

CAFTA Interim Environmental Review - Lake Nicaragua

To the Review Board,

I appreciate the opportunity to comment on the CAFTA Interim Environmental Review. I have been in correspondence with colleagues in Nicaragua regarding the environmental review and the public comments associated with the proposed Nicaraguan SA investment in tilapia aquaculture. I would like to offer these comments.

I am concerned about poorly regulated aquaculture development in Lake Nicaragua, specifically the threats posed by the introduction of exotic fish (tilapia) and their attendant diseases and parasites, and the environmental, social and economic impacts of large scale commercial aquaculture operations to not only the nascent eco-tourism and recreation industry, but to the unique fauna and habitats of Lake Nicaragua as well. The lake is recognized as a unique world resource and development should be carefully considered and planned, especially considering the abuses the lake and its resources have suffered in the past several decades. Recent reviews of the problems associated with the proliferation of cage fish culture (e.g. http://www.watershed-watch.org/www/publications/sf/Staniford_Flaws_SeaCage.PDF) clearly identify both the problems and the necessary approaches to minimize adverse impacts. It is not apparent that these approaches were utilized in the planning of this operation.

First, I would like to note that my colleagues in Nicaragua were unable to obtain a copy of the environmental review report because of extreme limits placed on public access to the document. Access was restricted by both MARENA, as the agency responsible for the preparation and input into the document, and by NICANOR SA, as proponents of the project and agitators for limited criticism of the review. Failures of the public comment process include short notice and lack of advertisement about the locations and times the document would be available for viewing, inadequate time for independent experts and other stakeholders to access and study the document, lack of study copies, and restrictions on making copies. In general, the pervasive lack of transparency surrounding the public comment component invalidates any generalities regarding public attitudes, muted or excluded constructive criticism, and prejudiced the conclusions of the document. These attempts at secrecy and manipulation call the public comment aspect and, indeed, the conclusions of the document itself into question.

The review may not adequately consider the entire scope of environmental, economic and social impacts of this investment on either the environmental or on other stakeholders. The process, as noted, is flawed by the lack of free and open public comment. The review also fails to address regulatory weakness in oversight and enforcement. Any one of these failures effectively compromises the findings of an environmental assessment or review. As a result, the environmental review, and especially the handling of public inputs on the review, fall significantly short of international environmental and social impact assessment standards. I raise these issues as a specialist in aquaculture and in environmental assessment (an International Association for Impact Assessment member, educator and practitioner), and as an ex-USAID environmental officer responsible for environmental review of US investments and USG funded activities in Nicaragua. I would like to point out key issues that need to be considered in this review.

An operation of the proposed scale has significant environmental impacts, on native fish populations, bottom biota, water quality and the lake community, coastal communities of fishers, and developing ecotourism industries. There are issues associated with waste feed, feces, antibiotics, hormones and farm operations, including noise, fuel spills, interactions with predatory birds and other impacts. These impacts should be adequately addressed in the EA. To provide a valid assessment of the potential impacts of tilapia culture, the environmental assessment must refer and build on on-going research on the environmental impacts of tilapia production in Central America

(http://pdacrsp.oregonstate.edu/pubs/workplns/wp_8/10/10.html). Without such references and links the assessment is deficient.

An environmental review or assessment of a proposed cage fish farming operation should follow generally accepted standards for evaluation of the impacts and to employ the best means possible (such as modeling) to determine the probable effects. I recommend that the Review Board examine the environmental review in light of existing guidelines and standards (e.g. <http://www.sepa.org.uk/guidance/fishfarmmanual/manual.asp>, especially <http://www.sepa.org.uk/guidance/fishfarmmanual/pdf/D.pdf>, <http://www.idea.iastate.edu/aqua/pub03.pdf>, <http://www.ifm.uni-kiel.de/allgemein/news/MERAMED.pdf>, <http://ressources.ciheam.org/om/pdf/c55/01600222.pdf>).

There are significant environmental impacts associated with the introduction of tilapia that must be reviewed in the context of the proposed operation in Lake Nicaragua.

(See Fitzsimmons <http://216.239.39.104/search?q=cache:7haMnrohacMJ:ag.arizona.edu/azaqua/ista/Malaysia/Environmental%2520impacts.doc+tilapia+culture+impact&hl=en&ie=UTF-8> for a detailed discussion).

Biological pollution is a key issue in aquaculture because escapes of farmed fish lead to ecosystem alteration and loss of biodiversity. International standards for the introduction of non-native species for cultivation require strict safeguards against escape and establishment of the exotic species. These safeguards may not in place nor even be recommended. The environmental review must address this issue.

World wide, cage culture of tilapia in open natural waters has, without exception, promoted the escape and proliferation of domestic tilapia in the host waters, to the detriment of local fauna. Tilapia hybrids for commercial culture are constantly evolving and introduction and escape of these hybrids is a real concern. While African tilapia was introduced into the lake in the 1980s, this does not mitigate the need to control escape and introduction of new and potentially even more threatening hybrids and strains of tilapia. Escape of tilapia from cages in commercial operation in Mexico was pervasive and reported at about 50% (<http://rbt.ots.ac.cr/revistas/45-3/schmitte.htm>). Tilapia escapes from aquaculture facilities in Florida have lead to the loss of food, native habitat, and spawning areas for native fish species <http://www.providence.edu/polisci/projects/aquaculture/EnvironmentalImpact.html>.

These factors indicate that regardless of the proposed measures to control escapes, tilapia will escape in significant numbers and the impact of such escapes must be a central component of any environmental assessment.

Tilapia can be devastating to native fishes (see Fitzsimmons, above, and <http://www.cichlidae.com/articles/a185.html> for a discussion). Ken McKaye and coauthors (McKaye, K. R., J. D. Ryan, J. R. Stauffer, Jr., L. J. Lopez Perez, G. I. Vega and E. P. van den Berghe; 1995; "African tilapia in Lake Nicaragua"; *Bioscience* 45: 406-411) present the alarming history and ongoing problems of Lake Nicaragua. These endemic species are a key component of the native fishery and a vital resource to coastal communities in the region. Lake Nicaragua contains at least 16 species of endemic cichlid species that have suffered severe declines in competition with introduced tilapia. These populations remain stressed by introduced tilapia populations. While introductions have ceased, establishing farmed tilapia in cages will resume introductions of newer and potentially more devastating tilapia and hybrids to escape and compete with native fish. Cage culture will also increase risk to endemic species from disease/parasite introduction and transmission from caged

fish, and from interbreeding and genetic dilution of the endemic species with escaped fish.

Because of limited knowledge of the health of endemic Lake Nicaragua cichlid species populations, it is impossible to know whether they should be considered endangered or threatened. Research by McKaye suggests that populations of endemic cichlid species are in serious decline because of tilapia introductions. Most fish species on the IUCN Red Book list are endemics with limited distribution. Most of these species are on the endangered list exactly because too little was known about them prior to exploitation, introduction of non-native competitors or disease, or habitat losses from development. These observations suggest a conservative, cautious approach to management of these endemic species and their habitats. Additional stress from tilapia farming may be sufficient to drive endemic some cichlid species to extinction. An environmental assessment of tilapia cage culture must address the impacts of the operation (and escapes) on endemic fish fauna.

Disease transmission is another is an important issue in exotic fish culture. Movement of live fish between countries is a necessity for the expansion of aquaculture, but has contributed significantly to the occurrence and spread of economically serious diseases to the fish farming industry and to native stocks. Among many diseases and parasites spread in this fashion, it is important to note the economic consequences of the spread of diseases on local fisheries (see <http://agriculture.de/acms1/conf6/ws9fish.htm>) The recommended mechanisms (laws, regulation, rigorous oversight and enforcement) for the control of disease and parasite spread through importation of fish stocks are not in place in Nicaragua. An effective environmental assessment must address the issue of disease transmission and control, as well as the movement of exotic fish species into the waters of the country.

Local scientists in Nicaragua report that recent introduction of tilapia for cage culture in Lago de Apoyo, a smaller Nicaraguan lake near Lake Nicaragua, introduced non-native parasites that now afflict the indigenous endemic cichlid species in the lake. Disturbingly, this failed trial cage culture operation was run and then abandoned by Nicanor SA, the same firm that is proposing to operate cages in Lake Nicaragua, suggesting extreme caution in reviewing their environmental protection and operational plans.

Most successful cage culture operations worldwide are located in deep water with adequate tidal flushing to remove and disperse fish farm wastes. This is not the case here, where the site is relatively shallow, with limited circulation and water movement. Cage fish farming has important and lasting effects on bottom biota, smothering bottom life through accumulations of feces, excess feed and other debris. The benthic fauna of Lake Nicaragua is poorly known and any estimation of cage farming impacts on this community presented by the environmental assessment is speculation, at best, not science. Tilapia culture and introductions in other lakes and reservoirs has been associated with eutrophication, declines in water quality and noxious algal blooms (<http://www.aaas.org/international/africa/ewmi/zinabu.htm>). Recognizing this threat, a regional development agency in Panama is evaluating the impacts on water quality prior to introduction of tilapia culture in the Gatun Lakes (see http://www.ari.gob.pa/ingles/index2.asp?codigo=areasi_prod). A similar pilot study and evaluation should be part of any comprehensive and adequate environmental assessment of tilapia cage production in Lake Nicaragua.

Environmental protection laws in Nicaragua do not adequately regulate certain activities (e.g. veterinary drug, hormones, antibiotic use), require planning for contingencies (especially spills of fuel, feed, chemicals) or offer adequate oversight of the operations or enforcement if non-compliant with environmental protection requirements. Piscivorous birds are a constant issue in cage fish farming, especially birds that dive to hunt and feed in the cages. Control measures for bird predation must be fully discussed and compatible with international environmental standards, especially if IUCN endangered, threatened or migratory bird species are involved. To be complete and more than a paper exercise, these shortcomings must be addressed and resolved in the environmental

assessment either.

There is also a need to consider social and economic implications of the operation. For example, existing cage culture operations in Honduras are seeking advice on how to manage and expand operations so as to minimize adverse environmental effects and impacts on lakeshore eco-tourism of noise, lights, visual impacts, bird and predator control and other activities. These are often the major impacts on neighboring communities and businesses and are the very same issues involved in Lake Nicaragua. Because of the potential to accelerate the decline of important lake fisheries through introduction of new hybrids, species and strains of tilapia, the review must also assess the effect of the operation on coastal fishers. I also suggest that the assessment provide a comprehensive review of the esthetic considerations associated with the operation: specifically noise, smoke, visual pollution, predator control and other impact potentially incompatible with eco-tourism and related recreation industries.

I speak from experience in the issue of placement of cage culture operations and their impacts - about a decade ago was asked by the State of Mississippi to lead the development guidelines for assessing the environmental and social impacts of cage culture in Mississippi coastal waters, and my findings and recommendations are available in the literature

There is a growing concern among scientists, development specialists and the public in the developed world that aquaculture is often not an environmentally benign food production system, but is often a significant source of pollution. This is most applicable in the less developed countries where environmental regulations and enforcement are inadequate to effectively prevent environmental abuses by producers. There has been a spate of poor publicity recently in the US press targeting aquaculture operations as polluters. This operation is exactly what is targeted by such criticism - a poorly designed and located operation seeking to operate without effective regulation and oversight, producing fish for US consumers with US blessing.

If this investment is approved and the operation proceeds, I will work with Nicaraguan and US scientists to document the impact of the operations on the Nicaraguan environment. CAFTA has a responsibility to both ensure an adequate and comprehensive environmental assessment and to require that mechanisms are in place to ensure that environmental, social and economic impacts on neighboring communities and businesses are minimized. I would like your assurances that this has been done.

Thank you

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