



## Roads Benefit People But Can Have Massive Environmental Costs

Posted by [Stuart Pimm](#) of Nicholas School, Duke University on October 19, 2014

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Road-killed tapir in Peninsular Malaysia (photo © WWF-Malaysia/Lau Ching Fong)

By *William F. Laurance*

*Located in the wrong places, roads can open a Pandora's Box of problems, says William F. Laurance*

In a recent Opinion in National Geographic News ("[Want to make a dent in world hunger? Build better roads](#)", 14 October 2014), U.S. Ambassador Kenneth M. Quinn makes a compelling case that roads can have major benefits for rural people—improving access to modern farming technologies, education, and healthcare, and even limiting the influence of extremist groups that prey on isolated communities.

However, Ambassador Quinn tells only half of the story. Yes, many roads or road improvements can yield major economic and social benefits. But other roads become environmental disasters—opening a [Pandora's Box of problems](#) such as illegal logging, poaching, [wildfires](#), and land speculation.

Understanding the difference between environmentally 'good' roads and 'bad' roads is vital, because we are currently living in the most explosive era of road building in human history. By 2050, it is expected that we will have an additional [25 million kilometers of new roads](#)—enough to encircle the Earth more than 600 times. Nine-tenths of those roads will be built in developing nations, often in the tropics, which sustain some of the planet's most biologically rich ecosystems. These ecosystems also provide a range of vital environmental services, such as storing carbon, providing clean water supplies, and regulating the climate.

Environmentally 'bad' roads are typically those that penetrate into remaining wilderness areas, rare ecosystems, or protected areas such as national parks—areas still largely dominated by native vegetation.

Consider, for instance, the first major highway in the Amazon, which linked the city of Belem, near the mouth of the Amazon River, with Brasília, the national capital nearly 2000 kilometers to the south. Completed in the early 1970s, the highway was initially a razor-thin cut through the forest. But then deforestation quickly proliferated along the highway route, like a [series of cancerous tumors](#). The tumors soon spread as the highway spawned scores of secondary and tertiary roads. Today, that narrow highway has evolved into a [400-kilometer-wide slash of forest destruction](#) across the eastern Brazilian Amazon.



**Deforestation along roads in the southern Brazilian Amazon (image from Google Earth)**

We're also seeing a wave of bad roads in the Congo Basin. In the last 15 years [over 50,000 kilometers of new roads have been built](#), often by industrial loggers. This is opening up the forest to commercial hunters, who use rifles and wire snares that are far more deadly than traditional hunting methods. As a result, we're witnessing an epic slaughter of forest elephants—killed by poachers for their valuable ivory tusks. The global population of forest elephants has [plummeted by two-thirds in the last decade](#), along with many other wildlife species.

The sad news is that many roads being built today are environmentally bad. Virtually all of the world's remaining wildernesses are under assault by road building—from the Amazon to New Guinea, and from Siberia to Sub-Saharan Africa.

Such roads are proliferating for a variety of reasons—to access valuable natural resources such as minerals, timber, land, oil, and natural gas; to construct new dams, power lines, and gas lines; to promote regional trade; and even to secure remote frontier areas. For instance, Brazil's paranoia about losing control of its vast Amazonian territory, and [India's nervousness about its disputed northern border with China](#), have both prompted waves of frontier road building—and caused severe environmental damage in the process.



In wilderness areas, such as this rainforest in northern Borneo, the best strategy is to 'avoid the first cut'—keep them road free (photo by Rhett Butler)

Of course, some roads can yield substantial economic and social benefits with only modest environmental costs. In a [recent article](#) in the leading journal *Nature*, my colleagues and I presented a 'global roadmap' that attempts to distinguish between areas where roads should and should not go.

One of the key areas where roads can have major benefits, with modest environmental costs, is in [already-settled lands that support relatively unproductive farms or grazing lands](#). Such conditions prevail in expanses of the developing world—such as parts of Sub-Saharan Africa, South Asia, and Latin America, among others. In such contexts, most of the native vegetation has already been removed, and [new or improved roads can help farmers get access to better farming technologies, such as affordable fertilizers and modern crop varieties, and transport their crops to urban markets much more efficiently and cheaply, with lower crop losses](#).



## productivity and incomes (photo by William Laurance)

Improving farming in such areas can go a long way toward helping us meet global food demand, which is rising sharply because of rapid population growth and changing diets. It is estimated that, [by mid-century, global food needs will roughly double](#). If we keep farming the way we are at present—without improving food production where yields are low—then we are likely to require around [1 billion hectares of additional farmland](#), an area the size of Canada. That would be a global environmental disaster, as we are already [farming an area the size of South America, and grazing an area the size of Africa](#).

So, not all roads are bad for the environment. Indeed, in the right places, roads can be environmentally beneficial, because they can help to improve and concentrate agriculture, thereby hopefully [sparing lands for nature conservation](#) elsewhere.

It all comes down to the local context. Where native vegetation still survives, or where there are rare ecosystems or concentrations of endangered or [locally endemic](#) species, then roads should be avoided whenever possible. In already-settled areas where farm yields are low, however, new or better roads can help to amp up food production and improve rural livelihoods.

These simple rules of thumb can help [guide us toward better road planning](#). Of course, we still face enormous challenges because roads are currently proliferating almost everywhere, often disastrously so. We have our work cut out for us—trying to feed and sustain a hungry planet while saving a place for nature.

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