



ADAPTATION FUND

REQUEST FOR PROJECT/PROGRAMME FUNDING FROM THE ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to:

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ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

PART I: PROJECT/PROGRAMME INFORMATION

Project/Programme Category:	Regular
Country/ies:	Yemen
Title of Project/Programme:	Increase the climate change resilience to water scarcity and sea level rise-related challenges in the Tuban delta
Type of Implementing Entity:	Multilateral Implementing Entity
Implementing Entity:	United Nations Human Settlements Programme
Executing Entity/ies:	TBD (see potential EEs in table 4)
Amount of Financing Requested:	USD 10 million

1.1. PROJECT / PROGRAMME BACKGROUND AND CONTEXT

Main issues and needs

Yemen faces serious risks from climate change that further threaten the already fragile state of the country.¹ As climate change and rapid population growth put more and more pressure on critical resources, especially water, Yemen shows what may start to happen more often in the region.²

It is widely acknowledged within government policy dialogues that Yemen's major environmental resource problem is water scarcity, a situation being exacerbated by climate change. The water sector in Yemen faces formidable challenges, including decreased agriculture productivity and related reduced food security, increased conflict over resources and accelerated land degradation, and increased livelihood vulnerability. With the current weak adaptive and institutional capacity, climate change associated risks and impacts will push livelihood vulnerability of the poor into further declines, leading to further environmental resource degradation, increased ecological scarcities, and hardship, and hence increased poverty.³

Projections suggest⁴ that the **Abyan** and **Tuban** aquifers may be depleted by 2025. Depletion of the **Tuban aquifer** is the most rapid (2015, versus 2019 for Abyan) because of a greater reliance on groundwater relative to discharge in the Tuban sub-basin. Moreover, **Aden** is one of the top 20 cities in the world where the most people will be at risk from sea level rise and storm surges.

This project aims to respond to the water scarcity-related challenges in the Tuban Delta, which also services Aden, and coastal climate change risks, including salt water intrusion.

Introduction

Due to the armed conflict, which started in 2014, Yemen is increasingly suffering from severe food insecurity and water scarcity, worsening gender inequality, widespread poverty (i.e. more than half of Yemen's population live below the poverty line) and a lack of economic growth.

Yemen is highly vulnerable to climate change-related risks and impacts such as drought, extreme flooding, disease outbreaks, changes of rainfall patterns, increased storm frequency/severity and sea level rise. These are serious concerns as Yemen's economy largely depends on its rural natural resources. Moreover, more than

¹ USAID (2016) Climate Change Risk Profile: Yemen. Available at: <https://www.climatelinks.org/resources/climate-change-risk-profile-yemen>

² <https://www.adaptation-undp.org/explore/arab-states/yemen>

³ World Bank (2014) Future Impact of Climate Change Visible Now in Yemen. Available at:

<https://www.worldbank.org/en/news/feature/2014/11/24/future-impact-of-climate-change-visible-now-in-yemen>

⁴ <http://www.undp.org/content/dam/yemen/E&E/Docs/UNDP-YEM-Governance%20of%20Climate%20Change%20in%20Yemen.pdf>

⁵ Haidera, M.; Alhakimi, S.A.; Noaman, A.; Al Kebsi, A.; Noaman, A.; Fencel, A.; Dougherty, B.; Swartz, C., (2011): Water scarcity and climate change adaptation for Yemen's vulnerable communities, Local Environment: The International Journal of Justice and Sustainability 16(5), <http://www.tandfonline.com/doi/abs/10.1080/13549839.2011.565465#>

75 percent of the population is rural based engaged in farming and pastoralism and hence highly reliant on favourable climatic conditions for their livelihoods.

Yemen experiences extreme water scarcity due to its climate and overexploitation of groundwater. In coastal zones this leads to saltwater intrusion, especially in combination with sea level rise. Climate change is expected to increase temperatures, variability of rainfall and heavy precipitation events. This may shorten growing seasons, especially in the north. Water scarcity, salt water intrusion and shorter growing seasons threaten food security, and competition for dwindling natural resources could further fuel conflict. On-going conflict, a lack of adequate natural resources management, weak governance as well as other factors seriously hinder Yemen's ability to address the current and future impact of climate change.

Geography and climate

Yemen is a Middle Eastern country at the southern end of the Arabian Peninsula. It is bordered to the north by Saudi Arabia, to the East by Oman, and to the South and West by a 2,200 km coastline along the Gulf of Aden, Arabian Sea and the Red Sea.

Figure 1 Yemen geography.



Figure 2 Yemen agro-ecological zones



Zone 1: Upper highlands
Zone 2: Lower highlands
Zone 3: Red Sea and Tihama Plain

Zone 4: Arabian Sea Coast
Zone 5: Internal plateau
Zone 6: Desert

Yemen has a semi-arid-to-arid tropical climate with significant variations due to topographical differences (see [Figure 1](#)). It features five agri-ecological zones (see [Figure 2](#)): a hot-humid coastal plain (2 zones), temperate highlands, high plateaus, the desert interior, and the islands. Temperatures vary by location and season. The coastal regions are hot and dry. Rain is rare in all but the highest regions, where the monsoon winds from the Indian Ocean bring rainfalls of 5-10 cm per month in June and July. Rainfall in the drier regions is rare but can be very heavy.

The **Temperature** in Yemen is generally high, with an annual average of 21 degree C. Temperatures vary by location and season. The coastal regions are hot and dry. The southern coastal areas are characterized by limited rainfall (50 mm per year). **Rainfall** in the central highlands varies from 400 mm to 800 mm per year. Northern regions and Wadi Hadhramawt are hot and dry throughout the year. In the highlands there is more seasonal variety: winter can be cold, with temperatures below 0 degree C, while the summers are temperate and rainy.

Climate change Trends, projections and impacts

Current trends. Over the last 30 years, temperatures have significantly increased, at a rate of 0.19 degree C per decade. Also, an increase of 29 percent in total annual precipitation over the last 30 years was observed. However, a decrease in the average rainfall at a rate of 12 mm per month per decade, generally affecting the drier season, with noted declines in the Highlands has also been suggested.⁵

The proportion of rainfall that falls in 'heavy' events shows an increase in most model projections. The projected rainfall increases for June - October is offset by a decrease in October - December across the country, except for the Upper Highlands where a decrease is projected for the whole year. The majority of climate models tend to predict a tendency towards increased total annual precipitation (probable increase in the September-November rainfall). By 2100, a change in rainfall is expected ranging from -7 percent to +69 percent.⁶

The mean annual temperature is expected to increase by 1.2-3.3 degree C by 2060 and by 1.6-5.1 degree C for the end of this century. Models predict a strong increase in the duration of heat waves, as well as a strong reduction in duration of cold spells. The rate of warming is more rapid in the interior regions than in areas close to the coast.

This is consistent with the higher rates of warming that are projected for the Arabian Peninsula and East Africa, according to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The projected average temperature increase is 2.3. The projected changes by 2025 per **region** are as follows:

- Sa'adah (north-west): precipitation +10 percent, temperature +1.8 degree C;
- Sana'a (central-west): precipitation + 2 percent, temperature + 1 degree C;
- Aden** (south-west): precipitation +10 percent, temperature unknown.⁷

Yemen is a disaster-prone country that faces **natural hazards** every year with floods as the most important and recurring form of disaster. While *regular* flooding has historically been beneficial for agriculture in Yemen, *high-magnitude* flooding often leads to losses of cropland, uprooting of fruit trees, death of animals caught in high floodwater surges, and destruction of infrastructure, such as irrigation facilities and rural roads. The damages done by floods tend to be exacerbated by ongoing desertification processes and land degradation, partly caused by climate change. In addition, several models project higher rainfall levels for Yemen, thus potentially increasing the frequency and severity of floods.⁸ Rising sea levels are expected to accelerate coastal erosion, damage key infrastructure, force community relocations, and threaten marine ecosystems and low-lying coastal wetlands. Greater variability in rainfall patterns will reduce food security because of the increasing severity of droughts and floods.⁹ Previous to 2015 Cyclones in this region of the world were relatively uncommon, but the 5 occurring since gives a clear picture of what could be expected in the future:

- June 12, 2015 , Cyclonic Storm Ashobaa.
- November 3, 2015 , after peaking as the second-strongest storm on record in the Arabian Sea, Cyclone Chapala became the first recorded storm to make landfall in Yemen as a very severe cyclonic storm

⁵ USAID (2016) Climate Change Risk Profile: Yemen. Available at: <https://www.climateintelinks.org/resources/climate-change-risk-profile-yemen>

⁶ USAID (2016)

⁷ Haidera, M.; Alhakimi, S.A.; Noaman, A.; Al Kebsi, A.; Noaman, A.; Fencel, A.; Dougherty, B.; Swartz, C., (2011): Water scarcity and climate change adaptation for Yemen's vulnerable communities, Local Environment: The International Journal of Justice and Sustainability 16(5), <http://www.tandfonline.com/doi/abs/10.1080/13549839.2011.565465#>

⁸ Wiebelt, M.; Breisinger, C.; Ecker, O.; Al-Riffai, P.; Robertson, R.; Thiele, R., (2011): *Climate Change and Floods In Yemen: Impacts on Food Security and Options for Adaptation* (IFPRI Discussion Paper 01139)

<http://cdm15738.contentdm.oclc.org/utils/getfile/collection/p15738coll2/id/126748/filename/126959.pdf>

⁹ Climate Investment Funds (2012): *Pilot Programme for Climate Resilience*.

- November 8, 2015 ,Cyclone Megh.
- May 18, 2018 cyclone Sagar.
- October 14, 2018,Cyclone Lubyan

An analysis of regional climate change impacts on agriculture in Yemen shows a mixed pattern, with production increases in the highlands (from Sa'adah to Taiz) due to higher temperatures. Significant yield reductions are expected in some lower and hotter areas such as around Raymah in the west, **Abyan-Aden** in the south, and in the eastern half of the country (see also Figure 3).¹⁰ Annual desertification of cultivated land is 3-5 percent,¹¹ which negatively affects food production and decreases overall availability of arable land. The countrywide food insecurity impact of floods is minor; however, there are substantial consequences at the local level where the consequences can be severe, especially in the areas that are directly affected by floods. Within agricultural subsectors, fruits are the hardest hit by floods, followed by sesame and tomatoes.¹²

Figure 3 Crops growth change.

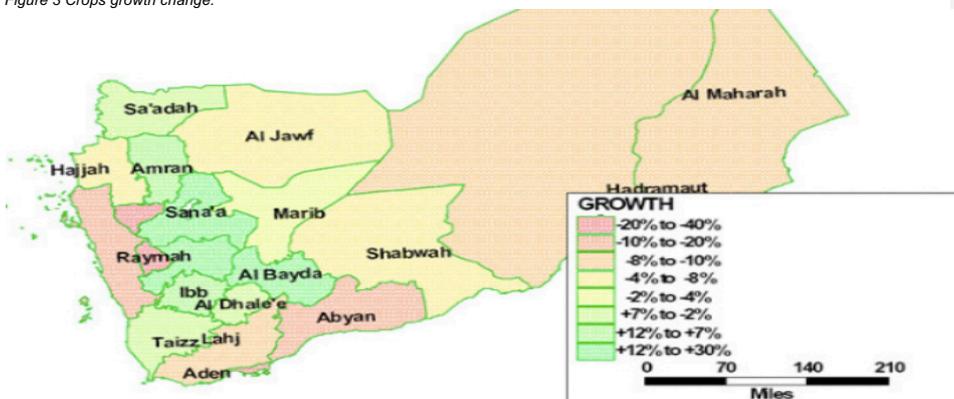
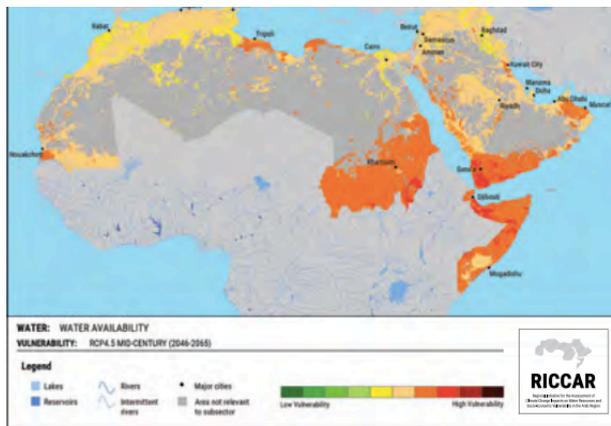


Figure 4 Water availability – Mid-century RCP 4.5 – Vulnerability

Yemen's **water availability** per capita is the lowest in the world¹³ as well as expected mid-century water availability vulnerability (see Figure 4). Groundwater extraction has exceeded the level of replenishment capacity, causing water depletion. Since Yemen over-extracts an estimated 0.9 billion cubic meter of water each year from its deep aquifers, groundwater aquifers are declining one to seven meters each year.¹⁴ It is anticipated that climate change combined with high population growth, inadequate agricultural development and policies, qat growth, and a lack of law enforcement to regulate water will put continuing pressure on



¹⁰ World Bank (2010): *Yemen: Assessing the Impacts of Climate Change and Variability on the Water and Agricultural Sectors and the Policy Implications*.

¹¹ Climate Investment Funds (2012): *Pilot Programme for Climate Resilience*.

¹² Wiebelt et al. (2011)

¹³ Glass, N. (2010): *The Water Crisis in Yemen: Causes, Consequences and Solutions*, *Global Majority E-Journal* 1(1)

¹⁴ USAID (2016)

Yemen's water resources and contribute to its water crisis.¹⁵

Greater rainfall variability could increase drought periods and diminish water supplies more rapidly while increased temperatures could lead to higher evapotranspiration rates, further slowing the replenishment of water sources.¹⁶ The overexploitation of groundwater resources and the rising sea level due to climate change will result in increased salt water intrusion, especially in coastal aquifers.

Projections suggest that aquifers such as **Abyan, Tuban**, and Sa'adah will be depleted by 2025. Depletion of the **Tuban aquifer** is the most rapid (2015, versus 2019 for Abyan) because of a greater reliance on groundwater relative to discharge in the Tuban sub-basin. Moreover, **Aden** is one of the top 20 cities in the world where the most people will be at the greatest risk from sea level rise and storm surges in the developing world.

Summary: The following provides a summary¹⁷ of major impacts of climate change in Yemen which represents priority areas of interventions for building resilience:

- Increased water scarcity and reduced water quality – leading to increased hardship on rural livelihoods;
- Increased drought frequency, increased temperatures, and changes in precipitation patterns – leading to degradation of agricultural lands, soils and terraces;
- Deterioration of habitats and biodiversity – leading to expansion of desertification;
- Reduced agricultural productivity – leading to increased food insecurity and reduced income generating activities;
- Increased sea levels – leading to deterioration of wetlands, coastal mangrove migration, erosion, infrastructure damage, and seawater groundwater intrusion;
- Increased climatic variability – leading to the possibility of spread and growth of vector borne and water borne diseases; and
- Impacts on coastal zones – leading to a loss of tourism activity due to sea level rise including loss of beaches.

Main barriers / lacking capacities as per an example vulnerability assessment for the Wadi Zabid watershed¹⁸:

- No priority is given to consider sustainability of groundwater resources by decision-makers at all levels;
- Absence of effective coordination and cooperation among relevant authorities and stakeholders for water resource management;
- Lack of effective implementation of water-related laws, regulations, policies, and water distribution rights;
- Absence of an effective planning framework (e.g., integrated water resources management) to help address and balance competing water demands;
- Inadequate awareness on responsibilities and roles among relevant bodies including Water Users Associations (WUAs);
- Lack of financial resources to enable authorities to improve the performance of agricultural extension services

Socio-economic vulnerability

Key facts:

- | | |
|---|--------------------------------|
| <input type="checkbox"/> GDP (PPP) per capita (2016): ¹⁹ | USD 2508.1 (decline) |
| <input type="checkbox"/> Population (November 2020): ²⁰ | 30,068,024 (2.28% growth rate) |
| <input type="checkbox"/> Population Aden (November 2020): ²¹ | 550,602 |
| <input type="checkbox"/> Projected population (2050): ²² | 48 304,000 |
| <input type="checkbox"/> Human Development Index (2020): ²³ | 177 out of 188 countries |
| <input type="checkbox"/> Gender Inequality Index (2020): ²⁴ | 0.834 |
| <input type="checkbox"/> Fragile States Index (2020): ²⁵ | 1 out of 178 countries |

¹⁵ Glass, N. (2010): *The Water Crisis in Yemen: Causes, Consequences and Solutions*, *Global Majority E-Journal* 1(1)

¹⁶ USAID (2016)

¹⁷ INDC (2015)

¹⁸ TNC (2018)

¹⁹ World Bank Data – GDP per capita, PPP. <http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD>

²⁰ World Population Review – Yemen, <http://worldpopulationreview.com/countries/yemen-population/>

²¹ Idem

²² UNDESA (2017): *World Population Prospects: The 2017 Revision, Key Findings and Advance Tables*. Working Paper No.

ESA/P/WP/248. https://esa.un.org/unpd/wpp/Publications/Files/WPP2017_KeyFindings.pdf

²³ <http://hdr.undp.org/>

²⁴ Idem

²⁵ <https://fragilestatesindex.org/data/>

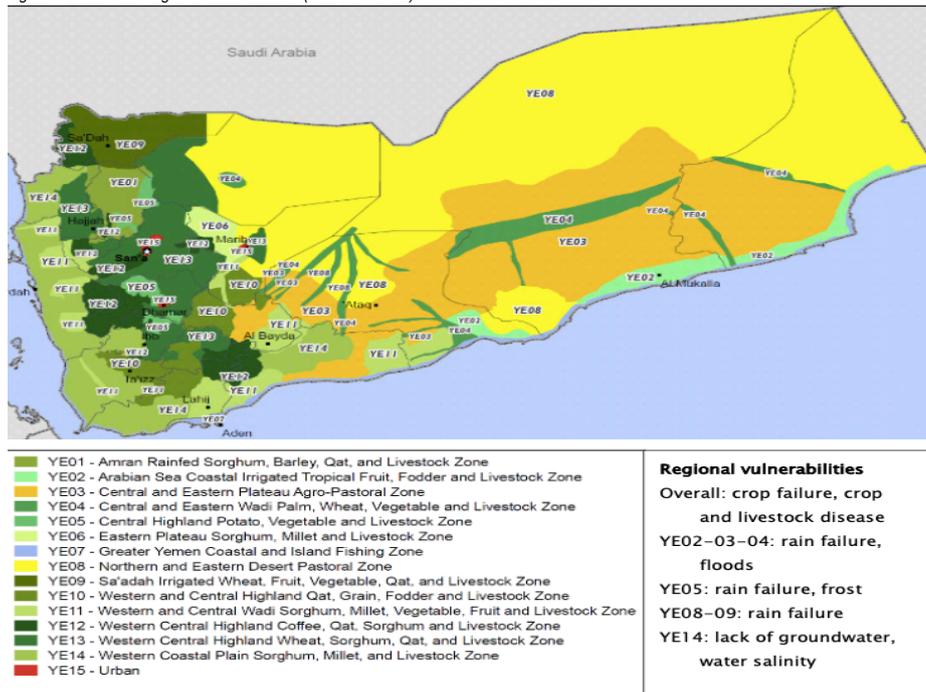
Annex 5 to OPG Amended in October 2017

<input type="checkbox"/> Groundwater depletion: ²⁶	1.5 billion m3 (170%) per year; 2-7 meters annually
<input type="checkbox"/> Per capita water availability	120 m ³ per year in 2016
<input type="checkbox"/> Wastewater treatment / access:	29% of the total population (2012)
<input type="checkbox"/> Share agriculture employment: ²⁷	33.1%
<input type="checkbox"/>	

Yemen currently ranks as the 1st most Fragile State in the world.²⁸ Prior to the current conflict Yemen was the poorest country in the Middle East. It was estimated that up to 43 percent of its people were living in chronic poverty with 32 percent of the population being food insecure.²⁹ Notwithstanding the current conflict, given the country's historically high levels of food import dependency, food insecurity, and poverty, both global and local climate change impacts are likely to significantly influence its prospects. Currently, according to the UN, Yemen is suffering the worst humanitarian crisis in the world. In 2020, the UN estimated 24.3 million people—80 percent of the population—were “at risk” of hunger and disease, of whom roughly 14.4 million were in acute need of assistance.³⁰

Climate change risks are projected to not only impede the national capacity to achieve sustainable development but also to reverse the economic development that occurred prior to the conflict. The impact of climate change on the most vulnerable groups (rural poor, women) include increased exposure to extreme weather events in combination with decreased financial resources available for reconstruction and preparedness due to lower (agricultural) incomes. Yemen's population growth is currently 2.28 percent, which increases the vulnerable position of the country by raising the demand for food, water, and other natural resources.

Figure 5 Livelihoods regional vulnerabilities (source: USAID)



²⁶ CSO, 2010

World Bank 2016

²⁷ National Agriculture sector strategy (2012)

²⁸ <https://fragilestatesindex.org/data/>

²⁹ Wiebelt et al. (2011)

³⁰ World Bank (2020) <http://www.worldbank.org/en/country/yemen>

Prior to the current conflict, over 90 percent of water consumption was used for irrigation. The government of Yemen is concerned that climate change will decrease the frequency and amount of rainfall, thereby destroying the country's agricultural production. This would not only result in a water crisis, but also in food and economic crises. The severity of the crisis is expressed in the projection that Sana'a is the only capital city in the world that may run out of fresh water within the next decade.³¹

Historically, Yemen was heavily dependent on imported food. Prior to the conflict, it imported 70-90 percent of its cereals and was a net importer of many other food items as well. Maize, millet, sorghum, and wheat are cultivated in Yemen, yet mainly for household or village level consumption (see [Figure 5](#) for production details per zone). There is concern that the ancient terraces designed to be flood-irrigated will become high risk with changes in climate as seed can germinate and then die due to lack of water.³² Wheat is considered the most vulnerable crop, followed by maize. Losses are mainly incurred in the Desert zone, where grain production is limited to wheat. Red Sea/Tihama is expected to benefit from climate change. This is because sorghum and millet experience high yield increase and at the same time account for a larger share of agricultural value-addition than in any other zone, whereas the grains with declining yields (maize and wheat) are hardly produced.

The on-going conflict overrides the climate concerns, however, climate change will exacerbate its consequences, and will impact disproportionately on vulnerable populations, such as women and youth. As water access declines, women and young girls, already travelling long distance for water, will experience further challenges to their health, safety, and ability to receive education. The absence of adequate natural resources management in combination with ongoing conflicts is likely to diminish Yemen's climate readiness in terms of governance and economic prosperity.

Project target area: Tuban Delta – Aden and Lahj governorates

The project target area is particularly vulnerable to:

- Aquifer depletion, affecting agricultural yields and water availability for human consumption, settlements and industry
- Aquifer pollution, and salty water intrusion in coastal areas.
- Loss of agricultural land diminished yield.
- Extreme weather events

This area has been selected because of:

- High vulnerability to climate change (and VA conducted for Aden coastal area in SNC)
- Challenges that need urgent response
- Government priority
- Relative stability and accessibility

Water scarcity. As mentioned earlier, projections suggest that the Al Tuban, aquifer will be depleted by 2025. Moreover, Aden is one of the top 20 cities in the world where the most people will be at the greatest risk from sea level rise and storm surges in the developing world. Aden also relies on the Tuban (and Abyan) aquifers as main water source.

[Info on the nature and status of aquifer is available in:](#)

- [KFW 2004 report on groundwater resources Abyan Al turban deltas](#)
- [NRWA 2009 Groundwater resources in Yemen](#)
- [KOMEX 2004 Water resources management in Al Turban'Abyan deltas](#)
- <https://www.researchgate.net/project/Water-Resources-Assessment-Yemen>

[The aquifer is an unconfined aquifer which is recharged from uplands with discharges in the Gulf of Aden. The main issue is a lowering water table, salinization near the coast and pollution. All reports indicate that current water demand and its predictable increase is unsustainable. The aquifer could be recharged through the following interventions:](#)

- [Treatment of affluents in some of the populated places over the most sensitive areas over aquifer would diminish pollution,](#)
- [Sourcing, partially, flood-surface water run-off in the rainy season and using natural means of reinjecting the water into aquifer \(flood channelling, injection wells, sub superficial barriers to facilitate water storage in the sandy areas\) and store will help into reducing the pressure into Aquifer](#)

³¹ Glass, N. (2010): *The Water Crisis in Yemen: Causes, Consequences and Solutions*, *Global Majority E-Journal* 1(1)

³² World Bank; UN; EU; Islamic Development Bank (IDB), 2012: Joint Social and Economic Assessment for the Republic of Yemen, <https://openknowledge.worldbank.org/bitstream/handle/10986/11920/693880ESW0P1300sment0pub08031012web.pdf?sequence=1>

The temperature increase in Yemen is alarming. Desertification and reduction of the water table poses severe risks to peoples' access to drinking water, agricultural production, and livelihoods. In the cities (see [Table 1](#)), temperature rise is further exacerbated by heat resources emitted from buildings (and air conditioning), asphalt roads, and limited vegetation, building up urban heat islands which in turn cause damage to asphalt roads and other infrastructure and impact human well-being.

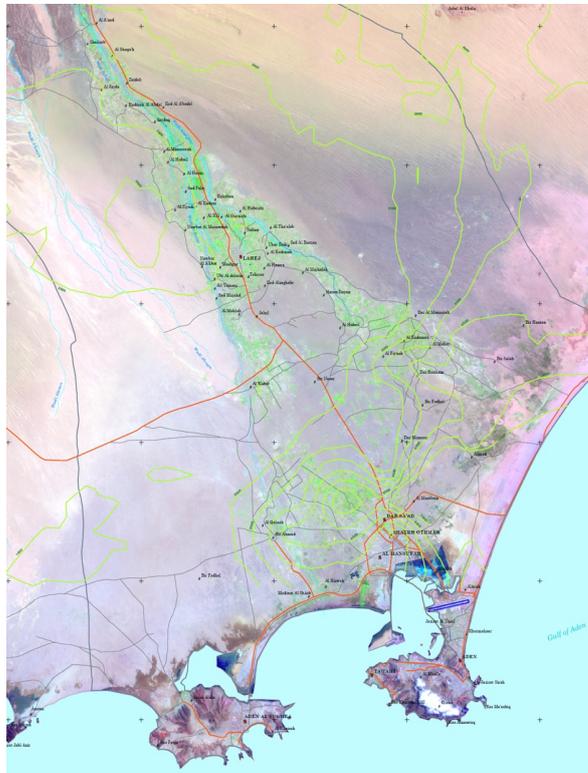
Extreme rainfall and city flooding

Rainfall in the coastal and desert cities is rare, with few rainy days in a year. 2016 data show as little as 22-mm rainfall in Aden. Rainfall usually happens during short and localised deluge, often accommodated by heavy thunderstorms. Precipitation generally decreases towards the east, as the region is considered a transitional zone between the wetter western highlands and the dry Rub Al-Khali desert. Several cities are repeatedly affected by heavy rainfall resulting from persistent deep land atmosphere depressions and cyclonic storms, which in turn occasionally causes urban flash flooding.

Heavy rainfall was experienced both in June 2019 and April 2020. Aden, Sana'a and Ma'rib were severely affected by flooding after the April 2020 rains, and an estimated 148,680 people were affected across 13 governorates,³³ leaving 15 dead and 89 injured by the end of April.³⁴ The floods caused severe disruption to services, and damages to housing and infrastructure, such as roads, bridges and the electricity grid, as well as contaminated water supplies. In Aden, IDP shelters for 1,812 families were damaged.³⁵ From January to April, around 110,000 cases of cholera had been recorded, with a further hike in this figure expected as a result of the flooding.³⁶

Aden's typology, with the characteristic slopes encapsulating the city, is conducive to debris slides being carried by flash floods. This has caused severe damages to people and physical assets, particularly on informal settlements constructed in the hillsides of the city. In the lowland areas in Aden, these floods create swamps and pools that stay unevaporated for several days. This is causing electricity outages, as well as contributing to health stresses such as cholera and malaria. The current city plans are not adjusted to prevent and adapt to such impacts.

Figure 6 Tuban-Abyan delta-Aden

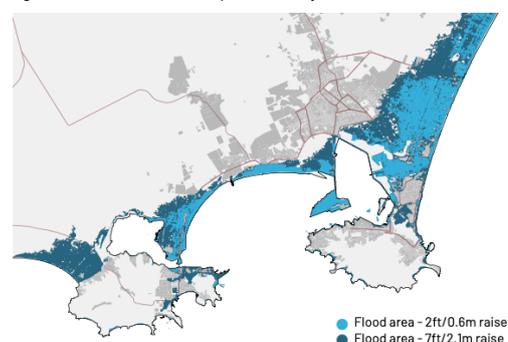


³³ OCHA, "Yemen : Flash Floods - Flash Update No. 3," OCHA, no. April, 2020.
³⁴ ACAPS, "Yemen - Heavy Rainfall and Flash Floods," ACAPS Yemen Analysis Hub, 2020.
³⁵ Ibid.
³⁶ OCHA, "Yemen : Flash Floods - Flash Update No. 3."

Table 1 Average temperature increase in Yemen cities

City	2016-2035		2046-2065		2081-2100	
	RCP45	RCP85	RCP45	RCP85	RCP45	RCP85
Al Hawtah	0.8	0.9	1.6	2.3	2.1	4.3
Sa'ada	0.8	1.0	1.6	2.3	2.0	4.2
Ibb	0.8	0.9	1.5	2.1	2.0	4.1
Aden	0.8	0.9	1.6	2.2	2.0	4.0
Al Hodeidah	0.8	0.9	1.5	2.1	2.0	4.0
Sana'a	0.7	0.9	1.5	2.1	1.9	3.9
Mareb	0.7	0.8	1.4	2.0	1.8	3.7
Ta'iz	0.8	0.8	1.4	2.0	1.8	3.7

Figure 7 Sea Level rise risk map for Aden city



Rising sea levels will have a severe impact on the coastal cities, as well as further infiltrate groundwater aquifers. Sea level rise projections modelled on Digital Elevation Maps (DEM) by the Climate Central,³⁸ show that even a one-meter sea level raise will submerge parts of Aden, Al Hodeidah, and Al Mukalla (see Figure 7). In Aden large parts of central economic and residential districts will be fully submerged, including the airport, cutting the linkage to the Aden peninsula hosting the port facilities. A number of cities, towns and villages along the main road stretching from Aden, through Zinjibar and Al Mukalla, and further into Oman, as well as urban settlements located along the Red Sea coast to the west up towards Al Hodeidah, are similarly located on low lying planes that will be severely affected by sea level rise.

Coastal ecosystems. Wetland degradation has been observed across the country, in part because of climate change and limited water resources, but also due to repurposing of land without policies and law enforcement to protect the areas, which has led to uncontrolled construction and the establishment of illegal dumping sites. In particular the wetlands in Aden have shrunk significantly over the past years. The loss of wetlands is a concern both to the biodiversity, as well as the wetlands ability to absorb pollution and floods, as well as recharge aquifers.³⁹

To address this, conservation efforts have focused on the establishment of protection areas. For example, the Aden Wetlands protection initiative was officially declared in 2006 by the "Prime Minister's decree" No. 304. In addition to protecting the habitat for migratory birds, the protection sites were important to maintaining several plant and aquatic animal species.

In Aden, sand beaches forming large and scattered areas along the coastline, are considered to be of great ecological importance for different marine organisms. For instance, some of the beaches are nesting sites for sea turtles. The Aziz Island west of Aden is considered the main important site for nesting Hawksbill turtles along the coastline of the Gulf of Aden.

Table 2 Population and communities in the Tuban Delta

Aden governorate 2019

Total	Females	Males	Districts
138,606	64,482	74,124	Dar Saad
176,071	80,860	95,211	Al Sheikh Othman
175,345	75,470	99,876	Al Mansurah
110,409	52,180	58,229	Al Buraiah
92,686	44,082	48,604	Al Tawahi
84,220	40,275	43,945	Al Ma'alla
130,584	62,812	67,772	Sirah (Crater)
79,079	36,840	42,239	Khor Maksar
987,000	457,000	530,000	Gov. Total

Lahj governorate 2019

-century, extracted from data www.riccar.org. Ensemble of 3 bias-RM-CM5, EC-EARTH, and GDFL-ESM2M). Data over the 20-year g/#9/13.5445/44.2831?show=satellite&projections=0-K14_RCP85-coastal Wetlands Degradation in Yemen," *Iioab Journal*, no. October,

Annex 5 to OPG Amended in October 2017

Total	Females	Males	Districts
74,732	36,324	38,408	AL Haad
105,264	51,706	53,557	Yafea
54,449	27,707	26,742	Al Mofelihi
52,954	25,778	27,176	Yahar
59,281	27,987	31,294	Habil Gabr
39,693	19,132	20,561	Halimain
61,469	29,206	32,263	Radfa
39,608	18,746	20,862	Al Melah
37,991	17,903	20,088	Al Musaimeer
133,294	69,136	64,157	Al Kabaitah
67,776	32,780	34,996	Toor Al Bahaa
75,590	42,391	33,198	Al Makaterah
64,770	31,441	33,329	Al Madharebah Al Aarah &
37,990	18,231	19,759	Al Hawtah
122,140	57,530	64,610	Tuban
1,027,000	506,000	521,000	.Total Gov

UN-habitat will conduct a climate change vulnerability assessment for the Tuban delta area (Aden and Lahj governorates), including hydrological studies to identify the most critical and effective adaptation measures to response to increasing water scarcity challenges and sea level rise impacts. This will be done through a GCF readiness project expected to start early 2021. Thus, outcomes are expected to be available during the AF full project proposal development phase. This will complement a climate change vulnerability assessment already conducted for the coastal area of Aden under the SNC. As per the Yemen INDC, possible adaptation measures and government priorities⁴⁰ to be considered for the Tuban Delta are included in below table.

Table 3 Possible adaptation measures that could be prioritized for the Tuban water basin / Delta

Possible adaptation measure	Applicability in Tuban Delta (Lahj and Aden governorates)
1. Promotion and scale-up of rainwater harvesting to reduce climate induced water shortage; 2. Water conservation	- Harvest / store water upstream and in urban areas, also to reduce flood risks - Reuse of treated waste water and grey water (e.g. from mosques) - Update and implement supporting plans and / or regulations (specify) - Capacity building for above (specify)
3. Promoting agriculture drought management as well as sustainable crop and livestock management;	- Water efficient irrigation (e.g. drip) and closed conduits - Alternative cropping schemes - Drought resistant and heat- and salinity- tolerant crops - Update and implement supporting plans and / or regulations (specify) - Capacity building for above (specify)
4. Plan and implement proper land resources management programs.	- Develop and implement integrated water resource and coastal management plan for Tuban Delta (Aden governorate) - Update and implement supporting plans and / or regulations (specify) - Capacity building for above (specify)
5. Livelihood approaches for integrating natural resources management and preservation of sensitive ecosystems;	- Above, implemented at community level
6. Disaster risk management including flood and drought management.	- Early warning systems - Update and implement supporting plans and / or regulations (specify) - Capacity building for above (specify)
7. Capacity Building for integrated coastal zones and marine resources management.	- Planting and re-planting of mangroves and palms for adaptation to sea level rise. - Develop and implement coastal zone and marine resources management plan - Update and implement supporting plans and / or regulations (specify) - Capacity building for above (specify)

During this concept note development phase, key actors and informants, including from the government, UN agencies, University, etc. have been consulted to identify the main climate change risks / impacts and vulnerabilities in the Tuban Delta, which adaptation measures would be appropriate and what should be prioritized. Please see the outcomes below. For more information on the consultations, see Part II. H

The outcomes of the consultations (as summarized in tables 4 and 5) show that heavy rains / floods and droughts are considered the main climate change hazards in the Tuban Delta area, followed by diseases.

⁴⁰ INDC (2015)

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These hazards have increased over the last ten years. The most important effects of these hazards on communities include reducing food and water security, increased poverty and reducing coping mechanisms. Heavy rains / floods result in destruction of farm lands / crops and contamination of wells, while droughts (and extreme heat) also result in reduced crop production and reduction in water availability. A crucial fact is that groundwater levels are going down and that some remaining sources are at risk of contamination / pollution. The adaptive capacity is very low with limited funds available to respond, in combination with limited knowledge, technology and response strategies, plans, regulations, etc. The risk of attracting diseases is high. There is a relation with floods and droughts here, with contaminated water sources, but also limited awareness and reducing coping mechanisms due to increasing poverty levels and reducing water and food availability.

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Table 4 Climate change-related hazards in target area prioritized

Climate Change hazards	Occurrences last 10 years	Ranking of climate change-related issues in target area (by representatives)									
		Environmental Protection Authority	Ministry of water & environment	Ministry of Planning and International Cooperation	Water resources authority	Local Water & Sanitation Corporation – Aden	Univ. of Aden, env center + technology	Water and Environment Centre- Sana'a University	Social Fund for Development	Estimada Fundation for nature conservation (NGO)	UNDP
Droughts (affecting agriculture, water availability, livestock, etc.)	6-9 / continuous	2	2	2	1	1	2	1	2	2	
Less rain (affecting agriculture, water availability, livestock, etc.)											
Flooding	10	1		1	1	2	3	2	1	1	1
Heavy rains, storms / hurricanes,	10		1								
Diseases (e.g. dengue, malaria, cholera, Covid-19)	10	3	3	3			4	3	3	3	2
Extreme heat (affecting agriculture, water availability, livestock, health, etc.)	Every summer						1				3
Salt water intrusion / siltation	continuous					3					
Coastal erosion	continuous										
Locust (desert)	Every summer										

Table 5 Main climate change hazards, effects on communities, barriers to adapt and possible adaptation measures

Most problematic climatic hazard	Location	Effect of hazard	Barriers to adapt	Possible Adaptation activity / intervention	Most important adaptation activity / intervention
Heavy rains and floods	Aden (Al-Mualla, Crater, Al-Tawahi, Khormaksar, Mansoura, and its suburbs to a lesser extent) Al Mahra, Hadhramaut, Abyan, Shabwa, Aden	<ul style="list-style-type: none"> Flooding of farmlands / destruction of crops / soil erosion Destruction of irrigation, sewerage and drinking water facilities Lack of income and food scarcity / malnutrition Increased poverty Losing about 100 million m³ annually Pollution of water wells. 	<ul style="list-style-type: none"> Institutional gaps (lacking strategies, regulations, capacities – technical, knowledge, funds) As a result of poverty, limited means to respond No early warning Dependence on aid kids / leaving farmlands 	<ul style="list-style-type: none"> Protection of affected lands / assets Rehabilitation wells and construct protecting walls for reducing pollution Rehabilitation of water and sewage networks. Capacity building of local communities to cope with the risks of climate change. Implement early warning systems and monitoring Collect flood water / recharge groundwater 	<ul style="list-style-type: none"> Disaster management framework Protection of affected land / assets Capacity building

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Droughts / less rain	All target areas	<ul style="list-style-type: none"> Scarcity of food and safe drinking water (reducing groundwater levels) Reduced crop production / Degradation agricultural lands Increased poverty Animal death 	<ul style="list-style-type: none"> Institutional gaps (lacking strategies, regulations, capacities – technical, knowledge, funds) As a result of poverty, limited means to respond Lack of groundwater No specific plans / programs to increase food security No expansion of water supply and sanitation plans Random / illegal drilling of wells 	<ul style="list-style-type: none"> Management of water basins Making lands suitable for agriculture. Cultivation of crops that are resistant to drought and epidemics. Extending drip irrigation networks Reuse of sewage and ablution water from mosques. Establish water user associations Drilling deep tube wells 	<ul style="list-style-type: none"> Management of water basins Making lands suitable for agriculture. Cultivation of crops that are resistant to drought and epidemics. Extending drip and drip irrigation networks. Rehabilitation of drinking water and sewerage networks
Diseases and epidemics	All target areas	<ul style="list-style-type: none"> Spread of infectious diseases (cholera, dengue fever, malaria, and COVID 19. Loss of lives esp. women, children and the elderly 	<ul style="list-style-type: none"> Lack of plans to deal with diseases and epidemics. Lack of programs at the local and national level. Lack of funds Lack of community awareness Deteriorating water quality / Pollution 	<ul style="list-style-type: none"> Awareness for the public to prevent diseases and epidemics. Rehabilitation of health centres and hospitals. Reducing contamination of water / swamps Continuous spraying to combat mosquito breeding and disease-carrying insects. 	<ul style="list-style-type: none"> Awareness for the public to prevent diseases and epidemics. Reducing contamination of water / swamps Rehabilitation of health centres and hospitals.
Salt water intrusion	Bir Ahmed and Al-Manaserah Wellfields.	<ul style="list-style-type: none"> Deteriorate Groundwater Quality of 	<ul style="list-style-type: none"> Lack of institutional and technical capacity, knowledge, lack of funds As a result of poverty, limited means to respond 	<ul style="list-style-type: none"> Expanding the wellfield area far from seashore and minimizing pumping rate from affected wells 	<ul style="list-style-type: none"> Expanding the wellfield area far from seashore and minimizing pumping rate from affected wells

1.2. PROJECT / PROGRAMME OBJECTIVES:

Overall objective

Increase the climate change resilience to water scarcity and sea level rise-related challenges in the Tuban Delta: Sustaining supply and reducing demand through supporting strategies, regulations and concrete adaptation interventions.

Sub-objectives

1. Strengthening the capacities of national and sub-national government institutions, communities and vulnerable groups to manage natural resources (i.e. water and land) and the coastal area in the Tuban Delta in an efficient, sustainable and resilient way, including supporting regulations and sharing of practices and tools

This is in line with the following AF outcomes:

- Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses
 - Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level
 - Outcome 7: Improved policies and regulations that promote and enforce resilience measures
 - Outcome 8: Support the development and diffusion of innovative adaptation practices, tools and
2. Increase the efficiency, sustainability and climate change resilience of water supply systems for agriculture and urban demand in the Tuban delta through concrete adaptation actions, using innovative and replicable techniques

This is in line with the AF outcomes:

- Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level
 - Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets
 - Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress
3. Reducing water demand from the agriculture sector and in that way strengthening agriculture livelihoods in the Tuban delta through water efficient irrigation and conservation techniques and the use of drought, heat and salt resilient crop varieties.

This is in line with the AF outcomes:

- Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level
- Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress
- Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas

1.3. PROJECT / PROGRAMME COMPONENTS AND FINANCING

Table 6 project / programme components and financing

Project/Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (US\$)	Potential EE
1. Managing natural / water resources and the coastal area in the Tuban Delta efficiently, sustainably and in a resilient way, including supporting regulations, capacity strengthening and sharing of best practices and tools	<p>Proposed most feasible impactful activities:</p> <p>1.1. Integrated natural resources / water <u>mapping, analysis of hydrogeological water use and replenishment, and develop an action plan</u> supporting the efficient, sustainable and CC resilient use of water in the Tuban-Delta,</p> <p>1.2. <u>Protection plan of the water well, including operations and maintenance plan</u></p> <p>1.3. Coastal management plan responding to CC risks, <u>including climate vulnerability, and implementing costal erosion preventions measures</u></p> <p>1.4. <u>Review and update local regulations supporting water resource management</u></p> <p>1.5. <u>Develop an early warning system at Tuban Delta and the costal side to reduce the impact of CC occurrences</u></p> <p>1.6. <u>Develop best practices and replication guidelines</u></p>	1. Enhanced capacities of national and sub-national government institutions, communities and vulnerable groups to manage natural resources (i.e. water and land) and respond to coastal CC risks in the Tuban- Delta efficiently, sustainably and in a resilient way	1,341,014 million	Aden university, environmental science research center; CSO; SFD
2. Establishment of efficient, sustainable and climate change resilient water supply systems in the Tuban Delta for agriculture and urban demands	<p>Selection of most feasible/ impactful <u>activities:</u></p> <p>2.1. Harvest / store water upstream <u>using traditional sub-superficial dams, gabion walls or trees in the delta</u> also to reduce <u>flash flood risks upstream.</u></p> <p>2.2. Reuse of treated <u>wastewater</u> and grey water <u>from sources that also pollute water sources)</u></p> <p>2.3. <u>Design and implement capacity building modules to enhance the capacity of local authorities and communities on the operations and maintenance of above water and waster water facilities</u></p>	2. Increased efficiency, sustainability and climate change resilience of water supply systems for agriculture and urban demand in the Tuban Delta	4 million	EPA; Aden university SFD Private sector contractors Mentor utilities
3. Establishment of <u>efficient, low-maintenance, sustainable</u> and climate change resilient water irrigation and conservation techniques and <u>promotion of use of alternate</u> drought, heat	<p>Selection of most feasible/ impactful <u>activities:</u></p> <p>3.1. <u>Introduce low maintenance water efficient irrigation systems and closed conduits</u></p> <p>3.2. <u>Promote Alternate cropping schemes</u></p> <p>3.3. Drought resistant and heat- and salinity- tolerant crops</p> <p>3.4. <u>Design and implement capacity building and training modules to ensure proper</u></p>	3. Reduced water demand from the agriculture sector and related strengthening of agriculture livelihoods in the Tuban Delta	3 million	Agriculture research center SFD Private sector contractors

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and salt resilient crop varieties.	operations and maintenance of above systems		
4. Total components		\$8,341,014	
5. Project/Programme Execution cost (9.5 %) ⁴¹		\$875,576	
6. Total Project/Programme Cost		\$9,216,590	
7. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable) (8.5%) ⁴²		\$783,410	
Amount of Financing Requested		10 million	

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1.4. PROJECTED CALENDAR

Table 7 project calendar

Milestones	Expected Dates
Start of Project/Programme Implementation	January 2022
Project/Programme Closing	June 2025
Terminal Evaluation	June 2025
Duration	3,5 years

⁴¹ Max according to AF guidelines

⁴² Idem

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. PROJECT / PROGRAMME COMPONENTS

To achieve the overall project objective to 'Increase the climate change resilience to water scarcity and sea level rise-related challenges in the Tuban Delta, the projects' 'core' is a set of concrete adaptation actions (component 2 and 3). Around 2/3rd of the components budget will be allocated to these concrete interventions and these will directly benefit the populations living in the target area. Component 1 will consist of capacity building support and strategy development to manage natural / water resources in the Tuban delta area as efficient, sustainably and climate change resilient as possible through vertical and horizontal cooperation, especially on water management, spatial planning and climate change. Component 1 is not only needed to verify the (to be selected) concrete no-regret adaptation interventions under component 2 and 3, but also to allow the government to identify other investment needs in the water sector and adjustments of the regulatory framework to manage water efficiently sustainably and in a climate change resilient way in the Tuban delta, but also in other geographical areas in Yemen.

The specific needs of women, youth and other vulnerable groups will be considered at all stages of the project. This is achieved through engaging representatives of these different groups in during the project preparation phase, but also during implementation of the project.

The adaptation actions identified so far (at the concept note stage) are based on inputs of key government stakeholders (to ensure alignment with (sub)national priorities / strategies) and inputs of some UN agencies and NGOs (to identify local needs).

During the full proposal development phase, a hydrology and climate change vulnerability assessment will be conducted in the target area in the Tuban delta. This will further identify localised climate change vulnerabilities (challenges and needs to adapt) through community-level and vulnerable groups consultations. Then a selection of adaptation actions will be made by looking at which possible adaptation actions are most effective / impactful looking at the larger water system and which of these are most feasible.

The following feasibility criteria for making a final selection will be used:

- Cost-effectiveness compared to alternative options, also understanding effectiveness of proposed actions)
- Benefits to target groups / vulnerable groups
- Maintenance and sustainability / exit strategy feasibility.

Another selection criterion is the manageability of potential environmental and social risks and impacts identified. The final selection will be made with government stakeholders and target communities / groups and potential environmental and social risks and impacts will be verified.

The formal municipal water services are delivered by Local Corporations under the Ministry of Water and Environment (MWE), while the National Water Resources Authority (NWRA) is responsible for overall water resource management, including water use and allocation. However, there is no effective coordination between the different authorities to ensure proper use of water, water conservation and operations and maintenance, which causes huge water losses. The project will bring about these authorities in the below forum to agree on proper coordination mechanism to protect the water losses and ensure appropriate and timely maintenance and sustainability of the project results on the ground.

The project will establish a Steering Committee to oversee the strategic direction of the project implementation and ensure it remains in line with the AF guidelines. The Steering Committee will be chaired by the Ministry of Water and Environment with the membership of UN-Habitat Yemen, representatives for the Local Water and Sanitation Corporation, local directorate of Public Works and community representatives. The Steering committee will meet every six month and will be responsible for providing advisory support and guidance on issues facing the implementation and reviewing the results and assess overall progress of the project. The project will also establish a technical committee with the above stakeholder and the project team, to ensure proper coordination and advice on technical issues related to the implementation of the project activities, the technical committee will meet on monthly basis and report to the Steering Committee for decision making on

strategic direction and implementation of the project. The committees will need to agree on operation and maintenance / sustainability arrangements for the proposed concrete interventions through a O & M plan, which will also be part of the strategies delivered under component 1.

Renewable energy/ solar panels are considered to cover 'extra' energy demand for new or upgraded water infra, if needed. This is to align with the AF principle 11 (climate change) to avoid emitting any extra GHGs due to project interventions. Thus, the project will be sure that, if any extra energy demand for new or upgraded water infra is required, this will be covered by renewable energy.

Component 1: Managing natural / water resources and the coastal area in the Tuban Delta efficiently, sustainably and in a resilient way, including supporting regulations, capacity strengthening and sharing of best practices and tools

In line with AF outcomes 2, 3, 7 and 8 and the priorities of the government of Yemen (see part II.D), this component will focus on strengthening the capacities of national and sub-national government institutions, communities and vulnerable groups to manage natural / water resources and the coastal area in the Tuban Delta in an efficient, sustainable and resilient way through the following outputs:

Selection of most feasible/ impactful activities during full proposal:

- 1.1. Integrated natural resources / water management strategy supporting the efficient, sustainable and CC resilient use of water in the Tuban- Delta
- 1.2. Coastal management plan responding to CC risks
- 1.3. Regulations supporting above
- 1.4. Early warning system
- 1.5. Best practices and replication guidelines

The information generated and included in the potential integrated natural / water resource management strategy will allow the government and target communities to understand what the existing water resources (supplies) are (including quantities), what the demands are and how these may be affected in the future by climate change, population trends, growth of sectors etc. The strategy will also identify a comprehensive set of actions to use the water resources efficiently, sustainably and climate change resilient in the whole Tuban delta. The same accounts of the coastal management strategy in terms of identifying a comprehensive set of response / adaptation options to climate change related risks. This component is required because the current information on water scarcity risks and coastal risks and responds / adaptation options is very limited, but also to verify the (to be selected) concrete no-regret adaptation interventions under component 2 and 3. Adjustment of the regulatory framework may be required to support the efficient management of natural / water resources. If needed, an early warning system could be implemented to warn for droughts.

Component 2: Establishment of efficient, sustainable and climate change resilient water supply systems in the Tuban Delta for agriculture and urban demands

In line with AF outcomes 3, 4 and 5 and the priorities of the government of Yemen (see part II.D), this component will focus on increasing the efficiency, sustainability and climate change resilience of water supply systems for agriculture and urban demand in the Tuban delta through concrete adaptation actions, using innovative and replicable techniques through the following outputs:

Selection of most feasible/ impactful activities during full proposal

- 2.1. Harvest / store water upstream and in urban areas, also to reduce flood risks
- 2.2. Reuse of treated waste water and grey water (e.g. from mosques)
- 2.3. Capacity building to implement, operate, maintain and sustain above. This could potentially be done with support of mentors from the region facing the same challenges

Component 3: Establishment of efficient, sustainable and climate change resilient water irrigation and conservation techniques and the use of drought, heat and salt resilient crop varieties.

In line with AF outcomes 3, 5 and 6 and the priorities of the government of Yemen (see part II.D), this component will focus on reducing water demand from the agriculture sector and in that way strengthening agriculture livelihoods in the Tuban delta through water efficient irrigation and conservation techniques and the use of drought, heat and salt resilient crop varieties through the following outputs:

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Selection of most feasible/ impactful activity(ies) during full proposal:

- 3.1. Water efficient irrigation (e.g. drip) systems and closed conduits
- 3.2. Alternative cropping schemes
- 3.3. Drought resistant and heat- and salinity- tolerant crops
- 3.4. Capacity building to implement, operate, maintain and sustain above

Both components 2 and 3 are required to respond to the climate change water and coastal challenges in the Tuban Delta through concrete interventions. UN-habitat will conduct a climate change vulnerability assessment for the Tuban delta area (Aden and Lahj governorates), including hydrological studies to identify the most critical and effective adaptation measures to response to increasing water scarcity challenges and sea level rise impacts through a GCF readiness project expected to start early 2021. Through this process, the interventions for this project will be selected.

Table 8 Overview of possible project activities, cost-comparison to alternative solutions and sustainability arrangements

Proposed outputs	Details of outputs / activities	Potential location	Cost-comparison to alternative interventions	Maintenance and sustainability / exit strategy activities proposed
2.1. Harvest / store water upstream using traditional sub-superficial dams, gabion walls or trees in the delta also to reduce flash flood risks upstream.	<ul style="list-style-type: none"> When possible, traditional structures (flash flood canals, terracing, cisterns) will be rehabilitated or enhanced to improve efficiency. Rehabilitate the structures damaged in the area (channels, dams and other flash flooding controls). Build some new ones, and add infiltration wells to recharge 	<p>Delta mostly settlements over the aquifer and upper delta.</p> <p>Aquifer recharge to avoid water losses</p>	<p>Multiple barriers and dikes downstream may be a more expensive option than upstream interventions</p> <p>Rehabilitate rather than build may be a more cost-effective intervention, using local materials, where possible</p>	<ul style="list-style-type: none"> Owners mechanisms, especially of local communities with capacity building. Maintenance and sustainability plans at ministries community level Approach and lessons learned captured for replication in whole Yemen, including building ministry and municipalities, local communities capacities to do so and guidelines Identify responsibilities, coordinate with municipalities, local communities and identify possible sources of funding for replication and upscaling
2.2. Reuse of treated wastewater and grey water (e.g. from mosques, schools and public facilities)	<ul style="list-style-type: none"> Small rural wwtps in the aquifer areas in the delta with basic sewage network to flush treated water into environment or for irrigation, decentralised from main networks, also avoiding any pollution of water sources 	<p>Aquifer areas with potential intervention in Aden.</p>	<p>Treating wastewater at crucial points upstream can avoid water pollution and will be more cost-effective than treatment downstream or to focus on using water efficiently that is already polluted</p>	
2.3. Design and implement capacity building modules to enhance the capacity of local authorities and communities on the operations and maintenance of above water and water water facilities	<ul style="list-style-type: none"> Capacitate of women, youth and vulnerable groups Prepare a capacitation plan Implement the plan 	<p>Delta agricultural areas</p>	<p>If capacities to operate, maintain and sustain interventions are not strengthened then above proposed interventions may be lost investments</p>	
3.1. Introduce low maintenance water efficient irrigation	<ul style="list-style-type: none"> Look for options and affordable alternative options 	<p>Delta agricultural land</p>	<p>Using water more efficiently is cost-effective compared to alternative</p>	

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<u>systems and closed conduits</u>	<ul style="list-style-type: none"> such as drip irrigation. Rehabilitate when possible 		<p>conventional water supply measures. E.g. drip systems are the most water efficient irrigation systems (reduce from 75% against overhead irrigation). Drought tolerant crops and trees are required to reduce unnecessary water consumption in a water scare area, especially with more frequent droughts and water table drop. Principle is to avoid water flowing open in the environment as the extreme heat and dry climate of the area causes extreme evaporation.</p>	
3.2. <u>Promote Alternate cropping schemes</u>	<ul style="list-style-type: none"> Accepted/commercially and culturally crops in Yemen and promote an alternate use to prevent nitrogen and fertility loss Introduce principle of Permaculture 	Delta agricultural land	<p>Monoculture systems decrease life in the soil and results in water loss and an increase in the need to use chemical fertilizers and pesticides. Permaculture results in 50% reduction in water use by using compost which increases water retention in soil, 100% reduction in chemical use and up to 200% increase in yield.</p>	
3.3. <u>Drought resistant and heat- and salinity- tolerant crops</u>	<ul style="list-style-type: none"> Specially for the lower parts where brackish water is already a problem 	Delta agricultural land and coastal areas	<p>The introduction of salt resilient crops is considered in the coastal areas as a cost effective solution compared to physical coastal protection infrastructure.</p>	
3.4. <u>Design and implement capacity building and training modules to ensure proper operations and maintenance of above systems</u>	<ul style="list-style-type: none"> Capacitate of farmers, women, youth and vulnerable groups into irrigation and permaculture Related 3.3, 3.2, 3.1 		<p>If capacities to operate, maintain and sustain interventions are not strengthened then above proposed interventions may be lost investments</p>	

B. PROJECT / PROGRAMME PROVIDES ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFITS

The proposed project aims to maximize benefits to the most vulnerable groups and women, youth, and to avoid as best as possible any negative environmental and social impacts. In the background and context section disaggregated population data is provided for the target area. The project will target all of the inhabitants of the Tuban Delta (Aden and Lahj governorates). As shown in table 2, the number of inhabitants of Aden governorate was 987,000 in 2019, of which 457,000 women and 530,000 youth. In Lahj governorate the number of inhabitants in 2019 was 1,027,000 of which 506,000 women and 521,000 youth. During the full proposal development phase, all direct and indirect beneficiaries of selected interventions will be identified and consultations with all relevant groups conducted to identify specific needs and possible concerns related to the

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proposed interventions. Annexes showing how the project and all proposed activities comply with the AF ESP and GP will be included in the full proposal. In general, possible negative impacts are avoided / mitigated through participatory assessment, planning and decision-making processes, also during project preparation, where different groups can express specific needs and possible concerns. Moreover, various stakeholders have already been consulted (see Part II.H) to identify potential project risks and how these could be avoided / mitigated. During the full proposal development phase, environmental and social risks and impact assessments will be conducted for all proposed activities in line with AF requirements and requirements by national law. These assessments will also identify any potential negative impact for people or ecosystems further downstream of considered water harvesting and storage of water actions.

The project will target women and youth, but also elderly and disabled and DPs. Women and youth will be involved where possible, through water user associations or any women and youth groups. Additional to the information provided in the gender approach in annex 1, further groups needs, and response options will be identified during the full proposal. One option for instance would be to ensure women are part of the board of water user associations or have access only to water sources, as in the Sanaa Basin Project.

Table 9: Economic, Social and Environmental benefits

Type of benefit	Baseline	With/after project
Economic	Climate change is already leading to economic and livelihood losses, especially caused by less rain, droughts and water evaporation, leading to water scarcity issues. Water dependent livelihoods, especially in the agriculture sector, are especially threatened. At the coast, sea level rise and storms are threatening Aden, related assets and agriculture through saltwater intrusion.	<ul style="list-style-type: none"> • The government, at different levels, will be able to better assess, plan and manage natural resources / water and coastal risks, which are also of economic importance and will reduce losses • The agriculture sector in target areas will be more climate change / drought resilient, leading to improved livelihood security, benefitting especially farmers and communities depending on it for food security with more secure / higher income. • Sustainable solutions implemented will avoid future costs. • <u>Water efficiency will also support economic activities and efficiency</u>
Social	Climate change is already leading to social issues, especially caused by tension of scare water resources. At the coast, sea level rise and storms are threatening Aden, related assets and agriculture through saltwater intrusion.	<ul style="list-style-type: none"> <input type="checkbox"/> The government, at different levels, will be able to better assess, plan and manage natural resources / water and coastal risks, also with the purpose to enhance social cohesion (i.e. avoid / reduce tension) over scare water resources. <input type="checkbox"/> Participative assessment, planning and decision-making processes over scare water resources, also involving women and youth, will enhance social cohesion (over scare water resources and reduce the burden on women to collect water. <input type="checkbox"/> Climate change resilient livelihood skills building activities, including to operate and sustain these + resilient water supply systems, will benefit the most vulnerable and women and youth <input type="checkbox"/> Improved or new climate resilient and sustainable water systems will contribute to social well-being. <input type="checkbox"/> <u>Vulnerable groups and women and youth will participate in assessment and planning processes and will benefit as direct beneficiaries and decision-makers</u> <input type="checkbox"/> <u>Increased income / livelihood security and reduced health issues</u>
Environmental	In addition to overexploitation of natural resources / water, climate change is already leading to negative environmental impacts, especially land / soil degradation and desertification and coastal erosion.	<ul style="list-style-type: none"> <input type="checkbox"/> The government, at different levels, will be able to better assess, plan and manage natural resources / water and coastal risks, also considering environmental sustainability and climate change risks. <input type="checkbox"/> Water resources such as wells, and water dependent livelihoods (i.e. agriculture) may be protected from overuse / droughts through above. This will mostly benefit the most vulnerable/poor groups dependent on these resources and women and youth. <input type="checkbox"/> <u>Environmental issues will be identified in the whole target area and response options for local communities</u>

*During the full proposal development phase, all benefits per output will be defined

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C. COST-EFFECTIVENESS OF THE PROPOSED PROJECT / PROGRAMME

Detailed costs per action / project activity will be provided during the full proposal phase, including cost effectiveness (cost per person). This can only be done once the project interventions are fully identified. The cost-effectiveness rational of possible project interventions is discussed in table 10.

Table 10. Proposed adaptation actions' cost-effectiveness rationale

Proposed adaptation actions	Alternative actions and rationale why priority actions have been selected from a cost-effectiveness perspective
<p>Selection of most feasible/ impactful activity(ies) during full proposal:</p> <p>1.1. Integrated natural resources / water management strategy supporting the efficient, sustainable and CC resilient use of water in the Tuban- Delta</p> <p>1.2. Coastal management plan responding to CC risks</p> <p>1.3. Regulations supporting above</p> <p>1.4. Early warning system</p> <p>1.5. Best practices and replication guidelines</p>	<p>A regional approach to integrated natural / water resource management is required to plan and manage water resources efficiently by looking at the whole system and future trends and projections (including for implementation of actions such as below)</p> <p>Alternatively, water is managed at the national level or per municipality, neighbourhood or well (ie not by basin/ delta or coastal area, which could result in unsustainable / inefficient practices because the 'whole' system is not taken into account.</p>
<p>Selection of most feasible/ impactful activity(ies) during full proposal</p> <p>2.1. Harvest / store water upstream and in urban areas, also to reduce flood risks</p> <p>2.2. Reuse of treated waste water and grey water (e.g. from mosques)</p> <p>2.3. Capacity building to implement, operate, maintain and sustain above</p>	<p>Rain or stream water harvesting may be required to collect clean water becoming available (and to use it for urban or irrigation purposes).</p> <p><u>There is ancestral use of rainwater in Yemen. However, this is more appropriate for uplands where rain is more frequent and rocky soils more favourable. In the lowlands water can be stored in the sand in some areas.</u></p> <p>Using water more efficiently is cost-effective compared to alternative conventional water supply measures (see above)</p> <p>(Mobile) wastewater treatment plants + irrigation connections may be required to enable beneficial use of wastewater. Irrigation connections may be required to make optimal use of treated water in a water scarce environment.</p> <p><u>The recommendation is to consider low tech decentralised water treatment (based on oxidation ponds and active sludge) as this is more cost effective than centralised treatment. The effluent level is not suitable as drinking water but can be used for irrigation or to recharge into aquifer.</u></p> <p><u>Greywaters is being directly discharged into aquifer (in the aquifer areas). Black water is being treated at a level safe to be reused for agriculture or aquifer recharge.</u></p> <p>Although wastewater treatment plans are more expensive than conventional water supply measures, treating waste water is the only way to use this water in a water scarce environment. Therefore, it is a more cost-effective solution on the long run.</p>
<p>Selection of most feasible/ impactful activity(ies) during full proposal:</p> <p>3.1. Water efficient irrigation (e.g. drip) systems and closed conduits</p> <p>3.2. Alternative cropping schemes</p> <p>3.3. Drought resistant and heat- and salinity- tolerant crops</p> <p>3.4. Capacity building to implement, operate, maintain and sustain above</p>	<p><u>Agriculture is the single most extensive use of water in Yemen (90% overall, in Aden 60%). The water for human consumption is extracted in Well fields, meanwhile the agricultural is partly from flooding in the rainy season and partly in private owned wells. The principle is using the water where it's not exposed to the environment because evaporation is very high, so piping and adjusting water demand when possible will reduce pressure over aquifer.</u></p> <p>Drip systems <u>could be used as these are</u> the most water efficient irrigation systems (reduce from 75% against overhead irrigation) or e.g. Growboxxes / Waterboxxes may be required to increase water use efficiency in the most water consuming agriculture sector. <u>Alternatively, existing farming practices are continued and more water supply will be required, however supply already over-exploited.</u></p>

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	<p>Drought tolerant crops may be required to reduce unnecessary water consumption in a water scare area, especially with more frequent droughts. Improved agricultural technology and techniques will further reduce water usage.</p> <p><u>Salt resilient crops may be introduced in the coastal areas. This will be more cost-effective than protecting coastal agriculture areas against salination through physical protection infrastructure.</u></p>
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Deleted: Alternatively, existing farming practices are continued and more water supply will be required, however supply already over-exploited.

Altogether, the project will be cost-effective by:

- Avoiding future costs associated with damage and loss due to climate change impacts (especially droughts) and to ensure the interventions are sustainable;
- Efficient project operations because of 'in-house' technical support options and capacity building expertise and because of direct partnering with communities (thereby building their capacity as well as reducing costs);
- Community involvement with development/construction of concrete interventions and because of community capacity building
- Selected technical options based on cost-feasibility and resilience/sustainability criteria (assessment to be done during full proposal)

D. CONSISTENCY WITH NATIONAL OR SUB-NATIONAL STRATEGIES

The proposed project is designed to be consistent with international, national and sub-national development strategies, plans and goals. From an international perspective, the project will at least (depending on the final section of interventions) directly supports targets under SDG 13 (climate change adaptation & DRR) and indirectly SDG 6 (increasing safe and clean water) and SDG 15 (reducing land degradation and improve sustainability of natural resource management). Non-climate change and environmental-related, the project will also support target indirectly under: SDG 1 (reducing poverty), SDG 2 (increasing food security) SDG 3 (improving good health and well-being), SDG 5 (improving gender equality), SDG 9 (improving innovation and infrastructure), SDG 10 (reducing inequalities), SDG 11 (increasing the sustainability of communities) and SDG 16 (enhancing social cohesion).

As per below, the project directly supports UN-Habitat's Global priority / Domain of Change (DoC) number 3: Strengthened Climate Action and Improved Urban Environment (especially outcome 3.2 (urban ecosystems) and 3.3 (climate change adaptation), and there are synergies with DoC1: *Reduced Spatial Inequality and Poverty in Communities Across the Urban-Rural Continuum* and DoC4: *Effective Urban Crisis Prevention and Response*. The proposal is also aligned with the New Urban Agenda.

DoC1: Reduced spatial inequality and poverty in communities across the urban – rural continuum

DoC2: Enhanced shared prosperity of cities and regions

DoC3: Strengthened climate action and improved urban environment

DoC4: Effective urban crisis prevention and response

Yemen has been party to the UN Framework Convention on Climate Change (UNFCCC) since 1996, and to the Kyoto Protocol since 2008 as non-Annex I Party. The Environmental Protection Authority is the national focal point for the implementation of the UNFCCC Convention and Kyoto protocol. To meet its commitments under the Convention, Yemen has initiated a process to establishing legislation, institutional and policy frameworks in order to fulfill the requirements of the Convention and the Protocol with support from international development partners including UNDP, GEF, World Bank, and Netherland.⁴³

Yemen has established the Inter-Ministerial Committee for Synthesis Paper 5 Governance of Climate Change in Yemen Climate Change (IMCCC) in 2009 to strengthen institutional coordination capacity and enhance climate change political leadership in the country.

The currently most relevant Climate change strategies are the NAPA (2008), which identified concrete adaptation needs/project and the recent INDC (2015) and TNC (2018). For the INC (2001) and SNC (2013)

⁴³ <http://www.undp.org/content/dam/yemen/E&E/Docs/UNDP-YEM-Governance%20of%20Climate%20Change%20in%20Yemen.pdf>

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pilot climate change vulnerability assessments were conducted. These publications found that agriculture, water and coast are among the top vulnerable sectors.

Table 11: project alignment with National and sub-national priorities

Policy / Document	Year submitted / ratified	Mapped relevant priorities
Climate Change strategies / plans		
National Adaptation Programme of Action (NAPA)	2008	<ul style="list-style-type: none"> - Focus sectors: water, agriculture and coastal vulnerability to sea-level-rise - Priority projects: <ul style="list-style-type: none"> Project # 1: Develop and Implement Integrated Coastal Zone Management (ICZM). Project # 2: Water conservation through reuse of treated waste water and grey Project #5: Planting and re-planting of mangroves and palms for adaptation to sea level rise. Project # 7: Rainwater harvesting through various techniques including traditional methods. Project # 9: Promotion of research on drought, heat and salinity tolerant varieties
Initial National Communication (INC)	2001	<ul style="list-style-type: none"> - Focus sectors: water, agriculture and coastal vulnerability to sea-level-rise - A pilot vulnerability and adaptation (V&A) assessment has been conducted for the Aden coastal area
Second National Communication (SNC)	2013	
Intended National Designated Contribution (INDC)	2015	<ul style="list-style-type: none"> - Focus sectors: water, agriculture and coastal vulnerability to sea-level-rise - Adaptation Priorities: <ul style="list-style-type: none"> o Promotion and scale-up of rainwater harvesting to reduce climate induced water shortage; o Promoting agriculture drought management as well as sustainable crop and livestock management; o Plan and implement proper land resources management programs. o Livelihood approaches for integrating natural resources management and preservation of sensitive ecosystems; o Disaster risk management including flood and drought management. o Capacity Building for integrated coastal zones and marine resources management. o Capacity building and awareness raising; and o Institutional capacity for building resilience climate change including planning, programing, monitoring and resources mobilization.
Third National Communication (TNC)	2018	<ul style="list-style-type: none"> - Focus sectors: water, agriculture and coastal vulnerability to sea-level-rise - Adaptation Priorities <ul style="list-style-type: none"> o Improved water irrigation efficiency: This involved the transition to the use of high- efficiency drip irrigation; o Reduced evapotranspiration: This involved the installation of enclosed conduits in place of open channels; o Reduced water losses: This involved the rehabilitation of traditional irrigation channels to reduce water infiltration to the underlying soil; and o Alternative cropping schemes: This involved changes to the type of crop cultivated through upstream and downstream areas.
National Adaptation Plan (NAP)	Forthcoming	Coordinate with UNEP
National Development strategies / plans		
The 4th Socio-Economic Development Plan for Poverty Reduction	2002	<ul style="list-style-type: none"> - Create income-generating opportunities and expand economic opportunities for the poor. - Enhance the capabilities of the poor and increase the return on their assets. - Reduce the suffering and vulnerability of the poor. - Develop potential economic sectors - Enhance human and capital assets of the poor. - Expand economic opportunities for the poor in the agriculture sector and in rural areas. - Improve and upgrade infrastructure - Rationalize water use - Combat desertification and environment degradation - Support measures that address issues limiting women's access to economic opportunities

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		<ul style="list-style-type: none"> - Review and amend legislation to ensure consistency with the poverty reduction strategy and policies, with special emphasis that legislation can and will be implemented - Citizens participation and involvement of civil society institutions.
Environmental strategies / plans		
National Environmental Action Plan (NEAP)	2005	<ul style="list-style-type: none"> - Development and Implementation of an Integrated Coastal Zone Management - Essential Measures for the Conservation of Agro-biodiversity in Yemen - Reviving Traditional and Indigenous Knowledge in Natural Resource
National Strategy for Environmental Sustainability (NSES)	2005	<p>Focus sectors:</p> <ul style="list-style-type: none"> a) water, b) land resources, c) biological diversity and coastal and marine environment, d) waste management. <p>NSES aims to link the effect of environmental degradation with poverty</p>
Sectoral strategies / plans, especially related to water		
National water sector Strategy and investment programme	2004	Proposes a set of institutional, financial and other measures, which are aimed at addressing discrepancies in five identified sub-sectors (water resources, urban water supply and sanitation, rural water supply and sanitation, irrigation and watershed management and environmental aspects of water) in order to protect the interests of all stakeholders in the resources
National Agriculture Sector Strategy (NASS) 2012-2016	2012	Seeks to provide a comprehensive guide to the development of the agriculture sector, including to address food security issues, climate change, water resources challenges, and the role of government in developing the agriculture sector.
National Biodiversity Strategy and Action Plan (NBSAP)	2005 (Draft)	<ul style="list-style-type: none"> - Conservation of natural resources - Sustainable use of natural resources - Integrating biodiversity in sectoral development plans
Yemen's Sixth National Report To Convention On Biological Diversity (CBD)	2019	<ul style="list-style-type: none"> - Aim to integrate / mainstream biodiversity values into national and local development and poverty reduction strategies and planning processes.
Sub-national / target area plans		
Yemen Aden Master Plan	2005-2025	<ul style="list-style-type: none"> - At present some 54,550 m3/day is available for consumers, which is insufficient to meet the current water demands. The need to identify additional resources as well as reduce unaccounted for water loss, which is very high, is therefore an imperative. - More effective use of the treated sewage effluent will be a priority in the future in order to maximize the utilisation of scarce water resources. - Low levels of rainfall mean that there is no specific provision for dealing with storm water run-off except in a limited number of locations, notably in Crater and at Wadi Kabir and Wadi Saghir.

E. Project / programme compliance with relevant national technical standards

Table 12. project compliance with relevant technical standards

Expected concrete output / intervention	Relevant rules, regulations, standards and procedures (to comply to AF principle 1)	Process / steps to comply	Authorizing offices
<ul style="list-style-type: none"> - Harvest / store water upstream and in urban areas, also to reduce flood risks 	<ul style="list-style-type: none"> - Environment protection law no. (26) of 1995 - Law No. 33 of 2002 regarding water - Law No. (41) of 2006 AD - Amending some materials - Law No. 33 of 2002 regarding water - Water allocation and water rights from the time of the Sultan – we can get it from NWRA or AlKood Centre 	<p>Coordinate with related Authorizing Offices</p> <p>During full proposal: Screening as per below section on EIA procedure</p>	<ul style="list-style-type: none"> - Environmental Protection Authority - Ministry of Agriculture & Irrigation - General Administration of Irrigation - Water Resources Authority - General Authority for Agricultural Research and Extension - Agricultural Research Centre - AlKood - Abyan

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- Reuse of treated waste water and grey water (e.g. from mosques)	- Environment protection law no. (26) of 1995 - Law No. 33 of 2002 regarding water - Law No. (41) of 2006 AD Amending some materials - Law No. 33 of 2002 regarding water	Coordinate with related Authorizing Offices During full proposal: Screening as per below section on EIA procedure	- Environmental Protection Authority - Local Corporation Water and Sanitation - National Water & Resources Authority – NWRA - Al- Aukaf - to have their permission for mosques
- Water efficient irrigation (e.g. drip) and closed conduits - Alternative cropping schemes - Drought resistant and heat- and salinity- tolerant crops	- Law No. 33 of 2002 regarding water - Law No. (41) of 2006 AD Amending some materials - Law No. 33 of 2002 regarding water - Law No. (26) of 1995 - On the protection of the environment	Coordinate with related Authorizing Offices During full proposal: Screening as per below section on EIA procedure	- Environmental Protection Authority - Ministry of Agriculture & Irrigation - General Administration of Irrigation - General Authority for Agricultural Research and Extension - Agricultural Research Centre - AlKood – Abyan (They have Delta Abyan Project) - General Ruler water Authority
- Develop and implement integrated water resource and coastal management plan for Tuban Ade	- Environment protection law no. (26) of 1995 - Law No. (26) of 1995 - On the protection of the environment	Coordinate with related Authorizing Offices	- Environmental Protection Authority - National Water & Resources Authority – NWRA - Agricultural Research Centre - AlKood - Abyan - Abyan Governorate
- Planting and re-planting of mangroves and palms for adaptation to sea level rise.	- Environment protection law no. (26) of 1995 - Law No. (26) of 1995 - On the protection of the environment	Coordinate with related Authorizing Offices During full proposal: Screening as per below section on EIA procedure	- Environmental Protection Authority - Ministry of Agriculture - Ministry of Fisheries - Local Hygiene and Improvement Fund
- Develop and implement coastal zone and marine resources management plan	- Environment protection law no. (26) of 1995 - Law No. (26) of 1995 - On the protection of the environment	Coordinate with related Authorizing Offices	- Environmental Protection Authority - Maritime Affairs Authority - Environmental Protection Authority

In Yemen, the following mechanism is in place to obtain environmental approval for projects:

The EIA procedure in Yemen starts with screening. Scoping is recommended, but not mandatory. Thereafter, the assessment, review, consent decision-making process and compliance monitoring are the main steps of the EIA procedure. Major documents resulting from the EIA process are the following: Scoping report incl. Terms of Reference (voluntary), EIS incl. Monitoring plan.

Screening process

EPA makes the screening decision, in consultation with the competent authority of the project. The decision on the screening lists themselves (i.e. standards, criteria, specifications) are formulated and approved by the Cabinet.

Screening is based on contents of EIA by-law which clearly states:

- which areas are considered of high value, requiring a (preliminary) EIA for any activity in that area;
- which activities are considered potentially harmful to the environment and therefore requiring an EIA;
- below what capacity or size the requirement for an EIA for any particular activity can be dispensed with. EIA should also be obligatory for existing facilities with plans for major expansions (e.g. 25% of capacity), if a new facility of this kind would be eligible for EIA.

Sensitive areas

There is specific requirement formulated for protected areas. The EPL provides for the formulation of a list of special environmentally sensitive areas and locations by the cabinet. Projects with likely effects to such areas as historical and archaeological places, wetlands, coral islands, natural protected areas, and public parks require full EIA. (Confirm with EPA.)

Timeline Screening

Within 24 working days after receipt of necessary information. In case of the need for additional information, the screening procedure starts when this additional information is received.

Scoping process

Scoping is advised, but not mandatory.

EPA in collaboration with specialists and responsible authority prepare a scoping report (incl. Terms of Reference), which is submitted to the competent authority. Communication between project proponent and EPA does not occur directly but goes through the competent authority, unless EPA requires specified information about the project.

Contents of the scoping document

Not specified.

Timeline scoping

Between six weeks and three months.

Assessment process

Assessment is on the basis of the scoping report (including the Terms of Reference). The EPA distributes free copies of the EIS to stakeholders. The report is available to the public for printing at their own costs. Governments have to respond with comments to the EPA, otherwise it is assumed that they agree. The EIS can be returned to the project proponent with additional advices and comments. Consequently, the final EIS is drawn.

Contents of the EIA report

- Description of the proposed activity, including a map of the location; the use of the neighbouring lands; the project's requirements of water, energy, drainage, and roads; description of manufacturing operations of the project raw materials handling incidents and risk and safety methods and measures of waste.
- Description of the environment that potentially might be affected.
- Description of alternatives to proposed project (e.g. using materials of least pollution).
- Evaluation and assessment of the probable environmental impact and effects of the proposed activity and the alternatives, including those direct and indirect effects, and short and long term accumulations contains (solid and liquid waste, gas emission, land uses, noise levels, socioeconomic factors).
- The extent to which areas outside the national sovereignty may be affected by the proposed activity.
- Monitoring plan

Accreditation of consultants

The EPA is responsible for maintaining a data base of consultants and consulting firms that may be contracted for EIA studies. Information and activities of these consultants have to be part of the data base. EPA advises project proponents on the consultants for their projects (EIA policy).

Review process

EPA receives the EIS from the proponent (or consultant). It then reviews the report and consults relevant stakeholders including the public. If satisfied, either approves the EIS or sends it back to the project proponent with comments. If not accepted, the EIS has to be improved and submitted again for review.

Review expertise

The EIA is sent back to the initial contributors of comments to review. This also include the public, in which case EPA is responsible for ensuring the public are invited for comments. There is also the possibility for external review by experts from other concerned ministries.

Timeline Review

Between six months and one year (EIA policy).

Integration of ESIA into decision-making

The competent agencies that give permits are co-operating agencies in EIA and, in this way; EIA is integrated into other existing consent procedures. The licensing Agency gives the final permission for the proposal.

The EPA in conjunction with other relevant government ministry or authority decides if, or under what conditions, the proposed activity is environmentally acceptable. Accordingly the MoWE issue clearance letter which may include conditions and mitigating measures (changes in design or location), to monitoring requirements or to requirements for operation and maintenance.

Decision justification

Decisions are justified in writing. The competent authority has to prepare a document in which the justification of the decision is elaborated upon.

- The decision of approval or rejection of the project is based upon the EIS. The competent authority may decide upon the proposed project or can select one of the alternatives. The competent authority does not necessarily follow the outcomes of the EIS review, but may take a different decision. This does however not mean that the EIA outcome can be omitted.
- The competent authority has to provide the EPA with a copy of the decision report. There is no mentioning of publication of the decision towards civil society and other actors that are not directly involved.

Besides national technical standards, the UN-Habitat 'Climate Proofing Toolkit for Basic Urban Infrastructure, with a Focus on Water and Sanitation (2021), is used to support the mainstreaming of climate change into proposed water-related interventions.

During the full proposal development phase, environmental and social risks and impact assessments will be conducted for all proposed activities in compliance with the AF ESP and GP and in compliance with Yemen law requirements and procedures to be followed as per above. For this, specialised / accredited consultants will be hired. Also, community level assessment and consultations, including with vulnerable groups and women and youth will take place with the purpose to identify possible environmental and social risks and impacts and opportunities, specifically for vulnerable groups and women and youth.

Guidelines that exist and are considered for the potential adaptation activities include:

- [UN-Habitat planning for climate change tools](#)
- [IUNC Adapting to Climate Change](#)
- [Guidance for protected area managers and planners](#)

Best practices will be identified through consultations, also about the projects mentioned in part II.F

F. DUPLICATION WITH OTHER FUNDING SOURCES

Table 13. Duplication with other funding sources

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Relevant projects and focus	Relevant focus and interventions / activities	Lessons learned	Complimentary potential and non-duplication (see also consultation section)
MENA region			
UN-Habitat – with AF funding – Climate change resilient communities through integrated natural resource management in Eastern Ghouta in Rural Damascus, Syria (concept to be submitted) – USD 10 million	<ul style="list-style-type: none"> - Integrated water and land resource management - The protection of water resources (and prevent contamination of surface and groundwater resources / wells) - The reduction of water losses; - The increase of water use efficiency, supporting water harvesting projects and using high efficiency irrigation methods; - The promotion of use of non-conventional water resources (e.g. treated wastewater) and: - Improved agricultural production practices (e.g. drought tolerant crops). 	<ul style="list-style-type: none"> - Project proposal approved and at waitlist 	<p><u>Complementary</u></p> <ul style="list-style-type: none"> - Align approach and lessons learned throughout project preparation and implementation (by ROAS) <p><u>Non-Duplication</u></p> <ul style="list-style-type: none"> - In Syria
Jordan government with AF funding - Increasing the resilience of poor and vulnerable communities to climate change impacts in Jordan through Implementing Innovative projects in water and agriculture in support of adaptation to climate change ⁴⁴ (2015-2018) – USD 9.2 million	<ul style="list-style-type: none"> - Wastewater treatment plant + monitoring quality - Irrigation study - Rain/flood water harvesting dam / basin (400.000 m3) with solar panels to reduce evaporation - Permaculture – adaptation + ecosystem management in demonstration sites 	<ul style="list-style-type: none"> - According to manager Permaculture has promising results for adaptation, reducing pollution and protecting ecosystem - Water user associations / cooperation can be used to reach farmers and administer water 	<p><u>Complementary</u></p> <ul style="list-style-type: none"> - Use permaculture concept in real farms and in urban context - Use similar approach for water harvesting basins at farms and in urban areas - Water user associations / cooperation can be used UN-Habitat is already in touch with manager and specialists (see also II.1) <p><u>Non-Duplication</u></p> <ul style="list-style-type: none"> - In Jordan Valley
Yemen			
Integrated Water Harvesting Technologies to Adapt to Climate Change Induced Water Shortage LDCF (USD 5 million); 2013	<ul style="list-style-type: none"> - Introduction and rehabilitate traditional water harvesting methods; - Introduction innovative water harvesting methods - Train local communities in maintenance and construction of these techniques - Promote awareness of the socioeconomic benefits of water harvesting. - Strengthen WUAs, increase the capacity of the SFD Engineering Unit and promote financial incentives to local communities for water harvesting 	<ul style="list-style-type: none"> - Check lessons learned related to activities and consider copying / complementing successful approaches and activities (during full proposal) 	<p><u>Complementary</u></p> <ul style="list-style-type: none"> - Rain harvesting <p><u>Non-Duplication</u></p> <ul style="list-style-type: none"> - Not in target area
Rural Adaptation in Yemen LDCF (USD 5 million); 2013	<ul style="list-style-type: none"> - Capacity strengthening of community associations on land planning and sustainable adaptive management of natural resources with a focus on climate-smart water and soil conservation. - Awareness programme on mainstreaming climate adaptation knowledge in decision making and planning processes - Programme on climate change adaptation and risk management in farming practices developed and implemented, targeting rural households in all target watersheds. 	<ul style="list-style-type: none"> - Check lessons learned related to activities and consider copying / complementing successful approaches and activities (during full proposal) 	<p><u>Complementary</u></p> <ul style="list-style-type: none"> - Complement approach in the Tuban Delta <p><u>Non-Duplication</u></p> <ul style="list-style-type: none"> - One of the watersheds involves the Turban delta. Overlap will be avoided through coordination

⁴⁴ <https://reliefweb.int/report/jordan/planning-ministry-launches-9-2million-project-adaptation-climate-change>

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	<ul style="list-style-type: none"> - Education programme on climate change adaptation and the sustainable use of natural resources developed and implemented, targeting students and youth in all target watersheds - Four Community Action Plans (CAP) at the watershed level produced that are gender balanced and climate change smart, with focus on innovative and sustainable land and water management measures. - Water harvesting and storage improved through the implementation of a mix of measures combining innovative technology and traditional knowledge - Water efficiency in agriculture irrigation and domestic use improved - Action plans developed and implemented to restore and upgrade traditional terrace systems - Pilot actions implemented to stop/reverse soil erosion and loss of fertility, integrating agriculture, rangeland, and forest restoration 		
<p>Pilot Programme for Climate and Resilience (PPCR):</p> <p>CIF/PPCR For 3 focal areas) 2013</p>	<ul style="list-style-type: none"> - Climate Information System and Pilot Program for Climate Resilience (CISPPCR) - Climate Services - (budget:US\$19 Million); - Integrated Coastal Zone Management (budget: US\$ 20 Million) 	<ul style="list-style-type: none"> - Check lessons learned related to activities and consider copying / complementing successful approaches and activities (during full proposal) 	<p><u>Complementary</u></p> <ul style="list-style-type: none"> - Use data produced - <u>Non-Duplication</u> - Not in target area
<p>Promote and build climate resilience to reduce vulnerability in Wadis and coastal areas;</p> <p>UNDP / GEF</p>	<ul style="list-style-type: none"> - The aim is to explore the relevance of NWSSIP II under changing climate. In addition, this note is also grounded on a deliberate review of relevant climate change policy and thematic studies particularly on the water sector in Yemen 	<ul style="list-style-type: none"> - Check lessons learned related to activities and consider copying / complementing successful approaches and activities (during full proposal) 	<p><u>Complementary</u></p> <ul style="list-style-type: none"> - Use data produced - <u>Non-Duplication</u> - Not in target area
<p>Resilient and sustainable livelihoods for rural Yemen (USD 87 million, not started yet)</p> <p>FAO/ GEF.</p>	<ul style="list-style-type: none"> - <u>Spatial planning: describes and prioritizes practices</u> - <u>Agriculture, livestock, and fisheries practices stimulated to improve livelihoods and mainstream conservation</u> - <u>Policy and regulatory frameworks guarantee enduring results by integrating lessons learned</u> 	<ul style="list-style-type: none"> - <u>Coordinate about approach / interventions and policy and regulatory framework and lessons learned (during full proposal)</u> 	<p><u>Complementary</u></p> <ul style="list-style-type: none"> - <u>Coordinate about approach / interventions and policy and regulatory framework and lessons learned.</u> - <u>Non-Duplication</u> - <u>Not in target area (the Socotra Archipelago, Al-Mahrah Governate, and the Sarawat Mountains)</u>
<p>The Enhancing Rural Resilience in Yemen Joint Programme (ERRY JP) funded by the EU (USD 40 million)</p> <p>UNDP, FAO, ILO and WFP in collaboration with a range of Implementing Partners</p>	<ul style="list-style-type: none"> - Enhance the resilience and self-reliance of crisis affected rural communities through support to rehabilitation of community infrastructure, livelihoods stabilization and recovery, social cohesion and local governance and improved access to sustainable energy 	<ul style="list-style-type: none"> - Check lessons learned related to activities and consider copying / complementing successful approaches and activities (during full proposal) 	<p><u>Complementary</u></p> <ul style="list-style-type: none"> - Use lessons and complement the approach is possible - <u>Non-Duplication</u> - Not in target area
<p>Sanaa Basin Project in Yemen</p> <p>FAO Dutch-funded (2014-2017)</p>	<ul style="list-style-type: none"> - Construction of wells through a <u>cash-for-work formula</u> for farmers to use for agricultural production. All Water User Associations choose their board members through elections and 30 percent of the seats are designated for women. 	<ul style="list-style-type: none"> - Water association and women only access to water can be used as a water management system to reduce conflict between tribes 	<p><u>Complementary</u></p> <ul style="list-style-type: none"> - Consider building upon lessons from Water association and women only access to water approach and cash-for-work formula for farmers to use for agricultural production. ROAS to contact FAO - <u>Non-Duplication</u>

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Water sustainability for farmers while empowering women			- Not in target area
World Bank Climate information system and pilot program for climate resilience – USD 19 million	<ul style="list-style-type: none"> - The SPCR focuses on longer-term interventions aimed at enhancing climate resilience in Yemen. The SPCR cannot address all of the key risks that have been identified, but aims to address the highest priority risks identified during the preparation process and through consultation with vulnerable communities. Four interrelated SPCR investments are proposed, each addressing a key risk related to climate change: - Climate Information System and PPCR Program Coordination - Improving the Climate Resilience of the Water Sector - Improving Rural Livelihood through Adaptation in Rain-fed Agriculture Project - Climate-Resilient Integrated Coastal Zone Management* 	<ul style="list-style-type: none"> - Check lessons learned related to activities and consider copying / complementing successful approaches and activities (during full proposal) 	<ul style="list-style-type: none"> <u>Complementary</u> - Use lessons and complement the approach is possible <u>Non-Duplication</u> - Not in target area
Netherlands Yemen NCAP Project	<ul style="list-style-type: none"> - Using an MCA analysis among local stakeholders, the highest priority initiative was identified in each area (Sanaa basin, Saada Basin, Aden), as an input to future planning efforts. The scoping effort included a sequenced plan for implementation and monitoring of the initiative as well as a cost estimate for required materials and labor 	<ul style="list-style-type: none"> - Aden City: The implementation of drip irrigation was identified as the best strategy in terms of water savings both in terms of distribution and application of water on farmlands. This strategy was preferred by stakeholders over others, but is more expensive. As the majority of farmers are poor and barely coping with existing living costs, subsidization or donor support would be needed for implementation 	<ul style="list-style-type: none"> <u>Complementary</u> - Recommendations to be adopted <u>Non-Duplication</u> - None
In target area			
Aden water and sanitation project	<ul style="list-style-type: none"> - Prevention of Water Borne Disease Outbreak through Emergency Repair and Upgrade of Damaged Water and Waste Water Facilities in Aden City- Yemen aims at reducing the Cholera outbreaks and other water-borne diseases to mitigate the current situation in the higher risk plagued areas through infrastructures (water, sanitation, drainage), and public health awareness 	<ul style="list-style-type: none"> - Check lessons learned related to activities and consider copying / complementing successful approaches and activities (during full proposal) 	<ul style="list-style-type: none"> <u>Complementary</u> - Provides UN-Habitat access and knowledge, plus valuable government and stakeholder access <u>Non-Duplication</u> - It aims to urban public health through infrastructure improvement and public awareness, not CC related

To practically coordinate and build synergies with other projects, including sharing lessons from projects, management arrangements for this will be put in place in the proposal (part III) during the full proposal development phase. This will include a proposed steering committee and advisory/technical committee. Entities working on relevant projects in Yemen will be invited to the advisory/technical committee with the purpose.

Once the adaptation activities are selected during the full proposal development phase, lessons from relevant projects will be further identified and integrated into the proposal. This will be done through desk research and consultations with relevant actors, also from outside Yemen.

G. LEARNING AND KNOWLEDGE MANAGEMENT COMPONENT TO CAPTURE AND DISSEMINATE LESSONS LEARNED

Component 1 Output 1.5 sets out to collect and share project lessons through a guideline. Whilst this output is a dedicated knowledge management output, other project outputs directly contribute to knowledge management mechanisms and dissemination of lessons learned (see table below).

Taken the alarming water scarcity and coastal management challenges in Yemen, approach, methods and techniques to manage natural resources / water and efficiently, sustainably and in a climate change resilient way benefitting the most vulnerable groups need to be urgently showcased for replication throughout the country. Capacities of government institutions and officials will be strengthened to replicate these approaches and techniques. The Ministry of Water & Environment or General Authority of Environmental Protection will capture lessons and share these among ministries, sub-national government bodies and the wider public. Knowledge sharing tools used will include social media streams (twitter, Facebook, etc.) plans and guidelines. Also, videos will be produced.

The project will develop a communication and knowledge management strategy and action plan, that will include the design and application of web portal which will enable knowledge sharing among the government counterparts and stakeholder, and the local authorities to ensure proper dissemination of knowledge. The plan will also reflect on the use of training event, workshops and consultation meeting to share knowledge and address challenges. The project will also develop publication/s in both Arabic and English languages, on lesson learned, possible replication, operations and maintenance manuals, etc. The project will benefit for the following knowledge management activities:

- Capturing best practices, tools and lessons learned from this project and disseminate among stakeholder, including MoWE, Ministry of Water Resources and Local Water Corporations
- Sharing project results and process documents across the region, in particular approved concept notes for each donor.
- Supporting project proposal formulation through generating meaningful statistics concerning other water basins, themes and donors.

Mapping donors' relations through demonstrating donor trends for supporting similar projects and interventions in other parts of Yemen.

Lessons will be relevant beyond the Yemen context. Therefore, the project team will also share lessons through international events, with relevant climate change bodies such as the UNFCCC and the Global centre on Adaptation and with UN agency offices, especially in the MENA region. UN-Habitat Yemen, will coordinate with the UN-Habitat Regional Office for the Arab State (ROAS) to share knowledge, lessons learned and success stories with ESCWA and ENEP Regional Office, through the different regional forums, including the Regional Coordination on the Issue-Based Coalition Theme on Climate Change, and Theme on Urbanisation lead by UN-Habitat, under the leadership of ESCWA. The Focal Point of Knowledge Management and Communications at ROAS will support the learning and knowledge management initiative of the project, through regular coordination with UN-Habitat HQ Knowledge and Innovation Section, to ensure two ways knowledge sharing from different global Climate Change Forums, to benefit the project and disseminate knowledge on Yemen project successful results, lessons learned and success stories that worthwhile sharing for future similar Climate Change Adaptation related initiatives.

Table 14. Learning and knowledge management

Expected Concrete Outputs	Learning objectives (lo) & indicators (i)	Knowledge products
Selection of most feasible/ impactful activity(ies) during full proposal: 1.1. Integrated natural resources / water management strategy supporting the efficient, sustainable and CC resilient use of water in the Tuban- Delta 1.2. Coastal management plan responding to CC risks 1.3. Regulations supporting above	(lo): To strengthen capacities of national sub-national government institutions, communities and vulnerable groups to manage natural resources / water in an efficient, coordinated, sustainable and climate resilient way, and to replicate the approach in other areas, to capture and share lessons and to mainstream these in strategies and regulations	<ul style="list-style-type: none"> • Project video (baseline and results) • Training package • Gaps analyses and recommendations for managing water and land, including for adjusting regulations • Integrated Natural Resource Management strategy for Tuban Delta and or coastal

Deleted: The project will develop a communication strategy and action plan, that will include the design and application of web portal which will enable knowledge sharing among the government counterparts and stakeholder, and the local authorities to ensure proper dissemination of knowledge. The plan will also reflect on the use of training event, workshops and consultation meeting to share knowledge and address challenges. The project will also develop publication/s in both Arabic and English languages, on lesson learned, possible replication, operations and maintenance manuals, etc

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1.4. Early warning system 1.5. Best practices and replication guidelines	(i): identification of lessons and recommendations in knowledge products in the column on the right	management plan • Replication mechanism / guidelines • Specific consideration roles women and youth
Selection of most feasible/ impactful activity(ies) during full proposal 3.5. Harvest / store water upstream and in urban areas, also to reduce flood risks 3.6. Reuse of treated waste water and grey water (e.g. from mosques) 3.7. Capacity building to implement, operate, maintain and sustain above	(lo): collect and share information on best practice low-cost and replicable innovative techniques on selected water facilities (i): Number of techniques showcased and identification of lessons and recommendations in knowledge products in the column on the right	• Showcased models also to include in project video above) • Guidelines for replication • Specific consideration roles women and youth
Selection of most feasible/ impactful activity(ies) during full proposal: 3.1. Water efficient irrigation (e.g. drip) systems and closed conduits 3.2 Alternative cropping schemes 3.2. Drought resistant and heat- and salinity- tolerant crops 3.4. Capacity building to implement, operate, maintain and sustain above	(lo) collect and share information on best practice low-cost and replicable innovative techniques on irrigation and farming (i): Number of techniques showcased and identification of lessons and recommendations in knowledge products in the column on the right	• Showcased models also to include in project video above) • Guidelines for replication • Specific consideration roles women and youth

H. CONSULTATIVE PROCESS

The proposed project has been designed based on inputs from key stakeholders in Yemen and project beneficiary groups, including representatives of vulnerable groups. During project preparation four types of consultations shaped concept note proposal (and will shape the full proposal):

1. Consultations to align with National and local priorities. This has been mainly done with the Environmental Protection Authority.
2. Consultations to avoid duplication with other projects (government, UN agencies, etc.)
3. Consultations to identify needs of target communities and vulnerable groups.
4. Consultations to identify potential environmental and social risks and impacts, in line with AF policies.

In summary, the following actors have been consulted, all in autumn / winter of 2020. The purpose of the consultations are show by the numbers, wh_ich are aligned with above.

- Environmental Protection Authority Aden and Sana's (1, 2, 3, 4)
- Ministry of Water and Environment Aden and Sana's (1, 2, 3)
- Ministry of Agriculture & Irrigation (1, 2, 3)
- Ministry of Planning & International Cooperation (1, 2)
- Aden and Lahj governorate authorities (1, 2, 3)
- Ministry of Works and Highway (1, 2, 3)
- Local Water & Sanitation Corporation (1, 2, 3)
- General Authority of Water Resources (1, 2, 3)
- General Rular Water Authority (1, 2, 3)
- Social Development Fund – Aden and Sana`a (1, 2, 3)
- Water & Environment Center - Aden and Sana's Universities (1, 2, 3)
- Estdamah Foundation for Capacity Development (1, 2, 3, 4)
- UNDP (2, 3)
- FAO (2, 3)
- UNOPS (2, 3)

Figure 8: Consultations in Yemen



The above actors have been consulted by using a questionnaire and through discussions. The questionnaire was developed to identify climate change-related vulnerabilities, issues and needs in the Tuban Delta (Aden and Lahj governorates). The outcomes have been used to develop this concept note project proposal ([see summary in tables 4 and 5](#)). The questionnaire included questions on climate change exposure (hazards) and trends (experienced) in the Tuban Delta, barriers to adapt, possible adaptation measures to respond to the hazards and barriers and possible concerns related to the 15 AF safeguard areas.

During the full proposal development phase, detailed assessments and consultations at the community level and with vulnerable groups and women, will take place to further select adaptation activities and to identify specific needs and possible concerns.

This will be done in cooperation with national government and local authorities, but also directly with NGOs and other relevant stakeholders. As part of the assessment, a detailed target area stakeholder mapping will be done, including to identify groups present in the target area. The consultations will be with heads of communities but also through women and youth focus groups and other any relevant groups. The planned consultations are the following:

- Target municipalities representatives
- Target neighbourhoods / communities' representatives
- Target area NGO representatives
- Women representatives
- Youth representatives
- Any other relevant groups representative (disabled, elderly, etc.).
- Farmer / water user association representatives
- Actors implementing projects in target area (or in other areas in Yemen).

As for the last point, e.g. consultations will take place with actors involved in the Sanaa Basin Project (FAO/Dutch-funded) phase, to identify lessons learned and replication options, especially related to empowering women and effectively addressing issues limiting their access to economic opportunities. For instance, Water User Associations could choose their board members through elections and 30 percent of the seats to be designated for women and / or women only access to water could be used as a water management system to reduce potential conflict over water.

I. JUSTIFICATION FOR FUNDING REQUESTED

The proposed project components, outcomes and outputs fully align with national and local government / institutional priorities and gaps identified (with a clear and direct response to needs in natural resource / water management identified in the national strategies mentioned in Part II.D.

The components, outcomes and outputs also align with [government priorities](#) and with the Adaptation Fund outcomes. This alignment has resulted in the design of a comprehensive approach to address climate change related water scarcity and coastal issues in a fragile state.

Due to the crisis, government capacity, both in terms of human resources and financing, is reduced compared to before the crisis. As such, Yemen depends to a large extent on external financial support from other countries, and on assistance from the UN and other agencies. At least 2/3 of the funding will be allocated to components 2 and 3, which are concrete adaptation activities. Concrete interventions will be selected and prioritized during

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the full proposal development phase based on priorities, cost-effectiveness / high impact and sustainability criteria.

The table below provides a justification for funding requested, focusing on the full cost of adaptation reasoning, by showing the impact of AF funding compared to no funding (baseline) related to expected project outcomes.

During the full proposal, the selection of adaptation actions will be made based on:

- Cost-effectiveness compared to alternative options, also understanding effectiveness of proposed actions)
- Benefits to target groups / vulnerable groups
- Maintenance and sustainability / exit strategy feasibility.
- Manageability of potential environmental and social risks and impacts identified

The planned hydrology and climate change vulnerability assessment in the target area in the Tuban delta, the most effective / impactful (beneficiaries per USD) interventions will be identified looking at the whole system and downstream effects. These may include upstream water harvesting / storage, also capturing storm flood water, which will avoid water loss and well as reduce flood risks. Also, some interventions to reduce water pollution upstream may be prioritized. These could include minimum treatment of wastewater so it can be infiltrated in the aquifer or used in agriculture. As for agriculture, the aim is to prioritize interventions that will use water efficiently and will avoid evaporation, which is very high in the target area. The introduction of salt resilient crops is considered in the coastal areas as a cost effective solution compared to physical coastal protection infrastructure.

Table 15. Overview of impact of AF funding compared to no funding (baseline) related to expected project outcomes

Project outcomes	Baseline (without AF)	Additional (with AF)	Comment and alternative adaptation scenario's
Enhanced capacities of national and sub-national government institutions, communities and vulnerable groups to manage natural resources (i.e. water and land) and respond to coastal CC risks in the Tuban-Delta efficiently, sustainably and in a resilient way	Water scarcity and coastal challenges in the Tuban Delta are alarming and a government priority. However, due to the crisis, both human and financial resources are so limited that governments and communities are not able to respond. Moreover, in Yemen, water is usually managed at local scale and not by looking at larger systems (delta / watersheds), which leads to inefficient and unsustainable management.	The activities related to this outcome will allow government institutions to assess, plan and manage natural resources in an efficient, sustainable and resilient way. The activities related to this outcome will enable communities and vulnerable groups to operate and sustain natural resource / water systems	Without sustainable and climate change resilient water management approaches (considering larger water systems and techniques to reduce water consumption), target areas will become even more water scarce, which will be disastrous. Alternatives are to only manage water more locally, but this would not improve the overall efficiency of the system and could have negative impacts downstream
Increased sustainability and efficiency of water supply systems for agriculture and urban demand in the Tuban Delta	Target communities have very limited options (capacity – skills and technically - and financial resources) to adapt to climate change-related water scarcity and coastal challenges. <u>The aquifer is depleting, and communities are not adjusting to the situation with water efficient use options.</u>	The activities related to this outcome will allow target communities to adapt to water scarcity and coastal challenges through concrete interventions. <u>The aim is to capture any water available, also storm / flood water and avoid any pollution of this water</u>	Alternatives will be identified during the full proposal development stage
Reduced water demand from the agriculture sector and related strengthening agriculture livelihoods in the Tuban Delta	Target communities have limited access to climate smart technology and techniques for agriculture. Traditional irrigation is not efficient and drought tolerant crops and livestock limited. <u>Currently, communities are losing crops due to reducing water availability or floods</u>	The activities related to this outcome will allow communities to improve efficiencies and productivity through adoption of new technology, species and techniques. <u>The aim is to use water as efficient as possible (through efficient irrigation and avoiding any evaporation). Salt resilient crops may be introduced in the coastal areas. This will be a cost-effective option compared to physical coastal protection infrastructure.</u>	Alternatives will be identified during the full proposal development stage

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J. SUSTAINABILITY OF THE PROJECT/PROGRAMME

Investing in increasing the resilience of vulnerable assets and livelihoods is a sustainable economic approach. It will not only avoid future costs related to climate change and disaster impacts, but it will also enhance livelihood options, improve the health and security of the community.

By engaging communities and vulnerable groups in project activities, including assessments, planning and decision-making processes, the project aims to achieve building of communities' awareness and capacities, and furthermore ownership and leadership in the area of natural resource / water management. Specific emphasis will be given to community capacity strengthening to operate and maintain the systems.

With all three components, the project aims to support sustainable development in Yemen compared to a currently humanitarian driven approach.

Climate-resilient development pathways stand at the center of most NDCs in Yemen, with intended actions to address vulnerability of land and water resources to climate impacts, building capacities for early warning systems (EWS), resilience of communities to droughts, floods and sea-level rise, and addressing risks of climate change to the onset of conflicts and displacement.

The project activities will be designed to ensure contributing towards building the resilience of urban and rural communities by mobilizing, capturing and diverting water resources, and by conducting on-the-farm and on-the-pasture training to facilitate sustainable land and water management.

Taken the limited institutional capacities in the country, the project will develop maintenance and sustainability plans with government institutions, including allocated budget, through the project steering committee and advisory committee. However, where possible, maintenance and sustainability arrangements should be agreed with the target communities and capacities build to this, including trainings, guidelines, plans, etc.

During the full proposal development phase, sustainability / maintenance arrangements for all proposed activities will be fully identified / established and verified. Support mechanisms to scale-up and replicate interventions will also be further identified and agreed upon during the full proposal development phase with relevant ministries, governorates, municipalities and UN agencies. During the project, operation and maintenance / exit strategy plans will be developed for each selected adaptation measure.

Table 16: Proposed arrangements to sustain /maintain, replicate and upscale project activities and supporting mechanisms

Proposed outputs	Maintenance arrangements and mechanisms to support this	Replication and upscaling arrangements and mechanisms to support this + exit strategy
Selection of most feasible/ impactful activity(ies) during full proposal: 1.1. Integrated natural resources / water management strategy supporting the efficient, sustainable and CC resilient use of water in the Tuban- Delta 1.2. Coastal management plan responding to CC risks 1.3. Regulations supporting above 1.4. Early warning system 1.5. Best practices and replication guidelines	Monitoring and updating of strategies <u>Responsible:</u> - Ministry of Ministry of Water & Environment - General Authority of Water Resources <u>How:</u> identify responsibilities, coordinate with municipalities, local communities and allocate required budget	Approach and lessons learned captured for replication in Yemen, including building ministry and municipalities, local communities capacities to do so and guidelines <u>Responsible:</u> - Ministry of Water & Environment - General Authority of Water Resources - Local Corporation of Water & Sanitation <u>How:</u> identify responsibilities, coordinate with municipalities, local communities and allocate required budget to develop new plans
Selection of most feasible/ impactful activity(ies) during full proposal 2.1. Harvest / store water upstream and in urban areas, also to reduce flood risks	O & M + exit strategy plans will be developed, including identified responsibilities and budget allocations from national and municipal governments <u>Responsible:</u>	Approach and lessons learned captured for replication in Yemen, including building ministry and municipalities, local communities capacities to do so and guidelines <u>Responsible:</u>

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<p>2.2. Reuse of treated waste water and grey water (e.g. from mosques)</p> <p>2.3. Capacity building to implement, operate, maintain and sustain above</p>	<ul style="list-style-type: none"> - Ministry of Water & Environment - General Authority of Water Resources - Local Corporation of Water & Sanitation <p><u>How:</u> coordinate with General Authority of Environmental Protection</p>	<ul style="list-style-type: none"> - Ministry of Water & Environment - General Authority of Water Resources - Local Corporation of Water & Sanitation <p><u>How:</u> identify responsibilities, coordinate with municipalities, local communities and allocate required budget to develop new plans</p>
<p>Selection of most feasible/ impactful activity(ies) during full proposal:</p> <p>3.1. Water efficient irrigation (e.g. drip) systems and closed conduits</p> <p>3.2. Alternative cropping schemes</p> <p>3.3. Drought resistant and heat- and salinity- tolerant crops</p> <p>3.4. Capacity building to implement, operate, maintain and sustain above</p>	<p>O & M + exit strategy plans will be developed, including identified responsibilities and budget allocations from national and municipal governments</p> <p><u>Responsible:</u></p> <ul style="list-style-type: none"> - Ministry of Agriculture & Irrigation <p><u>How:</u> coordinate with General Authority of Environmental Protection</p>	

The Ministry of Water and Environment and its departments in the governorates, including the Local Water and Sanitation Corporations (LWC) of Aden and Lahj are responsible for water management. These institutions have a mechanism to manage, monitoring and maintain the proposed water-related project activities in the target area based on the national requirement and compliance with ESIA policies. Through the ministries' related department and LWC, participatory processes will take place with local community representors and beneficiaries' groups, including water user associations, as well as with the municipalities through meetings and training sessions to assure sustainability and quality of the interventions.

The ministry of Agriculture and its departments in the governorates of Aden and Lahj are responsible for agricultural and irrigation activities. In line with their national and sub-national strategies, they are to define the type of climate resilient crops, etc. Water user / farmer associations will participate in the process to identify the most efficient irrigation options and innovative farming systems, but also to identify maintenance needs and arrangements and options for replication.

If water user association are not functional in the target areas, these will be set-up. Their main responsibilities will be to: 'equally' distribute available water resources among farmers according to the developed irrigation schedule and to operate and maintain the rehabilitated /installed irrigation system.

The project will aim at building the capacity of Ministry of Water Resources and Local Water Corporation to develop an Integrated Water Resource Management (IWRM) which will include a clear governance structure for the Tuban basin. The IWRM will include training modules on operations and maintenance of the project intervention, it will also include special training of local community-based organizations to contribute to proper management of water, reduce loss and conservation techniques. The project will also contribute to building the capacity of the staff of ministry to collect data, assess needs, analyses the context and develop project proposal to submit to donors who have interest to fund a similar initiative in other water basins in the country.

K. OVERVIEW OF THE ENVIRONMENTAL AND SOCIAL IMPACTS AND RISKS IDENTIFIED AS BEING RELEVANT TO THE PROJECT / PROGRAMME

The proposed project seeks to fully align with the Adaptation Fund's Environmental and Social Policy (ESP) and its 15 safeguard areas and the AF Gender Policy (GP). Further to Section II.E above on compliance with standards, outlined below is a summary of the findings of the initial screening process to identify and evaluate potential environmental and social risks and impacts of proposed interventions and based on that, of the entire project. With this information, the entire project has been categorized. As shown in tables 4 and 5 and Section II.H, consultations have been conducted to preliminary identify potential environmental and social risks and impacts and to identify specific group's needs and possible concerns. Consultations and assessments to further

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identify potential environmental and social risks and impacts will be conducted during the full proposal, especially with / focused on women, youth, farmers, etc. Annexes to show how the project complies to the AF ESP and GP in detail will also be included in the full proposal document. One of these annexes will be a gender and youth baseline, where baseline data will be provided and an approach to especially increase the adaptive capacity of women and youth, including e.g. elderly women and women with disabilities. A dedicated person to manage potential environmental and social risks and gender will be part of the UN-Habitat staff to manage this project (with dedicated budget allocation to safeguarding / gender). During the full proposal development phase, UN-habitat will work with accredited national consultants to complete the risks screening and impact assessments, also to ensure compliance to national laws.

During consultations one of the questions was to identify any potential risks / impacts of the possible project interventions. The response was that we should mostly focus on identifying any potential risks related to:

- Non-equal access to provided service
- Lack of participation in planning or execution of project / intervention
- Safety (during construction and operation)

Other possible concerns included potential pollution issues, difficulties to maintain interventions, possible disputants or other concerns related to equal access and clarity about land ownership. Also, in the case that reuse of wastewater is prioritized during the full proposal phase, social acceptability will be assessed, also depending on the type of usage intended with the recycling of grey water.

During the full proposal development phase, specific attention will be given to above, besides any other potential risk areas. This will include ensuring participation of vulnerable groups in assessment and planning processes.

Activities under component 1 consist activities to develop strategies, adjust or develop regulations, share knowledge and related capacity strengthening of national, sub-national and local actors. The project will ensure relevant actors and beneficiary groups will be equally represented and that they'll equally benefit from the project activities. In the full proposal document, measures will be proposed to ensure this, which is especially relevant to the AF safeguard areas 2, 3 and 5).

Activities under Components 2 and 3 are 'concrete' adaptation actions. Because of the scope of the proposed activities, which are mostly community-based and thus localized, potential direct risks and impacts will be minimal. Potential indirect impacts will be assessed during the full proposal development phase. This is relevant as the project will deal with a delta area, where upstream interventions could have consequences downstream. Transboundary impacts are highly unlikely because the target delta is not close to a boarder. Given this, cumulative impacts are also unlikely. As a result, at this CN stage, the entire project is regarded as a medium risk (Category B) project. During the full proposal development phase, all proposed activities will be selected and detailed so that potential risks and impacts can be fully identified, and if a risk exist, measures proposed to mitigate these.

The project is designed to generate positive economic, social and environmental impacts, using inputs from especially women and youth and farmers in target communities and by incorporating best practices from other projects. During the full proposal development phase, all required consultation will be completed. The adaptation measures proposed will be selected together with representatives from the target area, making sure they are culturally appropriate and local.

Table 17. Overview of environmental and social impacts and risks*

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance <i>to be conducted during the full proposal phase when adaptation activities are further selected / detailed.</i>
Compliance with the Law	▼	EIA assessments in compliance with AF and Yemen law will be conducted
Access and Equity	▼	There may be a potential risks / impact related to unequal access and equity, especially those between women and men, between communities and groups (e.g. over scarce resources) and between national government and local communities.

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Deleted: Once all interventions are selected (at the full proposal stage), compliance to all laws will be ensured. ¶
 ¶ At this CN stage, national laws have been identified for a range of possible interventions

Deleted: Complete assessments during full proposal development phase. ¶

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<i>Marginalized and Vulnerable Groups</i>		There may be a potential risk / impact related to a lack of participation by the most vulnerable (elderly, disables, women, youth). All stakeholders will be mapped and involved in the assessment process
<i>Human Rights</i>		Any potential risk of non-compliance with human rights will be identified.
<i>Gender Equity and Women's Empowerment</i>		There may be a potential risks / impact related to lack of gender equity and women empowerment. An initial gender approach has been included but this will be completed during the full proposal phase, including a baseline.
<i>Core Labour Rights</i>		Any potential risk of non-compliance with international standards will be identified.
<i>Indigenous Peoples</i>		All stakeholders will be mapped and involved in the assessment process
<i>Involuntary Resettlement</i>		There may be a potential risk / impact related to involuntary resettlement. Therefore, local land ownership will be assessed, including whom owns the land and how is it used, also informally.
<i>Protection of Natural Habitats</i>		Any potential environmental risks / impacts will be assessed.
<i>Conservation of Biological Diversity</i>		
<i>Climate Change</i>		There may be a potential risk / impact related to establishment of infrastructure, leading to 'extra' energy use. This will be assessed and compensated with renewable energy.
<i>Pollution Prevention and Resource Efficiency</i>		Any potential environmental risks / impacts will be assessed.
<i>Public Health</i>		Any potential social risks / impacts will be assessed.
<i>Physical and Cultural Heritage</i>		All heritage sites will be identified and potential risk / impact on these.
<i>Lands and Soil Conservation</i>		Any potential environmental risks / impacts will be assessed.

As part of a GCF readiness project, a climate change vulnerability and hydrology study for the Tuban Delta will be completed, including risks screening and impact assessment of possible concrete interventions

Potential risks related to large-scale conflict will be identified during the full proposal development phase in part III.C of the proposal. However, the target area has been selected because it is relatively stable and because there are no major conflicts between groups within the area.

Traditional water allocation and water access rights will be fully assessed during the full proposal development phase, including matching national water management priorities and practices with local water management traditions and practices. The main national and governorate level actors involved in water management have already been consulted (see part II.H). During the full proposal development phase will be matched with local level water managemen needs and priorities.

If wastewater treatment is selected as an adaptation activity, then the social and cultural acceptance of different types of treated wastewater for reuse will be assessed, as well as environmental risks related to wastewater treatment options.

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government⁴⁵

Ammer Nasser Al-Aulaqi Chairman, Environmental Protection Authority, Yemen Ministry of Water and Environment	Date: 11 January 2021
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Republic of Yemen
Ministry of Water & Environment
Environment Protection Authority



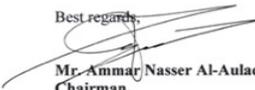
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 رقم الترخيص: 3
 رقم الترخيص: 3

To: Adaptation Fund Board
 c/ Adaptation Fund Board Secretariat
 Email: Secretariat@Adaptation-Fund.org
 Fax: 202 522 3240/5

Date: Jan -11-2021
 Ref.: H-B-2021-2
 Sub.: **Endorsement for the project "Increase the climate change resilience to water scarcity and sea level rise-related challenges in the Tuban delta."**

In my capacity as the designated authority of the Republic of Yemen to the Adaptation Fund, I confirm that the above mentioned project (a) is in accordance with government of Yemen national priorities and our commitment to the relevant global environmental conventions; and (b) was discussed with relevant stakeholders, including environmental convention focal points.

Accordingly, I am pleased to endorse the preparation of the above project proposal with the support from the Adaptation Fund. If approved, the proposal will be prepared and implemented by UN-Habitat in conjunction with EPA Yemen. Other execution entities will be defined at a later stage.

Best regards,

Mr. Ammar Nasser Al-Aulaqi
Chairman,
Environment Protection Authority- Yemen
National Designated Authority to Adaptation Fund



Copy with regards to:
 • Minister of Water & Environment


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 www.epa-ye.org
 info@epa-ye.org

⁶ Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

B. Implementing Entity certification

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans, especially the Yemen INDC and TNC, and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.

Raf Tuts



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Annex 1: initial gender approach (concept note phase)

1. Determinants for gender-responsive stakeholder consultations

Table 18 Stakeholders to be consulted to further develop gender approach during the full proposal

Type of stakeholder	Specific stakeholder
Government	- Ministry of social affairs
UN agencies	- UN Women - UNICEF - UNFPA
Community level	- Community consultations and focus group discussions with women and youth - NGOs

*See also part II.I

2. Initial Gender Assessment

a. Data baseline – overview of disaggregated data (beneficiaries) in target areas.

Table 19 overview of disaggregated data (beneficiaries) in target areas.

Laieh Governorate					Aden Governorate				
Districts	Male	Female	Total	F %	Districts	Males	F	Total	%
AL Haad	38.408	36.324	74.732	48.61	Dar Saad	74.124	64.482	138.61	46.52
Yafea	53.557	51.706	105.264	49.12	Al Sheikh Othman	95.211	80.867	176.072	45.92
Al Mofelihi	26.742	27.707	54.449	50.89	Al Mansurah	99.876	75.475	175.354	43.04
Yahar	27.176	25.778	52,954	48.68	Al Buraiah	58.229	52.181	110.416	47.26
Habil Gabr	31.294	27.987	59.281	47.21	Al Tawahi	48.604	44.082	92.686	47.56
Halimain	20.561	19.132	39,693	48.20	Al Ma'alla	43.945	40.275	84.222	47.82
Radfa	32.263	29.206	61,469	47.51	Sirah (Crater)	67.772	62.812	130.580	48.10
Al Melah	20.862	18.746	39.608	47.33	Khor Maksar	42.239	36.849	79.079	46.59
Al Musaimeer	20.088	17,903	37,991	47.12	Gov. Total	530.00	457.00	987.00	
Al Kabaitah	64.157	69,136	133.294	51.87					
Toor Al Bahaa	34.996	32.78	67.776	48.37					
Al Makaterah	33.198	42,391	75,59	56.08					
Al Madharebah & Al Aarah	33.329	31,441	64.77	48.54					
Al Hawtah	19.759	18,231	37,99	47.99					
Tuban	64.61	57,53	122,14	47.10					
Total Gov.	521	506	1,027.00						

b. Context:

Table 20 Analysis of gender-specific legal and cultural / religious context

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Analysis of legal status of women

1. Gender Analysis

The Gender Inequality Index (GII) was created by the United Nations Development Programme (UNDP) in 2010 to expose the differences in the distribution of opportunities between men and women. The GII provides insights into gender gaps in major areas of human development, effectively highlighting areas in need of critical policy intervention. In 2018, the GII measured Yemen to have a GII value of 0.834 while the world's average sits at 0.439, meaning Yemeni women have a lower standard of living compared to men. Here is how gender inequality in Yemen is affecting the nation and Yemeni women.

Education

Due to structural inequalities, women and girls cannot easily access essential services in Yemen, such as education. The effect of this limited access is poor education and, consequently, low literacy rates. According to the Human Development Index, the average years of schooling that Yemeni girls achieve is 1.9 years, in contrast to the 4.4 years that boys receive on average. While both are low, boys obtain more than twice as much schooling as girls in Yemen.

Education is critical for not only providing economic opportunities but is also key to political participation and understanding factors surrounding sanitation and health. However, the consequences of disparities in education are not only felt by women. Female education is especially important in developing countries due to the social benefits of maternal education. Children of educated mothers are proven to have improved health and higher test scores than children of uneducated mothers. Thus, restricting girls' access to education not only represses them by perpetuating gender inequality but damages society as a whole.

Health

Another consequence of structural gender inequality in Yemen is inadequate health care for girls and women. Yemeni girls and women struggle for adequate health care due to disproportionate impoverishment, a lack of health education and underrepresentation in politics.

A concrete consequence of poor female health care in Yemen is a radically high maternal mortality rate (MMR), with 43 per 1000 births. This rate, among other health factors, resulted in the 2018 HDI ranking Yemen as 177th in the world. Additionally, 18.5% of women suffer from female genital mutilation in Yemen. This procedure is immensely damaging, resulting in lifelong nerve damage and pain. Therefore, not only do women struggle to have access to health care, but the care they do receive is often detrimental to their overall health.

Violence

35% of Yemeni women have experienced physical or sexual assault. These high rates of sexual and physical violence are a result of damaging gender roles within Yemen society. In Yemen, women are forced to wear niqabs, subject to child marriage, honor killings victims and face divorce shame. Child marriages and divorce shame are particularly concerning in contexts where abuse is present. With child marriages, girls are young, vulnerable and subservient when sent off into marriage, increasing the likelihood of domestic violence and sexual assault by their partner. Furthermore, divorce shame prevents women from escaping abusive relationships due to social ostracization. As horrifying as abuse is in any context, Yemeni women have no authority to report the crimes with both formal and informal legal systems discriminating against women.

Economics

As a result of gender inequality in the economy, only 6% of Yemeni women participate in the labor force, in contrast to 70.8% of men. According to the 2020 Global Gender Gap Report by the World Economic Forum, Yemen ranks 153 out of 153, meaning Yemen has the most massive gender gap in the world. The Global Gender Gap considers the economic participation, education, health and political empowerment of all genders.

In Yemen, the few women who do work earn a fraction of the wage that a man earns for the same job. This economic inequality results in Yemeni women being economically dependent on their husbands, resulting in another obstacle to escape an abusive household.

The Humanitarian Crisis Disproportionately Impacts Women

This statement is true in several aspects. Firstly, crises historically increase sexual violence resulting in women being raped at Yemeni security checkpoints when unaccompanied by a male relative. Additionally, women are targeted for sexual harassment and assault at political protests as well. Women's limited access to health care has been amplified by the crisis with shortages of food, water and sanitation supplies. Thirdly, women have limited mobility to escape the conflict due to systemic gender roles, placing them with disproportionate responsibilities to provide care for their homes, including caring for children and the elderly. Moreover, the disproportionate impact of the humanitarian crisis on women is seen by how three-fourths of people displaced by the crisis are women and children.

2. Gender Dynamics in Yemen,

Gender equality indices were low prior to the conflict, but conditions for women and girls have worsened since this time. The prolonged crisis, ensuing stress and chaos, and entrenched patriarchal norms, have exacerbated women and girls' vulnerability and exposure to violence, abuse and exploitation. The reverses in gender equality have occurred in a number of areas. For example, prior to the conflict, there were steady improvements in the area of education. However, between 1997 and 2014, the proportion of girls aged 6 and above without formal education declined from 67% to 43% and from 33% to 21% for boys aged 6 and above⁴. However, many of these achievements have been overturned since the start of the conflict, with over 1.8 million children (or a third of the school going population) out of school since March 2015. There have been similar reversals for women in public life. Women represented nearly a quarter of National Dialogue Conference (NDC) representatives and successfully advocated for agreements, like a 30% quota for women in public life and an 18-year minimum age of marriage, but these agreements have since fallen through⁵, as women find themselves sidelined from decision making. Women have also been heavily impacted by the collapse of the health system. A significant proportion of the 14.1 million people who lack adequate access to healthcare are either pregnant and lactating mothers or children. The maternal mortality rate is not surprisingly one of the worst in the Arab world, with 164 deaths per 100,000 live births⁶. This number is expected to rise due to insufficient care for new and expectant mothers, resulting from growing restrictions on women's mobility, a lack of qualified female doctors and constricted resources. Conflict has also seen a rise in the number of pregnancies. At least 44.3% of households have pregnant or lactating mothers compared to 23.4% prior to the conflict. The rise in the number of pregnancies has been attributed to a rise in male idleness due to unemployment and time spent at home, and a lack of access to modern family planning methods. Communities also report that a growing number of women are getting pregnant so they can access food assistance. Although GBV was pervasive prior to the conflict and took a myriad of forms including forced marriage, female genital mutilation, and the denial of women's economic rights, including their right to inheritance. These cultural practices have intensified and worsened since 2015. According to OCHA, there was a 70% spike in GBV in 2015, and increased rates of child marriage as a coping mechanism for vulnerable families⁸. One study suggested that 90% of women face sexual harassment in public spaces, resulting in restricted mobility and barriers to accessing aid. Although men face security risks, they are in a better position to defend themselves by carrying a weapon or using public or private means of transport. That said, men have unique vulnerabilities including exposure to forced recruitment and arbitrary detention by armed forces and to death and injury as a result. Gender roles have shifted as a result of the conflict, with some positive and some negative effects. For example, men who are idle and unable to find paid employment are playing a growing role in the home. In contrast, women have become increasingly involved in both paid and subsistence labour, particularly women who have lost their husbands or been displaced. The changing roles have helped to lighten women's domestic responsibilities and to reinforce their social status. On the flip side, the changes have served to intensify conflict between married couples, as men are displaced and increasingly frustrated by their inability to provide materially for their families. The disruption in gender roles offers unique opportunities for social transformation beyond the crisis period, if programs are intentional about their approach to gender.

3. Legislation

Yemen has ratified the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) but The Government of the People's Democratic Republic of Yemen declares that it does not consider itself bound by article 29, paragraph 1, of the said Convention, relating to the settlement of disputes which may arise concerning the application or interpretation of the Convention.

Women in Yemen have historically been placed at a disadvantage due to their sex, with a highly patriarchal society. Although the government of Yemen has made efforts that will improve the rights of women in Yemen many cultural and religious norms, along with poor enforcement of this legislation from the Yemeni government, have prevented Yemeni women from having equal rights to men. women of Yemen, however, are subject to a society that reflects largely agrarian, tribal, and patriarchal traditions. This combined with illiteracy and economic issues has led women to continuously be deprived of their rights as citizens of Yemen. Due to the ongoing armed conflict in Yemen since the end of March 2015, Yemen is undergoing a humanitarian crisis worldwide. The conflict has brought numerous accusations of violations and abuses of international human rights law and violations of international humanitarian law. The events have been brutal, and have had cruel consequences on all civilians, but especially on the lives of women and young girls.

In 2003, it was estimated that only 30% of the Yemeni female population was literate. Today, 80% of Yemen's population lives below the National Poverty line, many of them women. This may be attributed to the large education gap between men and women in Yemen. Freedom House reported that while 73% of boys were enrolled in primary school in rural areas, only 30% of girls enrolled. According to a survey done by UNICEF in 2013, girls are 50% less likely to enrol in school compared to boys, and they are also less likely to complete basic secondary and post-secondary education. Other studies have

	found that girls are usually more likely to drop out of school, than boys. For example, a study done in 2014 by Yemeni Ministry of Education, found that girls are 17% more likely to drop out of school at the primary school level, while 23% more likely than boys to drop out of school by the lower secondary level						
Analysis of cultural/religious status of women	Countries/Territories	SIGI 2019 Category	SIGI Value 2019	Discrimination in the family	Restricted physical integrity	Restricted access to productive and financial resources	Restricted
	Yemen	Very high	64.0%	89.7%	37.7%	43.2%	75.8%
<p>However, regional, local customs and traditions play an important part in the extent to which women have a role in political, economic or domestic decision-making. UN Women's report <i>Women in Conflict Resolution and Peacebuilding in Yemen</i> highlights that the regional and historical differences in women's role in many cases have been further heightened as a result of the current conflict</p> <p>A trend of increased participation in the public sphere, where women move beyond socially acceptable roles, has been observed during the conflict. This includes examples of women working with local governance structures, where local leaders reportedly have been open to this. Moreover, women's role in conflict resolution varies between governorate and local level, and rural and urban areas.</p> <p>several researchers suggest that housing, land and property (HLP) rights abuses, violations and discriminations are widespread, however, they are not sufficiently documented in most of the communities. Particularly, those for women and girls are critical as they are discriminated or have limited access to land ownership even though major traditional Islamic legal system support women's rights to land. As customary laws do not recognize women's entitlement to enjoy, inherit, women often receive various forms of barriers, discriminations and violence when they try to claim their HLP rights.</p>							

Source: <https://www.genderindex.org/ranking/>
<https://www.genderindex.org/wp-content/uploads/files/datasheets/2019/YE.pdf>

c. Differentiated climate change impacts on men and women and their differentiated capacities do adopt to these, gender division of labour and gender-based power structures.

Table 21 Differentiated climate change impacts on men and women

Sector / Livelihood relevant to the project	Climate change impact	Gender and youth equality and empowerment issues, incl. specific vulnerabilities / barriers to adapt	Capacity to adapt and opportunities for promoting a 'women' and 'youth' as agents of change
Agriculture	Drought / less work/ low productivity, Lower livelihood opportunities and family income	High dependency on agriculture sector for income (around 45% women involved in agriculture) 50-60 % women headed households If women can't have the capacity to diversify their income resources and make informed decisions, they will be among the most affected in the rural communities. At the same time, the knowledge of women on how they manage some agriculture activities and take care of their families' nutrition, could be underestimated in some rural communities. Under climate change conditions, the power in making decision and management of resources could not take into account women role and knowledge. Drought, loss livelihoods push poor household into food stress and emergency coping strategies, such as reducing household assets, removing children from schools (mostly starting with Girls)	Opportunities; <ul style="list-style-type: none"> Interventions will be gender-responsive in their design and implementation, UN Habitat will ensure equal opportunities for men and women to participate in and benefits from the whole activities training and awareness among component-3. Involve women and youth unions and women through water user associations Target women-headed households Design specific interventions for youth and to empower rural women and meet their special requirements Creating training modules for women teaching them certain activities Such as crafts and sewing and similar to break out of poverty and moving out of the farm economy. Women to be part of board of water user associations and or women only access to water sources.
Water (domestic and for irrigation)	Drought / less work Flooding Sea surge		

		and temporarily or permanent migration.	
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d. Capacity gaps affecting Gender Policy compliance

Table 22 Capacity of potential executing entities to carry-out gender responsive activities.

Potential executing entity	Skills and expertise to provide gender mainstreaming inputs	Specific requirements execution entities for compliance	Capacity building needs
Government and NGOs	Limited	<ul style="list-style-type: none"> - Appoint ESP a compliance and gender focal point - Capacity to comply to the AF ESP and implementation of the ESMP guided by UN-Habitat - Capacity to comply to the AF GP (see annex 6). 	<ul style="list-style-type: none"> - Awareness on requirements - Share guidelines for execution entities to comply and to ensure 'opportunities' are identified and exploited - Support development baseline and approach before project start + reporting requirements

e. Opportunities for women and youth

Yemen has the lowest index GGI in the world. Thus, any involvement with women requires high level of cultural and religious sensitivity. Paradoxically the conflict results in certain opportunities as women currently have responsibilities and roles which were unthinkable before, and that's somehow a trend. Nevertheless, despite this and interest of women in participation, women involvement can be controversial. In general to guarantee sustainability given Yemen's particularities, supporting local level governance and particularly civil society and community engagement is one of the main goals of the project.

Women

- Participation in Water management at all levels
- Water users association and locally based resource involvement and decision taking (similar as in Sanaa basin project)
- Natural resource management
- Agricultural processing/transformation and value chain (date processing, fruit drying)
- Adaptation to CC, DRR and community response to CC related risk
- Female culturally accepted vocational training
- Community engagement principles for self-management
- Livelihood skills building

Youth:

- water management
- Natural resource management
- Permaculture (principles, rotation, forestry, soil, Carbon/Nitrogen cycle, resistant and climate adapted crops)
- Vocational training (Masonry, irrigation, plumbing, mechanics)
- Cash for work
- Adaptation CC and risk reduction (principles CC, risks, adaptation responses, response to CC related hazards and events).