SMART INFRASTRUCTURE

Energy and transportation infrastructure are essential backbones of economic development, and increase access to healthcare, education and other services. However, traditional large-scale infrastructure projects also flood, fragment and induce conversion of ecosystems, resulting in the loss of biodiversity and other ecosystem services worth millions of dollars.

25 MILLION KM NEW ROADS

The International Energy Agency predicts that by **2050** we will have **60%** more roads than we did in **2010**

That's about **25 million** kilometers of new paved roads

95 percent of all forest destruction in the Brazilian Amazon has occurred within **5 kilometers** of roads (many of them illegal)

In the Congo Basin, over **50,000 kilometers** of new roads have been bulldozed into the rainforest in recent years

This new accessibility has led to the slaughter of **2/3 of all** forest elephants in the Congo Basin for their valuable ivory tusks

From an ecological perspective, we can safely say that building new roads in pristine regions is bad. From an economic perspective, it is a matter of doing the numbers right to determine if a project's benefits are enough to cover its financial, social and environmental costs. Decision makers frequently conclude that the environmental sacrifice of infrastructure projects is justified; however, numbers often don't support that view when the values of nature are included and the true tradeoffs are revealed.

A CASE FOR NUMBERS: UGANDA

In July 2012, the Uganda National Road Authority (UNRA) announced plans for the design and construction of **1900 kilometers** of strategic roads in the country

The objectives of these roads are:

1 To promote equal access to economic and social development opportunities across the country

2 To improve the quality and connectivity of the national road network

3 To promote continual improvement of the national road sector in Uganda

One of the proposed projects includes upgrading **13 km of a road** that passes through Bwindi Impenetrable National Park (BINP)...

...one of the last remaining habitats of about **1/2 the world's population** of critically endangered mountain gorillas

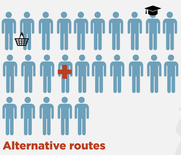
Civil society proposed two alternative routes around the park that would bypass construction within BINP

To support the decision-making process, **Conservation Strategy Fund (CSF) + International Gorilla Conservation Programme (IGCP)** studied the economic costs and benefits associated with the proposed road through BINP compared with the two proposed alternatives. The results showed that the alternative routes outside BINP would have a better overall economic performance, including providing benefits to more people, than upgrading the route through the park.

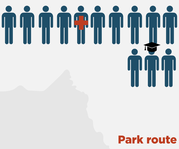
The road through the park is estimated to cost the Ugandan economy 2x more than the alternatives when potential losses in gorilla permit revenues are considered. The route could lead to an additional US $214 million in lost tourism revenues over the next 20 years.

-US $214 MILLION 20 YEARS
(IN PRESENT VALUE TERMS)

While alternatives outside the park may have higher construction costs than upgrading the existing road within the park, they would improve access to markets and important services like healthcare and education for a total of **19,000-25,000 people** (**6,000-12,000 more people** than would be served by the upgrade of the road through BINP).



Alternative routes



Park route

Upgrading the current road would risk changing gorilla behavior and ranging patterns, which could lead to losses as high as **US $15.7 million** in direct permit revenue, **US $26.5 million** to Bwindi's local economy, and **US $214.2 million** to Uganda's national economy over the **next 20 years.** Building alternatives around the park would avoid these costs for an additional expenditure of **only US $3 to $4 million.**

Comprehensive economic cost-benefit analysis (CBA) can determine if projects are desirable from societies' point of view, can assess viable alternatives and can identify mitigation strategies to compensate for environmental and social damages.

CSF's Smart Energy + Transportation Infrastructure program helps decision-makers and planners at national and regional scales consider the tradeoffs of infrastructure development and identify solutions that can maximize benefits for all of society. Some of the program's key components are:

- **Training and technical support** in comprehensive economic cost-benefit analysis (CBA) of projects and policies
- **Roads Filter and HydroCalculator tools** to evaluate feasibility and risks of road and hydropower projects based on economic, social and environmental criteria
- **Online video lessons** with expert instruction for conducting CBAs that incorporate social and environmental impacts

Please visit **CSF's Smart Energy + Transportation Infrastructure** page for more information on case studies, tools, training and news.

This document was made possible by the support of the American People through the United States Agency for International Development and its program on Biodiversity Understanding in Infrastructure and Landscape Development (BUILD). The views expressed herein are of the author(s) and do not necessarily reflect the views of USAID or of the United States Government.

Sources:
1. Laurence, et.al. 2014 A global strategy for road building. Nature 513, 229–232
2. Barr, et al. 2014. Pave the impenetrable? An economic analysis of potential Ikumba-Ruhija road alternatives in and around Uganda's Bwindi Impenetrable National Park. Conservation Strategy Fund Technical Series. April 2015. No. 35.
3. Conde, et al. Does the Maya Forest need more roads? Conservation Policy in Brief. November 2007. No. 4.

Infographic by Courtney Lewis Cheng
Copy by Irene Burgués Arrea, Kim Bonine and Alfonso Malky