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### **Shrimp farming: socio-environmental disaster in Northeast Brazilian mangrove ecosystems.**

The shrimp farming industry takes into account only business costs, to the detriment of environmental, ecological, cultural, social, and biodiversity damages. Communities have been expelled from their traditional activities. Indians are in grave danger of losing the bases of their food and culture. Fisherfolk have been tortured, received death threats, and prevented from fishing. An immediate paralyzation of shrimp production activities in Areas of Permanent Protection (APP's) and the recuperation of degraded sectors is urgently needed. And, to be sure, the denouncements and anxiety of the people of the sea must be considered, as well as their motives for preserving ecosystems which sustain their communities and which will guarantee the quality of life of future generations.

Socio-environmental damage of an elevated magnitude in Northeast Brazilian mangrove ecosystems was the conclusion of the report presented by federal deputy Joao Alfredo (of the Shrimp Task Force Working Group) to the Environment and Sustainable Development Commission of the Federal Chamber of Deputies (lower legislative chamber). As a regional approach to shrimp production, the report includes specific diagnostics, traditional community denouncements, technical reports, and results of 11 public hearings. Environmental impacts were amply characterized; integrated and participatory actions of managing agencies defined (with governmental institutions and civil society entities involved); and aspects enumerated to be considered in the revision of the Resolutions of the National Environmental Council (CONAMA) and Environmental Councils and State Agencies.

It was possible to demonstrate that shrimp farms located in hydrographic basins of NE Brazil promote: i) deforestation of mangroves, riparian vegetation, and carnauba palm forests; ii) disappearance of salt flat areas (*apicum*); iii) filling in of tidal inlets and channels; iv) blockage of tidal flow; v) contamination of water by effluents emanating from production ponds and larval and post-larval tanks; vi) salinization of aquifers; vii) impermeabilization of soils associated with mangrove ecosystems, carnauba palm forests, and riparian vegetation; viii) erosion of banks, dikes and supply and outflow canals; ix) absence of sedimentation basins; x) escape of exotic shrimp species to fluvial and fluvio-marine environments; xi) reduction and disappearance of habits for numerous species; xii) disappearance of areas for collection of shellfish, fishing, and crab capture; xiii) dissemination of diseases (crustaceans); xiv) expulsion of shellfish harvesters, fisherfolk, and crab collectors from their work areas; xv) hamper or impede access to estuaries and mangroves; xvi) exclusion of traditional communities in participatory planning; xvii) respiratory illnesses and deaths with the utilization of metabisulphite; xviii) pressure to sell land; xvii) lack of exact data on number of shrimp farms; xix) inexistence of management; xx) lack of definition of cumulative impacts; and xxi) threatened biodiversity.

In the State of Ceara, the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA-Brazil) completed the most complete study on the environmental impacts of shrimp farming. Two-hundred forty-five (245) shrimp farms (November

2005), with a total area of 6,069.97 ha, were visited in order to evaluate approximately 39 direct indicators of environmental impacts.

The report verified that, of all the shrimp farms licensed by the State Superintendent of Environment (SEMACE), 84.1% caused direct impacts to the mangrove ecosystem (mangrove and salt flat fauna and flora); 25.3% promoted the felling of carnauba palms, and 13.9% occupied areas previously destined for other subsistence agriculture crops. In the Jaguaribe River, 44.2% of the shrimp ponds constructed interfered directly with the mangrove ecosystem and 63.6% promoted an elevated magnitude of harm to one of the most important carnauba palm forests of the region's hydrographic basins.

The most alarming data were found in the estuaries of the Pirangi, Acarau, Coreau, and Timonha Rivers, with 89.5%, 96.9%, 90.9%, and 100% of shrimp farm activities, respectively, within mangrove ecosystems (in the Acarau, Coreau, and Timonha Rivers, 78.1%, 72.7%, and 81.8% provoked felling of mangrove vegetation, respectively). The majority of the farms create serious risks of dissemination of exotic species, as they do not possess efficient security mechanisms to prevent the invasion of a shrimp species (*Litopenaeus vannamei*) exotic and noxious to Brazilian mangroves. Only 21.6% possessed licenses which corresponded to their phase of operation and within the expiration date of validity.

In the abandoned farms, the dikes continue to function as those that are still in operation, precluding environmental interchange that gives sustenance to the biological diversity of the mangroves and other ecosystems of the hydrographic basins. The report also confirmed that 77% of the shrimp farms lack sedimentation basins (effluents are flushed directly into rivers, lagoons, and estuaries), which confirms the elevated environmental harm already defined by university researchers, representatives of Watershed Committees, environmentalists, and traditional communities. With such levels of unsustainability, 67.9% of the farms were affected by diseases (63% on the east coast and 90% on the west coast), with the death of shrimp and the probable contamination of other native organisms.

The liberation of investments under the allegation that they will generate jobs, considered the strongest argument of the entrepreneurs, no longer will be justified, as it has been determined that the average index of direct employment observed in all shrimp farms is up to 3.2 times less than that divulged by the Brazilian Association of Shrimp Farmers (ABCC). In the Acarau River, for example, an index of 6.3 times less than that publicized by shrimp farmers was found. SEMACE is committing grave socio-environmental harm when it permits the construction of shrimp farms within the mangrove ecosystem (areas of apicum and salt flats) and in other areas of permanent preservation (wetlands, riparian areas, and carnaubal palm forests), through technical decisions which orient the State Environment Council (COEMA).

The COEMA Resolution N° 02/2002, which concerns shrimp farming in Ceara, should be completely revisited and licensing suspended. Studies developed by the Department of Geography of the Federal University of Ceara (UFC), determined that salt flats are governed by eco-dynamic and geo-environmental processes which are developed in the mangrove ecosystem. Former sectors of salt flats are now found to be completely covered by mangrove vegetation. This directly contradicts that stated in the Resolution "successional stage ecosystem of mangroves as well as *salgado*, where sandy soils and

elevated relief predominate, which impedes the tides from covering the soils, being colonized by species of vegetation of *caatinga* and or *tabuleiro* forests.”

In addition, long-term studies of vegetation coverage of abandoned salinas demonstrate the high capacity of regeneration by mangrove vegetation. The reestablishment of the entrance of tides (breaking abandoned dikes), is sufficient for setting off the exchange of material and energy, nutrient cycling and changes in salinity levels of covering sediments, for the start of revegetation and the entrance of fauna. The COEMA Resolution once again wrongly treats the environmental dynamics of the mangrove ecosystem when it defined abandoned salt ponds as “areas influenced by humans that generate ecosystems presenting residual soil hypersalinity, and consequently low capacity of natural regeneration by mangrove vegetation.”

The Shrimp Farm Task Force WG of the Federal Chamber of Deputy’s report defined the basics for effective actions to preserve mangrove ecosystems, improve the quality of life of traditional communities and the return of biodiversity: i) review legislation, explicitly stating that apicum and salt flats are geo-environmental and eco-dynamic units of the mangrove ecosystem and therefore under permanent preservation; ii) for the establishment of shrimp farming, demand the delimitation of Lands of the Union, of marine lands, the demarcation of native community lands, and the recognition of the legitimate passive land title of traditional communities; iii) regulate the establishment of shrimp farms in conservation units and on indigenous lands; iv) define a zone of minimum distance between shrimp farms and human settlements, guarding areas of traditional activities, of superficial drainage linked to traditional use, and the rest of subsistence activities (fishing, shellfish collection, agriculture, and natural resources use); v) delimit production systems (intensive and extensive) based on the sustainable potential of support of the ecosystems involved and of the effective availability of water, assuring the continuity of traditional activities of fisherfolk, shellfish collectors, Indians, riverside residents, and quilombolas (settlements of escaped slaves) linked to fishing, shellfish collecting, agriculture, and natural resource use; vi) set maximum indices (biological, chemical, and physical) for the flushing of effluents from the production and processing of farmed shrimp; vii) determine that licenses are only granted for the production and industrialization of shrimp based on the effective actions of adequate use and management of chemical implements and substances potentially harmful to human health and the quality of involved environmental systems; viii) determine that licenses and financing be done according to the definition of cumulative impacts, the state of fragmentation of involved ecosystems and the availability of water based on projections of use for short, medium, and long-terms; ix) determine that licensing and financing be done based on plans and programs (with budgets) of recuperation of degraded areas that have been abandoned for shrimp production; x) determine that licensing and financing are linked to effective implantation of phytosanitary barriers for the production, importation, and exportation of products associated with shrimp farming; and xi) determine that licensing and financing are based on projects that demonstrate control programs and management of introduction/invasion of exotic species.

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