



Program Information Document (PID)

Concept Stage | Date Prepared/Updated: 19-Aug-2024 | Report No: PIDPC00133

**BASIC INFORMATION****A. Basic Program Data**

Project Beneficiary(ies)	Region	Operation ID	Operation Name
India	SOUTH ASIA	P506272	Karnataka Water Security and Resilience Program
Financing Instrument	Estimated Appraisal Date	Estimated Approval Date	Practice Area (Lead)
Program-for-Results Financing (PforR)	30-Apr-2025	01-Aug-2025	Water
Borrower(s)	Implementing Agency		
Department of Economic Affairs, Ministry of Finance, Government of India	Revenue Department , Bangalore Water Supply and Sewerage Board, Bruhat Bengaluru Mahanagara Palike		

Proposed Program Development Objective(s)

Improve services, and institutional and financial capacities to enhance resilience to water and climate stress in Karnataka.

COST & FINANCING (US\$, Millions)**Maximizing Finance for Development**

Is this an MFD-Enabling Project (MFD-EP)? Yes

Is this project Private Capital Enabling (PCE)? Yes

SUMMARY

Government program Cost	606.00
Total Operation Cost	606.00
Total Program Cost	595.00
IPF Component	10.00
Other Costs (Front-end fee,IBRD)	1.00
Total Financing	606.00



Financing Gap	0.00
FINANCING	
Total World Bank Group Financing	426.00
World Bank Lending	426.00
Total Government Contribution	180.00

Concept Review Decision

The review did authorize the preparation to continue

B. Introduction and Context

Country Context

1. **Karnataka is an economic powerhouse, driven by its urban centers, but increasingly faces adverse impacts of climate change, especially floods and drought.** Karnataka’s GDP per capita is approximately US\$3,000 (compared to US\$1,900 for India), of which 38 percent is contributed by Bengaluru alone.¹ The capital city is the engine of growth for the state and is also the national hub for the software industry. Karnataka’s rural economy is largely agrarian and heavily affected by droughts. As the second most drought-prone state in India, 77 percent of land in the state is considered arid or semi-arid. Almost 60 percent of the state experienced drought conditions between 2001 and 2020, and 23 of the 31 districts face acute water scarcity. The state contains seven river basins but also has high rainfall diversity, with an annual 4,000 mm of rain in the west, compared to 500 mm in the east. In addition to the pre-existing precarities of water security, Karnataka is witnessing an increasing frequency of extreme weather events including flooding, landslides, severe droughts, and erratic monsoon patterns. Cyclones affect coastal districts with higher intensity in addition to storm surges, erosion, and landslides have been increasing in the coastal, Malnad, and northern districts.

Sectoral and Institutional Context of the Program

2. **Bengaluru faces the rising challenge of frequent flood-induced disruptions and economic losses with several factors contributing to the flood risk.** Bengaluru, the fourth largest city in India, has experienced unprecedented economic growth. About one out of six people in Karnataka live in Bengaluru and the population has grown from 4 million in 1991 to around 14 million in 2024 and is projected to reach 28 million by 2041² without the accompanying infrastructure to accommodate these residents in livable conditions in a changing climate. A total of 1,167 flood events³ hit Bengaluru between 2013 and 2020, and 372 flood hotspots have been identified. The flood management problem in Bengaluru stems largely from the following five factors: (a) Increase in annual rainfall, intensity, and peak flows; (b) incomplete storm water

¹ Government of Karnataka (GoK). 2024 Economic Survey of Karnataka 2023-24.

² Expert Committee Report, Government of Karnataka, 2010.

³ Rangwala, L., S. Chatterjee, A. Agarwal, B. Khanna, I. Uri, B. Shetty, R.B. Palanichamy, and A. Ramesh. 2024. Climate Resilient Cities: Assessing Differential Vulnerability to Climate Hazards in Urban India. New Delhi: WRI India. doi.org/10.46830/wriipt.22.00055.



drain (SWD) network and poor solid waste management; (c) deterioration of Bengaluru's extensive lake system, because of pollution, siltation, and deliberate disconnection between lakes and SWDs (due to raw sewage in SWDs); (d) inefficient infrastructure design which has not kept pace with rapid unplanned city expansion; and (e) limited efforts to accommodate climate induced peak flows via nature-based solutions (NBS). The lack of adequate disaster risk management (DRM) capabilities such as impact-based forecasting, early warning, and emergency operations further impacts flood management.

3. **Key infrastructure and services—water, sanitation, drainage—have not kept pace with Bengaluru's rapid expansion and this has exacerbated water stress.** The core area of the city has a well-functioning sewer and SWD network and reliable water supply. The core area receives 1,450 million liters per day (MLD) of water lifted 300m from the Cauvery River. The city's water demand is 2,100 MLD, leaving a deficit of 650 MLD. Out of nearly 11,000 government city borewells, water levels decreased or dried up in almost 5,000 during the 2024 drought. Bengaluru generates 1,500 MLD of wastewater, of which only 18 MLD is reused for industrial and commercial use. In a context where every drop counts, there are huge water savings opportunities in reducing non-revenue water (NRW), which stands around 27 percent for Bengaluru. In 2007, the city expanded to cover the 110 surrounding villages (expanded area). As a result of rapid and unplanned development, the city struggled to extend water supply, sewer, and storm water infrastructure and services to the expanded areas and residents rely on private borewells, septic tanks, and limited SWDs. The expanded area faces acute water stress especially in the dry summer months with declines in groundwater levels across 70 percent of the city's wells while also overlapping with some of the most flood-prone parts of the city.

4. **Historically known as the 'city of lakes', Bengaluru has a vast lake system that is now polluted and disconnected but could be rejuvenated to ameliorate water stress by buffering floods and droughts.** Bengaluru has 204 cascading lakes, of which 21 have been reclaimed for development, including of infrastructure such as a stadium and a bus terminal. The remaining 183 lakes are polluted but hold great potential for reintegration into a system where lakes serve as balancing reservoirs during floods and droughts. In the absence of a proper sewage system in the expanded areas, raw sewage is discharged into SWDs. In an attempt to protect the lakes, the discharge from SWDs is currently diverted away from SWDs to downstream water bodies. However, if adequately treated, the wastewater can be used effectively for city lakes and water bodies. With support from the Japan International Cooperation Agency (JICA), the GoK is currently constructing 14 sewage treatment plants (STPs) in the expanded area, but an additional 9 STPs are needed to prevent all the sewage from entering the SWDs and from entering lakes during flooding. Desludging of existing lakes, addition of sewage treatment capacity, and upgrading of Bengaluru's SWD network (860 km of which one-third needs reinforcement or strengthening), can create the basis for a rejuvenated lake system and increase the flood discharge capacity of the city.

5. **Infrastructure is critical, but it cannot alone solve the problem: Addressing the flood and drought risks in Bengaluru and larger disaster risks in Karnataka, calls for robust institutions for water-related services and disaster risk management, including multi-sectoral and integrated solutions.** Karnataka experienced severe floods in 2023 and the worst drought in decades in 2024. Increasing weather events call for stronger, coordinated institutions to manage disasters with state-of-the-art decision support systems, clear roles and responsibilities, user-oriented climate and disaster monitoring services, and public engagement platforms. Although Karnataka has long-standing institutional experience in some of these areas, the current institutional setup needs to be aligned with new legal mandates and emerging sector needs. Both the Bengaluru Water Supply and Sewerage Board (BWSSB), responsible for water and wastewater, and the BBMP, the municipality of Bengaluru responsible for SWDs, have limited staffing capacity and integrated master planning is not carried across agencies. Another challenge is the lack of institutional capacity to monitor industrial and municipal wastewater, with the Karnataka State Pollution Control Board (KSPCB) facing capacity gaps to systematically monitor and control wastewater pollution.



6. **BBMP and BWSSB can deliver a climate-resilient city, free of pollution and with high-quality service, only if they are financially strong and operationally efficient.** There is a huge financing gap in providing water security and resilience to the fast-growing city. With regards to BWSSB, the water tariff was last revised in 2014, and around 70 percent of BWSSB's revenue is used to cover electricity bills. The tariff has not been adjusted for inflation or the increasing price of energy for a decade. In the past, BWSSB has implemented innovative performance-based contract (PBC) projects on NRW reductions, which produced a simple payback of 2.5 years; however, the existing 5,000 km of old pipes needing replacement remains unfinanced. Energy efficiency has great potential for generating savings with a calculated payback of two to five years; this too remains unfinanced. Solutions are available, but the financial capacity to invest in technologies and O&M is arguably the main challenge. BWSSB is exploring opportunities for private sector participation.

7. **Tackling floods, droughts, and other climate-related challenges call for a transformation of flooding and disaster risk management for Bengaluru and Karnataka.** It is clear climate shocks will increase in both frequency and intensity. There is currently no mechanism to quantify the risks and take informed decisions on diversifying disaster risk financing (DRF). Since 2009, flood- or drought-related annual estimated losses have been higher than US\$ 1.2 billion for every affected year, going as high as US\$ 4 billion in some years. Between 2008 to 2024, funding from Government of India (GoI), primarily via the National Disaster Response Fund (NDRF), was only 8 percent of the total estimated losses for droughts and 6 percent for floods. Currently, the only ex ante source of funds that are available to states is the State Disaster Risk Management Fund (SDRMF), which for 2021-2026 (15th Finance Commission) is about US\$497 million. Most of the funds were used for the floods in 2021 and 2022 and the drought in 2023. Private insurance penetration is low in the state, in line with the trend across India—less than 10 percent of homes and less than 30 percent of farmers and cropped area are insured. Adopting similar approaches for quantifying the needs and leveraging blended finance opportunities for financing climate adaptation and mitigation measures can enable Karnataka to meet its climate goals. To prepare for this and to safeguard future economic growth in the state, and especially in its capital city, the Government of Karnataka, seeks to adopt a three-pronged approach to water security and resilience. First, water- and DRM-related infrastructure and services need to improve. Second, institutions must be strengthened to facilitate coordinated, planning and delivery of integrated solutions. Third, new financing models need to be introduced and the financial strength of service delivery institutions for climate resilience needs to be stronger.

Relationship to CAS/CPF

8. **The Program is consistent with the World Bank Group's Country Partnership Framework (CPF) FY18–22 approved by the Board in 2018⁴ (Report 126667-IN).** The Program aligns with the World Bank's mission of ending extreme poverty and boosting shared prosperity on a livable planet and, more specifically, with the World Bank's India Systematic Country Diagnostic (SCD).⁵ The latter highlights that water scarcity is exacerbated by a deterioration of water quality partly due to the discharge of untreated sewage into surface water sources. The Program for Results (PforR) also aligns with Focus Area 1 of the CPF on Resource Efficient Growth by improving resilience to climate change. The PforR is also consistent with India's Long-Term Strategy,⁶ which promotes "low-carbon municipal service delivery through resource efficiency, management of water, solid, and liquid waste" and highlights the need for "strengthening basic infrastructure such as sanitation systems, [...] as well as institutional infrastructures such as disaster response teams" for building climate resilience. In addition, the Program is aligned with the country's Nationally Intended Determined Contributions - Towards Climate Change,⁷ which identifies the water sector as vulnerable to climate change and focuses the adaptation strategy on the efficient use of water.

⁴ Extended up to December 2024.

⁵ World Bank Group. 2018. *India Systematic Country Diagnostic: Realizing the Promise of Prosperity*. Washington, DC: World Bank. <https://openknowledge.worldbank.org/handle/10986/29879>.

⁶ MoEFCC (Ministry of Environment, Forest and Climate Change). 2022. [India's long-term low-carbon development strategy](#). Government of India.

⁷ <https://moef.gov.in/wp-content/uploads/2018/04/revised-PPT-Press-Conference-INDC-v5.pdf>.



Rationale for Bank Engagement and Choice of Financing Instrument

9. **With this Program, the World Bank can leverage international and national lessons on enhancing water security, climate resilience, and DRM** and facilitate convergence between six active water-related operations in Karnataka. The current operations include the Second Dam Rehabilitation and Improvement Project (P170873), National Groundwater Management Improvement (P158119), Rejuvenating Watershed for Agriculture Resilience through Innovative Development (P172187), Karnataka Urban Water Supply Modernization Project Additional Financing (P176107), National Hydrology Project (P152698), and National Cyclone Risk Mitigation Project (P144726). This Program will leverage data and experience, from these projects to inform the design of the proposed interventions.

C. Program Development Objective(s) (PDO) and PDO Level Results Indicators

Program Development Objective(s)

10. The proposed PDO is to improve services, and institutional and financial capacities to enhance resilience to water and climate stress in Karnataka.

PDO Level Results Indicators

- People with enhanced resilience to climate risks (Number, gender disaggregated)
- People provided with water and sanitation of which (%) is safely managed (Number, gender disaggregated)
- Operationalization of KSDMA⁸ with capacities to formulate and execute DRM projects (Yes/No)
- BWSSB enhances cost recovery (percent of O&M and full costs)
- Lakes rejuvenated and able to serve as balancing reservoirs for management of flood and drought (number)

D. Program Description

PforR Program Boundary

11. **The proposed PforR Program ('P', the Program) will support a subset of GoK initiatives on climate resilient and disaster risk management, as outlined in the Karnataka State Action Plan on Climate Change (KSAPCC) 2024**, which contains the state government's strategic plan to combat climate change across various sectors. KSAPCC contains an estimated budget of US\$ 6.3 billion (INR 52,827 Cr.) to implement measures in agriculture, forestry, energy, water resources and several other sectors between 2025 and 2030. There are four additional elements that represent the PforR Program boundary: (a) the Climate Action Plan for Bangalore launched by BBMP in 2023, (b) the Water Policy Implementation Roadmap (GoK 2023), (c) the state DRM plan, and (d) Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2021) 2.0 scheme designed to provide universal coverage of water supply and sewerage management in 500 Indian cities.

12. The boundaries of the Program are defined as follows:

- **Services.** The Program will cover selected service sectors under the government program, including water, sanitation; storm water drainage, and early warning and forecasting services.

⁸ Includes the establishment of the Disaster Risk Financing (DRF) Unit within KSDMA.



- **Institutions and state capability.** The Program will undertake institutional reforms and capability enhancement for improved delivery of sanitation and drainage services as well as flood and DRM in Karnataka.
- **Duration.** The Program will be implemented over a period of five years (2025-2031).
- **Financing.** The program budget is US\$606 million, with US\$426 million from IBRD and US\$180 million from GoK/Gol.
- **Implementation responsibility.** The Program will be coordinated and managed by the Revenue Department at the state level. The main implementing agencies will be BWSSB and BBMP.

13. **The government program largely overlaps with the PforR. Several guiding principles were used to determine the PforR Program boundaries and select the state-level interventions for PforR Program support.** First, while the government interventions focus on discrete action for climate resilience, the PforR will support interventions under an umbrella of water security, climate resilience, and DRM, with infrastructure investments focused on Bengaluru. Second, the PforR will support institutional reforms, integrated planning, and enhanced coordination between the four critically interlinked institutions, BWSSB, BBMP, the KSNDMC, and KSDMA. Third, the PforR will focus on a range of activities to reduce the financing gap required for climate resilience.

E. Initial Environmental and Social Screening

20. **The Program, through its investments in tertiary sewage treatment, SWDs, and lake rejuvenation, as well institutional strengthening, is likely to result in reduced pollution, reduced damage caused by flooding, droughts and cyclones, development of green recreational areas, and better disaster preparedness.** These efforts are likely to lead to positive environment and social (E&S) impacts and improved community health.

21. **The environment and social risk screening revealed that the likely environment and social effects of the program are moderate to substantial.** The main environmental risks are: (a) the substantial occupational safety and hazard risks for workers and communities due to numerous (approximate 1,000) work fronts for construction of sewers, lining of SWDs within the densely populated in Bengaluru, and potential traffic disruptions; (b) the residual pollution of SWDs discharging into lakes downstream if broken manholes of underlying sewers are not readily repaired as planned; (c) management of solid wastes in the SWDs to be fully integrated into Bengaluru’s overall solid waste management program; (d) minimization of tree-felling; and (e) management of usual construction-related pollution, dust, oil spills, noise, and so on. The social risk rating ranges from moderate to substantial. The key social risks are: (a) potential disruptions to and impacts on livelihoods of communities/vulnerable groups that have, at several locations, encroached upon the existing ‘Right of Way’ that will be used for upgradation of SWD network; (b) risks of disruption, safety and GBV/SEA-SH risks to communities, particularly in congested urban locations wherein nine STPs are proposed on government lands that have already been identified; (c) risk of disruption to citizens if works are not scheduled, planned and implemented with citizen-convenience in mind; and (d) inadequate information dissemination and community awareness in disaster management situations.

22. **The E&S contextual risk, including any risks to sustainability is moderate as BWSSB is already constructing 14 STPs in the expanded area of Bengaluru.**⁹ The planned investments under this Program will be undertaken on government land but in congested unplanned locations and could experience implementation challenges. The institutional capacity and complexity risks are moderate although these will be further assessed. All three IAs have a grievance redressal mechanism but will require strengthening of citizen feedback, consultative processes, and proactive public outreach at the preparation and implementation phases.

⁹ Through JICA funds.



23. **The Environment and Social System Assessment (ESSA), to be carried out by the World Bank during the preparation phase,** will assess the adequacy of provisions of legal and regulatory framework, implementation capacity, and past performance, including processes to adequately manage E&S risks and impacts identified in the Program.

Legal Operational Policies	Triggered?	
	Last approved	Current
Projects on International Waterways OP 7.50	No	
Projects in Disputed Area OP 7.60	No	

Summary of Screening of Environmental and Social Risks and Impacts of the IPF Component

24. The Social Risk is rated as Low as the proposed interventions are unlikely to have any physical footprint and therefore, will not result in adverse impacts on land, community health and safety, Indigenous Peoples/Tribals or cultural heritage.

25. The IPF component focuses on activities such as project management, training; running field pilots on aspects such as smart metering; and behavior communication change campaigns. The World Bank’s Environment and Social Framework (ESF) shall be applicable for the IPF component. Given the low E&S risks and impacts, a draft Environmental and Social Commitment Plan (ESCP), including Labor Management Procedures (LMP) and Stakeholder Engagement Plan (SEP), will be prepared, consulted upon, and disclosed before appraisal. The Program will clearly define the sexual exploitation and abuse and sexual harassment (SEA/SH) requirements and expectations in the bid and contracting documents, as engaging of consultancy firms and contractors for IPF activities may create opportunities for SEA/SH in the workplace. Based on the SEA/SH screening tool, the risk rating is Low. The rating will be reassessed at the appraisal stage.

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