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MANAGED FISHERIES, AQUACULTURE AND A LOW-DEFORESTATION FUTURE FOR THE AMAZON: A FISH EATER'S MANIFESTO

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The diverse and abundant fish resources of the Amazon River floodplain, also known as *várzea*, have sustained Amazon populations for millennia. Successful community-based models for managing this vast fishery have been developed, but are now being shelved as policy makers turn to aquaculture-fish production in ponds and cages-as the "modern" way to produce healthy, climate-friendly animal protein. Aquaculture has enormous potential in the Amazon as a strategy for producing high quality animal protein that reduces pressure on Amazon forests, but it is a mistake to see it as the substitute for fish from wild fisheries. In many cases fish from natural fisheries taste better, may be healthier and contribute to the conservation of wetland habitat. By developing aquaculture and sustainably managed floodplain fisheries as complementary elements of a fish-based low carbon protein production strategy it may be possible to reduce the impacts of beef production on Amazon forests and conserve várzea habitat and biodiversity, while also increasing wild and farmed fish production, jobs and income. Aquaculture has experienced rapid growth and expansion in recent decades, as capture fisheries throughout the world have either reached their sustainable maximum harvest or, more often, been seriously overfished. The situation is especially problematic for inland fisheries that face not just overfishing but large-scale habitat degradation. While aquaculture production is more than capable of compensating for declines in capture fisheries and by providing an alternative to beef reduce pressure on tropical forests, there could also be significant social and environmental impacts in wetland areas that should be considered. Although aquaculture development is of growing interest in the Brazilian Amazon, wild capture fisheries are still reasonably healthy and could recover rapidly with effective management. In part, the health of the Amazon's wild fisheries may be due to co-management policies that developed out of grassroots movements in the 1980s. These movements sought to protect local fisheries from expanding commercial fishing fleets. The "lake preservation movement" as it was called, pressured the government to develop formal co-management policies for floodplain fisheries that incorporated preexisting community fishing agreements. Under the resulting co-management policy, government agencies formally recognized and empowered communities to manage local fisheries. Implementation of co-management policies was followed by formal recognition of community rights to their territories and resources.

During the same period researchers and expert fishers at the Mamirauá Institute (Instituto de Desenvolvimento Sustentável Mamirauá) developed a highly successful management system for the iconic *pirarucu* or *paiche,* known as “the cod of the Amazon” for its historical role in regional trade. This management system has spread throughout the Amazon and is the basis for *pirarucu* management policies in several Amazon states. Despite success with managed fisheries, policy makers tend to see the modernization of fisheries as a transition from the exploitation of wild fish stocks to the production of domesticated varieties. Here “modernizing” fisheries does not mean sustainably developing small-scale managed fisheries, but promoting the transition from the “inefficient and irrational extraction” of wild fish to the “rational and efficient” production of domestic varieties. These views underlie the recent restructuring of the fisheries sector of the Brazilian government. The Ministry of Fisheries and Aquaculture was extinguished and its functions transferred to a Secretariat of the Ministry of Agriculture, Ranching, and Supply (MAPA), a Ministry closely aligned with the agribusiness sector and development of commercial aquaculture. Today there is no functional federal policy for managing the Amazon’s wild fisheries and the *pirarucu* sold by Whole Foods supermarkets comes from aquaculture operations instead of well-managed *pirarucu* fisheries. With the virtual abandonment of federal fisheries management efforts and weak state level enforcement, there is little to prevent the overexploitation of Amazon fisheries. This problem could be exacerbated by climate change. Intense exploitation of vulnerable floodplain fish populations during the extreme El Niño drought of 2015-16, for example, is a timely reminder of how quickly these fisheries could be depleted in a scenario that combines more frequent extreme weather events and ineffective fisheries management. Depletion of *varzea* fisheries would threaten the major source of income and food security for much of the traditional and Indigenous populations of the Amazon várzea and adjacent river margins. This is unfortunate, because these floodplain communities and small scale fishers are the main stakeholder group with a strong interest in and potential commitment to sustainably managing *várzea* fisheries and conserving aquatic habitat and biodiversity. In contrast to the situation in upland areas, where aquaculture can be separated from the aquatic system, aquaculture development in wetlands is more problematic. It often competes with managed fisheries for floodplain and riparian habitat that provide low cost access to abundant water supplies to produce fish and flush wastes. Large scale aquaculture development could transform the *varzea* into mosaics of ditches, fish ponds and irrigated cropland. These changes would disrupt links between floodplain habitats and the river that are critical to the productivity and ecological integrity of the Amazon aquatic system. While Amazon aquatic biodiversity is still reasonably intact, this could change rapidly with the expansion of commercial aquaculture throughout the Amazon

floodplain. The main point here is that with the right policies in place, we do not have to choose between managed fisheries and aquaculture. A low carbon protein strategy can support the development of both, with aquaculture development concentrated in upland areas and managed fisheries on the floodplain. Acre's approach to fisheries and aquaculture, which includes co-management policies for wild fisheries and specific regulations for the *pirarucu*, while also developing aquaculture at a range of scales, could become a model for this integrated approach. First and foremost, this integrated approach depends on effective government enforcement of fisheries management regulations. It also involves a change in perspective. Rather than assuming that aquaculture is the end result of fisheries development, policies should seek to modernize local fisheries, developing their capacity to manage fisheries and not just extract fish. Unlike cattle and aquaculture, the productivity and diversity of the Amazon's floodplain fisheries depend on healthy várzea forests and grasslands. These managed fisheries are the basis for the real low carbon protein strategy, one that promotes growth of várzea forests rather than merely reducing deforestation. Varzea communities are the stakeholder group that can make this happen. The key to this low carbon protein strategy is the design of fisheries and aquaculture policies that harness the growth of Brazilian aquaculture to drive the development of modern locally managed fisheries that are integrated through regional industries and wholesalers into national and international markets for high quality Amazon fish. If these policies are successful, production and export of farmed fish fed on soy will make it possible to find better tasting wild fish that feed on the fruits and nuts of varzea forests in great fish restaurants and markets throughout the world. We can have our fish and eat it too, really.

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