

Brazil's economy continues to recover, with gross domestic product (GDP) growing at 2.9 percent in 2022, propelled by a successful COVID-19 vaccination campaign, rising demand for services, and fiscal stimulus.

Improved revenues, gradual economic recovery and elevated prices of commodities boosted fiscal results in 2022, with the 12-month primary surplus of the public sector reaching 1.2 percent of GDP and public debt declining to 72.9 percent of GDP as of January 2023 (a 5.4 p.p reduction). GDP growth is expected to slow to 0.8 percent in 2023 due to the lagged effects of domestic monetary tightening, persistent inflation, and the deceleration of the global economy, and to mildly accelerate to 2.0 percent in 2024 on the back of a more accommodative monetary policy, easing inflation and higher global growth. Fiscal balance is expected to deteriorate in 2023 as projections indicate a primary deficit of 0.7 percent of GDP, reflecting the higher social expenditures in 2023 and lower economic activity.

With the economic recovery, poverty is expected to have gone down from 28.4 in 2021 to 25 percent in 2022, responding to increased job opportunities and expansion of the Bolsa Família cash transfer program. A real increase in the minimum wages combined with a major overhaul of the Bolsa Família and a planned introduction of additional benefits to families with children are expected to drive poverty down to 23.9 percent in 2023.

Water has both supported key drivers of economic growth and been pivotal to reducing poverty and promoting shared prosperity in Brazil; however, the country is facing more intense and frequent water shortages that are negatively impacting both development and livelihoods.

Floods comprise over 65 percent of the natural hazards in Brazil, and intense rainfall events that triggered flash floods and landslides were responsible for 74 percent of the deaths related to natural disasters in the 1991-2010 period.⁷ Addressing the challenges imposed by this context requires resilience from the water sector, as well as investments in better planning and institutional strengthening, increased water storage capacity, improved water reuse systems, and flood and drought infrastructure, including climate-resilient green infrastructure and hybrid green-gray solutions.⁸

State of Espírito Santo Context

5.

Despite its small size, SES contributed 1.9 percent of national GDP in 2019 and 3.5 percent of national exports in 2021.

Contributions to GDP are drawn mainly from services (70 percent), followed by industry (26 percent · of which more than 45 percent from oil and gas, and to a lesser extent, mining, steel and cellulose industries) and agriculture (4 percent). The extractives segment (oil and gas) has grown more than 200 percent in real terms since 2002, generating a massive increase in state revenues.

Raising and sustaining real GDP growth and reducing poverty and inequality levels are overarching State development goals.

This is in sharp contrast to the 2000-2010 period, when SES's economic growth, poverty levels and income inequalities had improved considerably, outpacing gains made by Brazil as a whole. The State 2030 Strategic Development Plan^{1, 1} lays out a comprehensive agenda to boost economic growth and reduce poverty and inequalities setting ambitious governance and socio-economic development targets. These would be achieved through a combination of public sector reforms, job creation programs and increased investment in many areas, including climate adaptation through increased water security, which the proposed Project will support. In December 2020, the state government launched an economic recovery plan (Plano Espírito Santo - Convivência Consciente) to mitigate the effects from the COVID-19 pandemic, focused on boosting public and private investments, promoting productive inclusion, and creating jobs.

¹ 4 Bank operations have contributed to improved sewerage treatment and collection indicators in Espírito Santo.

Moreover, most of these land use practices and structures increase participating landholder incomes, rendering them ·no regret· options.

(b) Traditional gray infrastructure applied to water resources management (WRM) has gained more traction recently.

Evidence suggests that integrating green and gray infrastructure provide lower-cost and more resilient services, helping fill the need for climate-resilient solutions.

Additional gray investments, in combination with green infrastructure, will likewise be needed to control or mitigate flooding (storage, dykes, river channeling, among others), in line with the state's plans to continue investing in more integrated green-gray solutions to address water security risks and adapt to climate change.

PDO Level Indicators

- PDO 1: Water resources management instruments improved.^{1, 5}
- PDO 2: Digital operations command system implemented.^{1, 6}
- PDO 3: Land area under sustainable landscape management practices (Corporate Results Indicator - CRI);
- PDO 4: Itapemirim river basin forecast and early warning system operational and issuing reports; and
- PDO 5: People benefitting from reduced water security risks, disaggregated by gender.^{2, 1}

B.

The proposed Project is a US\$113.6 million Investment Project Financing (IPF) operation, financed by a US\$86.1 million IBRD loan and US\$27.5 million in state counterpart funds.

Strengthening SIGERH-ES's water resources management capacity (US\$7.43 million of which US\$7.43 million IBRD).

Subcomponent 1.1 supports the implementation of the World Bank's GCRF, Pillar 4 -Strengthening Policies, Institutions and Investments for Rebuilding Better.

This subcomponent seeks to strengthen the State Coordination for Protection and Civil Defense's (CEPDEC) capacity to manage water security risks and respond to disasters by supporting, inter alia: (i) the construction and supervision of works of a specialized disaster response center (Centro Especializado de Resposta a Desastres - CERD); (ii) the acquisition of specialized equipment, notably fire trucks and emergency kits; (iii) the provision of training, including on gender aspects in DRM; and (iv) the design and implementation of an electronic emergency command, control and coordination response system (Incident Command System software).

Expanding the support to the Reforestar Program selected river basins
(US\$16.06 million of which US\$12.40 million IBRD)

It will
financial; inter alia: (i) the provision of payment for environmental services to land users for the reduction of water security risks through reforestation, improved land use and agricultural practices; (ii) the implementation of physical water and soil conservation structures (such as small/mini water detention ponds or soil built dry boxes); and (iii) the provision of technical assistance to SEAMA to improve the Reforestar Program's efficiency and effectiveness, including by, inter alia: (a) strengthening the Program's targeting; (b) developing additional financing sources, such as from the private sector; (c) strengthening its institutional capacity, including through the hiring of a Technical and Operational Firm to provide support to the Program; (d) improving its communication strategy; (e) assessing its effectiveness (in inter alia, attracting participants - including vulnerable and marginalized groups, with a specific target to reach 40 percent of women among new Reforestar participants - targeting payments to priority areas; providing the desired environmental services; and keeping administrative costs low) and using the lessons to improve it; and (f) improving the Portal Reforestar, which participants use to enroll in the Reforestar PES Program and SEAMA uses to administer it.

Improving flood and drought management in priority river basins (US\$14.12 million of which US\$10.99 million IBRD).

It will finance, inter alia: (i) Design and Build contracts for the implementation of urgent flood risk reduction investments,³ as well as supervision of work services, in three municipalities (Água Branca, João Neiva and Ibiraçu) for which technical solutions have been identified, but feasibility studies need revisions; and (ii) the carrying out of studies to identify more innovative integrated structural and non-structural solutions to reduce flood risks in two additional municipalities (Iconha and Alfredo Chaves); and (iii) the implementation of some of the prioritized innovative solutions resulting from these studies.

Component 3 supports the implementation of the World Bank's GCRF, Pillar 4 -Strengthening Policies, Institutions and Investments for Rebuilding Better.

³ 1 These no-regret interventions consist of drainage works to increase runoff capacity, including dredging, widening of cross sections and river channeling.

The proposed Project is expected to benefit Espírito Santo's 4.1 million residents by enhancing both the State's integrated water resources and disaster risk management capacities (Component 1).

At the river basin level, 2,800 landowner participants will directly benefit from the PES program, whereas an estimated 1.3 million will indirectly benefit from increased water security in the five selected river basins (subcomponent 2.1); the population of the Itapemirim River Basin (523,000 inhabitants) will benefit from integrated flood management interventions (subcomponent 2.2); and residents of the four river basins (538,000 approximately) will benefit from increased capacity to respond to drought (subcomponent 2.2). At the municipal level, roughly 39,000 residents of the three targeted municipalities (Águia Branca, Ibiraçu, and João Neiva) ³ will benefit from flood risk reduction interventions (Component 3), among which a significant share earn less than half a minimum wage per capita, and thus are either poor or at high risk of becoming poor, ³ ⁴ while 29,000 residents of Alfredo Chaves and Iconha ⁵ will stand to gain from improved designs and innovative studies that will inform future flood risk works in the municipalities.

Finally, public investments made through the proposed Project will help unlock opportunities for economic development and mobilization of private investments. Planned interventions for flood risk reduction and disaster risk management are expected to stimulate the local economy through private investments in urban development and expansion of local businesses. The expansion of Reflorestar PES will help leverage additional financing sources, by supporting studies and the development of strategies that could lead to the expansion of funding sources, including the private sector.

Water use charges are approved by the State Water Resources Council and lead to increased revenues to finance SIGERH-ES institutions and non-structural and structural measures identified in the State and River Basin plans;

- A2. Increased water rights issuance and registration, improved information on water use, allowing better water allocation and control of abstractions, and reducing the risks of water deficits and droughts;

- A3.

Adopting a proactive approach based on flood and drought risk management is critical to achieving technical and economic efficiency.

⁸ 7 Bank operations have contributed to improved sewerage collection and treatment in Espírito Santo.

This arrangement has both reduced implementation costs and allowed Reflorestar to considerably expand the area enrolled and will be continued under the proposed Project.

Indeed, D&B contracts tend to: attract quality firms with proven capacity to tolerate risks; provide an incentive to the firm to resolve issues rapidly, and reduce the number of procurement packages overall, combining design studies and construction into one single contract.

It is also funding additional staffing to improve the capacity of implementing agencies for advancing preparatory activities, with the expectation of an overlap between the two operations.

Progress towards achievement of the Project Development Objective will be assessed based on the PDO-level and intermediate results indicators.

infrastructure investments belongs to the municipalities.

The responsibility for maintaining

Moreover, as a result of the Project, collection of revenues from water uses charges should start and increase over time, as the Project will support their design at river basin levels and will improve the effectiveness in the issuance of water rights which constitute the revenue base for these charges.

The lessons learned from past World Bank's projects in the SES and other Brazilian States has strengthened water institutions and established a long history of engagement in capacity building and water infrastructure development.

The cost-benefit approach was used to compare the economic costs and benefits with and without the Project. If benefits surpass costs, the Project is economically viable. The present value of expected net benefits was calculated, as well as the economic internal rate of return, and benefit-to-cost ratios.

If benefits surpass costs, the Project is economically viable.

A sensitivity analysis included the following scenarios that modified direct costs and benefits: (i) increasing Reflorestar direct benefits of reducing sedimentation and increments in avoided damages in Itapemirim's locations, (ii) cost overruns of 50 percent during the lifetime of the Project for all components under economic evaluation, (iii) a decline in both costs and benefits that reduces the NPV to zero (breakeven point), and (iv) delays of Project's implementation up to 10 years.

Indirect benefits included increases in farm income due to better environmental and agricultural practices with higher economic value due to Reflorestar.

The estimation of costs comprised the investment in infrastructure works for the three subcomponents and the recurrent operation and maintenance (O&M) costs from these interventions.

The economic rate of return of the Project is 14.9 percent for the entire lifetime of the Project. The Net Present Value (NPV) of all components included in the economic evaluation is US\$75.8 million, with benefits reaching US\$234.3 million, and total costs reaching US\$158.5 million at present values.

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The impact of Project investments on the Borrower's fiscal situation is expected to be very small, considering the excellent fiscal situation of the SES, which can easily absorb the additional investment and recurrent costs, but also because some of those costs are expected to be recovered through reduced expenses associated to avoided flood and drought damages and compensations, lower potable water treatment costs and increased life of water reservoirs.

The main adverse social impacts are related to land acquisition, physical and economic displacement on a temporary or permanent basis for the construction of flood reduction infrastructures in urban areas as well as, at least potentially, for the green and gray interventions envisaged in the context of the flood risk management plan for the Itapemirim river basin.

The indicator refers to an increase of 10 percentage points in the participation of women (women-headed family farmers) among Reflorestar beneficiaries.

Itapemirim river basin flood risk integrated management plan and benefited from green and/or gray infrastructure measures.

Total number of inhabitants of river basins benefiting from Drought Preparation Plans and implementing measures provided for in the Plans.

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Procurement of goods.

It was agreed that an approximate amount of US\$ 200,000 will be made available under Project proceeds to finance procurement capacity deemed appropriate and previously approved by the Bank.

The proposed Project is a US\$113.6 million Investment Project Financing (IPF) operation, financed by a US\$86.1 million IBRD loan and US\$27.5 million in state counterpart funds.

Component 1 - Building the Borrower's capacity for water security in a changing climate (US\$15.52 million of which US\$14.05 million IBRD)

2.

Strengthening SIGERH's water resources management capacity (US\$7.43 million of which US\$7.43 million IBRD).

It will be necessary to digitalize these requests, strengthen the agency's human resources and establish effective systems to not only reduce the current backlog but also set appropriate time and quality standards to issue water rights.

The CERD will be constructed through the D&B modality, in which the contractor will prepare the designs and build the Center in an area located in Carapebus (land donated by the Arcelor Mittal Tubarão company), in the municipality of Serra (north of the capital Vitória), with the full infrastructure, including civil works, electric, electronic, fire alarm and security systems, fencing, water supply, furniture, information technology, radio communications; thereby providing, installing and testing systems, as well as performing technical and operational training, corrective and preventative maintenance.

The procurement of equipment seeks to complement goods acquired under the scope of the current operation in SES to contemplate additional areas and fill gaps that emerged during the COVID-19 pandemic as specific goods became unavailable in the market.

Expanding the support to the Reflorestar Program in selected river basins (US\$16.06 million of which US\$12.40 million IBRD) .

Under the proposed Project, the Reforestar program will be expanded in two ways: (i) by adding areas that contribute to other hydrological benefits, including reducing flood risk and dry season water shortages;⁶ and (ii) by incorporating additional contract options (including physical conservation structures such as small/mini water ponds or soil built dry boxes). The Project will also finance studies and provide technical assistance (TA) to SEAMA to help continuously improve the Reforestar program's efficiency and effectiveness, including by, inter alia (a) strengthening Program targeting; (b) developing additional financing sources, such as from the private sector; (c) strengthening its institutional capacity; (d) improving its communication strategy; (e) assessing its effectiveness (in inter alia, attracting participants - including vulnerable and marginalized groups, with a specific target to reach 40 percent of women among new Reforestar participants; targeting payments to priority areas; providing the desired environmental services; and keeping administrative costs low); and using the lessons to improve it; and (f) improving the Portal Reforestar, which participants use to enroll in the Reforestar PES Program and SEAMA uses to administer it.

In addition to the Reflorestar PES, the Project will finance physical water and soil conservation structures.

The implementation of these structures is part of several municipal programs to improve water quality and increase water availability during the dry season in rural watersheds, with over 600,000 barraginhas built in the country between 2008 and 2019.

Improving flood and drought management in priority river basins (US\$14.12 million of which US\$10.99 million IBRD).

The activity seeks to develop a methodology and testing it through a pilot, for the issuance of collective water rights to family farmers in rural micro-watersheds with a focus on developing and implementing community self-management.

Solutions include dredging to increase flow capacity, widening of the cross section of canals, and internal coating of canals.

After studies are ready, DER-ES will be responsible for the implementation of the Design and Build contracts for each municipality and for contracting the supervision of work services.

Recent recurrences throughout municipalities in the upper part of the state · Águia Branca, João Neiva and Ibiraçu · prompted the SES Government to single them out for priority infrastructure investments aimed at mitigating the impacts of floods in their respective urban areas.

It is also funding additional staffing to improve the capacity of implementing agencies for advancing preparatory activities, with the expectation of an overlap between the two operations.

The lessons learned from past World Bank's projects in several Brazilian States have strengthened water institutions and established a long history of engagement in capacity building and water infrastructure development.

The environmental and economic impacts of infrastructures and institutional development support will create better conditions for inclusive and green growth in the State.

Specifically, the Itapemirim river basin and three vulnerable municipalities are critical Project areas with a potential of accruing relevant environmental and economic gains.

The cost-benefit approach was used to compare the economic costs and benefits with and without the Project. If benefits surpass costs, the Project is economically viable. The present value of expected net benefits was calculated, as well as the economic internal rate of return, and benefit-to-cost ratios.

Two scenarios to measure the impact that changes in costs and benefits have on the Project's economic viability were considered. In the first scenario, the Project is economically viable if potential net benefits are positive. In the second scenario, the Project is economically viable if potential net benefits are positive and the economic internal rate of return is greater than the discount rate.

A sensitivity analysis included the following scenarios that modified direct costs and benefits: (i) increasing Reflorestar direct benefits of reducing sedimentation and increments in avoided damages in Itapemirim's locations, (ii) cost overruns of 50 percent during the lifetime of the Project for all components under economic evaluation, (iii) a decline in both costs and benefits that reduces the NPV to zero (breakeven point), and (iv) delays of Project's implementation up to 10 years.

Indirect benefits included increases in farm income due to better environmental and agricultural practices with higher economic value due to Reflorestar.

The estimation of costs comprised the investment in infrastructure works for the three subcomponents and the recurrent operation and maintenance (O&M) costs from these interventions.

Direct Project benefits estimate economic impact of three subcomponents.

The Reflorestar benefits are accounted with an increase in mean value of land R\$6,400 (US\$1,242) per hectare for agricultural activities, with an increase up to R\$ 2,411 (US\$ 468) per hectare per year of land conversion. Benefits were net out by considering different transaction costs and subsidies of the Reflorestar program.

A value of extra available water of R\$1.7 (US\$0.3) per m³ was assumed to monetize these additional water volumes as economic benefits. Because the specific nature-based solutions are to be designed as the Project gets implemented, changes in the effectiveness of this component are included in the sensitivity analysis by adding both indirect costs and benefits of complementary infrastructures.

The third component subject to economic evaluation (flood and landslide risk management interventions in the municipalities of Ibiraçu, João Neiva and Águia Branca) accrue benefits based on the avoided damages to property and physical assets resulting from extreme rainfall. Investments in structural and non-structural solutions contribute to avoid economic damages in the future. The effectiveness of this component is due to improvements in water-related risk management, dredging, cleaning of riverbeds, diversion channels, channeling rivers of structural investments implemented in three urban municipalities (Ibiraçu, João Neiva and Águia Branca).

The economic rate of return of the Project is 14.9 percent for the entire lifetime of Project. The Net Present Value (NPV) of all components included in the economic evaluation is US\$75.8 million, with benefits reaching US\$234.3 million, and total costs reaching US\$158.5 million at present values.

The financial assessment of 30 years of Reflorestar in Espírito Santo shows a financial return that ranged between 8.1 to 11.3 percent.

The annual present value of the financial assessment is between R\$ 1.2 million (US\$ 240,000) and R\$1.7 million (US\$335,000)

The extra net benefits with the low shadow price of carbon (US\$ 41.8 per tCO₂-eq) are US\$ 1.9 million and US\$ 3.8 million in the case of the high shadow price of carbon scenario (US\$ 83.7 per tCO₂-eq), and these benefits could add up to extra US\$ 9.0 million of NPV using the most updated price of carbon of US\$185 per tCO₂-eq.

A multiple scenario sensitivity analysis considered four initial scenarios of changes in direct costs and benefits, and a scenario that added indirect costs and benefits from the construction of complementary water storage and biodigesters facilities.

The sensitivity analysis also showed that Reflorestar's and Itapemirim's interventions could have substantial economic gains in the future if additional works (small ponds and biodigesters) are used to produce extra environmental and productive outcomes, particularly for farmers.

