

Improving Conservation Investment Returns for People and Nature in the East Cauca Valley, Colombia

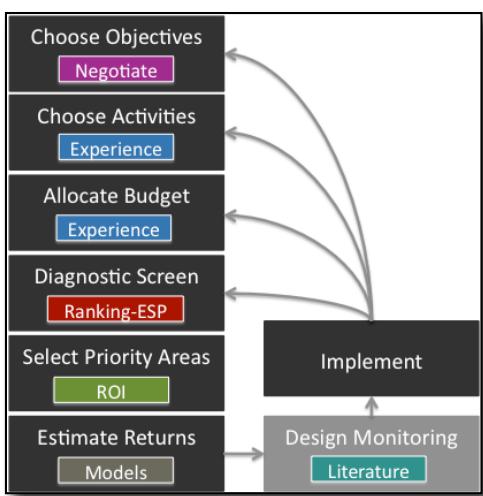
Water Funds

Water is one of the scarcest resources on the planet, and pressures on this vital form of natural capital will only grow as the human population expands and climate changes. Latin America is making a major effort to address this issue by improving the management of watersheds, the green infrastructure that supplies, regulates and cleans water. In June 2011, the Inter-American Development Bank, the Global Environment Facility and FEMSA (a large beverage company) committed \$27 million to developing 32 new water funds across Latin America in the next 5 years. The map to the right shows some of the planned water fund areas, which include water sources for many of the continent's largest cities, and some of the most important remaining intact habitats.



The Need for Science

While the idea of water funds is garnering international investment interest, there are still important scientific advances to be made in their design and implementation. For example, most existing water funds make investments on an ad hoc basis, offering incentives to anyone who will participate. In many cases, this approach is not likely to give the fund the best return on investment in terms of reaching project objectives for protecting biodiversity and improving or safeguarding environmental service flows. We have worked with the *Water for Life and Sustainability* water fund (red star in the map above) near the city of Cali (population 2.5 million), Colombia to try to improve the fund's return on investment. Our approach brings ecological and social information to their investment process through a combination of methods including ecological rankings, local knowledge, stakeholder preferences, return on investment and environmental service modeling.



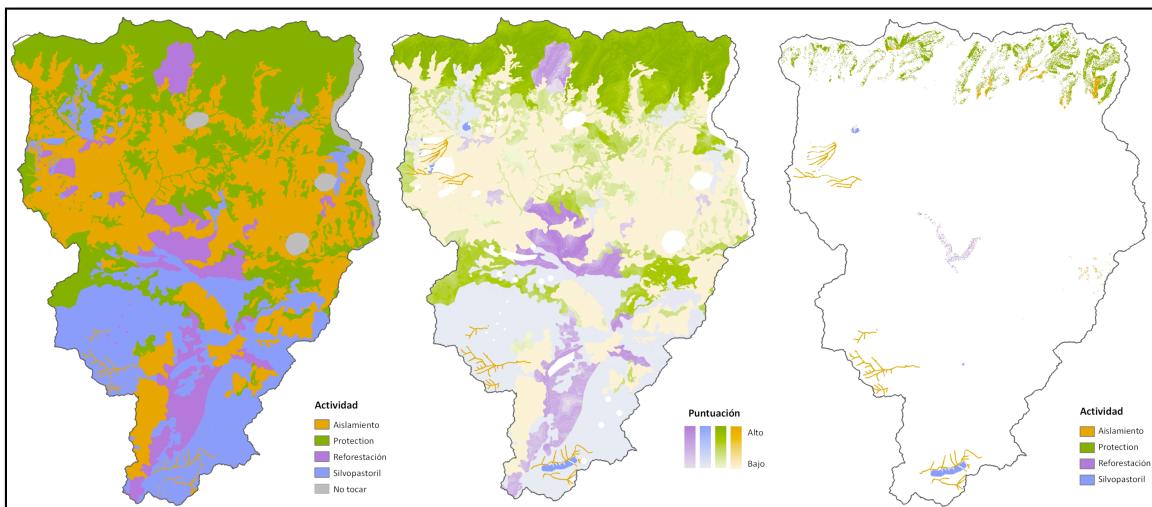
Setting the Stage

The *Water for Life and Sustainability* water fund is overseen by the Cauca Valley's sugar cane producer's association (ASOCAÑA), sugar cane grower's association (PROCAÑA), each watershed's local environmental authority, Vallenpaz (a peace and justice organization) and The Nature Conservancy. The process developed by the water fund and the Natural Capital Project for determining how investments would be made is shown at left. The stakeholder groups jointly agreed on the objective to "maintain consistent water flows necessary for drinking water, biodiversity and agriculture through a coordinated strategy". In the 11 watersheds included in the water fund, investments are made in management changes that

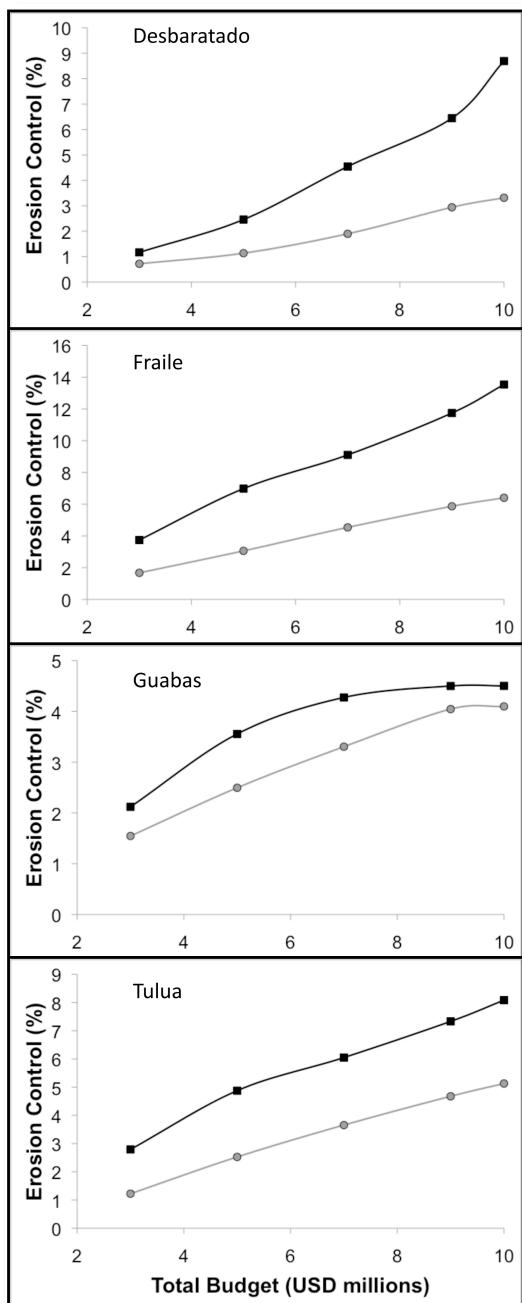
improve cattle ranching and small-scale farming practices, the major threats to biodiversity, water supply and water quality (sediment) in the upper watershed. The activities supported by the fund include protection, fencing, silvopastoral systems, forest enrichment and restoration. Past experience in the region has shown that these kinds of activities are feasible for landowners, given their likely opportunity costs. The fund has committed to investing \$10 million over the next 5 years. This target \$10 million budget was allocated among watersheds proportional to watershed area, and among activities based on the kinds of land use in each watershed.

Where should investments be made?

To move beyond the standard approach to water fund investment, we focused in on 4 watersheds within the Cauca Valley water fund area. We started with a map of where each activity was feasible based on past experience in the region (left map below). We then ranked the landscape to identify areas where each activity was likely to give the best returns in terms of terrestrial biodiversity, erosion control, annual water supply and dry season water supply. Rankings were based on literature reviews and, for annual water supply, on model estimates of likely change using the free GIS-based InVEST model suite (download it from the Natural Capital Project website given below). We also asked stakeholders to identify areas in each watershed where they thought activities should be focused, where they would be most feasible and where



investments might not be possible because of political instability. We combined all of this information into one score that showed where each activity was likely to be most effective and socially acceptable in each watershed (previous map, middle). Then, to identify which investments should be made first, we used a return on investment approach to select the areas that were likely to give the greatest returns for each activity. Using historic data on the cost of each activity, we selected areas until the budget level was reached. This gave us a final ‘investment portfolio’ map that showed which activities the fund should invest in, and where, in each watershed (previous map, right).



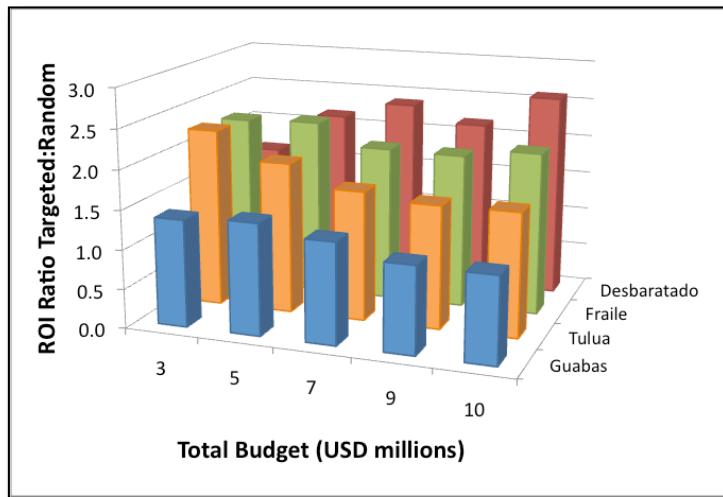
How much ecosystem service change will the fund provide?

Investors want to know how much change they will get from each portfolio of activities. Ideally, we would have local studies that have measured the response of biodiversity, erosion, and water supply to each of the activities supported by the fund. This kind of research has not been done in this region, so instead, we estimated erosion and annual water yield response (just two of the water fund objectives) using InVEST. The InVEST tool can give fund managers a preliminary estimate of how much return to expect. The panels on the left show the estimated erosion control benefits for each watershed in the black lines. There are no observed data on sediment loads in the region, so we cannot yet validate the model, but since we can estimate both current conditions and investment possibilities with the same modeling approach, we can get a relative sense of how much change to expect (% change) as spending progresses over the next 5 years. For example, erosion control in the Fraile watershed will likely increase from a 1% benefit in year 1 to a 14% benefit by year 5.

Monitoring of actual changes on the ground is essential to the success of the fund. In this case, the water fund is installing a monitoring program to track terrestrial and freshwater biodiversity, turbidity (sediments in the water) and water yield. These measures will show how much change the fund is really having, and will help inform adaptive management of where investments should be made. The monitoring can also be used to improve model estimates for further exploration of investment options.

Does the science help?

Scientifically targeting water fund investments takes a lot of work. In the end, is it really worth it? We asked this question using a random investment approach that represents well the way most water fund investments are made, and then we asked how the erosion control returns from that approach compare to our targeted approach described above. We used InVEST again to estimate returns, and found overall lower returns in all watersheds (grey lines in previous figure). When we used these estimated returns to calculate an estimated return on investment (change in erosion control per dollar spent), we found that using science is likely to double returns. The ratio of return on investment between the two approaches varies by watershed, meaning science is more worth the effort in some watersheds, like Desbaratado (red bars in the panel above), than in others, like Guabas (blue bars in the panel above). The four watersheds we analyzed account for about 40% of the budget, so at the total fund level of \$10 million, these watersheds would spend \$4.2 million. Using the targeted investment strategy saves \$3 million in these watersheds at that level of investment.



Further exploration of these methods, and the actual measurement of water fund outcomes will allow us to continue to improve the efficiency of this promising conservation finance strategy. For example, we are currently adding climate change analyses to the ranking step to create investment portfolios that will be robust to predicted changes in species ranges, agricultural opportunity cost, water supply and erosion risk.

Download InVEST at <http://www.naturalcapitalproject.org/InVEST.html>

For more information, contact Heather Tallis (htallis@stanford.edu) or Alejandro Calvache (acalvache@tnc.org)