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# Shrimps are part of a larger ecosystem

Aquaculture Department, Southeast Asian Fisheries Development Center

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# Shrimps are part of a larger ecosystem.

Shrimp farming, like all other agriculture enterprises, requires natural resources -- land, water, and biological resources including seed and feed. Below are the documented interactions between shrimp farming and the natural environment.

**1** In Thailand, pollution of water supplies with contaminants from industry, agriculture, and sewage is thought to have been partially responsible for shrimp industry losses since 1989. Similar cases in Bangladesh, China, Indonesia, the Philippines.

**2** In the Philippines, shrimp and milkfish culture is responsible for reducing the mangrove area from 448,000 ha in 1968 to 110,000 ha in 1988. Similar cases in Thailand, Malaysia, Indonesia.

**3** 3,344 ha of shrimp ponds have led to salination of 1,168 ha of agricultural land, mostly ricefields, in southern Thailand. In Vietnam, salt intrusion has damaged 2,000 ricefields in Ho Chi Minh City in 1991.

**4** Deterioration of coastal water quality because no mangroves can filter or remove suspended solids, toxic hydrocarbons, among others. The estimated area of *Rhizophora* mangrove forest that would be required to remove the nitrogen and phosphorus loads produced during the operation of shrimp ponds is as follows:

Nutrient	Ratio (mangrove:pond)	
	Semi-intensive	Intensive
Nitrogen	2.4:1	7.2:1
Phosphorus	2.8:1	21.7:1

**5** An estimated 10 kg of fish and shrimp larvae are killed during the collection of 1 kg of tiger shrimp postlarvae in West Bengal, India. Up to 5,000 postlarvae of other fishes and shrimps are killed for every 100 marketable postlarvae collected in Bangladesh.

**6** The effects of coastal eutrophication and red tides on shrimp culture have been extremely serious, like in China in 1989, when a *Gymnodinium* bloom around Bohai Sea caused an estimated US \$ 67 million worth of damage to *Penaeus chinensis* farms.

**7** Use of freshwater aquifers for intensive shrimp farms in Taiwan, the Philippines, and Thailand has resulted in saltwater intrusion and salination of freshwater aquifers. Also in Bangladesh and Indonesia.

**8** Use of freshwater aquifers by shrimp farms has resulted in subsidence of coastal land (about 0.3-2 meters in the Pingtung coastal area in Taiwan in 1970-83).

**9** wastes from shrimp ponds consist of solid matter; a mixture of uneaten food, feces, phytoplankton, colonizing bacteria; and dissolved matter as ammonia, urea, carbon dioxide, and phosphorus. Also amino acids, proteins, fats, carbohydrates, fiber, minerals, and bacteria. Major crashes in the shrimp industry in Taiwan, Philippines, Indonesia, and China have all been linked to waste production exceeding the assimilative capacity of local water bodies.

**10** Loss of mangrove forests has led to the acidification of pond water and soil through formation of acid sulfate soils.

**11** Shrimp shipments have helped the spread of pathogens like IHNV (from Pacific Latin America to Asia) and MBV (from Asia to Hawaii, Mexico and Tahiti).

**12** Introduction of new shrimp species and transfer of shrimps within their native range can bring in diseases and parasites, disrupt the host community through competition, predation and stunting, and cause changes in habitats, genetic diversity, and even coastal socioeconomics.

**13** Antibiotic residues can be extremely persistent in marine sediments and lead to the development of antibiotic resistance among bacteria. Use of oxytetracycline in Taiwan, Thailand, and the Philippines has resulted in resistant strains of *Vibrio*.

**14** In the Mekong Delta in Vietnam, loss of mangroves has increased vulnerability to storm damage and coastal erosion.

**15** Fishers in Thailand and Bangladesh reported declines in catches due to restricted access to previously accessible mangrove areas. One hectare of mangroves can yield 767 kg of wild fish and crustaceans, more than the yield in extensive shrimp systems which is usually considerably less than 500 kg per ha per year.

**16** Catches of wild tiger shrimp postlarvae have declined in India, Bangladesh, and Vietnam. There may be natural fluctuations in abundance of postlarvae, but other aggravating factors include overfishing, pollution, and habitat destruction.

**17** Some drugs used in shrimp culture like furazolidone and common chemicals like malachite green are potential carcinogens or allergens.

**18** Loss of wild shrimp resources by overfishing, pollution, loss of habitat, represents loss of broodstock and genetic material for future breeding programs.