

## LOCAL SPOTLIGHT

### Rio Yaque del Norte, Dominican Republic—Preparing for a climate-changed future



Photo: © Mark Godfrey



#### The challenge

As nations around the world commit to addressing the drivers of climate change, individual countries and the communities within them are confronted with the need to adapt today. The Dominican Republic in the Caribbean is becoming increasingly concerned with how climate change will affect its watersheds' natural hydrological services given the precipitation, temperature and extreme weather events that have been projected for the country. The projected increase in intense storms and hotter conditions are likely to disproportionately affect residents who are already vulnerable (e.g., people living in poverty, lacking infrastructure). Of high concern to decision-makers is the effect land use and climate change could have on reducing both water quality through sedimentation and the reliability of water supplies through changes in flow.

The Yaque del Norte River has the largest basin of any in the Dominican Republic, covering almost 15 percent of the country (about 705,300 hectares). Sub-watersheds within the basin are critical for delivering the urban populations' drinking supplies, meeting the needs of agricultural and industrial sectors, providing a source for hydropower development and housing a broad diversity of aquatic life. Agriculture is the most water-intensive of all sectors, using 80 percent of the basin's water and covering 20 percent of its land area. The remaining basin area is covered by forests, scrub and grasslands, mangroves, other vegetation types and populated areas. Urban areas use about 12 percent of the basin's water which goes to a combination of domestic, commercial and industrial sectors.

Given the importance of the Yaque del Norte Basin to the Dominican Republic's residents, economy and biodiversity, the projection that precipitation in the basin will experience a slight decrease in the future while extreme hydro-meteorological events will intensify, calls for increased investment in adaptation measures.

## Action and opportunity

The Nature Conservancy and its partners designed the Yaque del Norte Water Fund explicitly with climate change in mind. Its activities will contribute to regulating base flow and reducing soil erosion –with the aim of reducing future water security risk – and helping communities build resilience to other climate change impacts like sea level rise.

With support from the United States Agency for International Development (USAID), The Nature Conservancy worked with Riverside Technology to assess the long-term impacts of climate change when combined with different land use and land cover projections. Researchers used SWAT (Soil and Water Assessment Tool) to develop scenarios out to 2055, the results of which inform what conservation activities the water fund should specifically include to produce the greatest contribution to base flow and lowest sediment loads for present and future conditions.

While multiple climate change scenarios were used in this study, all projections supported the notion that the average annual temperature would increase by 1 to 3.5 degrees Celsius with respect to the historical mean. Mean annual precipitation projections, however, range from about -40 percent to +20 percent, representative of weather in a climate-changed future where variations of total rain from year-to-year can become intensified. Urban population growth and GDP projections were used to estimate the urban land cover in 2055, while changes in farmland from 2002 to 2011 were used to estimate the future extent and types of cropland.

A series of future land use and land cover scenarios was developed to compare possible outcomes of different management actions within the watershed. Urban and crop expansion were simulated for the business-as-usual, development and combination scenarios, whereas forest expansion and reduction of crops were simulated for the conservation scenario. A combination of reforestation, agroforestry and silvopasture practices were simulated under the best management practice scenario.

While this study identified a range of outcomes for each scenario, it found that the best management practice scenario would produce the best outcome, with the largest water yield in terms of base flow alongside the lowest sediment yield.

That scenario included:



- reforestation in areas where slopes are greater than 60 percent;
- reforestation of a 30-meter buffer along main rivers;
- reforestation of a 250-meter buffer around reservoirs;
- agroforestry practice in areas with slopes less than 60 percent, as well as within protected areas; and
- silvopasture practice in forested areas with slopes between 10 percent and 25 percent, as well as outside protected areas.

Scientific results such as these have been directly applied to guide decision-making under the Yaque del Norte Water Fund’s approach to adapting to climate change. The climate change adaptation strategies for the water fund now include:

- conservation and restoration of riparian corridors to diminish the impacts of floods;
- targeted conservation of forests to avoid an increase in sediments during heavier rainfall periods;
- conservation and restoration of mangroves and coastal wetlands to diminish the impact of sea level rise; and
- analysis of connectivity routes to develop private and community-managed biological corridors.

These adaptation-focused activities will complement others, including forest restoration for both ecological and hydrologic benefits, the implementation of BMPs on coffee and cacao plantations and livestock pastures, training and environmental education programs, and facilitation of participatory governance processes. All told, the water fund is expected to generate a range of benefits for more than 1.7 million people living and working in the basin, for companies using bulk water systems in production and processing, and for power companies for whom reducing sedimentation of hydroelectric reservoirs is a priority.

### RIO YAQUE DEL NORTE DASHBOARD

| Water fund start date | Number of upstream participants to date | Number of potential downstream beneficiaries | Number of partners to date | Primary funding sources                    | Activities  | Anticipated co-benefits   |
|-----------------------|---|--|----------------------------|--|---|---|
| 2015                  | 475                                     | Between 1,000,000 and 5,000,000              | 14                         | Multi-lateral<br>Private<br>NGO/Foundation |  |  |