

Q&A:

Ecologist spotlights greenhouse emissions from dams

Ecologist Philip Fearnside, a research professor at Brazil's National Institute for Amazonian Research in Manaus, has worked in the Amazon for over 30 years. He has focused on the human carrying capacity and sustainability of tropical forests, and has written about environmental services as a development strategy in Amazonia—especially avoided deforestation for climate-change mitigation. Fearnside began studying the impacts of Amazon dams in the 1990s. In papers, he has spotlighted potential impacts of dams planned for the Madeira River and the proposed Belo Monte dam, which this month won a key permit. (See related story—this issue.) Fearnside calculates some dams produce more greenhouse emissions than a fossil fuel plant generating the same amount of energy. Fearnside, born in California and brought up in Massachusetts, holds degrees from Colorado College and the University of Michigan. He spoke recently by phone with EcoAméricas correspondent Barbara Fraser.



Philip Fearnside

reservoir is flooded will rot and release carbon dioxide, [which] needs to be counted. There are millions of trees, so it's not a small amount. And it isn't being counted in environmental-impact statements or reports for the [UN] Climate Convention. Methane is generated at the bottom of the reservoir. It is mostly released by water going through the turbines or spillways, as opposed to coming out as bubbles on the surface of the reservoir. The water comes from the bottom of the reservoir, so it's full of methane, and that isn't being counted in Belo Monte's environmental impact statement, for example. It's important to have a full accounting of the dams' impacts and benefits, so you can compare them and make a rational decision.

Are greenhouse gas emissions always too great to make hydroelectricity a truly green option?

You can't generalize. There's quite a bit of variation among dams in how much green-

house gas is emitted and how much electricity is generated, so the balance between the two varies a lot. It's worse in tropical areas than other parts of the world, but it's not zero anywhere. The time sequence also varies. The big pulse of emissions is in the first few years after you fill the reservoir. Then emissions go down, but they don't go to zero, and this sustained emission varies among dams. In Brazil, the dam with the highest emissions in the 2004 national inventory was Três Marias in Minas Gerais. It's not in the rainforest, so you'd think it would have lower emissions. And it was built in 1962, so there are dams that have high emissions over the long term.

Dams fell out of favor not long ago. Now they're portrayed as a green-energy solution. Have dams changed, or is this green-washing?

There's green-washing going on. Basic impacts of dams have not changed. In Brazil, there are environmental-impact statements, and the government supposedly evaluates impacts and makes rational decisions. But look at the history of these dams, and you'll see [the review] has little effect on the actual decision. Once the auction is held and the company starts investing more, it becomes much more difficult to stop a project.

Is the Belo Monte dam an example?

In the case of Belo Monte, there is a fictitious story that only one dam is to be built. The original plan was to have six dams. That was reduced to four. In October 2008, the National Council on Energy Policy announced there would only be one dam. But it's not economically viable with just the one dam, and there is no legal barrier to building another.

Why is Brazil so interested in building dams in the foothills of the Andes in neighboring countries?

The most controversial thing is that Brazil is exporting its environmental impacts. It's doing exactly what the U.S. and the World Bank have been criticized for—doing things in other countries that they wouldn't do at home. It's much easier to get these projects approved and built in Peru than Brazil. There are fewer demands in the licensing process, so they can do it more cheaply and quickly, and all the impacts are in Peru.

When did you begin studying greenhouse gas emissions from dams, and what has your research shown?

A group of Canadians published a paper in 1993 saying there were emissions from dams in Canada. My first paper came out in 1995 and enraged the hydroelectric industry. Since then, the industry has spent millions trying to prove me wrong. But the more data that gets collected, the worse it looks. They keep finding more and more emissions from the dams. There is some recognition of greenhouse gas emissions, but it's a tiny fraction of what the real emission is. There are several sources of greenhouse gases [from dam reservoirs]. The trees there when the

Should hydroelectric dams count for carbon offsets?

If you look at the IPCC [Intergovernmental Panel on Climate Change] guidelines, they only count the CO₂, although methane is the big impact from dams. The system is set up in a way that doesn't count the real impacts. Reservoirs act as methane factories, taking carbon out of the atmosphere as CO₂ [by photosynthesis] and returning it as methane, which has a much greater impact on global warming per ton of carbon. Most carbon released by the reservoir as CO₂ does not have a net impact on global warming, since the same amount of CO₂ that is being removed from the atmosphere by photosynthesis by plankton, water weeds, etc., is being returned to the atmosphere if they rot in the presence of oxygen. Only the CO₂ from the rotting trees that were present when the reservoir was flooded is considered a net emission. Methane, on the other hand, is virtually all a net emission. This forms when decay occurs at the bottom of the reservoir where there is no oxygen in the water.

Can dams be done well?

You can't make an across-the-board statement that all hydro is evil, but there's a consistent pattern of overestimating the benefits and underestimating the impacts. It's very important that this be corrected. There isn't a magic number in terms of size of the dam. In terms of the area of water per megawatt, small dams are actually worse. So it isn't true that small dams have minimal impact. And they are proliferating. Brazil has thousands of small hydroelectric centers planned.