



Yemen's First GCF CN: Building a water-secure future for the residents of the Tuban Delta, including Aden and Lahj Cities 2024

Abdulwahid Arman
Director of Climate Change Unit

Ministry of Water and Environment

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Country in Brief

Area: 528,076 km²

Cultivated area: 1.2 million ha

Population: 31 million

Growth: 3.5 %

Rural: < 60%

Rainfall 50- 800 mm/year

Average 250 mm/year

Evaporation is much higher than rainfall:
2100mm/year

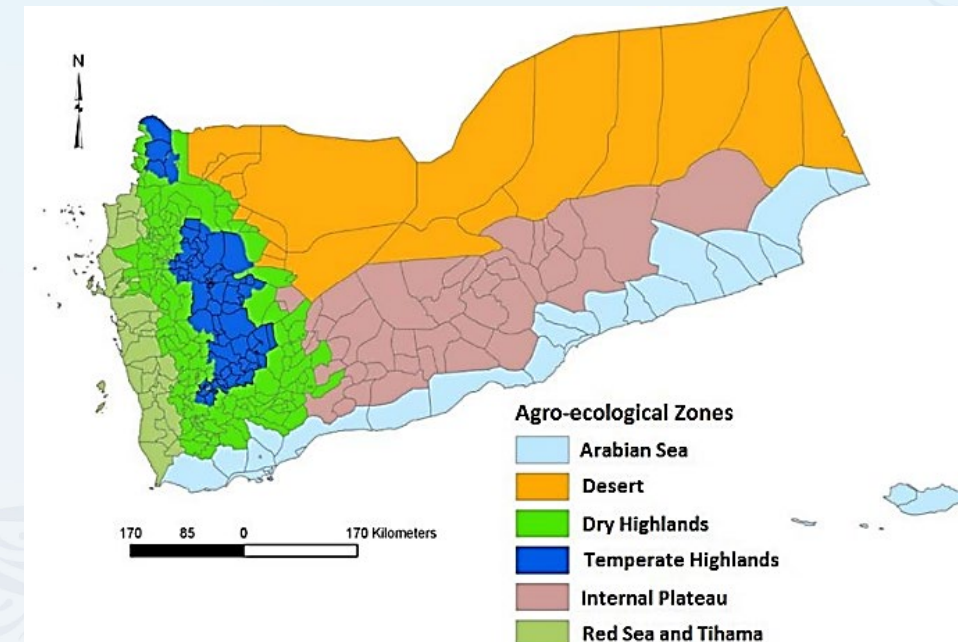


Country in Brief

- The country is characterized by five major land systems:
- A hot and humid coastal plain, 30-60 km wide, along the Red Sea and the Gulf of Aden.
- The Yemen Highlands, a volcanic region with elevations between 1,000 and 3,600 m parallel to the Red Sea coast, and with temperate climate and monsoon rains;
- The dissected region of the Yemen High Plateaus and the Hadramout - Mahra Uplands, with altitudes up to 1,000 meters.
- The Al-Rub Al-Khali desert interior; with a hot and dry climate
- The islands, including Socotra in the Arabian Sea and more than 112 islands in the Red Sea.
- 29% of the population is urban and the majority, about 71%, live in rural areas.



Distribution of agroecological zones in Yemen.



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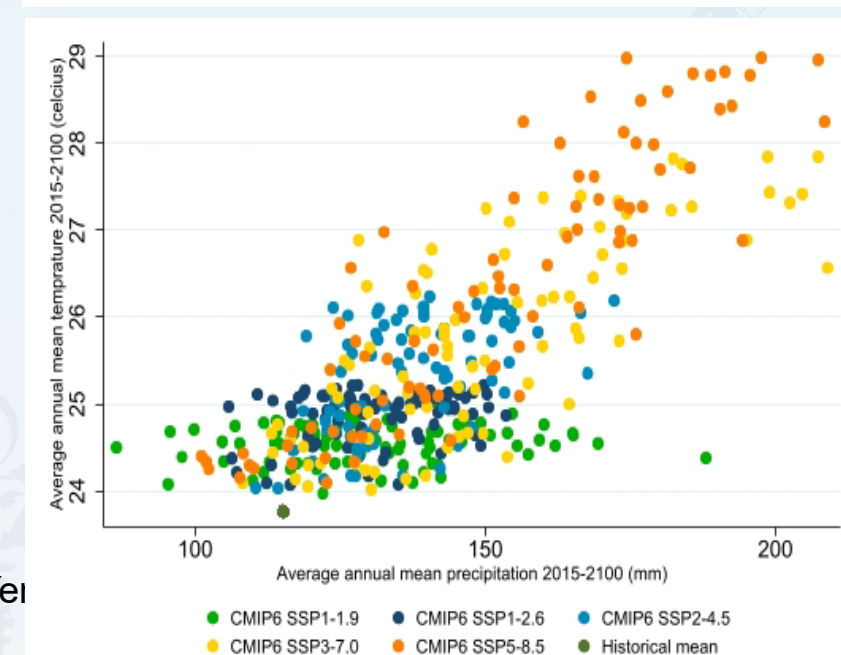
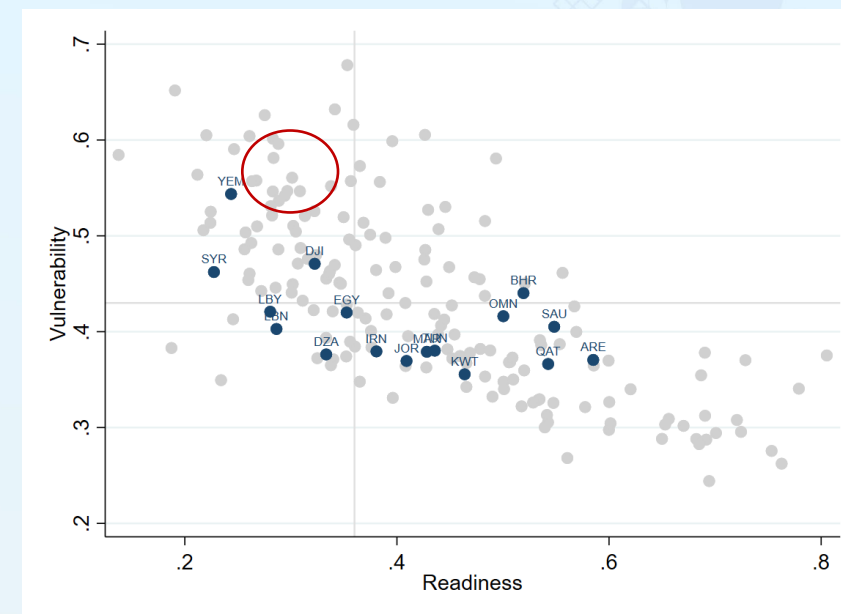
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Climate Change Vulnerability and Readiness in Yemen

- ❖ **In the past two decades**, Yemen experienced frequent drought and Flood disasters.
- ❖ Yemen is the most vulnerable country in MENA and among the least ready to face climate change impact and **It is one of the least climate-funded countries globally.**

Global climate models forecast:

- **Warmer temperatures and**
- **Higher annual average precipitation, with an increase in extreme weather events.**
- **Rising Temperatures:** Global warming is intensifying Yemen's aridity, leading to more evaporation and less water availability.
- **Rainfall Patterns:** rainfall becoming more unpredictable. This hampers water resource planning and agricultural sustainability.
- **More frequent and severe droughts:** Dry periods are intensifying in frequency and severity, depleting fragile water supplies and reducing the resilience of agriculture.
- **Floods have resulted in significant damage and loss of life.** The total economic direct damages of the 2022 flood, were estimated at US\$570 million, which is about 2.7% of 2021 GDP.



Challenges Facing Water Sector

The WS suffers scarcity challenges that are exacerbated by the consequences of the conflict



Systemic Challenges in the Water Sector

- i. Arid to Semi-Arid Zone.
- ii. Water availability ~65 M3 per capita/yr
- iii. GW aquifers at risk of being fully depleted (90% for agricultural)
- iv. Mountainous cities are running out of water and the coastal cities lack safe drinking water

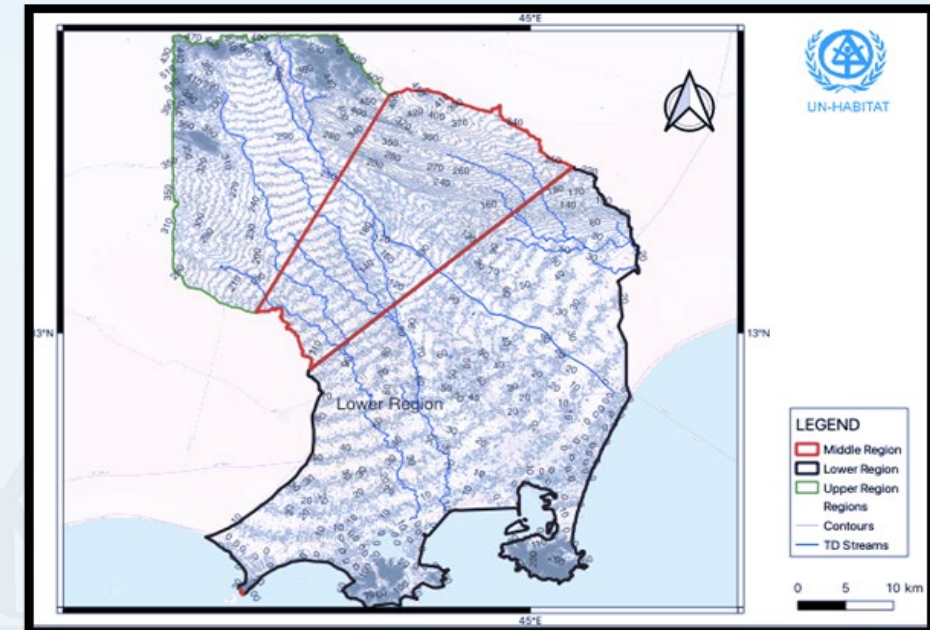
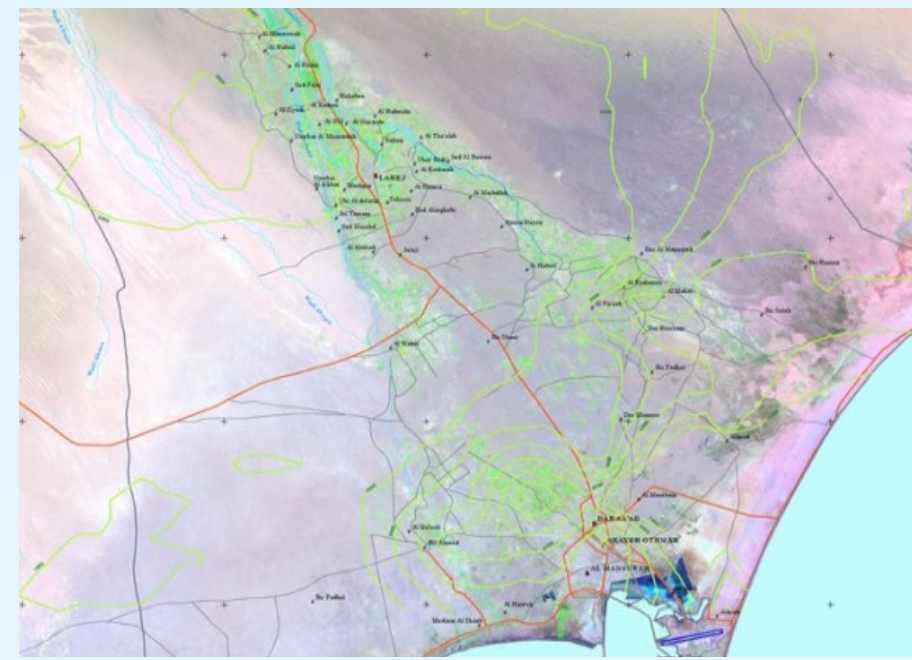


Challenges during the Conflict

- i. ~ 18 million people (70% of population) lack access to safe WSS
- ii. W&S facilities & institutional capacity severely impacted & weakened.
- iii. Shortage/lack and high price of fuel, electricity & staff salaries & Financial sustainability of LWSCs.
- iv. Outbreak of waterborne diseases & corona.
- v. Impact of Climate change increased.

Introduction : Context and Baseline of the Project

- ❖ The Tuban Delta is the downstream area of the Wadi Tuban basin which is one of the most important water reservoirs in the country.
- ❖ The current capital city of Yemen, Aden, is in the Tuban Delta, which is a crucial groundwater basin for the livelihoods of over a million people and is a key economic and political hub for the country, including the major international airport and a major port.
- ❖ In the Tuban Delta, surface water and groundwater are experiencing several challenges, including overuse, increased evapotranspiration, and a lack of a sustainable water management strategy.
- ❖ In the upper regions (Lahj), many people are still engaged in agricultural activities as their primary source of income, so the depletion of groundwater resources and climate change impacts on these livelihoods in the area are significant besides the water needs of households, industries, and businesses in and around Aden rely on this same groundwater source, causing water insecurity in the area.



Climate Rational: Climate Vulnerability

Water- Related Challenges:

- ❖ Climate change risks and impacts
- ❖ Overuse of groundwater/depletion
- ❖ Lack of a sustainable/integrated water management strategy

Main hazards

- ❖ Droughts / Water scarcity
- ❖ Flooding (flash, river, coastal)
- ❖ Sea level rise (and saltwater intrusion)
- ❖ Heat (Heat waves, high nr hot days)

Impacts on water resources

- ❖ Reduced water availability due to the reduction of annual rainfall rates, which have depleted groundwater levels by about 1 m/year, increased saltwater intrusion, and led to land & soil degradation.
- ❖ Increased drought periods have dried out many streams in the lower Tuban region

Water deficit (2022 estimation)

- ❖ Water supplies: 53 MCM
- ❖ Water demand: 137.4 MCM
 - Domestic: 45.5 MCM
 - Agricultural 91.9 MCM
- ❖ Total current water deficit: 84.4 MCM The deficit will increase due to climate change and population growth to about 90 MCM in 2025 and 147 MCM in 2050

Climate risks	Upper Tuban Region	Middle Tuban Region	Lower Tuban Region
Water Security	Medium-High	High	High
Flooding	Medium	Medium-High	High

Climate Rational: Adaptation Needs

- ❖ The Lower region needs additional water resources, which can be provided by a solar-powered desalination plant.
- ❖ Wastewater treatment plants need rehabilitation, monitoring, and appropriate plan to reuse the treated water for irrigation or for groundwater recharge.
- ❖ Irrigation channels should be maintained, and modern irrigation method should be applied.
- ❖ Disaster management plan should be developed coupled with an early warning system to cope with flooding and drought.
- ❖ Groundwater discharge should be monitored to control groundwater depletion and saltwater intrusion in the Lower Region.
- ❖ Continuous capacity building programs are needed addressing hydrological modeling, water use efficiency, water allocation and climate change adaptation.
- ❖ Integrated Water Resource Management (IWRM) plan/strategy for the Tuban Delta.

Potential solutions	Potential contribution to addressing water deficit
Shift to modern/efficient irrigation	45-50%
Wastewater treatment and reuse.	10 %
Greywater treatment and reuse.	5 %
Groundwater recharge from flood water and from the treated wastewater.	5 %
Total	65-70%

The remaining current gap: If potential solutions mentioned in Table are implemented: is at least 30-35 % or 25.3-29.5 MCM.

The remaining solution: increase the water supply through desalination plants which would provide a minimum of 35 MCM (100,000 m³/day) for domestic water use needed in 2024.

Climate Rational: Main interventions

Based on this pre-feasibility assessment and the CCVA and hydrology study, the following projects are feasible and can be considered:

- ❖ Constructing a solar-powered seawater desalination plant is feasible as it reduces water insecurity and groundwater depletion in the Tuban Delta.
- ❖ Rehabilitating the irrigation canals is feasible as it reduces flooding risks and supports water security.
- ❖ Rehabilitating WWTPs is feasible as it produces more water to be used for irrigation thus reducing the pressure over the depleted groundwater resources.

Green Climate Fund	Adaptation Fund
- Constructing solar-powered seawater desalination plant	- Improvement of water resources and land management system
	- Rehabilitating the irrigation canals
	- Rehabilitating WWTPs

Intervention Under GCF: Construction of Seawater Desalination

- ❖ **Component 1:** Aden's water supply is increasingly reliable, safe and climate-resilient
 - **Output 1.1** Construction of a seawater desalination plant with a capacity of 20,000 Cubic meter/day in Aden Governorate
 - **Output 1.2** Safe and environmentally compliant extraction of seawater and disposal systems
- ❖ **Component 2:** Critical water infrastructure in Aden is climate resilient and low-carbon
 - **Output 2.1** Construction of a solar photovoltaic plant to provide all energy needs for the seawater desalination plant
- ❖ **Component 3:** Institutional strengthening for water supply management, including long-term operation and sustainability
 - **Output 3.1** Capacity development with local and national government on resilient water management
 - **Output 3.2** Develop a costed, integrated water-land resource management plan for the Tuban delta, including saline and land degradation control.
 - **Output 3.3** Undertake maintenance and operation for the sustainable and long-term functioning of the desalination and solar plants
- Component 4:** Skills development, outreach, and awareness raising on water management and climate change adaptation
 - **Output 4.1** Skills development with women and youth on water management and climate change
 - **Output 4.2** Capacity development for CSOs with a focus on women's groups to ensure their participation in the development of integrated water-land resource management plans
 - **Output 4.3** Awareness raising about water conservation and climate change in Aden and the Tuban Delta

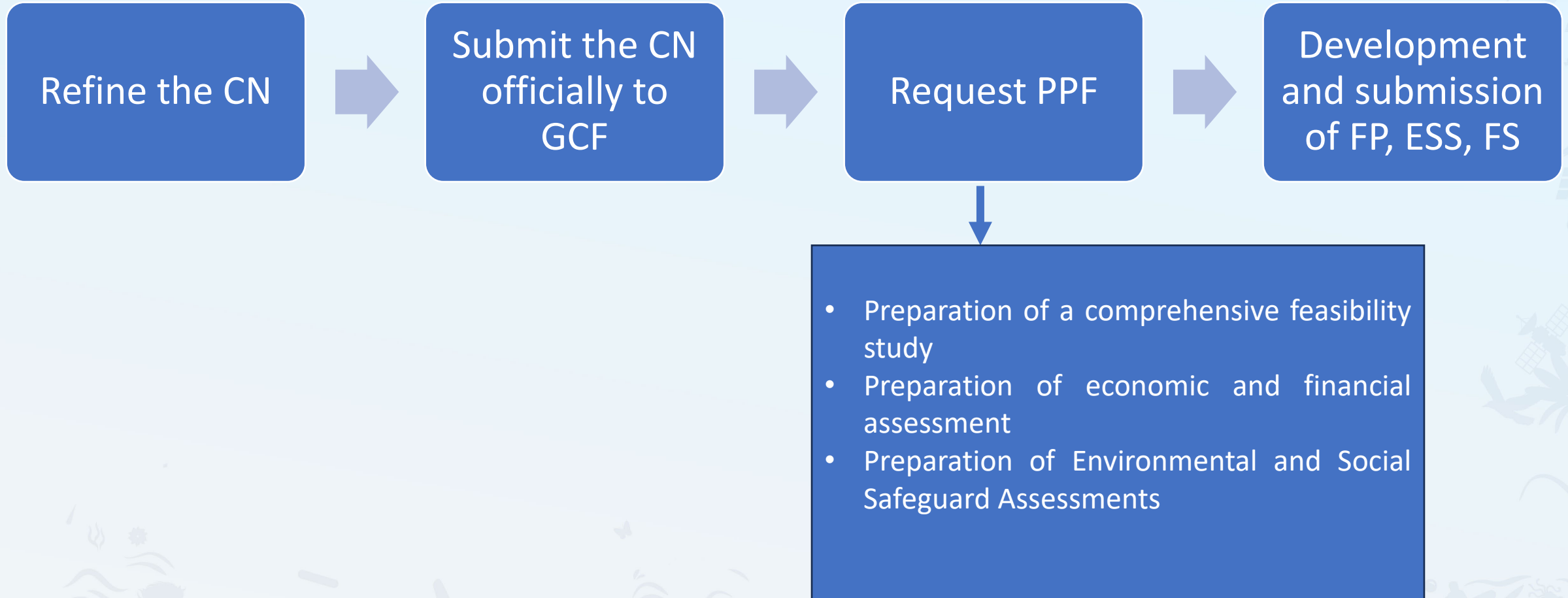
Financing by components



Component/Output	Indicative cost (USD)	GCF financing		Co-financing		
		Amount (USD)	Financial Instrument	Amount (USD)	Financial Instrument	Name of Institutions
Aden's water supply is increasingly reliable, safe and climate resilient	31,200,000	31,200,000	Grant			
Critical water infrastructure in Aden is climate resilient and low-carbon	21,300,000	19,800,000	Grant	1,500,000	In-kind	Aden Governorate and Ministry of Water and Environment
Institutional strengthening for water supply management, including long-term operation and sustainability	9,000,000	7,500,000	Grant	1,500,000	Bi-lateral funding (TBC)	
Skills development, outreach and awareness raising on water management and climate change adaptation	3,000,000	3,000,000	Grant			
Parallel finance from AF	10,000,000 (Grant)					
Indicative total cost (USD)	74,500,000	61,500,000		3,000,000		



Next steps



Thank you

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