Impact of huge highways in the jungle

RAICES: Effects of anthropogenic habitat perturbation on rodent population dynamics and risk of rodent-borne diseases (CRN 3076)
Budget: US$884,870
Main agency: Tulane University, United States
PI: Daniel Bausch
Countries: Bolivia, Ecuador, United States and Peru.

http://www.iai.int/en/post/detail/crn-3076-raices-perturbacion-antropogenica-y-roedores

Abstract:

Research on the impact of the construction of highways in pristine ecosystems, supported by the Inter-American Institute for Global Change Research (IAI), draws attention to its possible consequences for human health.

The Peru-Brazil Inter-Oceanic Highway connects the Brazilian ports on the Atlantic Ocean with the Peruvian ports on the Pacific Ocean. It is a transcontinental highway of 2,600 kilometers, built between 2002 and 2011, which has produced developmental and economic benefits. However, a five-year study concludes that besides the improvements in sanitary and food infrastructure, it has caused a change in human land use which has generated a loss of biodiversity and a transformation in fauna dynamics.

The research, co-financed by the Inter-American Institute for Global Change Research (IAI), reached several conclusions. Among these, the construction of highways changes population composition and distribution of wild rodents. This in turn increases the potential for human contact, putting the health of surrounding populations at risk due to the life-threatening nature of some of the diseases that rodents transmit.

The field study took place in four populations in the department of Madre de Dios, Southeast Peru: Santa Rosa, Florida Baja, La Novia and Alegría. These populations are mainly dedicated to forestry and agriculture. The interdisciplinary group of scientists interviewed leaders and members of the communities individually and in groups to learn about the highway's impact on their quality of life and health. They suggested topics such as the change in the communities' dynamics because of the arrival of migrants at the beginning of the construction. They also applied surveys to measure the impact of the

communities' perception of their health and the risks to their well-being. They took samples of the rodents in the region and identified the presence of bacteria that produce infectious diseases when transmitted by these vectors.

Perception of the communities

The study was based on two focus groups, 35 in-depth interviews with key informants of the region, and the application of a survey which 522 people answered. One of the most surprising results was that 90% of those who answered the interview and had seen rodents around their houses could not name the diseases the rodents transmit. They describe them as nasty animals, and they use cats as an eradication method.

The informants declared that the quantity of rodents had increased since the construction of the highway but were not conscious of the risks that this entailed. "If rodent-borne diseases are not on the radar of health professionals, they may not consider presumptive treatment, which could result in unnecessary morbidity and mortality", concludes one of the published articles based on the research.

As part of the construction works and due to the easier access to agricultural and mining work, the region has experienced the arrival of a large number of workers, many of them immigrants. The study did not find any differences regarding access to food or health services between the incoming construction workers and the residents. Instead, the study identified social gaps between the incoming population and the resident one, mostly because of the perception that the residents have of the incomers. The latter are perceived as using the land in non-sustainable ways for agriculture and then leaving. Since both populations had greater similarities than differences regarding well-being and since they both trust the local government more than the national one, the researchers' recommendation is that the responsibility of enacting potentially necessary changes should fall to local leaders. They propose the encouragement of social cohesion through participation in organizations, secure property rights and improving job opportunities.

In general terms, the local population perceives that the construction of the highway has both positively and negatively impacted their well-being. Perceived positive impacts include increased access to infrastructure (including healthcare) and a variety of food products, employment opportunities and cultural exchange. Perceived negative impacts include changing community dynamics due to migrants, an increase in the risk of certain diseases (e.g. dengue fever and gastroenteritis), road accidents, increased crime (drug-related and sex trafficking), increased contamination of food and water sources, soil depletion and flooding, and decreased biodiversity due to gold mining, much of it illegal.

Rodents as disease vectors

The research team made a longitudinal study collecting wild rodents in habitats with different levels of anthropogenic perturbation in the surroundings of the mentioned communities. The samplings were taken every four months between December 2013 and

September 2016. Researchers analysed samples from a sub-group of 97 rodents of eleven different species, collected between 2014 and 2015, and they found that 78% of them were positive for *Bartonella* bacteria and 24% for *Leptospira*. These microorganisms cause serious infectious diseases that, without care or proper treatment, can be lethal. The numbers of these rodents varies according to season, as well as with changes in land use. Even though a large presence of *Bartonella* was found in both the rainy and the dry season, and in disturbed areas, *Leptospira* presence in animals was more prevalent during the rainy season.

Changes in land use because of human activities, as well as deforestation and agricultural expansion, can contribute to an increase in animal-human interaction and cases of zoonotic transmission. Taking this into account, scientists draw attention to the need for better knowledge of what they call a “pathogen landscape”, which is present in human settlements around the highway, in order to understand the risk of the population acquiring infectious diseases.

“People living in Madre de Dios struggle between the prospect of development and the increasing global need and pressure for conservation”, researchers say.

Despite the fact that the study centred around the Inter-Oceanic Brazil-Peru route, it also included other areas where the construction of roads in pristine forests in Ecuador and Bolivia has had consequences for the environment and human health.

Because of this, they recommend more complete public health strategies, adapted to the dynamics of the areas where habitat transformation by human activities occurs. They also endorse collaboration with community leaders in order to improve empowerment and encourage an exchange of ideas about how to manage and adapt to changes in their environment. Finally, they suggest implementation of public policies for land use which consider the health of the ecosystem before any intervention.

Regarding the different approaches utilized in this research, ecologists, mastozoologists, veterinarians, epidemiologists, social scientists, experts in remote sensing and geographic information systems, and experts in the diagnosis of pathogens all participated in the study.