New software provides more effective accounting development projects' impact

December 5 2014, by Rob Jordan

A high-altitude wetland that provides freshwater to Quito, Ecuador, is protected from grazing. Software from Stanford provides data for similar conservation agreements. Credit: Stacie Wolny

Globally, road and rail networks are expected to increase 60 percent by 2050. Increasingly, countries and funders are requiring such projects to account for and mitigate environmental damage. Mitigation projects, however, sometimes fail to benefit the communities most affected by new development.

A powerful new software tool can help countries around the world more efficiently assess the impact of such development projects, and plan mitigations that benefit communities equitably. The software, Offset Portfolio Analyzer and Locator, or OPAL, was developed by the Natural Capital Project, a collaborative program of the Stanford Woods Institute for the Environment, the Nature Conservancy, the World Wildlife Fund and the University of Minnesota's Institute on the Environment.

"OPAL makes the consequences of development transparent," said Lisa Mandle, a Stanford postdoctoral scholar in biology and senior scientist at the Natural Capital Project. "You can see which communities are affected and how."

A predecessor of OPAL is already in use in Colombia, a country that has been a leader in planning for and mandating offsets of development impacts. Businesses use that software, Mapping Alternatives for Equivalents, or MAFE, to determine ways of compensating for development's damage to natural ecosystems and the benefits those ecosystems provide, such as clean water and climate stabilization. Government regulators use MAFE to verify whether proposed offsets are adequate.

Unlike MAFE, which was designed specifically for Colombia's unique natural conditions and legal requirements, OPAL is highly customizable. After inputting some region-specific data, businesses and regulators anywhere can use OPAL to shape development plans that clearly outline likely impacts and necessary offsets. For example, a mining company proposing to dig for metals in wetlands that provide freshwater to area communities might be directed to pay for the protection or restoration of similar wetlands nearby. This way, the development permitting process would become more open and fair.

"It's one thing to have offsetting development broadly as a goal; it's

another thing to figure out how you're going to do it," said James Douglass, a Woods-affiliated senior software engineer at the Natural Capital Project.

Thanks to ever-stronger sensing technology around the world, OPAL is powerful enough to model a wide range of changes in land and water systems. "If you have a rainstorm, we know where the water flows," said Douglass. "We know how that affects erosion, runoff and drinking water sources." To accomplish this, OPAL applies the Natural Capital Project's Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) suite of ecosystem service tools to model natural processes and quantify development impacts and possible offsets.

OPAL can model not only landscape-level impacts of development, but it also allows users to determine the most equitable ways to offset those impacts. Users input development plan details in order to return a list of suggested offsets, complete with detailed maps. As users select potential offsets from a menu of options, the software shows the resulting effect on different communities.

OPAL will become increasingly relevant as interest grows in the benefits of including ecosystem services in development considerations. The governments of Peru, Paraguay and Mongolia, among others, are moving forward with ambitious offset policy plans. Eventually, Mandle, Douglass and their colleagues want to customize OPAL so that it can auto-populate all the necessary data for offset decisions anywhere in the world.

Provided by Stanford University

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