond water that has been treated with teaseed, mass fish kills have occurred in mangrove areas adjoining shrimp farms (Primavera 1993: 175). [10] When the pond is emptied

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[9] Taiwan Fu Kung Industrial Company advertisement online at http://my.so-net.net.tw/fukung/teaseed.htm. Though not customary in Silanga, tobacco dust and derris roots are also used in the Philippines in the same way these local operators are adding teaseed. See also http://pdacrsp.oregonstate.edu/pubs/nops/nops11-15.html

[10] Though it is not clear whether practiced in Silanga fishponds, the use natural fertilizer, livestock and chicken manure and sludge from waste treatment plants have routinely been used to fertilize Philippines fishponds (CRSP

after harvest, operators apply lime to neutralize the acidity of the soil, and its residue is added to the sludge that is periodically flushed into the Bay.

Environmental Impacts of Fishing and Aquaculture

Silanga's mangroves have been diminished dramatically by several eras of aquaculture development, the most massive deforestation occurring between 1975 and 1985. The abandoned intensive fishpond has not been reclaimed into mangrove. Fish and shellfish have been depleted to a crisis point by past prawn farming, by current semi-intensive operations, and by capture tactics such as *sanggab* and dynamite fishing. *Amahong* (brown mussels) and *burnay* (white or brownish bivalve)-- two marine resources that have been a traditional part of local subsistence diets– are virtually gone from area waters. In the past, *amahong* were plentiful enough to provide good income to Silanga fishers, and the disappearance of this mollusk has led to the emergence of local mythology about its extinction. Silanga residents tell a folk story in which *Dagat* (the sea god) was angered when uplanders brought many *karomata* (horse or *carabao*-drawn carts) to harvest *amahong*. According to the story, the uplanders particularly liked *amahong* because they lasted longer without refrigeration and provided them with energy for their farm work.

In reality, *amahong* and *burnay* disappeared because of uncontrolled, unregulated and continuous harvesting to collect feeds for prawn production and because of the siltation in coastal waters. [11] Once the *amahong* were gone, *punaw* was the next marine resource depleted to feed the

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Research Report 88-12, online at http://pdacrsp.oregonstate.edu/pubs. These natural inputs also generate high chlorophyll concentrations which lead to algae blooms; see CRSP Research Report 88-12, online at http://pdacrsp.oregonstate.edu/pubs.

[11] Interview with Fishery Technician at the Bureau of Fishing and Aquatic Resources Station in Silanga, October 2004.

prawn farms. *Punaw* are now so limited that this traditional subsistence shellfish is marketed at the expensive price of 5 to 10 pesos (9 to 18 cents in $US) per *kaltek*. [12] After *punaw* were diminished, fishpond farmers substituted *agihis*, which are now also decreasing rapidly. Once plentiful in the shallow coastal waters, *agihis* are now concentrated in deeper waters and are difficult to harvest in the traditional method. Thus, harvesters must go longer distances to find alternative sites for easier harvesting. Silangans wonder what next will disappear from their ecosystem, as they have observed dramatic declines in crabs, prawns, big fishes, clams, and small subsistence fishes and shellfish over the last three decades.

Fishing Households of Barangay Silanga

As has occurred all around Panguil Bay, Silanga has experienced a steady increase of population and of fishers over the last two decades. Most of these new residents have fled poverty in the agricultural uplands, and some newcomers have undertaken fishing without any prior experience. [13] In fact, the number of fishers has grown from 35 in 1989 to 60 in 2004 (JEP-ATRE 2004). Even though only sixty (60) households are registered as full-time fishers, almost all barangay households depend on the sea for a significant portion of their subsistence. In fact, a

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[12] *Kaltek* is the popular term for a recycled one-liter plastic container which once contained Caltex Engine Oil.

[13] Information from a 2004 barangay workshop in Silanga sponsored by the Fishery Resource Management Program.

majority of Silanga households are engaged in part-time or full-time capture fishing. [14] Even those with low-waged jobs must work full-time or part time at *pukot* or *bungsod* fishing. Very few of the wives are employed at waged jobs, but women do most of the fish selling, gather and sell oysters, assist with capture fishing, and engage in other informal sector activities. Most fisher families have lived in Silanga their entire lives. While most households own their dwellings, they do not hold title to the public lands on which their homes are built. By the standards of most poor nations, some Silanga households are well housed, but a few appear about the quality of urban slum housing in many other peripheral societies. A majority of the houses is only about 10 by 12 feet and has two to three small rooms. About half the dwellings are combinations of nipa thatch, bamboo and wood and about half are combinations of wood and concrete block.

Cooking is done on a raised wood table covered with a thick layer of soil. Pots are mounted on stones and iron frames, with firewood between them. While some families have indoor bathrooms, many still bathe outside their houses, and females wash clothes outdoors in plastic containers or basins. Unlike most dwellings in peripheral countries, most Silanga households have electricity, but families have few appliances. [15] Only the fishpond operators can afford a refrigerator or electric range. Most households carry water from outdoor nearby public spigots. [16] Most houses either use outdoor pit toilets or have no toilet, but a few have indoor

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[14] My host household, for example, is not registered as a fishing household because an adult member is employed full-time as a public school teacher. Still, several household members fish occasionally while the women regularly gather oysters.

[15] Household acquire television on long-term credit contracts with high interest rates. As a result, they pay for more than the normal market prices.

[16] Only three houses of the 11 interviewed had piped-in water.

toilets supported by septic tanks.

A quarter of the households I interviewed subsists on less than 21 cents per capita per day ($US), and a third below 50 cents, placing them far below the national and world Bank poverty lines. By world standards, these are households which cannot consistently supply their basic survival needs. Even though other fishing households rank them *datu* (rich), Silanga fishpond operator households average only $US1.79 per capita per day, not middle-class by either world or Philippines standards. In fact, one of the fishpond operator households lives on less than $US1 a day per capita, placing this family among the ranks of the peripheral poor. The husbands average only 5.2 years of schooling, about the level that is typical of Filipino fishermen. Wives fared slightly better, having completed on average 6 years of schooling. In other words, parents were able to acquire elementary educations, but few attended high school. The only college attendees or graduates are in fishpond operator households.

The average household size is 3.7 adults and 2.3 children younger than eighteen. This is an aging population in which husbands average 54 years and wives average 51 years. Only two husbands and three wives are younger than 40. Six of the households are adults older than fifty. A majority of the households include extended kin or adult offspring, young couples often living with parents at the beginning of their marriages. Because of the declining fish catches and the lack of local opportunities, many teenagers and young adults out-migrate– a trend that heralds the future demise of this traditional way of life.

Threats to Household Survival in the Barangay

In comparison to the other two communities studied, Silanga has a better quality of life as measured by water and sanitation factors. Unlike Lapinig and San Roque, this barangay is not inundated with floods. In addition, the barangay subsidizes household toilet construction. In an attempt to insure safe water supply, the barangay has drilled an eighty-foot-deep well and pumps water to outdoor public spigots located near clusters of houses. With respect to other quality of life indicators, however, Silangans are not any better off than their counterparts in the other two barangays. Family health is threatened by changes in the ecosystem, including exposure to the accumulated pollutants that contaminate the rivers and coastal areas. Most fisher households reside on land, but their dwellings are located very near water. Mold and contaminants from the breathed water contribute to the high incidence of respiratory disease.

Families usually go to the Barangay Health Center for health concerns but serious health problems are treated at the city hospital located about 5 Km away. The barangay health center is staffed by barangay health workers trained in primary health care. A midwife from the City health office visits the barangay every week to give immunizations, prenatal checkups, and attend to minor illnesses. Even though 40 percent of women experience problem pregnancies, midwives and trained *hilots* provide prenatal care and deliver the babies for most women. [17] Because of the doctor shortage in this area and in the country in general, midwives can prescribe antibiotics for upper respiratory infections, but there are no prescription drugs in the clinic. Because of national budget cuts to meet structural adjustment goals and to speed the neoliberal trend toward privatization of health care, the health center discontinued in early 2005 its free supply of

[17] Health Statistics, Philippines Department of Health, www.doh.gov.ph. Traditionally, a *hilot* delivered babies in women's homes; now some are trained, others are not.

condoms and birth control pills. Currently, the Philippines government is being funded by a USAID project aimed at helping the country make:

> the transition from a free contraceptive delivery system to a sustainable and commercial delivery model. The program promotes contraceptive products, builds and expands the market and harnesses the active participation of the private commercial companies to ensure the future of family planning. . . . Efforts are concentrated on increasing the usage of oral contraceptive pills and injectable contraceptives and expanding the market for these. [18]

Not only does the USAID program eliminate free services, but it also shifts the country's family planning strategy away from male condom use and places full responsibility on women for controlling population growth. In a country in which few women ever see a doctor before, during or after a pregnancy, NGOs associated with this program offers "discounts"on vasectomies and tubal ligations, surgical procedures that are far out of the economic reach of a vast majority of the poor couples of child-bearing age.

Economic Risks to Survival

Unemployment in Panguil Bay has doubled over the last decade, so three-quarters of all households are impoverished-- a rate that is nearly twice the national average (MSU-Naawan 1996). In addition to their declining incomes, household spending capacity has been further

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[18] See USAID Philippines at www.usaid-ph.gov/ophn_so3_ir2_dkt.php. Another element of the privatization of family planning is the funding of the FriendlyCare Foundation (www.friendlycare.com.ph) whose mission is to "promote responsible parenthood for sustainable development."

diminished by national currency devaluation and by price inflations. Because marine resources have steadily declined, fisher households now catch less than one kilogram per day, about 6 percent of the average catch in 1969 (see Table 3.1). Silanga households reported that a two-day catch from a *bungsod* now provides income of only about 50 to 150 pesos (91 cents to $2.73 in $US). Monthly, households average only about 700 pesos ($US 12.73) from *bungsod* fishing which is not enough to support household needs and to maintain fishing gear. Since *pukot* fishers face even more unreliable conditions, they are able only occasionally to generate enough daily income to cover both basic household needs and fishing gear maintenance.

While fishpond operators earn more, their incomes are unstable and precarious due to ecological risks and price drops. Monthly income from prawn farming can range from a high of 15,000 to 30,000 pesos ($US 272.73 to 545.46) to a low of 5000 to 7000 pesos ($US90.91 to 127.27), resulting in an erratic household budget that can range from more than $18 a day to as little as $3 a day. Despite their capture of so much of Silanga's ecological resources, local fishponds provide very few waged jobs, and even these are unreliable and erratic. Fishpond laborers are hired seasonally or as short-term workers to complete specific tasks, such as dike repair. Thus, this source of wages cannot be depended upon to sustain basic household needs. An adult fishpond laborer earns 30 pesos daily (55 cents in $US) for feeding the prawns while a child laborer earns only 8 pesos (less than 15 cents in $US) for the same work. Some fishers collect and sell *agihis* to prawn fishponds at 50 pesos (91 cents in $US) per sack. However, the more common practice is for a fishpond operator to pay one laborer at the rate of harvesting ($US 1.82) a day for harvesting a boatful of *agihis* (usually 3 sacks). Since *agihis* are becoming depleted around Silanga, the fisher must travel to another barangay across the Bay and spend a

long day to capture a boatload.

Table 3.1

Daily Fish Catch in Barangay Silanga

Year	KG per fisher per day
1969	12.00
1984	6.00
1994	2.00
2004	0.75

Source: Calculated from statistics provided by JEP ATRE (2004)

During one Focused Group Discussion, women described Silanga as a community in which "everybody is poor," but there is still the following economic stratification among fishing households.

1. *Pobre kaayo* (Very poor): About five households have extreme difficulties acquiring sufficient food and cannot afford to send children to high school, sometimes not even to elementary school. Most of these households do not fish but try to locate waged work or income from the informal sector, such as driving pedaled pedicabs at 30 to 40 pesos (55 to 73 cents in $US) daily. This income does not afford the household the basic survival needs, especially not rice which costs 20 pesos (36 cents in $US) per kilo for the cheapest quality.
2. *Pobre* (Poor): These households depend largely on *pukot* (gill net) fishing. A few operate a *bungsod* which does not harvest enough fish. The permanent location of the *bungsod* determines the volume of fish caught. The best locations lie in the natural routes of the fishes, and there is much competition for these sites. Most of the time these households meet daily food fish requirements, but they are having increasing difficulty affording the increased costs of rice or corn. Household expenses rise for these families once children enter high school, so some children will not be able to complete four years of education at this level.
3. *Arangan* (Average). These households rely on *bungsods*, supplemented by *pukot* fishing. Most of the time, they are able to catch adequate food fish and to afford corn or rice for consumption. While most children will be able to attend high school, some will drop out to help with the operation of the family *bungsod*, to help with *pukot* fishing, to gather

oysters, or to seek non-fishing incomes. Some of these households have been able to send children to college in the past, but that is less likely in the face of declining catches.

4. *Datu* (rich): These fishpond operators meet all basic survival needs and can afford some luxuries, such as refrigerator, electric range, or VCR. Their houses are usually larger and constructed of concrete. Their children will be able to attend elementary and high school without difficulty, and many will go to college.

While public elementary schools are "free," the national government now only pays about 60 percent of the costs, so families are required to pay regular "project costs" to subsidize the costs of teacher supplies. [19] It is more expensive to attend high school because students are required to pay annual fees, to absorb the added costs of "projects," of school uniforms and of transportation to a more distant school. In the past, seven of the eleven interviewed households were able to send offspring to high school, but it is getting harder for them to achieve that goal in recent years.

In addition to declining and erratic incomes, Silanga fishers must rely on a paternalistic credit system for short-term emergencies or gear maintenance. During the unproductive one or two-week period of *huklas* when nets must be cleaned and repaired, a *bungsod* operator usually arranges a cash advance of 300 to 500 pesos ($US5.46 to 9.09) from their *suki,* "a system of patronage in which the customer regularly buys from the same seller and receives special favors in return," such as credit. The fisher household also sells its catch to the *suki* who purchases the fish at a price before market value (Jocano and Veloro 1976: 125). It is not unusual for the *suki* to

[19] In the Philippines, an elementary education is 6 years, high school is 4 years.

buy the household's fish for 50 pesos per kilo when the market price is 70 pesos, a high profit margin.

Some families have no credit at all in the community, not even in small stores. Occasionally, in a few households, women take a small loan from banks that participate in the government's anti-poverty program. These banks offer micro-credit to encourage alternative income sources for women. Most women are deterred from such credit arrangements, however, because one is not eligible for a loan until she has saved a certain level of savings in the cooperative's "capital build-up fund." Moreover, few avail themselves of such government-sponsored programs because there are so few business opportunities in Silanga and because they fear accumulated household debt. They retort: "*Dili man mi kabayad, nganong mangutang pa man*!" We definitely cannot pay, why borrow?"

Meeting Basic Survival Needs and the High Cost of living

"Mao ra ang kinabuhi! Ang problema mao ang pagmahal sa palaliton, mao nga mas lisod karon. Life is the same. The problem is the increasing cost of commodities. That is the reason why it is more difficult these days," says Anna, a young mother whose labor portfolio includes a waged job with the barangay government, assistance in the household's three-quarter-hectare fishpond, and oyster gathering. Her lament is shared by most of the Silangans, and they are correct to assert that prices are rising while they have less to spend. Prices have inflated at an average rate of 9.7 percent yearly over the last decade while consumer prices have escalated as much as 27 percent in some years (*Third World Guide* 1999). To make matters worse, there has been a 10 percent decline in average family incomes since 1995 (Schelzig 2005). Husbands and

wives complain that the inability to afford rice is their worst worry. The Silanga fishing household diet consists primarily of fish or shellfish and rice (for which the cheaper corn is often substituted), with occasional garden vegetable supplements. When the household makes purchases, rice is prioritized before anything else. Consequently, the daily catch must be adequate to supply food fish and enough marketed fish to cover the cost of grain. Because of the conversion of ricelands to shrimp ponds and the salinization of agricultural lands, the Philippines now produces far less rice than in past years, and the country has become chronically dependent on more expensive rice imports (Primavera 1997). That is why the sharp decline in daily fish catches is so alarming for these households. Most of the current daily catch consists of small fishes that barely meet household consumption needs. One-third or more of the people in this region suffer from iron deficiency anemia since many households are not meeting daily fish food requirements. However, it is easier for most households to meet fish food needs than it is for them to catch the types of larger fish, crabs or prawns that will bring enough income for them to purchase rice. In addition to small fishes, household diets are supplemented with oysters. In the past, households consumed three varieties (*punaw, amahong* and *sisi)*, but household consumption is now far less diversified. In recent years, the nutritious *amahong* have been extinguished, and *punaw* are rapidly diminishing. While some supplement household diet through gardening of greens like *malungay*, squash, *camote* (sweet yam) and eggplant, the high incidence of Vitamin A deficiency makes it clear that one-third or more of the households do not have access to the kind of fruits and vegetables that supply essential vitamins[20]. Even when

[20]See "Statistics" at www.fnri.dost.gov.ph , also "Poverty Statistics," online at www.nscb.gov.ph

households supply adequate daily caloric intake for their members, it is highly doubtful that most of them-- especially children and pregnant women-- are receiving the essential mix of nutrients. At present, about one-third of regional children are underweight and under-height, and about one-third of pregnant women are anemic. Many fishing households now substitute far less nutritious corn for the more expensive rice, exacerbating dietary deficiencies. [21]

Household Survival Strategies in the Barangay

The people of Silanga are dependent on their ecosystem for household subsistence, for waged income, and for supplementary cash earning. While they note with growing alarm the environmental degradation and the depletion of marine species, they maintain an anxious determination in the face of the environmental and economic changes they cannot control. "*Dili problema and pagkaon sa pamilyang mangingisda. Kung magkugi lang, naa gayud makaon*," says an oyster-gathering mother. "Food is not a problem among fishing households. If one is industrious enough, there will always be food to eat." To generate cash income, however, "*importante ang paningkamot!* The important thing is to be hard working" at something other than fishing. Their comments about the future show a recognition that household members will have to work harder and harder and perhaps travel farther to acquire the natural resources their families need. Their words also demonstrate recognition that their options are severely limited, that they must try to manage with the difficult hand that life has dealt them. In short, their

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[21] For dietary deficiencies, see "Statistics," Philippine Food and Nutrition Research Institute, www.fnri.dost.gov.ph See Chapter 6 for a discussion of the negative dietary impacts of corn consumption.

assessments are frank acknowledgment that increased *self-exploitation* will be necessary. In these households, adult men and women alike work long hard days, day in and day out. On average, they sleep only about six hours a night, sometimes less. Tasks are far less gender-segregated than many western feminists would predict, men sharing in household tasks when women are ill or away selling fish, women helping with capture fishing or fishpond labor as the circumstances require. Survival demands effort from all household members, especially if they are to accumulate the daily cash needed for grain purchases and school expenses. Moreover, compared to Barangay Lapinig, women in Barangay Silanga have far more control over decision-making about how household income is expended, for it is the adult females who market their husbands' daily fish catches and distribute that income to cover their daily expenses. There is also far less domestic discord than we might expect, for the knowledgeable midwife at the barangay health clinic reports only two families (less than 1 percent of all households) in which husbands have acted violently toward wives or children, after alcohol use. At present, these households are barely scraping by, and fishing provides only part of their basic survival needs. They must pool resources from as many forms of nonfishing labor as possible, including:

1. tenant farming;
2. small household gardens;
3. livestock raising;
4. oyster gathering and selling;
5. limited informal sector activities;
6. remittances from wage-earning children in distant locations;
7. and supplements through networks of family and friends.

Agriculture, Livestock and Gardening

These families cannot shift occupations by combining fishing with farming, as do so many other fishing communities on Panguil Bay. Farms in the Tangub area are situated too far from the coast to make agriculture a realistic option for them. [22] Nor is it possible for them to convert to seaweed production. Seaweeds require a higher salinity than conditions in Silanga. [23] Still Silanga fishing households engage in agriculture in several ways. A few raise hogs or chickens to supplement their diets and incomes. For others who cannot afford to purchase baby livestock on their own, it is common practice to raise livestock on shares (especially cows, hogs, or sheep) for neighbors. [24] If they have enough cash to invest in pots, vegetables are raised without access to land. Rarely, a household member is hired as a part-time farm laborer, earning 10 to 30 pesos (18 to 54 cents in $US) to dig holes and plant mango trees. If very lucky, they might earn 300 pesos ($US 5.40) a month for tending the newly planted mangoes. A few households have been able to arrange tenancy/crop share agreements, so they can utilize one (1) hectare or less of a distant farm to plant coconut, cassava, and corn for consumption. If they plant a pint of corn, they can harvest 57 kilos which can be milled to provide 25 kilos of corn corngrits for cooking. [25] Most households cannot afford to farm, however, because they do not have access

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[22] City Councilwoman Francesca Lopez, October 2004

[23] Seaweeds need 70ppt. salinity, but Silanga's salinity is diluted to 40ppt. by its many fresh-water rivers.

[24] The tending household keeps, usually, 50% of the offspring of the livestock.

[25] Corn is milled into several different grades and is priced according to quality gradations, the best quality being very similar to US cornmeal. There is also a grade that is similar to what is termed "grits" in the US. However, the ground corn is not eaten in the same ways it is consumed in the US.

to a work animal (such as a carabao), and the prohibitive cost of fertilizer makes farming an unprofitable activity. In fact, fresh fruits and vegetables are a luxury in most fishing households, and family diets center around two foods– fish and rice (or corn). Because the price of rice is 1.6 times greater than the price of corn, fisher households are increasingly substituting the cheaper, less nutritious grain.

Oyster Gathering

The most significant source of household supplements is oyster gathering, and almost all fisher wives (and a few men) engage in this work. In the past, oyster gathering was a diversionary activity intended only to provide diversity in the family diet. At present, however, oyster gathering is not only a crucial food source but also the most important income-generating activity to augment the meager fishing incomes. One of the most important forms of ecological knowledge is the lunar calendar. Fishpond operators and artisanal fishers refer to it to keep watch for the high tide which will permit flushing of prawn farms or bring in the fish that can be captured with *pukot* or *bungsod*. In contrast, oyster gatherers keep watch for the low tide when mangrove floors are exposed, and the mudflats will sparkle with oysters. A woman usually spends two to three hours in the *hunasan* (mangrove tidal flats), carefully etching and detaching the small shells from the bark of nipa trees or the stones to which they cling. Then another two hours or so of *tilang* is needed, during which she uses a *bolo*, a foot-long cast iron blade, to break open the shells and remove the meat. On average, a gatherer will produce about three cups of oyster meat daily, part of which will be marketed fresh for 10 pesos (18 cents in $US) per cup. Typically, a woman sells salted/bottled oysters to a *suki* who buys them for 18 pesos (32 cents in

$US) per bottle and resells them at the Tangub city market for 25 to 30 pesos (45 to 54 cents in $US)-- about a 56 percent higher than the producer's price. In addition, women save the oyster shells and pack them in sacks to await the December arrival of a buyer. Each sack is sold for 20 to 40 pesos (36 to 72 cents in $US) to be pulverized into fertilizer.

Informal Sector Activities and Network Supplements

There are few wage-earning opportunities for women. Similarly, there are few informal sector opportunities because there is no barangay demand. Moreover, capitalization and transportation costs are too prohibitive to venture into Tangub city. A few women work as *labandera* (washwoman) for middle-class families. For two laundry sessions every week, the *labandera* is paid 400 pesos ($US7.27) a month. Laundry is done manually in the employer's home where the wife provides the necessary basins, soap and hangers, plus lunch for the worker.

Family networks are also important to fisher household survival. It is common practice to share fish catches with family and friends. It is a common practice that adult offspring settle near their parents and fish after their marriages. These extended kin share food resources and depend on each other for support during crises. At present, however, many adult children migrate away to locate waged jobs. In their late teens and twenties, daughters can work in city retail shops in nearby Tangub for 700 to 1,000 pesos ($US 12.72 to 18.18) monthly. Still others migrate further away to larger cities like Manila where they are employed as domestic servants for a monthly salary of 1000 to 2000 pesos ($US18.18 to 36.36). [26] For about 50 pesos a day (90 cents in $US),

[26] See Arnado (2003) who made an extensive study of domestic help in the southern Philippines.

some teenage sons find rare waged employment as *bodegeros* (store helpers) or as laborers in a *bodega* (warehouse). In most instances, these migrated children remit a share of their earnings to rural parents. There are several households which receive regular monthly support from their distant working children. Typically, that supplement amounts to the cost of one sack of rice or about 900 to 1200 pesos ($US16.33 to 21.81). A privileged minority of households have family or friendship ties to fishpond operators who permit them to help in the harvests for a share of the rejected prawns that fall below the standard export size.

Survival Strategies of a Fishpond Laborer Household

Bels and Doy are the youngest couple (both aged 32) among the interviewed households, and their living conditions are below average for the sample. [27] Neither spouse completed six years of elementary education. With three children aged one to eleven, they struggle to survive on 19 cents per capita per day ($US). Two children walk to elementary school, but the parents struggle to pay their regular "school project fees." Three adults and three children live in the family's small, one-bedroom hut of thatched bamboo walls and floors and a thatched nipa roof. Like some of their neighbors, their house has no electricity. Since there is neither indoor nor outdoor toilet, the family uses the beach area. Bels is expecting her fourth child in eleven years, one every 2.8 years. Even though she receives free regular prenatal checkups from the midwife at the barangay health center, Bels has worked at hard physical labor most of her pregnancy. Until two months ago when she reached her seventh month of pregnancy, Bels was supplementing family income by working as a *labandera* for a middle-class family in Tangub for 400 pesos

[27] Fictitious pseudonyms have been used to conceal the identity of the informants.

($US7.27) per month. She plans a midwife delivery at home, as she has always done.

When they were first married, Doy worked as a *pan-id* (prawn feeder) in one of the barangay fishponds where he earned 70 pesos per day, an income level that permitted them to save a little. Now at an average of 90 pesos ($US1.63) per day for the same job, they never save anything. In fact, Doy has lost ground in spending power due to currency devaluation and price inflations over the decade he has been married. Doy is paid 30 pesos (54 cents in $US) daily for feeding the prawns, but he earns 100 pesos ($US1.82)per day when he gathers *agihis* for the pond. *Agihi* harvesting has become much more difficult for Doy. Since the shellfish are nearly extinct around Silanga, he must travel to a different barangay at the opposite side of the Panguil Bay where he will work all day. For family consumption, Doy also fishes with hook and line during high tide, and Bels gathers oysters during low tides.

They carry water from the barangay public faucet located about 300 meters away (about a 20 minute walk), and they collect firewood for cooking from the rapidly disappearing mangrove behind their house. Because they live beside the fishpond and could not afford to invest in pots, they have no garden. To supplement the household diet and income, they are raising three chickens and one hog, and they are tending two other pigs on shares with the owner. Family ties provide them access to store credit. While most of the household's food is supplied from fish and oysters, they can purchase other essential items on weekly credit at a grandmother's *sari-sari* store.

As in most other neighboring households, extended kin live in this household. Bels' father stopped fishing nine years ago due to ill health. He had a type of chronic lung congestion that is typical among Philippines fishers. As noted earlier, various forms of respiratory

congestion and infection are the primary causes of death in the Philippines, with an even higher incidence of these diseases among fishers. He has lived in his daughter's household more than a decade, now able only to help with cooking and child care. The grandfather remembers with pride his past fishing days when ecological conditions were good enough for him to harvest 6 kilos daily with his hook and line and non-motorized boat. Unlike his son-in-law today, he did not worry about affording rice for his family. His catches were bountiful enough; and rice was much cheaper then. About fifteen years ago, he could earn 12 pesos per kilo for fish, but rice cost only 6 pesos per kilo. The elder fisher was able to send all his six children to elementary school (although Bels did not complete six years) and one to high school. Pondering that Doy's usual daily catch rarely reaches 2 kilos and that the cost of living has escalated so much, the grandfather shakes his head in despair and worries about how his daughter and grandchildren will meet the demands of the future. "*Maayo kayo ang panagat sa una ikompara sa karong panahon. Karong panahona, dili na makabuhi ang panagat*," he laments. "Fishing before was good. This time, we cannot live through fishing any longer."

Survival Strategies of an Oyster Gathering Household

Every day when the low tide exposes the tidal flats, Manang wades – feet, heart and mind – into the slimy dark mud of the *hunasan* (mangrove floor) to gather oysters. She toils two to three back-breaking hours-- alternately bending, sitting on a leg, and plodding through the mud-- to slowly detach oysters from nipa trunks and rocks. She will probably gather a pailful which must be worked another 2 hours of *tilang* (breaking the shell to remove the meat). Everyday, she uses the lunar calendar to determine the forecasted time for the low tides, then she glances

through her window to check the state of the *hunasan* behind her house. When she has enough cash on hand, she takes a "break" from oyster gathering to prepare salted oysters and pack them in bottles. Salted oysters provide a higher cash return-- almost twice the amount she earns from selling the raw oysters.

Manang and her husband Bert are in their late fifties. Both attended elementary school and know how to read and write. There are now three adults and three teenagers in the household, and their three married children live only five to ten minute away. Since Manang and Bert were married, their primary sources of livelihood have always been fishing and oyster gathering. In 1976, they were evicted from their *bungsod* when the fishery authorities created a barangay fish sanctuary. They were unable to locate an alternative area to install their *bungsod* because all sea spaces were already occupied."*Pwesto-pwesto kami. Kung kinsa ang maka-una sa lugar, iya ang lugar,*" she explains. "We have our respective areas. Whoever gets the area first, only he can access that specific area!" In the alternate site they tried, they suffered an unwelcome situation. People stole their fish or tore apart their net. Consequently, they abandoned their *bungsod* fishing and had to rely solely on the *pukot.*

Occasionally in the past, Bert was hired by fishpond operators to repair dikes at 100 pesos ($US1.82) per day. He also gathered and sold *agihis* until he had an accident in 2001. In 1997, Manang was hired at 200 pesos ($US3.64) monthly to maintain a public building. Most days, they fish between 4:00 a.m. and 7:00 a.m., usually making two attempts with the *pukot*. She recalls that their usual catch in the 1970s was about 15 to 20 kilos of assorted crabs, fish, and prawns. From the early 1980s until now, their *pukot* catch has fallen so much that they can only sell three to five kilos. When they recently caught 5 kilos of *gisaw* (small fish), she sold two-

thirds of it in the community for 25 pesos per kilo and distributed the rest to her household and those of her three married children.

The household needs 47 pesos per day to cover its basic survival needs, and 30 pesos or more to cover the costs of sending three children to high school. [28] Manang prioritizes her children's education above all else. The mother celebrates when she can harvest 30 pesos worth of oysters daily because that will cover the cost of her children's transportation to school. "*Ang pang-adlaw adlaw na panginahanglan gikan sa sisi*. Our daily needs are derived from the oyster selling," she asserts. In addition to her oyster income, she often raises pigs on half shares with the owners, as a means of raising educational funds. Annual high school fee is 185 pesos ($3.36) per student. In addition, there are intermittent project fees and daily transportation expenses. "*Daghan kayo gastos sa pagpaeskuwela*. There are a lot of expenses for school," the mother frets. She walks to church on Sundays rather than spending 7 pesos for public transportation. The children carry food to school, so the mother can avoid this added expense. Herbal medicines are used for health problems, such as *gabon* to treat coughs. [29] There is no electricity in the house, so she can reserve that 35 pesos monthly for schooling expenses. Instead they rely on firewood for cooking and kerosene lamps for lighting. She also budgets house repairs and maintenance gradually in order to keep the needed cash flow to cover school expenses. Slowly, they are substituting galvanized iron for the nipa roof, but they are installing it one sheet at a time. The

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[28] Daily living expenses are 45 pesos for corn, 2 pesos for kerosene, 30 pesos for school transportation. Manang also saves another 20 pesos daily, as required by her cooperative membership (see later discussion). Consequently, the household's daily cash expenses total 97 pesos.

[29] Respiratory diseases are the major causes of mortality in the Philippines.

earthen kitchen floor has still not been covered with bamboo or wood.

In addition to working hard to educate her children, Manang supplements the household resources of their married children. She and her husband have already raised three offspring who also try to eke out their livelihoods through fishing:

1. a thirty-year-old married son who works as a *pan-id* (fishpond feeder);
2. a twenty-five-year-old married son who fishes and drives a *sikad* (pedaled pedicab); a
3. and a twenty-one-year-old daughter whose husband fishes and drives a *sikad*.

One son had to drop out during his first year in college, so his parents could afford to send his younger siblings to high school. He still lives at home but is employed as a *tindero, bodegero*, (salesman, warehouse man), or cashier in a city store. He gives most of his 35 pesos (64 cents in $US) per day earnings to his mother. The parents share fish catches with the married children, especially when they harvest *uyabang* (small shrimp) or *tambangongo*, a bland fish which is good for grilling. Manang saved enough of her wages to buy a *sikad* for her married son to earn cash.

The household diet consists primarily of oysters and corn, supplemented by small fishes when they can be caught. These days, her husband may catch only a small bowlful with the *pukot*. Manang substitutes cheaper corn for purchases of expensive rice. She can purchase 3 kilos of corn for 45 pesos each day, but the equivalent in the more nutritious rice costs 60 to 72 pesos. [30] She cultivates *tubo* (sugar cane) and *camote* (sweet yam) in her garden, but she does not grow green vegetables– a dubious nutritional choice given the vitamin deficiencies that predominate in

[30] At current prices, corn (27 cents per kilo in $US) and rice (44 cents per kilo $US) are more expensive in the Philippines than in the United States.

the area.

Unlike most of the barangay women, Manang participates in a cooperative that has been organized by an NGO on behalf of the Philippines Fishery Resources Management Program. [31] The cooperative encourages household saving by requiring regular contributions to a "capital build up fund." Once the family reaches its build-up goal, the household is eligible for loans. Because of the expense involved, most women cannot afford to participate. Manang saved 160 pesos weekly until the end of 2004, and she was eligible to borrow from 3,000 pesos from the coop in February 2005 to cover unexpected school expenses and to make house repairs.

Manang shows the physical signs of a life of hard work and malnutrition. She is underweight and under-height, and her small frame is beginning to stoop. [32] Like her husband, she works an eighteen-hour day and sleeps only six hours. When asked if her life is more difficult now, she replied "*Ang pinakaproblema diri mao ang gamay nga kuha sa dagat*. The main problem here is poor catch from the seas." Since she has toiled all her life, it is hard for her to measure degrees of increase in her blinding work pace. "*Pareha ra ang sa una ug sa karon, kalisod!* Our situation before and now is the same -- hardship," she is convinced. However, she knows that none in the household can ease up on daily work output. "*Ang importante ang paningkamot!* The important thing is to be hard working!"

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[31] The savings requirement deters the participation of most women because they cannot afford to save 20 to 30 pesos daily in the cooperative.

[32] Osteoporosis is not unlikely.