



SANTA MARIA DA VITÓRIA

RIVER BASIN

IMPROVING WATER SECURITY AND ADAPTING TO CLIMATE CHANGE IN THE ATLANTIC FOREST WITH NATURE-BASED SOLUTIONS

The Santa Maria da Vitória Basin is one of the basins identified in a study conducted by WWF on key river basins in the Atlantic Forest that urgently require Nature-based Solutions (NbS) to bolster water security and climate resilience. Compared to conventional interventions, NbS offer long-term affordable and sustainable solutions to major water-related societal challenges, and have multiple co-benefits. The objective is to – together with partners – scale these solutions to generate significant positive impact on biodiversity, water security, and climate resilience.

The Santa Maria da Vitória basin spans 178,000 hectares and **supplies water to 40% of Greater Vitória's**

population (800,000 people). The basin is also key to the State of Espírito Santo's electricity production, accounting for **25% of the State's hydropower generation**. The Santa Maria da Vitória basin is part of a major coffee-producing region, making coffee production an important contributor to the local economy. The wider region, which the basin is part of, is responsible for 40% of the state's Arabica coffee production.

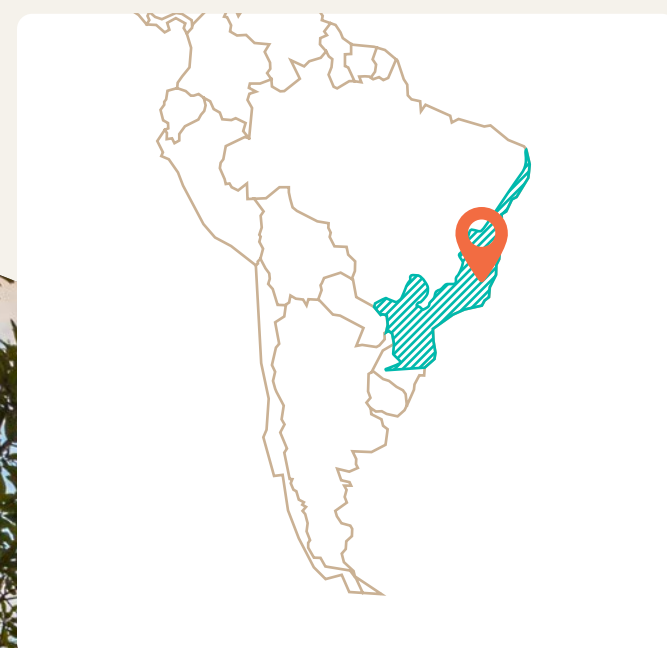
However, the basin has faced more frequent and extreme weather events in recent years, causing extensive damage and threatening livelihoods. **Long periods of drought and flooding events have affected 2.5 million people in the basin**, costing a reported US\$ 38 million in damages from 2012 to 2022, with 35 flooding incidents. Over that same period, 18,000 people have suffered from the effects of droughts.

Intensive agriculture in the basin has further compounded challenges associated with erosion after

BE ONE WITH NATURE

heavy rainfall. Eroded sediments increase the river water turbidity to such an extent that effective water treatment becomes too difficult and hence must be paused.

Nearly 10% of the basin comprises degraded riparian areas that require rehabilitation, following the Brazilian Forest Code. **Restoring a mere 0.5% of the basin's riparian zones can reduce water treatment costs by US\$ 5 million over the next 20 years.** Thus, there is a huge opportunity to support farmers with restoration efforts – in compliance with the code – to improve river water quality and instill sustainable farming practices across the basin.



RELEVANCE FOR NBS

The Santa Maria da Vitória River Basin is a priority basin for NbS due to the following key attributes:

- **Essential water source** for downstream urban areas.
- **Increased flood and landslide risk**, and this vulnerability is amplified by the effects of climate change.
- **Escalating drought threat**, exacerbated by climate change.
- **Low Compliance with Forest Regulations.** The basin displays a substantial deficiency in adhering to the Brazilian Forest Code – 11,000 to 15,000 hectares in permanent preservation areas and 100 hectares in legal reserves – particularly concerning the degradation of riparian zones.

MAIN BENEFICIARIES OF NBS

- **Local population:** Experience enhanced water supply security and reduced exposure to flood risks.
- **Water supply company (CESAN):** Benefit from more consistent river flow and lower water treatment costs due to cleaner water.
- **Industries:** Enjoy improved water quality and a decreased likelihood of water withdrawal restrictions.
- **Farmers:** Witness improved soil conditions and have the opportunity for diversified crop cultivation.
- **Ecosystems:** Improved environmental flow and biodiversity protection, leading to higher connectivity and ecosystem resilience.

POTENTIAL PARTNERS FOR NBS

- CESAN (Espírito Santo Water Sanitation Company)
- Santa Maria da Vitória Watershed Committee
- Specialty Coffee Producers Association of Espírito Santo Mountains (Acemes)
- International coffee producers
- International coffee traders, such as Vitória Coffee Trade Center (CCCV)
- Private sector companies

NATURE-BASED SOLUTIONS:

WHAT IS POSSIBLE?

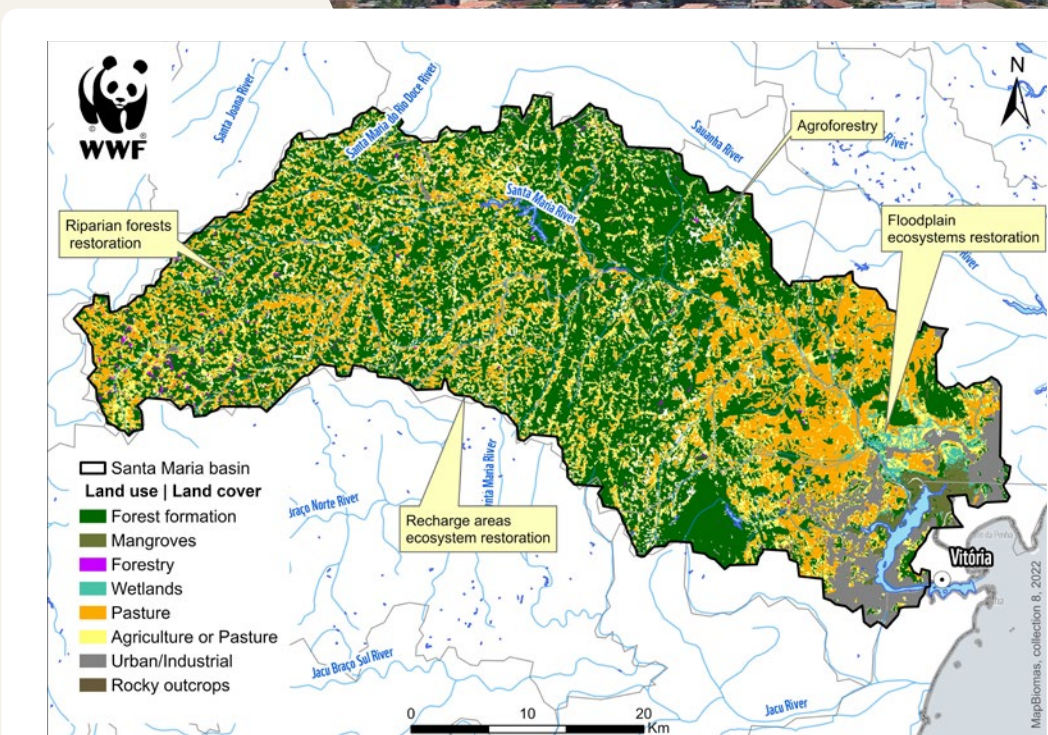


Figure 1: Land use and land cover in the Santa Maria da Vitória River Basin, with the suggested NbS.

PROTECTION AND RESTORATION OF RIPARIAN FORESTS

Riparian forests act as a buffer and natural water filter, reducing the sediment input to the river by 33% to 95%. By restoring and protecting these forests, sediment and other pollutants are trapped before they reach the river, thereby improving the river's water quality.

AGROFORESTRY

Agroforestry is an agricultural practice that includes biodiversity and ecosystem services recovery, increasing infiltration rates and reducing erosion and sedimentation. Coffee, a very important commodity to this region, is very suitable for the agroforestry approach.

PROTECTION AND RESTORATION OF WATER RECHARGE AREAS

Groundwater recharge can be stimulated by protecting and restoring natural vegetation in areas that have enabling infiltration conditions, such as flatter slopes or better permeable soils and geology. These activities can lead to improved infiltration capacity in former pastures and agricultural areas by 182% and 291%, respectively. Ultimately, NbS enhance groundwater input, which is crucial in regulating water supply.

FLOODPLAIN ECOSYSTEM RESTORATION

Floodplains and wetlands act as sponges and filters during flood events, storing large volumes of water, slowing the flow of water, and filtering upstream-sourced pollutants. Reconnecting these to the river system creates additional space for water retention, reducing in situ and downstream flood risk. The final stretch of the Santa Maria da Vitória River crosses a degraded floodplain, which could largely benefit from this NbS.

ENABLING CONDITIONS FOR NBS

Importance for public water supply: Being a strategic water source for Greater Vitória (state capital), the basin receives special attention from the state government, economic sectors, and society in general.

Presence of programs and initiatives facilitating

NbS: There are already initiatives in place that promote the use of green infrastructure for improving water security, biodiversity, and/or climate change adaptation. The presence of the following initiatives enhances the success of NbS adoption in the basin.

- **Reflorestar¹:** The Reflorestar Program is a State programme dedicated to advancing water security by conserving and restoring native forests on farmlands. It employs a Payments for Ecosystem Services (PES) mechanism to incentivize rural producers while promoting the adoption of sustainable production practices, including agroforestry. Since the program's start in 2015, the total investment has amounted to approximately US\$20 million, funded by royalties generated by offshore oil exploitation in Espírito Santo.
- **The Integrated Water and Landscape Management Program²:** This is a pivotal State programme focused on enhancing the water and sanitation sector. This involves the expansion of sewage collection and treatment services and fortifying preparedness for extreme hydrological events. It also endorses forest restoration and sustainable soil and water management practices, for which a pilot is currently being started. Commencing in 2014, this program is jointly funded by the World Bank and the State of Espírito Santo,

with a total budget of approximately US\$400 million to be spent until July 2024.

Espírito Santo's Sustainable Development

- **Program for Coffee³:** The recently launched program offers a good opportunity to include agroforestry as an NbS approach in creating a sustainable coffee production chain.

THE WAY FORWARD

1. **Focused feasibility study on NbS implementation.** Outputs include the identification of priority areas and activities considering water security and biodiversity needs, the integration of climate scenarios with socio-economic and cost-benefit analyses, and the design of a NbS implementation plan.
2. **Strengthen existing coalitions** – such as The Nature Conservancy's Coalizão Pelas Águas – for NbS implementation in the region, identifying main actors and commitments needed.
3. **Development of a proposition** for large-scale NbS implementation, further engagement of key partners, and integration with ongoing programs (such as Reflorestar) where possible.
4. **Large-scale implementation** of the selected NbS.

Criteria

The Santa Maria da Vitória basin was selected as 'priority basin' from a selection of 87 basins in total, based on three criteria as outlined in a policy brief of WWF Brazil (WWF Brasil, 2024). These criteria are: 1) importance in providing water ecosystem services, 2) vulnerability to water security risks, and 3) suitability for developing or enhancing NbS.

WWF Netherlands. (2024). Improving water security and adapting to climate change in the Atlantic Forest, Brazil, with Nature-based Solutions – Santa Maria da Vitória River Basin [Fact sheet].

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1. <https://seama.es.gov.br/programa-reflorestar> 2. <https://seama.es.gov.br/gestao-das-aguas-e-da-paisagem>

3. <https://www.es.gov.br/Noticia/governo-lanca-programa-de-desenvolvimento-sustentavel-da-cafeicultura-do-espirito-santo>