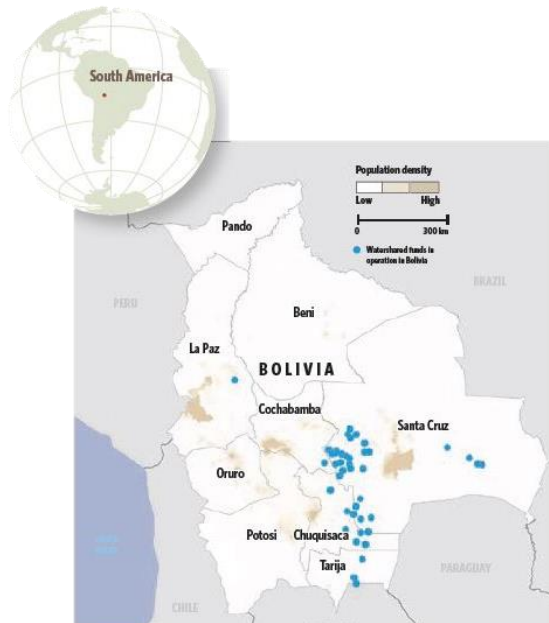


## Beyond the Source: The environmental, economic and community benefits of source water protection

### LOCAL SPOTLIGHT

#### Santa Cruz Valleys, Bolivia—Promoting health through Watershed Funds



#### The challenge

The Santa Cruz valleys of eastern Bolivia are among the most biodiverse regions on Earth, spanning an altitudinal range of nearly 3,000 meters and lying at the intersection of three major ecosystems: Amazonia, the Andes and the dry forests of central South America. The forests of this area are home to numerous species, including conservation icons such as the Andean spectacled bear (*Tremarctos ornatus*) and the endangered endemic red-fronted macaw (*Ara rubrogenys*).

However, pressure from agriculture in the region has led to forest degradation and fragmentation, as well as contamination and pollution of the aquatic environment, with implications for aquatic species, forest animals and local communities. Communities in the area obtain water for drinking, cooking, washing, sanitation and irrigation from water bodies in the forest near settlements. While this makes them independent and largely self-sufficient in terms of water supply, it also means that water quality in those communities is dependent upon land use in the surrounding area upstream of water sources as chemical water treatment in the area is extremely rare. Farmers in the area allow their cattle to roam freely through the forest during a large part of the year. During this period, cattle have direct access to these water bodies for drinking, but they also contaminate them with their feces, which contain pathogenic viruses, bacteria and protozoa. The consequence of this is a public health crisis in many of the communities: widespread diarrhea, often affecting babies, young children and the elderly.

One case, from the village of Pucará, demonstrates the problem. Almost immediately after the village relocated its drinking source to a larger mountain stream, incidences of gastrointestinal disease increased dramatically (Figure 3.15). The source of the contamination was easy to identify: the new water source was situated in a catchment of 116 hectares used as rough grazing for cattle. None of the watercourses upstream of the outtake were protected and there was little conserved forestland within the catchment. Unsurprisingly, monitoring found heavy *E. coli* contamination.

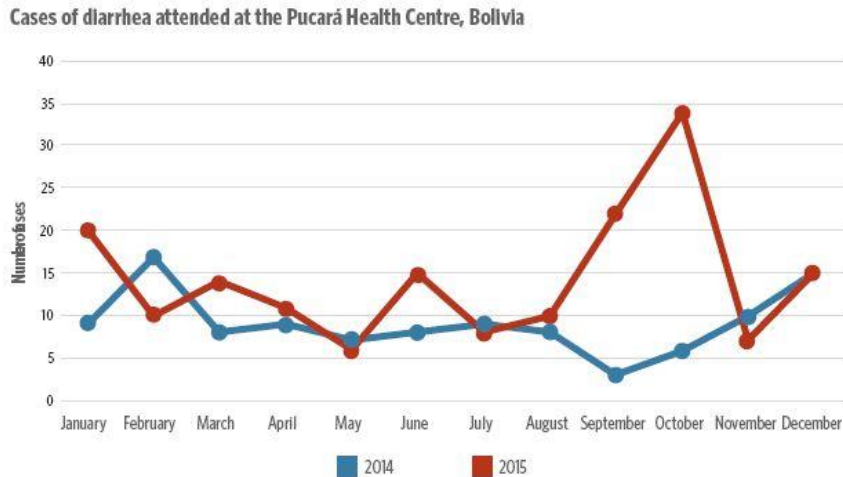


Figure 3.15. Cases of diarrhea attended at the Pucará Health Centre. The new water system was connected in August 2015.

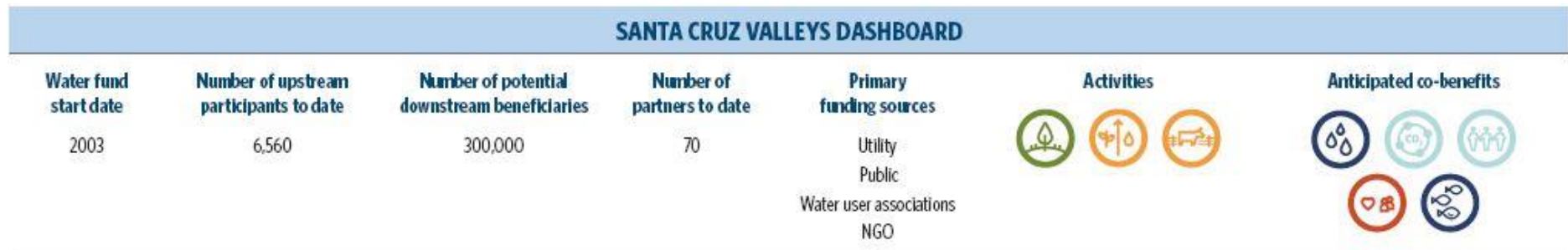
### Action and opportunity

As in many other communities in the region, the mayor of Pucará is working with a Watershared Fund, as well as landowners and the local water committee, to determine how to remove cattle from the watershed and to protect the

watercourses from intrusion. Watershared is an initiative of more than 125 municipal and regional governments across the Andes to protect their upstream water sources by conserving their forests. Municipal water funds are one of the initiative’s primary mechanisms. In Bolivian Watershared Funds, farmers who protect lands and streams receive compensation with a value of US\$10 per hectare per year if they comply with their contract, and in the form of productive goods such as beehives, fruit trees, irrigation tubing and cement for construction of irrigation systems and water troughs for cattle. Conserved land is monitored yearly for compliance to ensure that cattle continue to stay out of forests and watercourses. Municipal Watershared Funds, made possible by contributions from local governments, water user associations and Fundación Natura Bolivia (a conservation NGO), pay for program implementation, compensation and monitoring.

Researchers from Fundación Natura Bolivia and collaborating universities have conducted water quality studies in the community to monitor changing levels of *E. coli*, an indicator of fecal contamination. In the worst cases, levels of *E. coli* at water outtakes can reach 30,000 colony-forming units per liter, greatly increasing the risk of infection by people consuming this water. Colonies are enumerated using a field-friendly technology, Coliscan™ Easygel, that allows bacteriological work in contexts without laboratory equipment.

Monitoring is showing that real improvements in health outcomes can be achieved through investment in both upstream conservation and water infrastructure, of which there are many examples. Experiences of the Watershared Funds suggest that delivering water of high quality, sustainably and through locally appropriate technology, is achievable and requires creating and/or strengthening local institutions.





## **Bolivia, Colombia, Ecuador and Peru: Watershared agreements**

**Description:** The “Watershared” model was first developed in 2003 in the Bolivian village of Los Negros when six downstream irrigators negotiated a first-of-its-kind deal with their upstream counterparts. Upstream forests were protected from cattle incursion by landowners who were compensated for their conservation efforts. Downstream water users provided alternative development tools, such as beehives, fruit tree seedlings and irrigation tubes. There are now 40 Watershared funds in three Bolivian states (Departments) largely operating in small rural municipalities. Within Bolivia, almost 5,000 upstream landowners collectively participate in these Watershared agreements that now protect 250,000 hectares. In addition, Watershared programs in nine municipalities have supported the creation of 1 million hectares of newly protected Water Sanctuaries. The underlying philosophy of Watershared is the same everywhere— “people who produce water, share it; people who use water, share the benefits”—but local details vary significantly.



**Governance:** There are a number of defining characteristics of Watershared governance. The municipal government drives the process, first issuing a watershed conservation decree and then allocating funds to finance the decree. At

the same time, the water provider commits funds, either in a fixed amount or via a tariff increase. These two institutions, along with a catalyzing entity, usually an NGO, then create the water fund institution. This institution leads the creation of a board (one representative from each institution), the development of statutes and operating regulations and the opening of a bank account (usually housed within the legal structure of the water provider). The board makes major decisions, while day-to-day operations are coordinated by the water provider with technical support from the NGO.

Watershared funds are designed primarily to reduce conflicts and bureaucracy. In Cuenca, Ecuador, for example, the city water provider, Empresa de Telecomunicaciones, Agua Potable, Alcantarillado y saneamiento de Cuenca (ETAPA), had for decades been working to protect the upper Yanuncay watershed. However, in upstream Soldados, villagers were viscerally opposed to ETAPA, going as far as to kidnap company staff. Downstream, demand was exceeding supply in the dry season, but city users were wasting water. A two-pronged public awareness campaign calmed tensions upstream and promoted a “shorter showers” initiative downstream, thereby resolving both of ETAPA’s major problems. With the conflicts resolved, and a clear local mechanism of cooperation visible to all, ETAPA was then able to contract 22 Watershared agreements in the middle watershed, conserving 1,341 hectares.

**Funding:** Watershared programs are, on average, about 70 percent funded by local water users and/or their municipal governments, with the rest coming from outside donations, including NGOs. Accordingly, resources come primarily from local governments and 195,000 downstream water users, who annually invest roughly US\$500,000 across the 40 funds. The Watershared model requires and facilitates a local, long-term financial commitment to conservation: municipal governments and water users’ associations must commit funds before the facilitating NGOs provide start-up funding. Given that a local financial commitment requiring public money is required for program initiation, local officials take great interest in designing the schemes, resulting in a sense of local ownership and the potential for long-term sustainability.

**Implementation:** Watershared agreements are implemented through a tool known as reciprocal watershed agreements, as well as through land purchases. The provision of alternative development tools to upstream landowners provides a quick and low-cost route to forest conservation. Landowners choose what compensation packages they prefer from of a menu of options, including improved cattle management, irrigation systems, and honey and fruit production. They also receive technical support to help maximize economic improvements. Community

members recognize that the program provides not just economic benefits, but also downstream recognition of communities' key role in the management of water resources and hence increased visibility of the communities in the local political arena.

Watershared programs do not rely on extensive hydrological and economic studies to define the correct payment levels, nor do they focus on the opportunity cost of conservation as the primary driver of levels and types of compensation. Rather, they attempt to strengthen and formalize pro-conservation social norms, by publically recognizing individuals who contribute to the common good by conserving their "water factories." They respond to one of the key findings of behavioral economic experiments, that "money ... is the most expensive way to motivate people. Social norms are not only cheaper, but often more effective as well." Watershared compensations are thus tokens of appreciation rather than economic transactions and can comprise much lower amounts than neoclassical economic theory would predict.