

Researchers create global road maps showing potential economic and ecological consequences of new roads

August 28 2014, by Bob Yirka



A logging road slices through a rainforest in Sabah, Malaysian Borneo. Credit: Rhett Butler

(Phys.org) —A multinational team of researchers has published a paper in the journal *Nature*, offering a way towards better global planning for road construction. They highlight the benefits of road building along with detriments and include maps of the world they've constructed that indicate where road building would be economically beneficial, where it would be ecologically harmful and where it would be both. Stephen Perz of the University of Florida offers a News & Views piece on the roadmap idea proposed by the team in the same journal issue.

Most everyone agrees that the path to growth for developing nations includes a lot of road building. You can't move products you make or crops you grow without a way to get them to places where they can be sent somewhere else for sale. Historically, building such [roads](#) has not always been well thought out though—some roads, for example, have led to cutting up ecologically sensitive areas, others have led to illegal logging or mining of minerals and others yet have led to general chaos for drivers. In this new effort, the researchers propose the idea of a global road [map](#) for the future, laying down the case for better planning of new roads and highlighting the strengths and weaknesses of such plans before construction begins, hopefully, in the process, leading to a more intelligent road network in the future.

The researchers note that current estimates suggest approximately 15.5 million miles of road will be built between now and 2050—a 60 percent increase over existing roads in 2010—which of course represents an enormous amount of growth, most of which will occur in developing countries. Instead of just building them ad hoc as apparent need and funding arise, the team wonders, why not take a more logical approach that includes discussing trade-offs. To that end they created maps of the whole world based first on economic gains that could be seen from road building—areas such as central parts of the U.S., parts south of the Sahara in Africa, and parts of India for example, could benefit from roads that would carry agricultural goods. Next, the team created maps

indicating where roads would almost certainly cause ecological problems, such as parts of southwest Africa, the Amazon basin and many parts of Siberia. Their third set of maps highlighted areas where there is likely to be trade-offs, such as in many parts of Central America, Southeast Asia and Madagascar.



A caravan of logging trucks along a forest road in Sabah, Malaysian Borneo.
Credit: Rhett Butler

Overlaying the maps, the team notes, would allow planners to gain a better perspective on road building projects and hopefully, make smarter decisions in the future.

More information: A global strategy for road building, *Nature* (2014)
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Abstract

The number and extent of roads will expand dramatically this century. Globally, at least 25 million kilometres of new roads are anticipated by 2050; a 60% increase in the total length of roads over that in 2010. Nine-tenths of all road construction is expected to occur in developing nations, including many regions that sustain exceptional biodiversity and vital ecosystem services. Roads penetrating into wilderness or frontier areas are a major proximate driver of habitat loss and fragmentation, wildfires, overhunting and other environmental degradation, often with irreversible impacts on ecosystems. Unfortunately, much road proliferation is chaotic or poorly planned, and the rate of expansion is so great that it often overwhelms the capacity of environmental planners and managers. Here we present a global scheme for prioritizing road building. This large-scale zoning plan seeks to limit the environmental costs of road expansion while maximizing its benefits for human development, by helping to increase agricultural production, which is an urgent priority given that global food demand could double by mid-century. Our analysis identifies areas with high environmental values where future road building should be avoided if possible, areas where strategic road improvements could promote agricultural development with relatively modest environmental costs, and 'conflict areas' where road building could have sizeable benefits for agriculture but with serious environmental damage. Our plan provides a template for proactively zoning and prioritizing roads during the most explosive era of road expansion in human history.

[Press release](#)

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