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TAKING THE AMAZON BACK TO FISH: A FISH-BASED LOW-EMISSION DEVELOPMENT STRATEGY FOR THE AMAZON BASIN

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While Amazon states and regions struggle to reduce deforestation and carbon emissions from beef production, it is useful to remember that fish has been the animal protein that sustained Amazon populations for millennia. Fish are not just part of the past; they can also play an important role in the future of Amazon development. And, most importantly, the subnational governments of the basin recognize the potential of fish and many are investing in making it a reality.

A fish-based production strategy integrating aquaculture and managed fisheries could meet growing demand for animal protein on a far smaller land base than beef, with far lower impacts on forests and global climate. It can also provide an important new source of income for Amazon farmers and cattle ranchers of all sizes. While development of aquaculture and managed fisheries faces significant challenges, there is a logical path forward that draws in part on the approach that led to the modern Amazon beef sector. Here we briefly outline arguments for fish, trends in aquaculture and managed fisheries, challenges to developing a fish-based approach, and a strategy for implementing an Amazon-wide transition to fish-based low-emission development.

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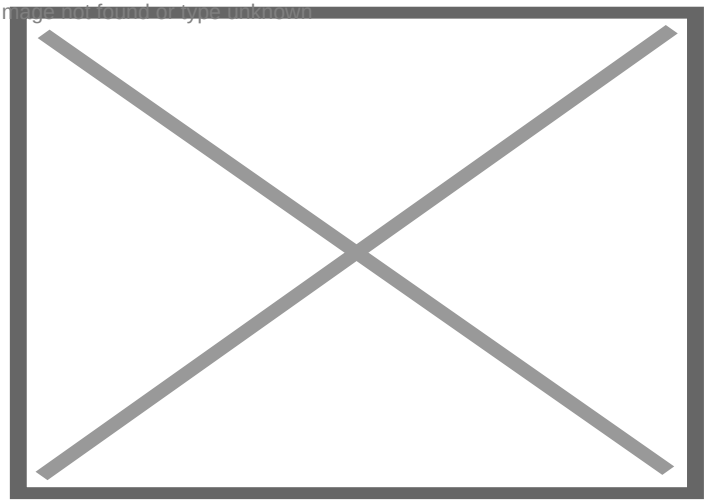

Figure 1: Area needed to produce one ton of beef or fish with today's prevalent production systems

There are four main benefits of a fish-based regional development strategy. First, aquaculture is far more efficient than beef in terms of land use and generates far smaller quantities of greenhouse gases. One metric ton of fish can

be produced on a half hectare with conventional aquaculture versus 16 hectares for traditional beef production (Figure 1). Second, fish are better for human health than beef with far lower levels of saturated fats and higher levels of healthy omega-3 fatty acid. Third, from an ecological perspective, a fish-based development model is far more compatible with the basin-scale hydrological processes that maintain forest cover, Amazon farming systems, and the regional precipitation regime. And finally, fish is by far the dominant form of animal protein in global production (35% for fish vs. 14% for beef) and trade (64% for fish vs. 12% for beef), so fish have the market power to drive the regional transition from a beef- to a fish-based rural development model (FAO 2019a, 2019b).

Fish from aquaculture and managed fisheries could be the foundation of a sustainable, low-emission future that enables Amazon countries to progressively increase animal protein production while reducing deforestation and greenhouse gas emissions. Many Amazon beef producers and smallholders are already investing in aquaculture as a strategy for increasing profits and diversifying their sources of income. In the process they are developing the capacity to lead a region wide transition to a fish-based development trajectory.

Trends in Managed Fisheries and Aquaculture

In recent years important progress has been made in developing a fish-based strategy in Brazil that integrates managed fisheries and aquaculture. During the 1990s, IBAMA, the federal institute then responsible for managing fisheries, implemented a co-management policy that legalized inter-community fishing agreements for floodplain lake fisheries. Similar co-management policies have been adopted by numerous Amazon states and regions. Studies have found that fishing in these community managed lakes can be 50%-60% more productive than in similar unmanaged lakes. Results from the management of the *pirarucu* (*paiche* in other countries; *Arapaima spp.*) have been even more impressive. In the state of Amazonas, Brazil, production of sustainably managed *pirarucu* increased from 20 metric tons in 2003 to almost 2,000 metric tons in 2015 after a regulatory system was implemented by the state government.

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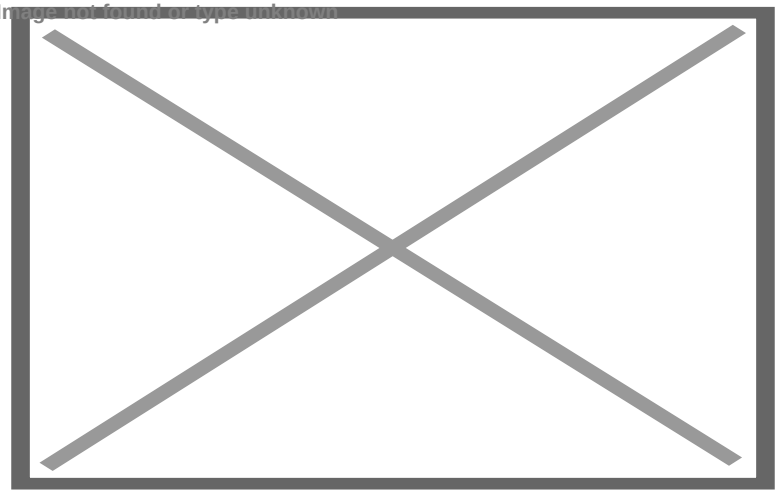

Figure 2: Trends in Capture Fisheries and Aquaculture in Brazil: 1950-2016. Source: FAO Fishery Global Production Statistics 1950-2017 and FAO Global Aquaculture Production 1950-2017

Over the last decade there has been growing interest in aquaculture, often promoted as the modern alternative to capture fisheries. Total Brazilian aquaculture production is approaching that of Brazil's capture fisheries (Figure 2). Today, virtually all Amazon states and regions are investing in aquaculture, which they see as an important component of their rural development strategies. The state of Rondônia in Brazil is one of the top aquaculture producers in the country. Thus far, Amazon aquaculture production has been based on popular Amazonian species such as the *tambaqui*. Aquaculture is practiced by a wide range of rural producers, from small-scale subsistence farmers to large-scale agribusiness operations. Rondônia, the leading aquaculture producer among Amazon states and regions, has the lowest average scale of production.

While supporters of aquaculture often promote it as an alternative to wild fisheries, there is no reason to choose between them, as the two systems are complementary components of a fish-based low-emission development strategy. Along major Amazon Rivers, wild fisheries provide employment, cash income and subsistence. As such, they are an important subsidy for other household activities and the regional economy as a whole, including hundreds of thousands of rural, urban and indigenous Amazonians. Public and private investment in sustainably developing these fisheries could significantly improve the livelihoods of these peoples and revitalize the rural economy. At the same time investments in aquaculture in upland areas could have a similar impact as fisheries, in this case introducing a dynamic new commodity that could steadily improve incomes and drive rural development in response to growing national and international demand for a high-quality animal protein that is produced on a fraction of the land already cleared for cattle.

Challenges to fish-based development

While the potential for a fish-based rural development strategy in the Amazon is huge, there are significant bottlenecks all along the supply chains for managed fisheries and aquaculture that must be resolved to harness this potential.

Inefficient production and management: Amazon people have little experience with aquaculture production or managing wild fisheries. Improving efficiency is a major challenge that involves developing more efficient production and management systems and training Amazon fishers and fish farmers in best practices in producing and managing fish.

*Informal supply chains***:** Most Amazon fishers and a significant proportion of aquaculture producers operate outside the formal economy and are therefore unsupported in their efforts to store, process and sell their catch. They are also largely invisible to government regulatory agencies. Consequently, policy levers and market signals are of limited effectiveness. Furthermore, there is little reliable government data on these sectors to inform policies for developing fisheries and aquaculture.

Deficient supply chain infrastructure: Moving a highly perishable product from producing areas deep in the Amazon to processing centers and from there to major urban markets is logistically challenging. The success of a fish-based strategy will depend on targeted investment in efficient, modern infrastructure adapted to Amazon logistical conditions.

*Limited market penetration outside the Amazon***:** Native Amazonians consume large amounts of fish and prefer a wide range of native species such as *tambaqui*, *tucunaré*, *matrinxã* and *pirarucu* (SEBRAE 2016). Amazon markets, then, are the logical initial focus of a fish-based development strategy. Average fish consumption elsewhere in Brazil is below the global average and demand for native Amazon species is relatively low. Expansion of Amazon fish into non-Amazon markets will require an effective marketing strategy, one that takes advantage of the strong branding potential of fish products that are associated with conserving Amazon forests, supporting indigenous and traditional communities and promoting Amazon culture and cuisine.

Difficulties accessing technical assistance, quality inputs and markets: Under prevailing Amazon conditions small- and medium-scale fishers and fish farmers are often at a competitive disadvantage. Equitable commercial partnerships between producer organizations and companies could provide the technical assistance, quality inputs and market access that small-scale producers need and that local governments can rarely provide.

Enabling conditions for the transition to fish: A jurisdictional approach in which subnational governments work with local producers and other supply chain actors to create the regional governance conditions, infrastructure and regulatory frameworks that modern supply chains require, can provide the enabling conditions that local fish farmers and community managers need to make the transition to sustainable fish production and management.

Making the transition to fish

In May 2019, Earth Innovation Institute presented a proposal for a fish-based, low-emission development strategy at the Annual Meeting of the Governors' Climate and Forests Task Force (GCF), in Caquetá, Colombia. The presentation was followed by individual discussions with the 16 GCF governors and Secretaries of Environment at the meeting representing state and regional governments in the Brazilian, Peruvian and Colombian Amazon (Figure 3). These conversations confirmed that subnational governments across the Amazon region are investing in aquaculture, while those in states and regions along the major Amazon tributaries are also seeking ways to sustainably develop their fish resources.

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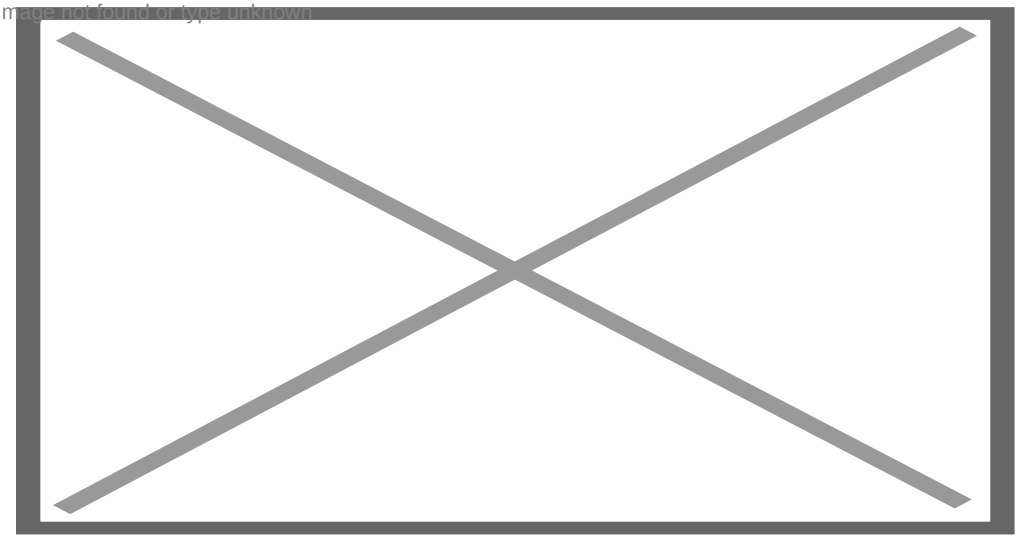

Figure 3: Pan-Amazon governments interested in a fish-based, low-emission development strategy

These Amazon governors could lead a basin-wide transition in which a fish-based low-emission development strategy gains progressively more space in the regional economy. But while there is clearly enormous potential for a fish-based development strategy, without significant support in the critical areas listed above, there is no guarantee that such a transition can be achieved.

A strategy to create conditions that could make this transition possible includes:

1) Work with diverse local stakeholders to undertake assessments and generate baselines for aquaculture and fisheries in each GCF jurisdiction;

2) Based on these assessments, prepare and implement jurisdiction-wide plans that create enabling conditions for developing inclusive, modern supply chains for sustainable fisheries and aquaculture;

3) Work with and through leading regional universities and technical schools — especially those in the Amazon — to build jurisdictional capacity to develop and implement fish-based, low-emission development strategies;

4) Form a decentralized, basin-scale governance framework for the sustainable management of the Amazon's important migratory fisheries and other aquatic resources;

5) Develop marketing strategies and commercial alliances that take advantage of the branding potential of Amazon fish in national and global markets.

In conclusion, it should be remembered that the future of beef production in the Amazon was not at all guaranteed in the 1970s when large-scale, government subsidized expansion of cattle ranching began. The current beef sector is a product of decades of collaboration between producers, researchers, companies, government policymakers and civil society organizations. Through these kinds of collaborations, formal and informal, we seek to prepare the region for the large-scale transition from a rural economy dominated by beef production to a more diversified one in which fish gain progressively more space. Through this process, the Amazon can cease to be a major threat to the earth's climate and biodiversity and become an important part of the solution.

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Figure 2:

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