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Program Information Document (PID)

Appraisal Stage | Date Prepared/Updated: 15-Jan-2025 | Report No: PIDPA00170

Public Disclosure Authorized

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)	27-Jan-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 water security related municipal services, institutions, and financing 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	**677.00**
Total Operation Cost	**677.00**
Total Program Cost	676.00
Other Costs (Front-end fee,IBRD)	1.00
Total Financing	**677.00**
Financing Gap	**0.00**

FINANCING

Total World Bank Group Financing	**426.00**
World Bank Lending	426.00
Total Government Contribution	**246.00**
Total Non-World Bank Group Financing	**5.00**
Private Capital and Commercial Financing Amount	5.00
of which Private Capital	5.00

Decision

The review did authorize the team to appraise and negotiate

B. Introduction and Context

1. **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 2041 without the accompanying infrastructure to accommodate these residents in livable conditions in a changing climate. A total of 1,167 flood events occurred in Bengaluru between 2013 and 2020, and 372 flood hotspots have been identified. The flood management problem in Bengaluru stems from five factors: (a) Increase in annual rainfall, intensity, and peak flows; (b) incomplete storm water 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.

2. **Key infrastructure and services—water, sanitation, drainage—have not kept pace with Bengaluru's rapid expansion, which exacerbates 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. Bengaluru generates 1,500 MLD of wastewater, of which only 18 MLD is reused for industrial and commercial use. 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.

3. **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. Desludging of existing lakes, addition of sewage treatment capacity, and upgrading of Bengaluru's SWD network, can create the basis for a rejuvenated lake system and increase the flood discharge capacity of the city. Both the Bengaluru Water Supply and Sewerage Board (BWSSB), responsible for water and wastewater, and the Bruhat Bengaluru Mahanagara Palike (BBMP), the municipality of Bengaluru responsible for SWDs, face numerous flood related challenges.

4. **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.** The government estimates that 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 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 operation and maintenance (O&M) is arguably the main challenge.

5. **Tackling floods, droughts, and other climate-related challenges call for a transformation of flooding and disaster risk management for Bengaluru and Karnataka**. Currently there is no mechanism to quantify the risks for 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, 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, 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.

PforR Program Scope

6. **The Karnataka State Action Plan on Climate Change (KSAPCC) 2024 will serve as the overarching government program ('p', the government program).** The proposed Program-for-Result (PforR) Program ('P', the Program) will support a subset of GoK initiatives on climate resilience and DRM, as outlined in the KSAPCC ('p'), which contains the state's strategic plan to combat climate change. The KSAPCC contains an estimated budget of US$1.38 billion ('p') to implement measures in agriculture, forestry, energy, water resources and other sectors between 2025 and 2030. Owing to the cross-cutting nature of water security and resilience, the government program will include three additional elements: (a) the Bengaluru Climate Action and Resilience Plan launched by BBMP in 2023, (b) the GoK's Water Policy Implementation Roadmap, 2023, and (c) the state DRM plan.

7. **The Program supports the state government in achieving water security and resilience through three results areas (RA). RA1: Improving infrastructure and services for enhanced water security and resilience**. RA1 will focus on water, sanitation, drainage, and DRM infrastructure and services that directly enhance resilience to floods and droughts.

8. **Through a multi-agency approach, RA1 will incentivize BBMP to strengthen and fully integrate SWDs with lakes to create climate-resilient balancing reservoirs** to dynamically retain and release water for groundwater recharge, recreation, and green zones along with storm flood management. BWSSB will support this integration by sealing leaking machine-holes in the sewer truck lines in the SWDs. The integration of SWDs with natural lakes is a key climate adaption strategy to manage increased surface water runoff during climate-induced extreme rainfall events, thereby reducing flood risks and improving groundwater recharge through water retention in city lakes. Finally, it will incentivize enhanced early warning and forecasting system services for selected hazards and emergency operation capabilities at the state, district, and taluka levels to increase the capability of local agencies to plan for and respond quickly to disaster risks. In selected hotspots, landslide mitigation solutions will be demonstrated.

9. **RA2: Strengthening institutions and integrated planning.** RA2 incentivizes integrated planning and institutional strengthening and reforms of disaster risk governance. The integrated planning involves water audits for 16 sub-basins across Karnataka, a comprehensive water security plan for the greater Bengaluru, and detailed sub-catchment flood management plans for Bengaluru informed by advanced flood modelling. To transform the institutional approach to SWDs, the Program will set up and staff eight zonal multi-agency SWD cells that will develop joint O&M implementation plans, with citizen engagement, behavior change campaigns, and a new digital water and environmental governance system to monitor, track and benchmark critical sector indicators such as effluent from sewage treatment plants (STPs), STP utilization rate, water reuse, industrial and residential wastewater effluent, residential water harvesting structures and a lake health index. This joint approach will involve BWSSB; Karnataka Pollution Control Board and BBMP's SWD, lakes, and solid waste management divisions and will apply to the entire 860km of BBMP's SWD. In addition, an effluent treatment plant for industrial wastewater will be installed to remove toxic materials and chemicals in a high-pollution industrial zone. NBSs will also be demonstrated in flooding hotspots in each of the city's eight zones.

10. **The institutional structures related to Disaster Risk Management (DRM) will be reformed** through the enhancement of the Karnataka State Disaster Management Authority's (KSDMA) capabilities and the establishment of functional units such as Mitigation and Disaster Risk Financing units. These new units will facilitate the development and implementation of a wide array of DRM activities tailored to address the specific challenges posed by multiple-hazards. Central to this reform effort will be the Karnataka State Natural Disaster Management Centre (KSNDMC), which will be scaled into a Centre of Excellence (CoE) focused on proactive climate actions and strategies for managing extreme weather conditions. A key feature of the CoE will a new comprehensive data model – the Karnataka Climate and Multi-Hazard Risk Information System. This cutting-edge, one-stop risk management tool will function as a comprehensive decision-support platform. It will empower stakeholders and decision-makers with vital information to strengthen emergency preparedness, streamline response efforts, enhance mitigation planning, and promote resilience-building initiatives—all crucial for safeguarding communities and ensuring risk informed development considering climate-related challenges.

11. **RA3: Enhancing financial capabilities and resources of key institutions.** RA3 seeks to strengthen the financing sustainability of BWSSB and BBMP. It will incentivize the improvement of BWSSB's cost recovery through enhanced operational efficiencies, including energy efficiency, smart water meters for large volume consumers, and NRW reduction. The Program will support the government's aim of increasing BBMP and BWSSB's revenues by at least 30 percent and piloting Public Private Partnerships at BWSSB to mobilize at least US$5 million private capital. The Program will support BBMP to strengthen capital investment planning and financial management systems enhancement. Lastly, RA3 will incentivize the establishment of a Disaster Risk Financing Unit and development of the state DRF strategy including the operationalization of a blended finance facility expected to enable at least US$20 million private capital investments.

12. **Program beneficiaries.** The Program will give 2 million people access to safely managed sanitation and provide 4 million with enhanced resilience to climate risks.

C. Proposed Program Development Objective(s)

Program Development Objective(s)

Improve water security related municipal services, institutions and financing in Bengaluru and strengthen DRM institutions in Karnataka.

13. The PDO indicators by outcomes are the following:

Outcome 1: Improving infrastructure and services for enhanced water security and resilience
PDO indicator 1: People with enhanced resilience to climate risks (Corporate, number, gender disaggregated)
PDO indicator 2: People provided with safely managed sanitation (Corporate, number, gender disaggregated)

Outcome 2: Strengthening institutions and integrated planning
PDO indicator 3: Disaster risk governance institutional reform program implemented

Outcome 3: Enhancing financial capabilities and resources of key institutions
PDO indicator 4: Own source revenue increased

D. Environmental and Social Effects

14. **The Program will enhance climate-resilient services in Bengaluru** which will mitigate urban flooding by upgrading of SWDs and integrating lakes as balancing reservoirs. The construction of STPs with methane capture will increase the volume of wastewater treated and coupled with households' decreased reliance on septic tanks, will enhance public health outcomes. Additionally, the increased STP usage will reduce groundwater pollution from leaking septic tanks, thereby enhancing communities' resilience to water shortages and droughts by improving groundwater quality. The Program will strengthen institutional frameworks and DRM capabilities by reforming key institutions and enhance their financial resilience, for enhancing preparedness and response to climate-related disasters such as flooding.

15. **Under the Program, key activities would involve** infrastructure relating to construction of tertiary STPs (nine STPs), one WTP, 400 km of sewers network and sewage pumping stations, retaining walls and lining of SWDs (173 km), fortifying of existing stone masonry storm water walls (80 km), lake rejuvenation activities and construction of buildings at KSNDMC. It would also involve piloting of smart meters and institutional strengthening activities within BBMP, BWSSB, and KSNDMC.

16. **In line with the World Bank PforR Guidance, an Environmental and Social Systems Assessment (ESSA) was carried out** and comprised review of secondary literature review, consultations (field and state level), assessment of E&S system strengths, and areas for improvement, besides site visits. Furthermore, the ESSA identified the risks and opportunities and confirmed compatibility of the Program with the core principles on (a) E&S management systems, (b) natural habitats and cultural properties, (c) public and worker safety, and (d) land acquisition and livelihoods.

17. **The main environmental risks are** (a) the substantial occupational safety and hazard risks for workers and communities due to numerous work fronts for construction of sewers, lining of SWDs within the densely populated urban settings, and potential traffic disruptions; (b) the residual pollution of SWDs discharging into lakes downstream if broken machine-holes of underlying sewers are not readily repaired as planned; (c) management of solid waste in the SWDs to

be fully integrated into Bengaluru's overall solid waste management program, which is being pursued in parallel; (d) ensuring of water quality during construction of SWDs and STPs; (e) minimization of tree felling at STP sites; (f) management of usual construction-related pollution, dust, oil spills, noise, and so on; and (g) reputational risks if the lake water quality continues to be poor due to constraints in sewage treatment considering that many current STPs cannot upgrade to tertiary treatment facilities, due to a shortage of land. 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' (or land within the buffer zone of SWDs), which will be used for upgrade of the SWD network; (b) risks of disruption, safety, and gender-based violence/SEA/SH[1] risks to communities, particularly in congested urban locations wherein nine STPs are proposed on government lands that have already been identified; (c) inadequate measures at construction sites on city roads that have led to accidents/fatalities in the past and which might occur in the future too; (d) inadequate information dissemination to communities on use of treated water, installation of smart meters, and so on; and (e) inadequate community awareness in disaster situations.

18. **Comprehensive and overarching legal and regulatory provisions on E&S exist at the national and state levels.** Both BWSSB and BBMP, which will executive infrastructure works, have Public Relations Office (PRO) Cell and a well-developed robust system of citizen/stakeholder engagement. In respect of grievance management, both BWSSB and BBMP have robust systems. Key gaps identified therefore include (a) explicit inclusion of key legal provisions of applicable E&S laws, certifications related to contractor's environmental management systems as well as on occupational health and safety, in the bid/contract documents and diligent monitoring of contractors (and PMCs, if applicable) through formal reporting; (b) strengthening of the system of water quality monitoring; and (c) provisions to manage the physical and economic displacement impacts of civil works on 'vulnerable' encroachers/unauthorized occupants in relation to the activities under the World Bank's Program. However, it is noted that the Program does not include any activity that may have significant adverse E&S impacts that are sensitive, diverse, or unprecedented. Overall, the ESSA found that the E&S policies and legal framework applicable to this sector are largely compatible with the E&S core principles of the PforR.

19. **The ESSA recommends the following actions** (a) Hiring social specialist for the PMU at the state level and full-time deputation of officials as environmental specialists, (b) Receipt of monitoring reports following strengthening of E&S provisions in tendering and contracting procedures (bid documents, work orders, contract agreements, and so on) pertaining to civil works to be awarded under the World Bank Program, (c) site-specific planning and enforcement of 'safe work zone' practices for all activities related to SWDs and STPs and real-time reporting from each such site of civil works throughout the construction period, (d) strengthened Water Quality Monitoring systems covering both BBMP and BWSSB such that ambient pollution levels (particularly at the lakes and lake inflows) could be matched with the various SWDs and STP outfalls, to be able to take remedial actions, (e) no diversion of treated water from STPs for channels flowing into the downstream Bannerghatta National Park, (f) development of systems to manage impacts related to physical and livelihood impacts in World Bank-financed investments including enrollment of vulnerable people into ongoing government schemes.

20. **Grievance redress.** Regarding grievance management, BWSSB, BBMP and KSDMA have robust systems that comprise multiple modes for registration of grievances (website, helpline, app, phone-in programs, Water Adalat (court), AI chatbot, etc.), well-advertised procedures, database for managing grievances and with suitable escalation provisions. Apps such as Sajala, Sahaaya 2.0 and Janaspandana Integrated Public Grievance Redressal systems are also in place. Likewise, BBMP through its Integrated Command and Control Centre (ICCC), KSDMA and BWSSB through their 24x7 call centre provide quick services on a whole range of citizen related services.

[1] SEA/SH = Sexual Exploitation and Abuse/Sexual Harassment.

E. Financing

Program Financing

Source	Amount (US$, Millions)	% of Total
Commercial Financing	**5.00**	**0.74%**
Unguaranteed Commercial Financing	5.00	0.74%
Counterpart Funding	**246.00**	**36.34%**
Borrower/Recipient	246.00	36.34%
International Bank for Reconstruction and Development (IBRD)	**426.00**	**62.92%**
Total Program Financing	**677.00**	

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APPROVAL

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