

CHECKLIST #8 FISHING AND FISH FARMING

Fish farming and aquaculture projects (fish, shellfish, and so on) in fresh, brackish or salt water, and in natural and/or artificial environments.

A. Questions relating to the fish farming project location

1. What are the existing infrastructures (water catchments, sewers, and so on), uses and activities on the proposed site of project implementation? What is the land use master Plan? What is the population density? Do the objectives and management of the fish farming operation correspond to government policies, laws and the local population's needs and patterns of consumption? Could the project lead to:
 - displacements of the population, changes in ways of life and cultural characteristics (if means of subsistence and traditional activities are disrupted by introducing intensive methods of production and/or "modern" fishing techniques or if the positive aspects of existing methods of environmental management, such as selective fishing, and so on, are not taken into account);
 - accentuation of social inequalities and/or losses of territory (if all specific groups of the population, such as women, farmers, fishers, and so on, are not consulted; if there is no plan for equitable sharing and reallocation of the project's positive results in the community; if there is an increase in women's workload or if women are restricted to low-income processing activities, and so on);
 - incompatible land uses (loss of agricultural lands, livestock-raising sites, wetlands, wooded areas, and so on) and/or social conflicts, value conflicts and conflicts over ownership rights (among the different users of the water sources and fish resources, and so on);
 - a change in the visual quality of the landscape;
 - problems with the quality and supply of water, energy, and other resources and services;
 - a decrease or an improvement in the quality of life;
 - an improvement in food security, the nutritional value of diets (additional protein intake) and/or increased income for the population and its specific groups;
 - assumption of responsibility for the project by the community and clear distribution of responsibilities;
 - optimization of fish and water resources by recycling and enhancing multipurpose systems (for example, an irrigation system based on the availability of water and prevention principles; a fish farming system involving the re-use of pond water for agricultural irrigation)?
2. What types of environment and landscape are present? What is their specific importance? Are there bodies of water and waterways, slopes, wooded areas, coastal and riverine wetlands, coral reefs, mangrove forests and other vulnerable sites? What are the characteristics of the indigenous and exotic fish in this region (species, abundance, age classes, nutritional requirements, habitats, and so on)? What sources of water are available, and what is their quality, quantity and renewal rate? What are the characteristics of the ocean (currents, tides, and so on), topography and soil (composition, texture, drainage, water-holding capacity, acidity, and so on)? Is the area prone to soil instability and climatic stress (heavy rains, drought, hurricanes)? Could the project have an effect on:
 - environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources (water, soil, vegetation, fauna, and so on) they contain;
 - rare or vulnerable species and/or species of economic, cultural or ecological importance (biodiversity)?

B. Questions relating to the fish farming site construction

1. What are the various site preparation activities? Will there be demolition, excavation, leveling, clearing of trees and/or brush, diversion of waterways, tapping of groundwater, flooding of land, transformation of wetlands or soil sealing? What are the components of the system and how large an area will they cover (reservoirs, water pipes, pumping stations, treatment facilities, ponds,

roads, and so on; see appropriate checklists)? What equipment and materials will be required? How will they be conveyed to the site? Could the project lead to:

- changes in, encroachments on and/or the destruction of environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources they contain (if creating shrimp ponds leads to the destruction of mangrove forests, if installing piers or floats causes the destruction of spawning grounds or nursery areas, and so on);
- flooding of land, by creating ponds, and its associated problems, such as decomposition of organic matter;
- erosion of fragile or thin soils, on sloping land or near bodies of water, or where no protective vegetation cover exists, if there is no plan for buffer zones of vegetation, and so on;
- soil compaction or changes in soil texture, drainage, permeability and/or water-holding capacity (when sealing the bottom of ponds, through the accumulation of debris, and so on);
- changes in the quality, quantity and circulation of surface waters and groundwater, for example, by creating ponds and/or diverting surface water, and associated problems, such as creating an imbalance in aquatic habitats;
- nuisances (foul odours, noise, dust, vibrations), risks of accidents, soil, water, air pollution and/or health risks due to improper management of construction materials and wastes;
- fair and equitable participation of the local work force?

C. Questions relating to the fish farming project's operational phase

1. What species have been selected, and what are their origin and characteristics (nutritional requirements, growth rate, habitats, reproduction rate, life cycle, competition and predation, vulnerability, and so on)? Where will eggs, larvae, alevins and juveniles be obtained? Are there risks of contamination by toxic substances? Have they been subjected to genetic manipulation? What is their resistance? Is there a possibility of:
 - changes in, encroachments on and/or the destruction of indigenous and/or adjacent environments by intentionally or accidentally introducing exotic fish; a loss of biodiversity; changes to the food chain; spread of diseases and parasites and/or a decline in fish production due to competition for habitats, food or predation, and so on;
 - a reduction in fish resources in the natural habitats due to harvesting of parent species;
 - social and value conflicts, if the preferences of the population are not considered?
2. What maintenance activities will the project require? Have all users of aquatic products been involved? What techniques will be used (water intake and circulation system, types of food, pesticides, fertilizers, antibiotics, cages, longline cultures, follow-up and monitoring, and so on)? How will fish be introduced into artificial ponds and/or natural environments? Will there be a greater demand for natural resources? Will harvesting take place? What harvesting methods will be used (nets, mesh and hook size, dredges, trawl nets, and so on) and who will use them? What will the intensity of exploitation be (the quantity harvested in relation to the available quantity and regeneration capacity)? What is the management Plan and does it include further introductions of stock? Will the project involve resource processing activities? Will there be an increase in population as a result of migration? Will the project lead to spontaneous, unplanned human settlements? Can the water requirements of the various users be met with the available water? Is there a possibility of:
 - changes to natural habitats or to the quality and quantity of surface water and groundwater;
 - undesirable growth of algae and aquatic plants as a result of fertilizer loading;
 - pollution of the air, soil, groundwater and surface water, bio-accumulation of toxic substances (lead, mercury, and so on) in the food chain, unpleasant odours, health risks and risks of accidents due to improper management of pesticides (herbicides, insecticides, sterilization, and so on), fertilizers (used to increase productivity, for example), food, antibiotics, drugs, growth hormones, wastes, and so on;
 - water, soil and air pollution, risks of accidents and/or health risks due to harvesting and processing of resources;
 - conflicts over ownership rights, land use and resource harvesting (between small-scale or traditional fishing and commercial fishing, between water users upstream and downstream, among landowners, pond owners and the rest of the population, between the concepts of

- common ownership of surface waters and private ownership of fish products, poaching, and so on);
- socio-economic conflicts (with the income-generating activities of those having no direct contact with the project, loss of subsistence resources for indigenous peoples, problems of large-scale appropriation of resources by commercial operators, rivalries between users and owners, absence of diversified markets, distance from markets, and so on);
 - additional or reduced pressures on natural resources (water, arable lands, fish, and so on), infrastructures and local services housing, schools, and so on);
 - an increase or decrease in local sale prices of food products and an effect on local and regional economies (financial resource management system, credit system, access to markets, start-up of businesses, and so on);
 - sustainable economic development, fair and equitable forms of partnership, ease of access to aquatic resources of subsistence value and of good market value;
 - involvement of the population and all its specific groups in user and tariffication agreements, in economic decision-making, in maintaining and monitoring fish and the water management plan;
 - assumption of responsibilities by the population, particularly the anticipated direct recipients of the project;
 - an improvement in the quality of life resulting from a healthy environment, the development of socio-economic activities, food security and better nutritional value of diets?
3. More specifically for fish farming projects in natural environments, could the project lead to:
- changes in, encroachments on and/or the destruction of aquatic environments (such as coral reefs, reproduction sites, spawning sites, feeding sites, and so on) and the natural resources they contain, due to inappropriate fishing methods, such as blasting, poison, pressure from divers, anchors or on marshes and riverine lands as a result of increased traffic (people, vehicles, boats, and so on);
 - changes in water or tidal movements as a result of fishing gear such as traps and large structures that could block the natural flow of tides and currents;
 - an increase in sedimentation in water and/or eutrophication caused by the high input of particles generated by longline cultures of crustaceans or by piers, or by the accumulation of sand due to the slowing of water movements generated by stake or longline cultures;
 - any form of overexploitation of aquatic products exceeding the environment's carrying capacity, that is, what an environment and its components can sustain without compromising their growth, regeneration and roles in terms of ecological regulatory functions (for example, the use of non-selective harvesting methods, resulting in population reductions among target fish, other fish species, amphibians, marine mammals, molluscs, and so on; due to the abandonment or loss of nets and traps);
 - risks to navigation due to abandoned or lost nets and traps, high concentrations of enclosures, or floats and piers which reduce water quality and circulation?
4. More specifically for fish farming projects in artificial environments, could the project lead to:
- saline intrusions into fresh water as a result of inappropriate use of groundwater;
 - an increase in harmful species and disease vectors associated with humid areas (malaria and schistosomiasis, for example) due to the presence of stagnant water puddles;
 - odours, eutrophication of surface waters, water, soil and/or air pollution as a result of discharging pond effluents (which contain little oxygen, suspended matter, commercial food residues, excrement) without prior filtration, dilution or treatment and without considering the receiving environment's carrying capacity;
 - an increase in temperature, a decrease in oxygen content or an accumulation of wastes in pond waters if water exchange and renewal conditions are not frequent enough and/or if pond water is affected by other activities (such as washing);
 - overexploitation of pond resources and a short life expectancy of the project if site monitoring is inadequate, if harvesting quotas are too high or non-existent, and so on?