THE KINGDOM OF MOROCCO
MINISTRY OF AGRICULTURE, FISHERIES, RURAL DEVELOPMENT, WATER AND FORESTS

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

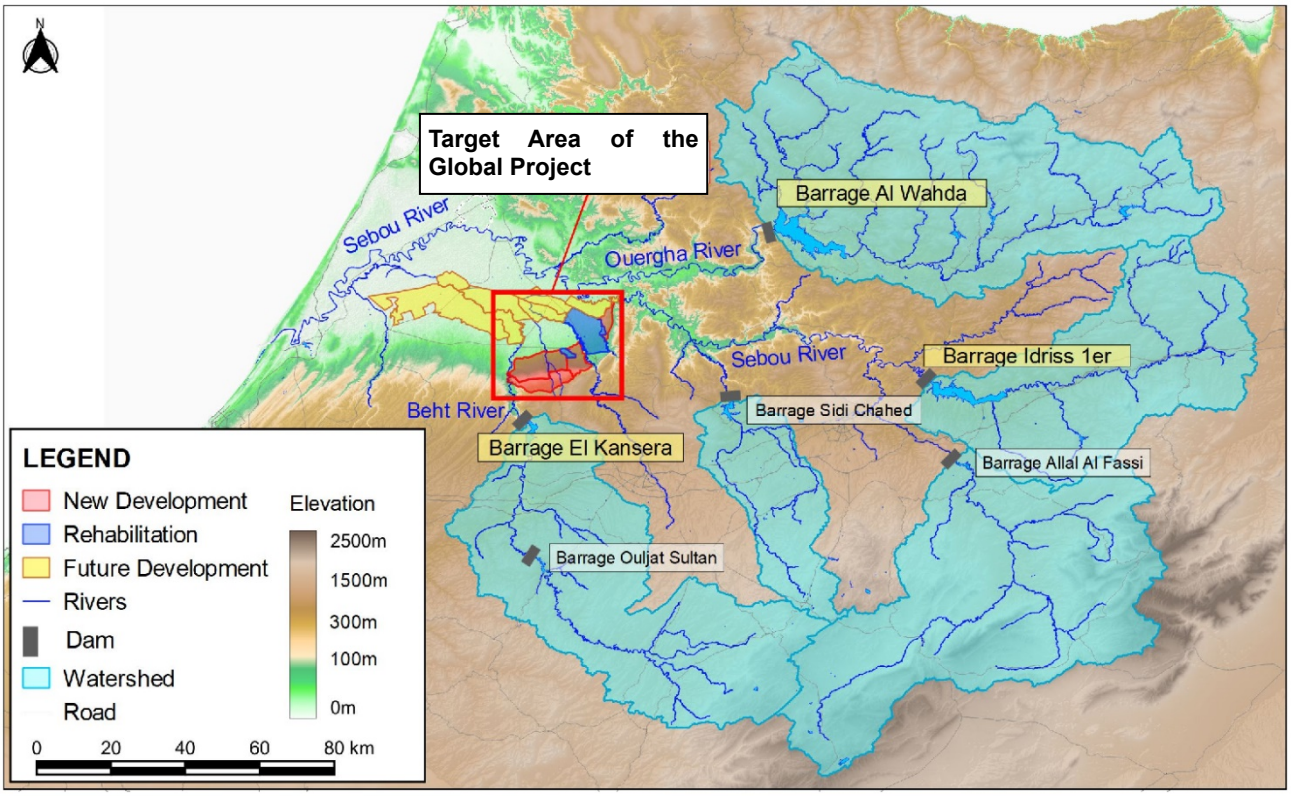
MAIN CANAL DEVELOPMENT PROJECT AND BRANCH CANAL DVELOPMENT PROJECT UNDER GLOBAL PROJECT FOR THE HYDRO-AGRICOLE DEVELOPMENT IN THE SOUTH EAST ZONE OF GHARB PLAIN IN THE KINGDOM OF MOROCCO

March 2024

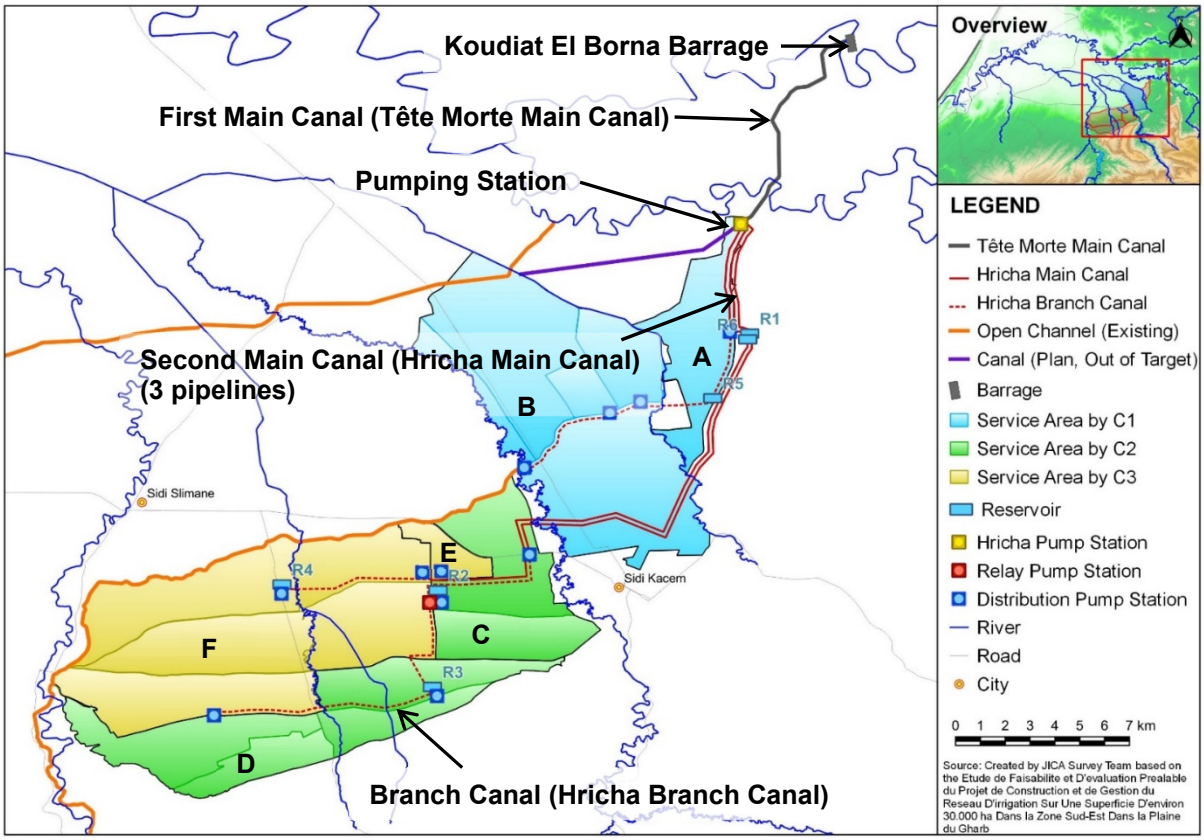
DIRECTION OF IRRIGATION AND DEVELOPMENT OF AGRICULTURAL SPACE (DIAEA)

OFFICE REGIONAL DE MISE EN VALEUR AGRICOLE DU GHARB (ORMVAG)

LOCATION MAP OF THE GLOBAL PROJECT



TARGET AREA OF THE GLOBAL PROJECT AND MAIN FACILITIES



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ACRONYMS AND ABBREVIATIONS

ABH	Water Basin Agency (Agence du Bassin Hydraulique)
ABHS	Water Basin Agency Sebou (Agence du Bassin Hydraulique de Sebou)
ADA	Agency for Agricultural Development (Agence pour le Développement Agricole)
AGR	Network Management Districts (Arrondissement de Gestion des Réseaux)
ANCFCC	National Agency for Land Conservation, Cadaster and Cartography (Agence Nationale de la Conservation Foncière, du Cadastre et de la Cartographie)
APD	Detailed Study (Avant Projet Détaillé)
APS	Summary Study (Avant Projet Sommaire)
AUEA	Agricultural Water Users' Association (Associations d'Usagers des Eaux Agricole)
BOD	Biochemical Oxygen Demand (Demande Biochimique en Oxygène)
CDA	Agricultural Development Center (Centre de Développement Agricole)
CGR	Irrigation Network Management Center (Centre de Gestion des Réseaux)
COD	Chemical Oxygen Demand (Demande Chimique en Oxygène)
CP	Counterpart (Homologue)
DD	Detailed Design (Conception Détaillée)
DDA	Department of Agricultural Development (Département du Développement Agricole)
DGH	General Directorate of Water (Direction Générale de l'Hydraulique)
DGR	Department of Management of Irrigation and Drainage Network (Département de la Gestion Réseau d'irrigation et Drainage)
DIAEA	Direction of Irrigation and Development of Agricultural Space (Direction de l'Irrigation et de l'Aménagement de l'Espace Agricole)
DO	Dissolved Oxygen (Oxygène Dissous)
DPA	Provincial Directorate of Agriculture (Direction Provinciale de l'Agriculture)
DRA	Regional Directorate of Agriculture (Direction Régionale de l'Agriculture)
EC	Electric Conductivity (Conductivité Electrique)
EIA	Environmental Impact Assessment (Evaluation de l'Impact Environnemental)
FAO	Food and Agriculture Organization of the United Nations (Organisation des Nations unies pour l'alimentation et l'agriculture)

FS	Feasibility Study (Etude de Faisabilité)
GDP	Gross Domestic Product (Produit Intérieur Brut)
GHG	Green House Gas
GIS	Geographic Information System (Système d'Information Géographique)
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (Agence Allemande de Coopération Internationale)
GL	JICA Guideline (Lignes directrices de la JICA)
GOJ	Government of Japan (Gouvernement du Japon)
GOM	Government of Morocco (Gouvernement du Maroc)
IBA	Important Bird and Biodiversity Area (Zone importante pour la conservation des oiseaux et de la biodiversité)
ICT	Information and Communication Technology (Technologies de l'Information et de la Communication)
IDAEA	Departemnt of Irrigation and Development of Agricultural Space (Direction de l'Irrigation et de L'Aménagement de l'Espace Agricole)
IFAD	Implementation Fund of Agriculture Development (Fonds International de Développement Agricole)
IUCN	International Union for Conservation of Nature (Union Internationale pour la Conservation de la Nature)
IsDB	Islamic Development Bank (Banque Islamique de Développement)
JICA	Japan International Cooperation Agency (Agence Japonaise de Coopération Internationale)
KBA	Key Biodiversity Area (Zone Clés pour la Biodiversité)
KfW	Kreditanstalt für Wiederaufbau (Institut de Crédit pour la Reconstruction)
L/A	Loan Agreement (Accord de Prêt)
LCB	Local Competitive Bidding (Appel d'Offres Local Concurrentiel)
ONCA	National Office of Agricultural Council (Office National du Conseil Agricole)
ONEE	National Office of Electricity and Drinking Water (Office National de l'Electricité et de l'Eau potable)
ONSSA	National Office for Sanitary Safety of Food Products (Office National de Sécurité Sanitaire des produits Alimentaires)
ORMVAG	Office Regional de Mise en Valeur Agricole du Gharb (Office Régional de Mise en Valeur Agricole du Gharb)
PDAIRE	Master Plans for Integrated Water Resources Management (Plan Directeur d'Aménagement Intégré des Ressources en Eau)
PMU	Project Management Unit (Unité de Mise en Œuvre du Projet)

PPP	Public-Private Partnership (Partenariat Public-Privé)
SHM	Stakeholder Meeting (Réunion des Parties Prenantes)
TOR	Terms of Reference (Termes de Reference)
TSL	Two Step Loan (of JICA) Prêt en Deux Temps (de la JICA)
SS	Suspended Solid (Matières en Suspension Totales)
WB	World Bank (Banque Mondiale)

ABBREVIATION FOR PAST STUDY

DD for Tête Morte Main Canal (2023)	Aménagement hydro-agricole de la zone Sud Est du périmètre d'irrigation du Gharb: Etude d'exécution du Lot 1 relatif à l'adduction Oued Ouergha (2023)
FS for Zirara and Zrar Ext (2018)	Étude de faisabilité de l'aménagement hydro-agricole de la zone Zirara et Zrar Extension (2018)
FS for Zrar and Beht Ext (2018)	Étude de faisabilité de l'aménagement hydro-agricole de la zone Zrar et Beht Extension du Gharb (2018)
FS for Beht Est (2018)	Étude faisabilité de reconversion du système d'irrigation gravitaire en irrigation localisée au niveau de la zone Beht Est du Gharb (2018)
FS for the South-East of the Gharb Plain (2023)	Étude de faisabilité et d'évaluation préalable du projet de construction et de gestion du réseau d'irrigation sur une superficie d'environ 30.000 hectares dans la zone Sud-est de la plaine du Gharb (2023)

UNIT CONVERSION

1 pound (lb)	0.454 kg
1 kilogram	2.205 pounds
1 long ton	2,240 pounds
1 metric ton	1,000 kilograms, 2205 pounds
1 Gallon	4.546 litre (based on Imperial gallon)
1 Litre	0.220 Gallon (based on Imperial gallon)
1 inch (in.)	2.540 cm
1 feet (ft.)	30.480 cm
1 meter	3.281 feet
1 kilometer	0.621 mile
1 mile	1.609 kilometers
1 feddan	0.420 ha (60m x 70m), 1.037 acres
1 hectare (ha)	2.381 feddans
1 acre (ac)	0.405 ha
1 hectare (ha)	2.471 acre
1 Milliard	One thousand millions; equivalent to U.S. billion

CURRENCY EQUIVALENTS（AS AT NOVEMBER 2023）

1 EUR	=	158.203 Japanese Yen (TTB)
1 US$	=	149.419 Japanese Yen (TTB)
1 MAD	=	14.7213 Yen (TTS)
1 EUR	=	10.7465 MAD
1 US$	=	10.1499 MAD

MOROCCO FINANCIAL YEAR

January 1 to December 31

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1. RATIONALE AND SETTING-UP OF THE ENVIRONMENTAL IMPACT ASSESSMENT

Morocco's climate is characterized by inter-annual and inter-seasonal irregular rainfall and is also affected depending on locations such as river basins and or mountainous areas. . Agriculture in Morocco is subject to a very restrictive rainfall regime, characterized by insufficient and poorly distributed rainfall causing water deficits that are detrimental to crop productivity and the regularity of harvests. In this climatic context, water management through irrigation has always been a necessity in order to intensify agricultural development, guarantee food security, circumvent the strong constraint of aridity and cope with climatic hazards.

In this climatic context, water management through irrigation has always been a necessity in order to intensify agricultural development, guarantee food security, circumvent the strong constraint of aridity and cope with climatic hazards.

In recent years, the Kingdom of Morocco (hereinafter referred to as “Morocco”) has experienced unstable rainfall and reduced precipitation due probably to climate change, which has increased the frequency and intensity of droughts and heat waves. For example, due to the 2019/2020 drought, major cereal production in 2020 was reported to have fallen by about 50% from the 2016-2020 average. Further, rising temperatures and dry weather are expected to further increase pressure on limited water resources, requiring efficient and sustainable use of water resources and thereby stabilization of agricultural production.

The development of irrigation by 2030 is in line with the national agricultural strategy Green Generation 2020-2030 and the water sector strategy 2009-2030 presented to His Majesty the King and adopted by the Government.

The long-term national development strategy reviewed in 2019, “The New Development Model (2021-2035),” emphasizes the importance of improving food security, taking into account the stabilization of agricultural production against climate change, and also more efficient use of limited water resources. In addition, National Drinking Water Supply and Irrigation Program 2020-2027 identifies “Modernization of irrigation systems and increasing the value of irrigation water” as a priority measure. The program, in particular aims to introduce water-saving irrigation to 60% of all irrigated farmland by 2030 (as of 2019, it is at 50%)

In this context, the Government of Morocco has developed an irrigation development project (the irrigation development project is henceforth referred to as “the Global Project”) for the Gharb region[1], which belongs to one of the most water-rich watersheds in Morocco. Gharb region has great potential in irrigation with 224,000 ha considered irrigable, yet 110,000 ha is still underdeveloped[2] with irrigation facilities. The Global Project is a part of the National Drinking Water Supply and Irrigation Program 2020-2027, including the modernization of obsolete irrigation facilities and the development of new irrigation areas. The objective of the Global Project is to improve the efficiency of water use and to increase and stabilize agricultural production by updating and newly constructing irrigation facilities in the Gharb region, thereby contributing to the promotion of agricultural development and adaptation to climate change in the Country

Under the Global Project, constructions of the main canals, the branch canal and the irrigation network are proposed (the series of constructions is referred to as “the projects”). Those construction works can cause environmental and social impacts; therefore, the expected impacts of the projects are to be examined. This report has been elaborated based on the results of an Environmental Impact Assessment

[1] The Gharb region here refers to the area in the Sebou River basin centered on the Gharb plain, which is under the jurisdiction of ORMVAG. Administratively, it is included in the Provinces of Sidi Kasem, Sidi Slimane, and Kenitra.

[2] Update of Master Plans for Integrated Water Resources Management (2018)

(EIA) for the projects implemented under the Global Project (Except for the project of the irrigation network). The report examines measures to mitigate any adverse effects and can encourage the stakeholders and the public to manage the expected environmental impacts, of the Global Project. The report assesses environmental items such as air quality, water quality, biodiversity, noise/vibration, social impacts and so on, aiming to ensure the projects are environmentally sustainable and comply with laws/regulations in Morocco as well as the JICA Guidelines for Environmental and Social Considerations.

2. SCOPE OF THE GLOBAL PROJECT

2.1 General Information of the Global Project

The Global Project is to provide irrigation water to the 30,000 ha by means of water intake at the Koudiat El Borna Barrage, which is under the construction by the Ministry of Equipment and Water as of March 2024. The Global Project consists of four projects, (1) the First Main Canal (Tête Morte Main Canal), (2) the Second Main Canal (Hricha Main Canal), (3) the branch canal (Hricha Branch Canal), and (4) the irrigation network to be constructed in the command area of 30,000 ha. Those projects, namely, (1), (2), (3) and (4) are shown in the following figure in the black line, red line, red dots and Areas A, B, C, D, E and F, respectively. Both of the projects (1) and (2) will be financed by JICA. The command area consists of approximately 10,000 ha of existing irrigation area and around 20,000 ha of new irrigation area. The First Main Canal (Tête Morte Main Canal) will irrigate 42,000 ha of farmland, which is located on the western part of Gharb, in the future. Still, the area is not included in the Global Project.

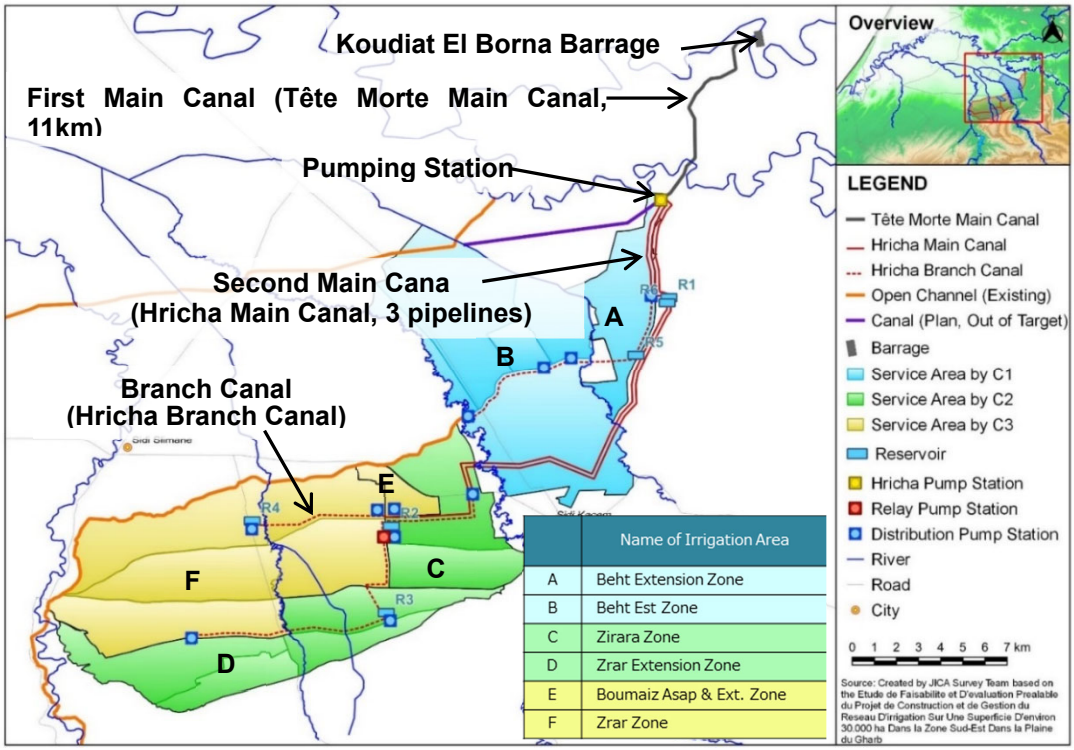


Figure 2.1 Construction Works Planned in the Target Area of the Global Project

Source: prepared by JICA research team based on FS report (2018, ORMVAG)

The four projects of the Global Project and their main facilities to be constructed are listed in Table 2.1. The expected environmental impacts of these projects except construction of the irrigation network are assessed in this EIA report.

Table 2.1 List of Construction Works to be Implemented by Each Project under the Global Project

Project		Construction Works
1	Construction of the First main canal (Tête Morte Main Canal)*	Intake Facilities
		Main Canal (11km)
2	Construction of the Second Main Canal (Hricha Main Canal)*	Pump Station
		Main Canal (total 58.3km)
		Regulation Pond
3	Construction of the Branch Canal (Hricha Branch Canal)	Branch Canal (total 32.8km + 6.2km)
		Relay Pump Station
		Regulation Ponds
4	Construction of the Irrigation Network	Distribution Pump Station
		Irrigation Distribution Network

*Collectively titled the JICA Financed Project as "The Project for Hydro-Agriculture Development in the South-East Zone of Gharb Plain" Source: JICA Survey Team (2022)

2.2 Project of Construction of the First Main Canal (Tête Morte Main Canal) and the Second Main Canal (Hricha Main Canal)

The project of the construction of the First Main Canal (Tête Morte Main Canal) consists of intake facilities and one line of culverted canal with siphon crossing the Sebou River, while the Second Main Canal (Hricha Main Canal) consists of pipelines entirely. The details of those main facilities to be constructed are as follows:

(1) The First Main Canal (Tête Morte Main Canal)

- ✓ Intake Facilities:
  - ➢ Intake Structure: opening width 4.0m x height 2.5m x 4 nos
  - ➢ Sedimentation pond: width 55m x length 110m x height 4.6-5.6m x 2 nos (water depth 4.0m, sedimentation depth: 1.0m)
- ✓ Tête Morte Main Canal
  - ➢ Canal: design flow 60.0m^3/s, 11.4km, related facilities
  - ➢ Reinforced concrete box culvert: width 3.5m x height 4.3-5.6 x 3 nos x 2 lines
  - ➢ Siphon (Crossing the Sebou River): φ2.8m x 6 sets x 97.5m
  - ➢ Siphon shaft: width 17.5m x 7.2m x depth 16.5m x 4 sets
  - ➢ Regulation pond (at the endpoint of Tête Morte Main Canal): 372,000 m^3
  - ➢ Maintenance road: width 6.0m

(2) The Second Main Canal (Hricha Main Canal)

- ✓ Hricha Pump Station
  - ➢ 3 pump stations
  - ➢ Line 1: pump Q 8.98m^3/s, total head 40m (C1, Beht Est and Beht Ext.)
  - ➢ Line 2: pump Q 6.31m^3/s, total head 50m (C2, Zirara and Zrar Ext.)
  - ➢ Line 3: pump Q 8.34m^3/s, total head 52m (C3, Boumaiz and Zrar)
- ✓ Hricha Mian Canal
  - ➢ Line 1 (C1): 5.5km, φ2.6m*
  - ➢ Line 2 (C2): 23.7km, φ2.4m*
  - ➢ Line 3 (C3): 29.1km, φ2.6m*
  - ➢ Control and monitoring system: 1 LS
- ✓ Regulation Pond
  - ➢ R1 (at 6.2km from the starting point of Line 2, 36,500m^3)
  - ➢ R6 (at 6.2km from the starting point of Line 3, 45,100m^3)

2.3 Project of Construction of the Branch Canal (Hricha Branch Canal)

The project of construction of the branch canal (Hricha branch canal) consists of the Hricha Branch Canal, relay pump station and regulation basins. Anticipated environmental impacts by the project are discussed in the EIA report. The details of main facilities of the project are as follows:

- ✓ Hricha Branch Canal (total 32.8km + 6.2km)
  - ➢ Line 1 (C1): 5.5km, φ2.6m
  - ➢ Transforming to pipeline: 6.2km of the Beht MC from the connecting point with Line 1 (C1), φ2.4m x 4.0km, φ2.2m x 2.2km
  - ➢ Line 2 (C2): 21.2km, φ2.2m x 5.9km, φ2.0m x 6.0km, φ1.5m x 9.3km
  - ➢ Line 3 (C3): 6.1km, φ2.2m x 6.1km
- ✓ Relay pump station
  - ➢ 1 station (at 29.6km from the starting point of Line 2 (C2), 4.16m^3/s, total head 85m)
- ✓ Regulation ponds
  - ➢ R2: at 23.7km from the starting point of Line 2, 23,400m^3
  - ➢ R3: at 29.6km from the starting point of Line 2, 57,000m^3
  - ➢ R4: at 35.2km from the starting point of Line 3, 1,000m^3
  - ➢ R5: at 8.5km from the starting point of Line 1, 48,100m^3

2.4 Project of construction of the Irrigation network Distribution Pump Station

- ✓ Distribution Pump Station
  - ➢ 16 pump stations in total (Zirara: 2 stations, Zrar Ext.: 4 stations, Zrar: 5 stations, Boumaiz: 1 station, Beht Ext.: 1 station, Beht Est: 3 stations)
- ✓ Irrigation Distribution Network
  - ➢ Pipeline network: total 497.4km
  - ➢ Zirara: 41.1km (φ0.09m-1.2m)
  - ➢ Zrar Ext.: 76.4km (φ0.09m-1.2m)
  - ➢ Boumaiz ASAP & Ext.: 7.5km (φ0.11–0.6m)
  - ➢ Zrar: 200.4km (φ0.09m-1.2m)
  - ➢ Beht Ext.: 43.3km (φ0.09m-1.3m)
  - ➢ Beht East 128.7km (φ0.09m-1.4m)

The environmental impacts by the project of the irrigation network construction are not assessed in this report, since the final alignment will be determined after the farmers' irrigation water contracts have been finalized.

2.5 Derivative, Secondary and Cumulative Impacts

It is needed to confirm the possibility of derivative, secondary and cumulative impacts for any JICA

funded projects. Definitions of those impacts are shown below. Considering the definitions, it is judged that the projects would not cause derivative and secondary impacts. On the other hand, water intake at Koudiat El Borna Barrage is not 24m^3/s, for the Global Project, but maximumly 60 m^3/s for the area to be developed in the future. Therefore, it is needed to assess expected cumulative environmental impacts on the downstream area. The Chapter discusses such cumulative impacts by the water intake of 60 m^3/s. Especially, "8. Environmental Examination" describes the expected environmental and social impacts by the water intake of 60 m^3/s in detail. Various impacts such as those on hydrology, resettlement, land acquisition and so on are anticipated and those evaluation items are presented with check marks (✓) in Table 8.1 and Table 8.2.

Box-1：Definition of derivative, secondary impacts in JICA projects

If some unexpected environmental impacts due to a project, which is implemented resulting from a JICA project implementation, are caused in the future and/or in other areas, such impacts are regarded as "derivative and secondary impacts".

Box-2：Definition of cumulative impacts in JICA projects

If any 1) on-going development activities and/or planned activities at the timing of identification of environmental risks and impacts, such as scoping, and/or 2) planned development projects, cause additional environmental impacts on the target area and/or its natural resources by a JICA project, or, planned development activities and other reasonably recognizable development activities cause environmental impacts on the target area and its natural resources by a JICA project, those impacts are regarded as cumulative impacts.

3. CURRENT ENVIRONMENTAL CONDITIONS

3.1 Natural Environment

1) Meteorological Conditions

The target area of the Global Project is located in the northern part of Morocco, which enjoys rich rainfall compared to other areas in the Country. According to the rainfall record of Zirara Station in the target area of the Global Project, it rains intensively from November to March generally, which accounts for 70% of annual rainfall (see Figure 3.1). It is noted that rainfall varies yearly depending on the timing of start/end of rainy season, 200mm-700m (see Figure 3.2), while mean rainfall is 413mm in 1979-2015. Although the annual precipitation at Zirara observatory has not shown any long-term trend of increase or decrease during the observation period, the overall trend of Morocco is toward a decrease in rainfall, also, the decrease in water resources has already been identified according to the observation records.

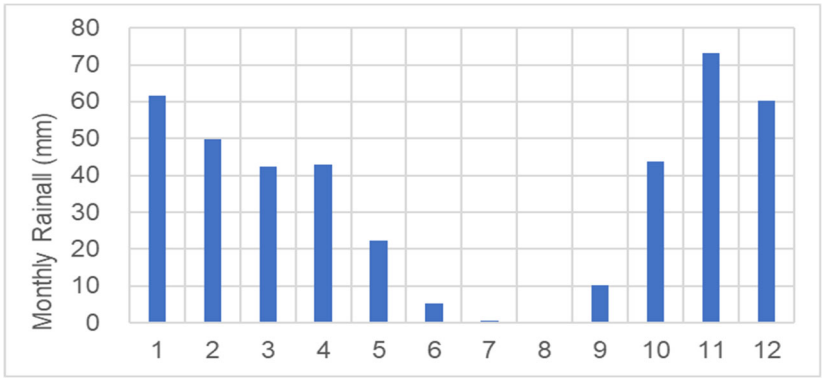


Figure 3.1 Monthly Precipitation (Zirara Station: September 1979 – August 2015)

Source: FS Report (ORMVAG 2022)

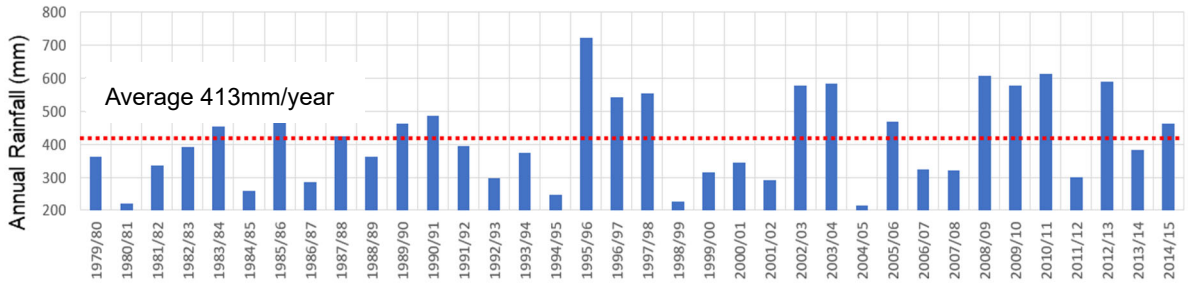


Figure 3.2 Annual Rainfall Distribution (Zirara Station: 1979-2015)

Source: FS Report (ORMVAG, 2022)

Regarding temperature, as illustrated in Figure 3.3, mean annual temperature in Morocco has been increased by 0.9℃ compared to that in 1960s according to "the Country Profile: Morocco (World Bank 2021)". Especially, in April-June, 0.34 ℃ per 10 years has been increased.

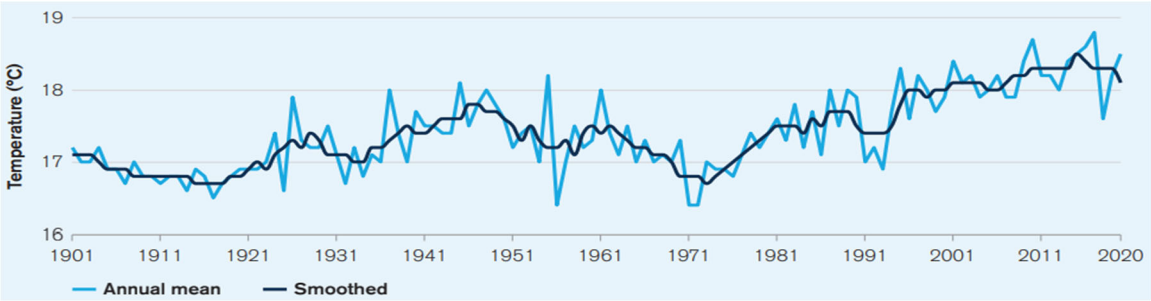


Figure 3.3 Trend of Annual Temperature (Average in Morocco: 1901 to 2020)

Source: World Bank (2021)

2) Topography and Geological Conditions

The target area of the Global Project is located in the eastern part of the Gharb Plain. It is flat terrain ranging from E.L.20m to 80m with moderate hills in the southeast, namely, Zrar Extension Zone and, reaches to EL.180 m at maximum (see Figure 3.4). In the Gharb Plain, Sebou River and its tributaries, Ouergha, Beht, Rdom, and Tihili Rivers, which are originated by the Rif Mountains and Middle Atlas Mountains, flow down in the Gharb Plain from the southeast to the northwest, finally, reaches the North Atlantic Ocean.

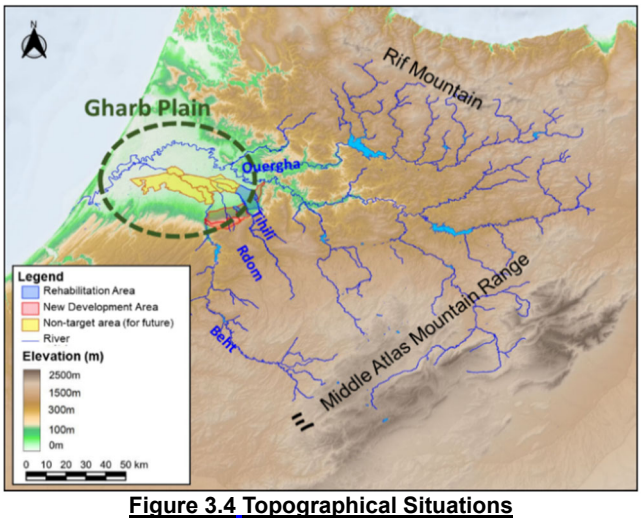


Figure 3.4 Topographical Situations
Source: SRTM and ORMVAG (2022)

The Neogene Pliocene to Quaternary Holocene strata that form the Gharb Plain are clastic and marine deposits formed by the Sebou River watershed. The stratum in Holocen is composed of silt and clay mainly, partially interbedded sandy layers, which form shallow groundwater aquifers. The strata in Pliocene and Pleistocene are observed in the lower part, while the main sandstone and conglomerate are observed in the deep subterranean aquifer. The basement rock is Miocene/marl, which is impermeable, and thus forms an aquifer overlying the upper sandstone and conglomerate. Miocene to Pleistocene sandstone and marl are distributed in the shallow part of the target area of the Global Project, and basement rock can be observed on the adjacent hills from the southeast to the northeast.

3) Hydrological Conditions

According to "Country Climate and Development Report" (WB, 2022), it is estimated annual water resource from 1979 to 2018 in the Country is approximately 15 billion cubic meters on average. According to ABHS (2023), the Sebou River basin, where the target area of the Global Project is located, has an average annual water volume of 4.835 billion meters from 1939 to 2016, about 1/3 of the national annual water volume. The target area of the Global Project, which draws water from the Ouergha River, a tributary of the Sebou River, enjoys one of the richest water resource areas in Morocco.

The water source for the Global Project is planned to depend on Al Wahda Dam, which is located on the Ouergha River, one of the tributaries of Sebou River. The dam was constructed in 1996 for multipurpose, namely, flood control, hydropower, drinking water supply and irrigation. It is the largest dam in Sebou River basin. Main dam sites and water reservoirs in the basin are illustrated in Figure 3.5 and Table 3.1.

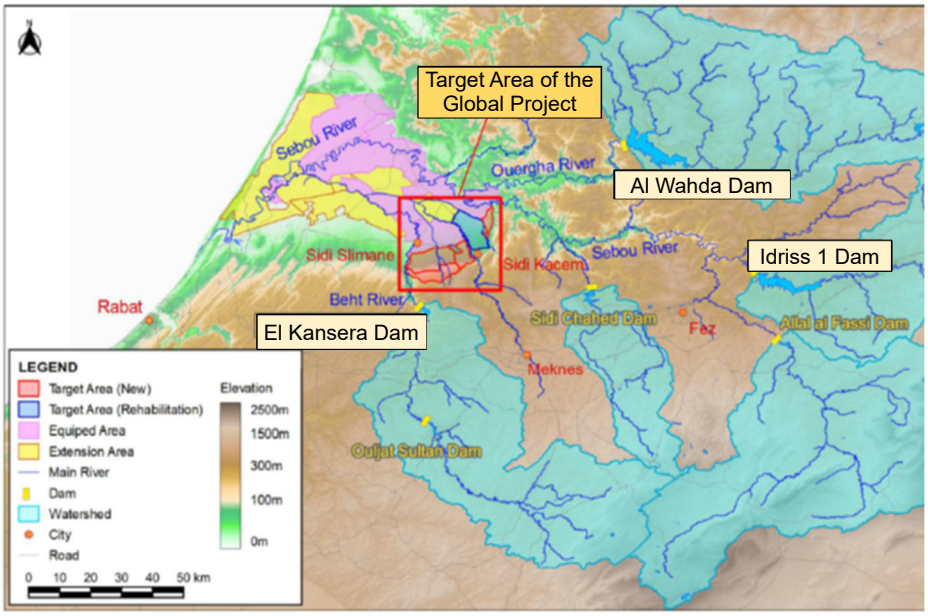


Figure 3.5 Main Dam Sites and Reservoirs in Sebou River Basin

Source: SRTM and JICA Survey Team (2022)

Table 3.1 Specification of Main Dams in Sebou River Basin

Dam	River	Basin Area	Year of Construction	Water Storage Capacity	Remarks
Al Wahda *1	**Ouergha**	**6,190km²**	**1996**	**3,730 MCM**	**Water resources of the existing irrigation area and new irrigation command area**
Idriss 1er *1	**Inaouen**	**3,330km²**	**1973**	**1,186 MCM**	**For irrigation, hydropower, and flood control**
El Kansera *2	Beht	4,542km²	1935	266 MCM	Water resources of the rehabilitation area of irrigation
Ouljat Sultan *3	Beht	2,473km²	2017	510 MCM	A dam for flood control and is located on upstream of El Kansera dam
Sidi Chahed *1	Mikkes	1,415km²	1997	153 MCM	For water use in urban areas and irrigation
Allal El Fassi *2	Sebou	5,400km²	1990	81 MCM	Hydropower dam

Source *1: Developed by the JICA Survey Team based on the data by ABHS (2023)

Source *2: Maria Snoussi and Souad Haida、2002、Effects of the construction of dams on the water and sediment fluxes of the Moulouya and the Sebou Rivers, Morocco

Source*3:https://energiemines.ma/le-barrage-ouljet-es-soltane-sur-le-sebou/, Ali Essahlaoui、2019、Assessment of Soil Erosion by (Rusle) Using Remote Sensing and GIS Case of Watershed of Beht in Upstream of Ouljat Sultan Dam (Morocco)

Water discharge of Sebou River has been changed depending on the year as illustrated in Figure 3.6. As mentioned before, Sebou River discharge is controlled by many dams, however, annual discharge has varied drastically, from 400Mm^3 to 10,000Mm^3. In fact, after 1972, the river discharge has decreased severely. Mean discharges in 1973-2009 in Ouergha River and Sebou River have decreased by 21% and 23%, respectively compared to those in 1939-2009 as shown in Table 3.2. Given that recent water storage volumes of dams in Morocco show a trend of decrease in general, it can be thought that droughts, which are observed more frequently and longer than before, are the cause of such discharge decreases.

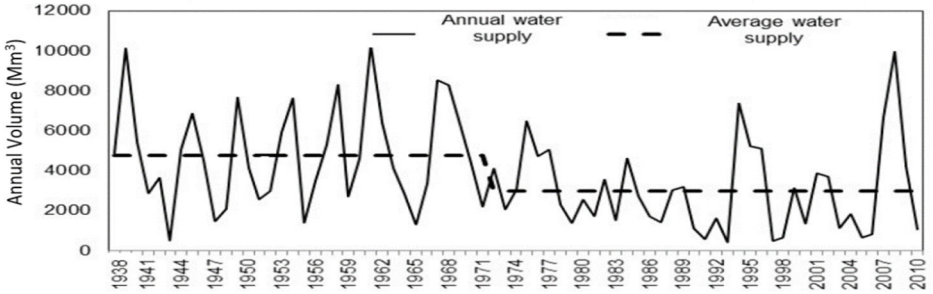


Figure 3.6 Fluctuation of Annual Discharge of Sebou River (1938-2010)

Source: World Bank, 2015, noted that original data is provided by ORMVAG

Table 3.2 Mean Discharge of Ouergha River and Sebou River

River	Mean Discharge (m^3/s)		Annual Discharge (Mm^3)		Decreasing and increasing ((a)/(b))
	(a) 1939-2009	(b) 1979-2009	(a) 1939-2009	(b) 1979-2009	
Ouergha	85.45	67.70	2,696	2,136	-21%
Sebou	157.97	122.20	4,984	3,856	-23%

Source: Sebou River Basin Development Master Plan (ABH 2011)

There are two Ramsar sites, namely, Sidi-Boughaba and Merja de Fouwarate downstream of the Sebou River basin. The seasonal change of water body areas of those Ramsar sites and rainfall identified in the satellite map is shown in Figure 3.7. The inundated area in Merja de Fouwarate is not changed seasonally and drastically, while that in Sidi-Boughaba is increased in winter, namely, rainy season, and decreased in summer clearly. However, the water resources of those Ramsar sites are neither Ouergha River nor Sebou River, thus it is thought that negative impacts on them are not expected.

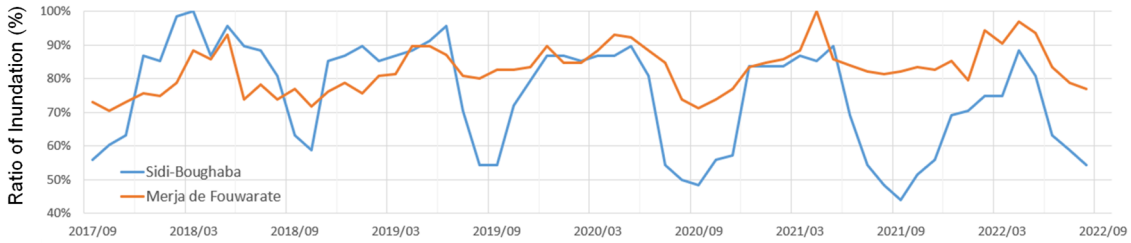


Figure 3.7 Fluctuation of Inundated Area of the Ramsar Sites

Noted the maximum area in 2017-2022 is set as 100%

Source: Developed by the JICA Survey Team Based on Sentinel 2 (ESA)

4) Water Quality

ABHS implements a series of water quality tests of surface water, and groundwater in both summer and winter seasons once per several years. In Morocco, surface water and groundwater are categorized into 5 classes from "Excellent" to "Poor" in terms of intended purpose based on water quality as shown in Table 3.3.

Table 3.3 Water Quality Categorization of Surface Water and Groundwater

Category	Purpose		
	Drinking Water	Irrigation	Others
Excellent	Usable	Usable	-
Good	Usable by simple water treatment	Usable	-
Average	Usable by advanced water purification and germicidal treatment	Usable	-
Poor	Non-usable	Usable only for some crops	For cooling
Very Poor	Non-usable	Non-usable	Non-usable for most of cases

Source: Water Resource Master Plan (ABHS 2011)

According to the water quality results by ABHS, it is possible to judge that surface water and groundwater in the basin of Ouergha River and Sebou River have following characteristics:

4.1) Surface water

- ✓ River water close to urban cities especially, Méknes, Féz, and Sefrou, is polluted, showing "Poor" to "Very Poor". It is said that such pollution is caused by industrial wastewater, mainly from sugar production factories, tanning factories, oil refining factories, paper mill factories, and meat processing factories. The phenomena indicate that advanced wastewater treatment and strict management in the treatment are necessary.
- ✓ Electrical Conductivity (EC) value of Sebou River is 2,000-2,500µS/cm in winter, which is categorized as "Average", while EC in summer is 900µS/cm, categorized as "Good". On the other hand, EC value of Ouergha River in winter is 1,460µS/cm, categorized as "Average", while EC in

summer is 810μS/cm "Good", which is suitable for irrigation water. The reason for high EC in winter is probably due to leaching of pre-Lif Hill containing saline base by floods.

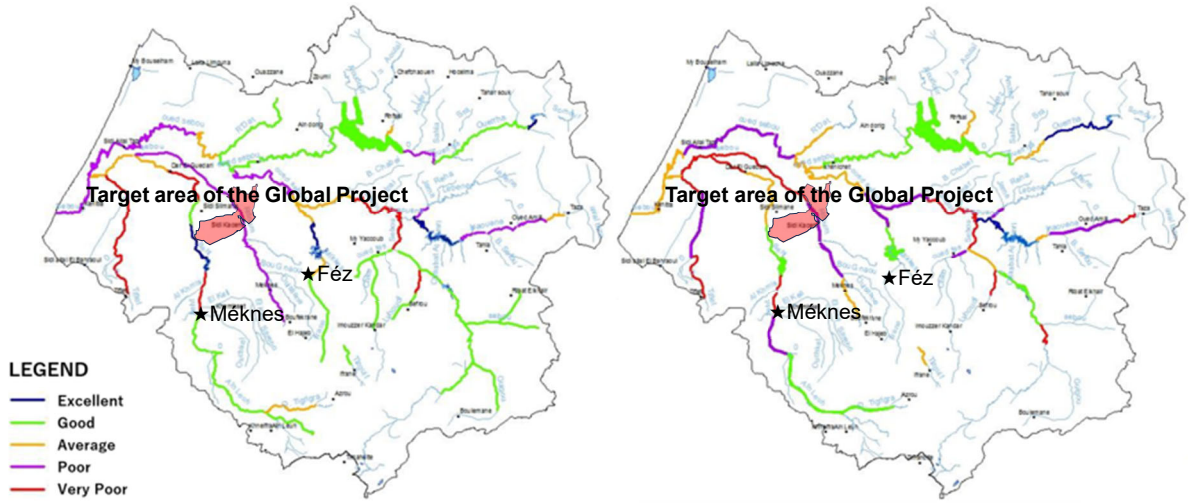


Figure 3.8 Water Quality of Surface Water in 2013 (Left: March-May, Right: August-October)
Source: ABHS (2022)

4.2) Groundwater

✓ In the Sebou River basin, there are 131 points of test holes and wells. In terms of water quality, 47% of them are classified as "Poor" or "Very poor" in the study in 2013 (see Figure 3.9). Except for one hole, the main cause of pollution is the inflow of nitrogen ($N\text{-}NH_4^+$) by application of fertilizer and contamination of domestic wastewater.

✓ The same trend is observed in the target area of the Global Project also, and the cause is mainly due to dissolution of fertilizers into groundwater, which results in groundwater quality deterioration, categorized as "Average" to "Very poor". It is reported that the deterioration is caused by excessive fertilizer application, especially, in case of gravity irrigation. Therefore, in terms of water quality conservation, it is recommended to disseminate drip irrigation, one of water-saving irrigation systems. It is possible to apply the minimum required fertilizer for crops by using drip irrigation, which can mitigate groundwater pollution.

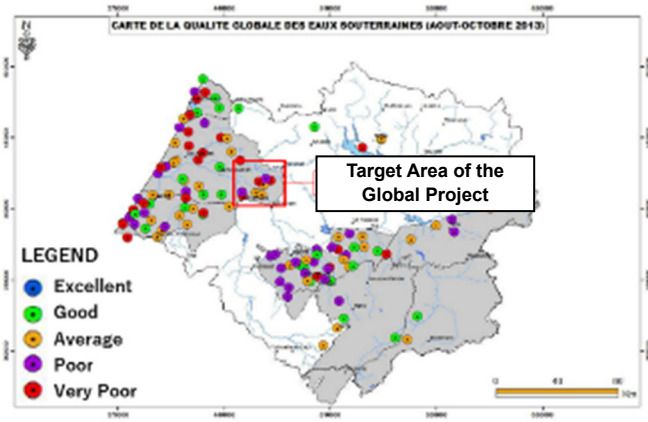


Figure 3.9 Groundwater Quality (Aug-Oct. 2013)
Source: ABHS (2022)

5) Land Use

Most of the approximately 30,000 ha of land in the target area of the Global Project has been already developed for agricultural purpose as illustrated in Figure 3.10, and 95.1% of the land, namely, 27,537 ha, is used for farming. The downstream of the Sebou River basin has suffered from flood three times per five years in the past. However, agriculture has been operated in the area by using abundant water resources despite the flood damage.

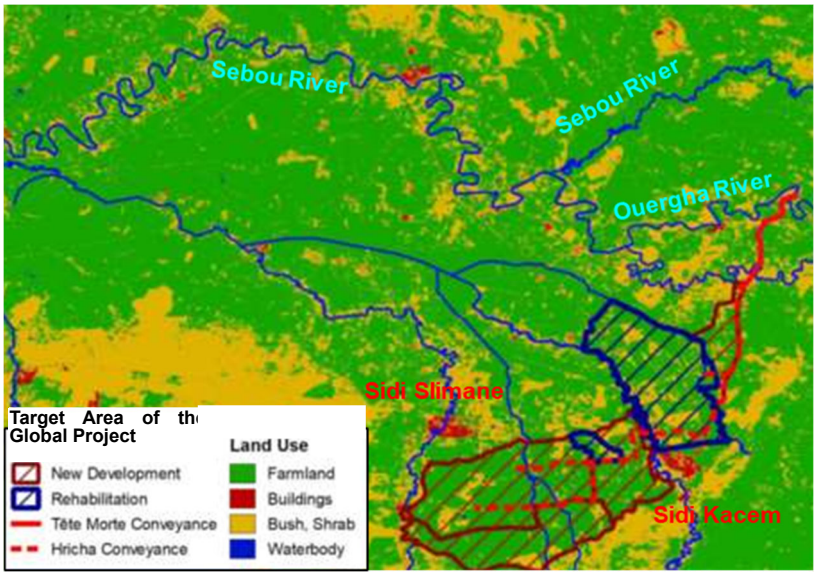


Figure 3.10 Target Area of the Global Project and Land Use in the Downstream of Sebou River
Source: Global Land Cover Map ver.3 (ESA)

In this area, large-scale irrigation development such as dam construction, especially, since Al Kansera dam was constructed for flood control, and drainage improvement in 1927. Moreover, irrigation development targeting about 250,000 ha over a 25-year period from 1970 to 1996 had been implemented. The three provinces under ORMVAG, namely, Kenitra, Sidi Kacem, and Sidi Slimane have areas of 723,800 ha, while 476,100 ha in the lower Sebou River basin is used as arable land, which accounts for 65.8% of the total area of the three provinces. The food security in Morocco is supported by the grain production in this area, which supplies 70% of the whole country's production.

The areas outside of the wetlands are relatively high in elevation, with natural vegetation such as shrubs and grasslands, in which densely populated areas (towns and villages) such as Kenitra, Sidi Slimane, and Sidi Kacem provinces are located (see the yellow and red areas in the south in Figure 3.10).

Main crops cultivated in the target area of the Global Project are orange, wheat, fodder crops, olive, artichoke, and so on. Especially, orange is widely and intensively cultivated for export purpose to European countries. Center pivot irrigation and drip irrigation system using groundwater are observed in the target area of the Global Project.

Seeding is delayed in the wheat land due to a draught.

Large-scale orange farm

Large-scale olive farm

Photos: Vegetation in and around the Target Area of the Global Project
Source: JICA Survey Team (taken in November 2022)

6) Protected Areas

6.1) National Protected Areas

The Government of Morocco specified protected areas, namely, National Park, Natural Park, Biologic Reserve, Natural Reserve, and Natural Site based on "Law No.22-07 related to protected area". In addition, the Agency for Water and Forest established categories, consisting of Sites of Ecological and Biological Interest (BEIS), Biosphere Reserve. As illustrated in Figure 3.11 and Figure 3.12, the target area of the Global Project is not located on any of the protected areas.

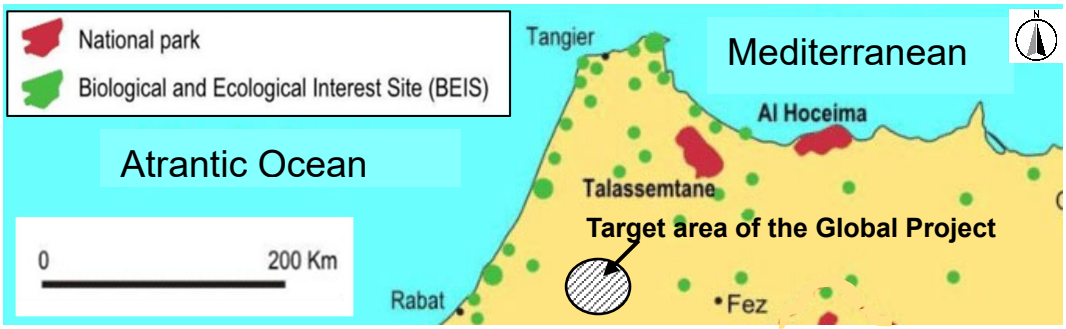


Figure 3.11 National Parks and Biological and Ecological Interest Site（BEIS）

Source: National Agency for Water and Forest

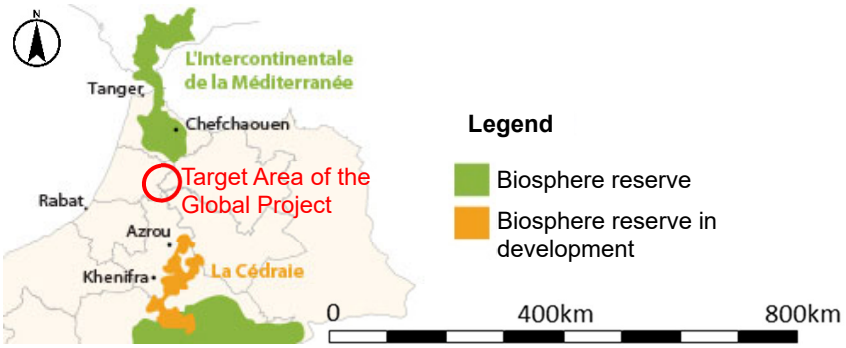
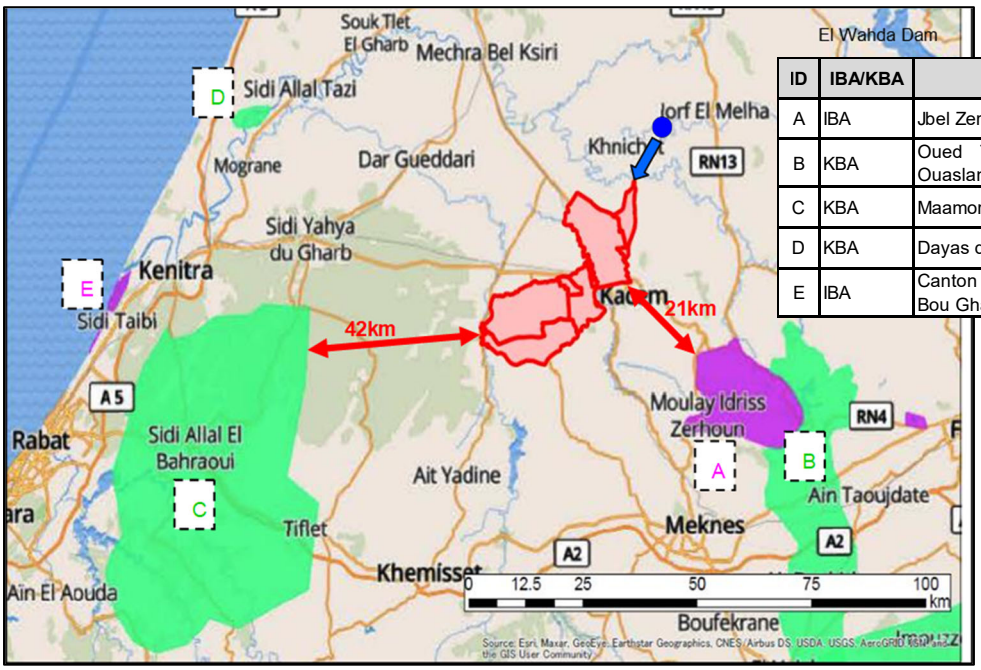


Figure 3.12 Protected Areas around the Target Area of the Global Project

Source: National Agency for Water and Forest

6.2) Important Habitats Internationally

For the "Key Biodiversity Area (KBA)" and "Important Bird Area (IBA)" in the vicinity of the target area of the Global Project, Jbel Zerhoun and Oued Tizguite et Oued Ouaslane are located more than 20 km apart in a straight line to the southeast (see Figure 3.13).



ID	IBA/KBA	Site Name
A	IBA	Jbel Zerhoun
B	KBA	Oued Tizguite et Oued Ouaslane
C	KBA	Maamora
D	KBA	Dayas du Gharb
E	IBA	Canton Forestier de Sidi Bou Ghaba

Figure 3.13 IBA and KBA around the Target Area of the Global Project

Source: Added by JICA Survey Team to Information by IBAT

Merja de Fouwarate and Merja Sidi Boughaba are designated Ramsar wetlands near the mouth of the Sebou River, downstream of the target area of the Global Project (see Figure 3.14). As mentioned above, the wetlands are included in BIESs among the protected areas under the national law, but both sites are located more than 52 km away from the target area of the Global Project in a straight line. It is noted that the Merja Sidi Boughaba Ramsar site overlaps with the Canton Forestier de Sidi Bou Ghaba IBA, and the IBA encompasses the Ramsar site.

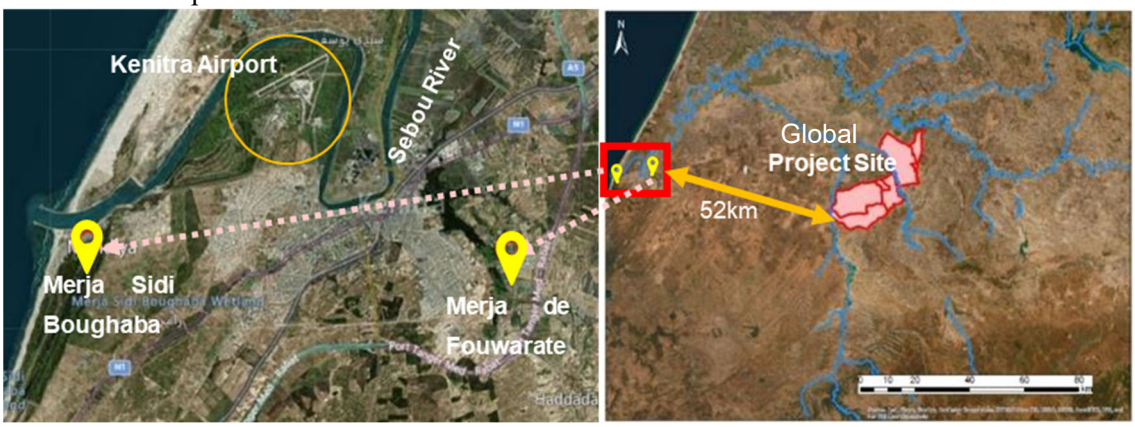


Figure 3.14 Ramsar Site around the Target Area of the Global Project

Source: Prepared by the JICA Survey Team based on the Ramsar Site and IBAT

6.2.1) Merja de Fouwarate[3]

Merja de Fouwarate is the remnant of a large wetland body that once covered the Garb Plain. According to "Integrated Water Resources Master Plan for the Sebou River by ABHS", the area of around 160,000 ha was flooded at that time. Today it is a shallow marsh that serves as a nesting, staging, and wintering area for about 60 species of waterfowl. It is possible to observe a rich bird diversity including White-headed Duck (*Oxyura leucocephala*), an EN (Endangered) species according to International Union of Conservation Nature (IUCN), Marbled Teal (*Marmaronetta angustirostris*) (NT: Near Threatened) species and Ferruginous Duck (*Aythya nyroca*), Black-tailed Godwit (*Limosa limosa*), and Eurasian

[3] Merja de Fouwarate, Ramsar Sites Information Service: https://rsis.ramsar.org/ris/2324

Curlew (*Numenius 15rquata*). According to the Ramsar Site Information Service, the site is located near an urban area in Kenitra Province and has been affected by domestic wastewater and agriculture from the surrounding area for many years.

The water source of Merja de Fouwarate is neither Ouergha River nor Sebou River but is another watershed as illustrated in Figure 3.15. The site has the function to drain surplus water to the Sebou River through a channel to avoid inundation of residential areas and farmland during flood (Figure 3.16). In other words, water intake upstream of the Ouergha and Sebou Rivers for irrigation would not cause negative impacts on this Ramsar Site.

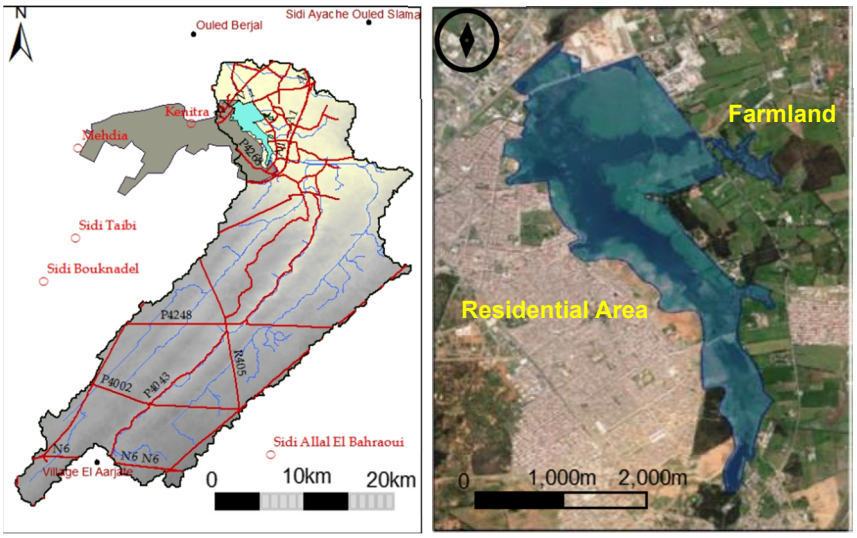


Figure 3.15 Merja de Fouwarate Watershed (Left) and Surrounding Area (Right)

Source: Ramsar

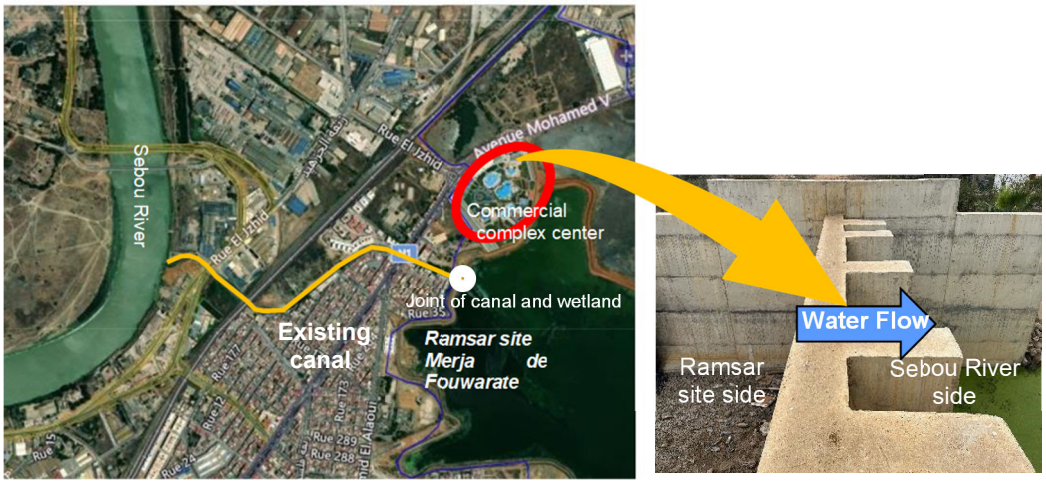


Figure 3.16 Existing Canal Connecting Merja de Fouwarate and Sebou River

Source: Added by the JICA Survey Team on the Satellite Map by Ramsar Sites Information Service
The photo (right), showing the joint between the Ramsar Site and Canal was taken by the JICA Survey Team in Nov. 2022.

6.2.2) Merja de Sidi Boughaba[4]

Merja de Sidi Boughaba is a coastal lagoon consisting of brackish and freshwater areas and surrounded by abundant emerging plants. It is a breeding ground for waterfowl and has a function as a stopover for

[4] Merja de Sidi Boughaba, Ramsar Sites Information Service: https://rsis.ramsar.org/ris/207

migratory birds, including rare species such as Marbled Teal (*Marmaronetta angustirostris*), which is categorized as NT according to the IUCN red list.

As well as Merja de Fouwarate, Merja de Sidi Boughaba is located along Sebou River, which is the water resource of the Global Project (see Figure 3.17). However, the Ramsar site is not supplied with water from Sebou River but receives water from inland groundwater and rainfall. Therefore, limited rainfall during summer season sometimes reduces the water level of the site, which results in drying the lagoon. On the west side of the lagoon, sand dunes covered with Mediterranean shrubs can be seen along the shoreline and are not hydrologically connected to the Sebou River, including groundwater.

Main features of the five KBA and IBA neighboring the Global Project mentioned above are as follows:

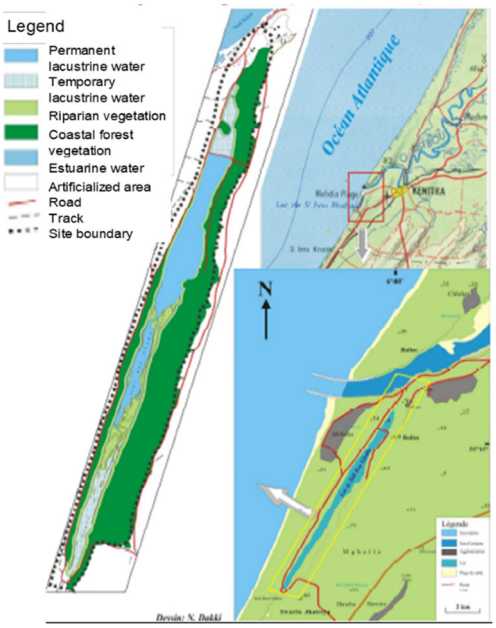


Figure 3.17 Merja de Sidi Boughaba
Source: Ramsar

Table 3.4 Characteristics of IBA/KBA

KBA/IBA	Main Feature
Oued Tizguite and Oued Ouaslane (KBA)	It is located in the Sebou River basin, upstream of the intake point of the Global Project. Water within the KBA shows relatively salinity and highly alkali. Small freshwater area remains partly due to outflow from the dam, with relatively rich eco-system. The KBA includes two lakes, but they are dried more than before by water use in surrounding areas, which leads to decline of animal species.
Maamora (KBA)	Maamora Forest is regarded as the largest lowland oak forests in the world, covering an area of 133,500 hectares, and provides recreational space for residents of the main urban areas. However, there are concerns about the degradation of the forest due to the ongoing development of the surrounding area.
Jbel Zerhoun (IBA)	The IBA contained Moulay Idriss. Various steep valleys and ravines have been formed, creating a spectacular landscape. The average annual rainfall is about 800 mm, and the majority of the area is currently covered with non-native pine forests. The pine plantations are subject to forestry regulations. It serves as recreation area for visitors from nearby cities such as Fez and Meknes.
Dayas due Gharb (KBA)	Two rate plants, namely *Lotus benoistii* and *Pilularia minuta* are identified and it is specified as KBA. It is located downstream of the Sebou River and has already been developed as farmland and residential land.
Canton Forestier de Sidi Bou Ghaba (IBA)	It is specified as both an IBA and a Ramsar site. It is located 500m away from the coastline and on a route of migratory birds. Many birds can be observed, including white-headed duck, Marbled teal, nightjar, wheatear, warblers, and falcons. Pollution from wastewater from surrounding farmland and lowering of the groundwater level due to irrigation by surrounding farmlands are becoming concerns.

Source: Key Biodiversity, https://www.keybiodiversityareas.org/site/factsheet/6489
IUCN, 2019, The conservation status of freshwater species and habitats in Key Biodiversity Areas at the Sebou river basin

7) Ecosystem

Flora and fauna which range in IBAs, KBAs, and Ramsar sites nearby the target area of the Global Project are shown in the following table. 30 rare species of fauna and flora, namely, CR (Critically Endangered), EN (Endangered), VU (Vulnerable), and NT (Near Threatened), are identified according to the category developed by IUCN.

Table 3.5 Flora and Fauna in the Ramsar Sites, KBA and around the Target Area of the Global Project

Name of Protected Area	Taxonomic Group	Scientific Name	Common name	IUCN Category
IBA Jbel Zerhoun	Aves	*Falco naumanni*	Lesser Kestrel	LC
	Reptiles	*Saurodactylus fasciatus*	Banded Toed Gecko	VU
KBA Oued Tizguite et	Actinopterygii	*Cobitis maroccana*	Moroccan spined loach	LC
	Invertebrates	*Calopteryx exul*	Glittering Demoiselle	EN

Name of Protected Area	Taxonomic Group	Scientific Name	Common name	IUCN Category
Oued Ouaslane	Invertebrates	*Giustia midarensis*	NA	EN
	Invertebrates	*Heideella knidirii*	NA	EN
KBA Maamora	Amphibians	*Discoglossus scovazzi*	Moroccan Painted Frog	LC
	Amphibians	*Pelobates varaldii*	Varaldi's Spadefoot Toad	EN
	Plants	*Bellis prostrata*	NA	NT
	Plants	*Elatine brochonii*	Elatine de Brochon	NT
	Plants	*Eryngium atlanticum*	Panicaut Atlantique	NT
	Plants	*Isoetes delilei*	Iberian Quillwort	NT
	Plants	*Lotus benoistii*	Lotier de Benoit	CR
	Plants	*Pilularia minuta*	Dwarf Pillwort	EN
	Reptiles	*Blanus mettetali*	Moroccan Worm Lizard	LC
	Reptiles	*Timon tangitanus*	NA	LC
	Reptiles	*Vipera latastei*	Lataste's Viper	VU
KBA Dayas du Gharb	Plants	*Lotus benoistii*	Lotier de Benoit	CR
	Plants	*Pilularia minuta*	Dwarf Pillwort	EN
IBA Canton Forestier de Sidi Bou Ghaba	Aves	*Alectoris barbara*	Barbary Partridge	LC
	Aves	*Caprimulgus ruficollis*	Red-necked Nightjar	NT
	Aves	*Falco eleonorae*	Eleonora's Falcon	LC
	Aves	*Fulica cristata*	Red-knobbed Coot	LC
	Aves	*Marmaronetta angustirostris*	Marbled Teal	NT
	Aves	*Oenanthe hispanica*	Black-eared Wheatear	LC
	Aves	*Oxyura leucocephala*	White-headed Duck	EN
	Aves	*Sturnus unicolor*	Spotless Starling	LC
	Aves	*Sylvia cantillans*	NA	LC
	Aves	*Sylvia melanocephala*	Sardinian Warbler	LC
	Fish	*Labeobarbus reinii*	Giant Atlas barbel	EX
	Reptiles	*Saurodactylus fasciatus*	Banded Toed Gecko	VU
Ramsar Merja de Fouwarate	Plants	*Anagallis crassifolia*	Pimpernel	NT
	Plants	*Cyperus appendiculatus*	NA	LC
	Plants	*Galium Elongatum*	NA	LC
	Plants	*Glinus lotoides*	Damascisa	LC
	Plants	*Hydrocharis morsus-ranae*	European Frogbit	EN/LC
	Plants	*Juncus tingitanus*	Jonc de Tanger	EN/CR
	Plants	*Ludwigia palustris*	NA	LC
	Plants	*Myriophyllum verticillatum*	Whorled leaf water milfoil	LC
	Plants	*Nasturtium africanum*	NA	EN
	Plants	*Oenanthe peucedanifolia*	Corky-fruited Water-dropwort	LC
	Plants	*Paspalidium obtusifolium*	NA	LC
	Plants	*Paspalum vaginatum*	Seashore Paspalum	LC
	Plants	*Phyla nodiflora*	Turkey Tangle Frogfruit	LC
	Plants	*Potentilla erecta*	Tormentil	LC
	Plants	*Ranunculus sceleratus*	Celery-leaved Buttercup	LC
	Plants	*Rumex palustris*	NA	LC
	Plants	*Spirodela polyrhiza*	Greater Duckweed	LC
	Plants	*Utricularia gibba*	Humped Bladderwort	LC/NT
	Aves	*Aythya nyroca*	Ferruginous Duck	NT
	Actinopterygii	*Anguilla anguilla*	European Eel	EN
	Mammalia	*Atelerix algirus*	North African Hedgehog	LC
	Amphibia	*Bufo mauritanicus*	Moroccan Toad	LC
	Reptilia	*Chalcides mionecton*	NA	LC
	Reptilia	*Chamaeleo chamaeleon*	Mediterranean Chameleon	LC
	Amphibia	*Discoglossus pictus*	Painted Frog	LC
	Aves	*Limosa limosa*	Black-tailed Godwit	NT
	Aves	*Marmaronetta angustirostris*	Marbled Teal	NT
	Aves	*Numenius arquata*	Eurasian Curlew	NT
	Mammalia	*Miniopterus schreibersii*	Schreiber's Bent-winged Bat	VU
	Mammalia	*Mustela nivalis*	Least Weasel	LC
	Mammalia	*Myotis punicus*	Maghreb Mouse-eared Bat	DD
	Mammalia	*Nyctalus lasiopterus*	Giant Noctule	VU
	Mammalia	*Oxyura leucocephala*	White-headed Duck	EN
	Amphibia	*Pleurodeles waltl*	Sharp-ribbed Salamander	NT
	Reptilia	*Testudo graeca*	Common Tortoise	VU
Ramsar Merja de Sidi Bougha	Plants	*Ammophila arenaria*	European Marram Grass	NA
	Plants	*Iris pseudocorus*	Yellow Iris	NA
	Plants	*Juniperus phoenicea*	Phoenician Juniper	LC
	Plants	*Pennisetum (genus)*	Fountaingrasses	NA

Name of Protected Area	Taxonomic Group	Scientific Name	Common name	IUCN Category
	Plants	*Populus alba*	White Poplar	LC
	Plants	*Pteridium aquilinum*	Common Bracken	LC
	Plants	*Rubus ulmifolius*	Elmleaf Blackberry	NA
	Aves	*Aythya nyroca*	Ferruginous Duck	NT
	Aves	*Alcedo atthis*	Common Kingfisher	LC
	Aves	*Anas acuta*	Northern Pintail	LC
	Aves	*Spatula clypeata*	Northern Shoveler	LC
	Aves	*Anas crecca*	Common Teal	LC
	Aves	*Mareca penelope*	Eurasian Wigeon	LC
	Aves	*Anas platyrhynchos*	Mallard	LC
	Aves	*Spatula querquedula*	Garganey	LC
	Aves	*Mareca strepera*	Gadwall	LC
	Aves	*Ardea cinerea*	Grey Heron	LC
	Aves	*Bubulcus ibis*	Cattle Egret	LC
	Aves	*Asio capensis*	Marsh Owl	LC
	Aves	*Aythya ferina*	Common Pochard	VU
	Aves	*Aythya fuligula*	Tufted Duck	LC
	Aves	*Aythya marila*	Greater Scaup	LC
	Aves	*Cettia cetti*	Cetti's Warbler	LC
	Aves	*Charadrius alexandrinus*	Kentish Plover	LC
	Aves	*Charadrius dubius*	Little Ringed Plover	LC
	Aves	*Charadrius hiaticula*	Common Ringed Plover	LC
	Aves	*Circus aeruginosus*	Western Marsh-harrier	LC
	Aves	*Cisticola juncidis*	Zitting Cisticola	LC
	Aves	*Egretta garzetta*	Little Egret	LC
	Aves	*Fulica atra*	Common Coot	LC
	Aves	*Fulica cristata*	Red-knobbed Coot	LC
	Aves	*Gallinago gallinago*	Common Snipe	LC
	Aves	*Gallinula chloropus*	Common Moorhen	LC
	Aves	*Himantopus himantopus*	Black-winged Stilt	LC
	Aves	*Larus audouinii*	Audouin's Gull	VU
	Aves	*Larus cachinnans*	Caspian Gull	LC
	Aves	*Larus fuscus*	Lesser Black-backed Gull	LC
	Aves	*Larus ridibundus*	Black-headed Gull	LC
	Aves	*Limosa limosa*	Black-tailed Godwit	NT
	Aves	*Marmaronetta angustirostris*	Marbled Teal	NT
	Aves	*Netta rufina*	Red-crested Pochard	LC
	Aves	*Nycticorax nycticorax*	Black-crowned Night-heron	LC
	Aves	*Phalacrocorax aristotelis*	European Shag	LC
	Aves	*Phalacrocorax carbo*	Great Cormorant	LC
	Aves	*Philomachus pugnax*	Ruff	LC
	Aves	*Phoenicopterus ruber*	American Flamingo	LC
	Aves	*Platalea leucorodia*	Eurasian Spoonbill	LC
	Aves	*Podiceps cristatus*	Great Crested Grebe	LC
	Aves	*Podiceps nigricollis*	Black-necked Grebe	LC
	Aves	*Porphyrio porphyrio*	Purple Swamphen	LC
	Aves	*Rallus aquaticus*	Western Water Rail	LC
	Aves	*Recurvirostra avosetta*	Pied Avocet	LC
	Aves	*Sterna sandvicensis*	Sandwich Tern	LC
	Aves	*Tachybaptus ruficollis*	Little Grebe	LC
	Aves	*Tadorna ferruginea*	Ruddy Shelduck	LC
	Aves	*Tadorna tadorna*	Common Shelduck	LC
	Aves	*Tringa erythropus*	Spotted Redshank	LC
	Aves	*Tringa glareola*	Wood Sandpiper	LC
	Aves	*Tringa hypoleucos*	Common Sandpiper	LC
	Aves	*Tringa nebularia*	Common Greenshank	LC
	Aves	*Tringa ochropus*	Green Sandpiper	LC
	Aves	*Tringa totanus*	Common Redshank	LC
	Aves	*Vanellus vanellus*	Northern Lapwing	NT

Remarks: If plural IUCN Categories are indicated for the same species, both of them are shown in the table.

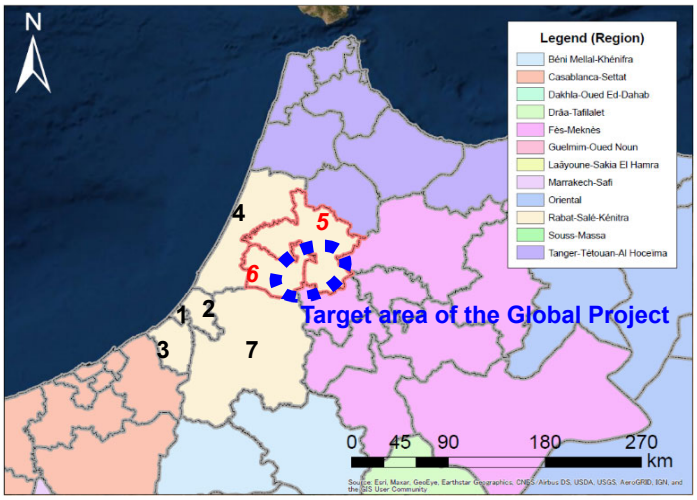
LC: Least Concern NT: Near Threatened VU: Vulnerable CR: Critically Endangered EN: Endangered NA: Not available DD: Date Deficient

Source: IBAT、Ramsar Sites Information Service and IUCN Red List

3.2 Social Conditions

1) Administrative District

The target area of the Global Project is located within the Sidi Kasem and Sidi Slimane provinces of the Rabat-salé-Kenitra region as shown in Figure 3.18. the target area of the Global Project is 100-130 km away from Rabat, the capital of Morocco, to the North-east.



Region	Province	No.	Number of Communes	
			In Urban Areas	In Rural Areas
Rabat-salé - Kenitra	Rabat (Israeli political party)	1	2	-
	Salé	2	2	2
	Skirat Témara.	3	5	5
	Kenitra (Nikkei Stock Exchange)	4	4	41
	Sidi Kacem.	***5***	***3***	***20***
	Sidi Slimane	***6***	***5***	***24***
	Khemisset	7	2	9
	Total		23	91

Figure 3.18 Administrative Boundaries around the Target Area of the Global Project

Source: Prepared by JICA Survey Team (2022) and Statistical Yearbook by Region (2020)

2) Area and Population

The areas of Sidi Kacem Province and Sidi Slimane Provinces are 4,060 km^2 and 1,492 km^2, respectively and the sum of them accounts for around 37% of area of whole area of Rabat-salé-Kenitra Region (15,132km^2) as shown in Table 3.6. On the other hand, the populations of Sidi Kacem and Sidi Slimane are 520,831 and 329,210, respectively. The population density in Sidi Slimane is 220.7 people/km^2 and is almost same as the average of 267.4 people/km^2 in the whole region, while that in Sidi Kacem is about half, at 128.3 people/km^2.

Table 3.6 Area and Population of Target Provinces

Province/Region	Area (km^2)* 1	Population *2			Population Density
		Total	Male	Female	
Rabat Province	118	572,717	277,348	295,369	4,482.6
Salé Prefecture	672	973,418	483,382	490,036	1,655.0
Scirat Themara Province	485	572,170	286,644	285,526	1,479.8
Kenitra Province	3,253	1,052,177	525,815	526,362	358.6
Sidi Kacem Province	***4,060***	522,070	264,169	257,901	***128.3***
Sidi Slimane Province	***1,492***	320,205	160,086	160,119	***220.7***
Chemiset Province	8,305	539,828	265,392	274,436	65.1
Rabat-salé-Kenitra Region	15,132	4,552,585	2,262,836	2,289,749	267.4

Source*1 :Board of Trade in Rabat-salé-Kenitra Region, http://www.ccirabat.ma/

Source*2: Statistical Yearbook by Region (2020)

The number of households in Sidi Kasem Province and Sidi Slimane Province are 108,127 and 67,839,

respectively as shown Table 3.7. The number of family members per household is 4.1 for whole Rabat-salé-Kenitra Region, while that in urbanized area, namely, in Rabat, is only 3.5. On the other hand, the number of family members per household in both provinces is 4.8. relatively many compared to Rabat.

Table 3.7 Number of Households and Family Members per Household

Province	Number of households*1			Average Family Members [2]
	Urban Area	Rural Area	Total	
Rabat Province	153,262	-	153,262	3.5
Salé Prefecture	276,527	15,357	291,884	3.8
Scirat Themara Province	169,230	15,940	185,170	3.9
Kenitra Province	179,493	81,142	260,635	4.5
Sidi Kacem Province	***44,135***	***63,992***	***108,127***	***4.8***
Sidi Slimane Province	***33,569***	***34,270***	***67,839***	***4.8***
Chemiset Province	82,310	51,275	133,585	4.0
Entire Rabat-salé-Kenitra Region	938,526	261,976	1,200,502	4.1

Source: *1 from "Morocco by the Numbers (2022, HCP),"[5] ;
*2 Calculated based on the numbers of households and population.

3) Cultural Heritage

United Nations Educational, Scientific and Cultural Organization (UNESCO) has specified the nine sites in Morocco as the World Cultural Heritage sites as illustrated in Figure 3.19 and Table 3.8[6]. On the other hand, there are no World Natural Heritage sites registered at this time. The closest World Cultural Heritage to the target area of the Global Project is the "Ancient Monument of Volubilis" registered in 1997, however, it is located more than 20 km away from the target area of the Global Project by airline distance.

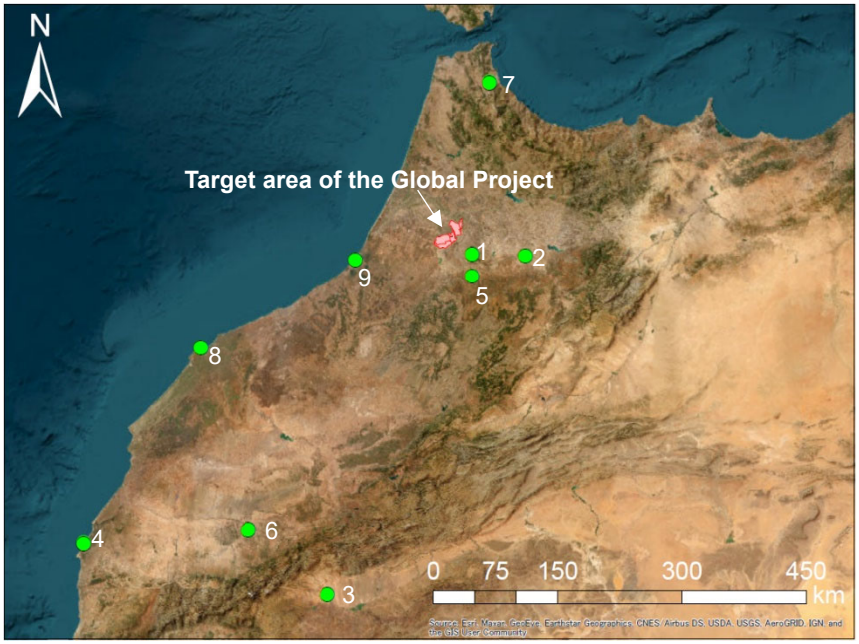


Figure 3. 19 Location of World Cultural Heritage Sites in Morocco
Note: The numbers in the figure are Table 3.8.
Source: JICA survey team based on location information provided by UNESCO.

Table 3.8 World Cultural Heritage Sites in Morocco

No.	Site Name	Year of registration
1	Archaeological Site of Volubilis	1997
2	Historic City of Meknes	1996
3	Settlement of Ait-Ben-Haddou (Ksar of Ait-Ben-Haddou)	1987

[5] Morocco in numbers 2022 (HCP): https://www.hcp.ma/downloads/?tag=Maroc+en+chiffres
[6] UNESCO Website: https://whc.unesco.org/en/statesparties/ma

No.	Site Name	Year of registration
4	Medina of Essaouira (formerly Mogador)	2001
5	Old City of Fez (Medina of Fez)	1981
6	Medina of Marrakesh	1985
7	Medina of Tétouan (formerly known as Titawin)	1997
8	Portuguese City of Mazagan (El Jadida)	2004
9	Rabat, Modern Capital and Historic City: a Shared Heritage	2012

Note: "No." in the table is indicated in Figure 3.19.
Source: UNESCO

In Morocco, national cultural reserves are specified by the Ministry of Youth, Culture and Communication. Figure 3.20 and Table 3.9 show the status of the around the target area of the Global Project. Sidi Saïd and Moulay Yakoub (Aquar Dacicae) are located near the area, but both are outside the target area of the Global Project. Therefore, it is found that there are no cultural reserves within the area.

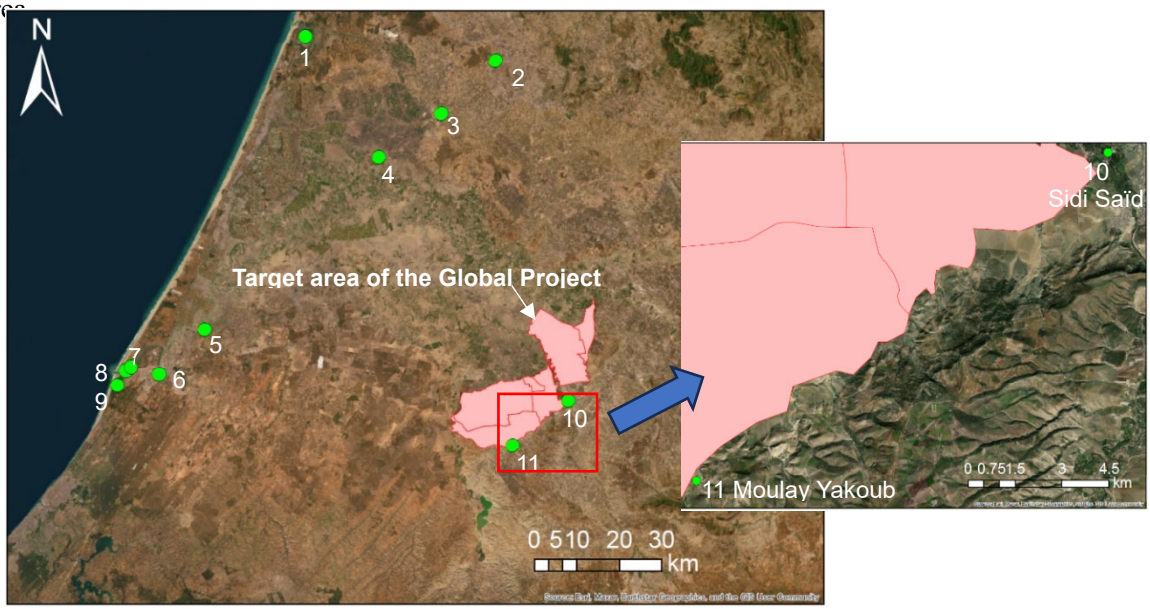


Figure 3.20 Location of National Cultural Heritages around the Target Area of Global Project
Note: The numbers in the figure correspond to the numbers in Table 3.9.
Source: JICA Survey Team, based on location information provided by the Ministry of Youth, Culture and Communication (2022).

Table 3.9 National Cultural Heritage around the Target Area of the Global Project

No.	Site	Year	Law/Decree for Specification
1	Moulay Bouselham Lagoon	1978	Ministerial decree No. 223-78 of 3 March 1978
2	Al Basra	1930	O.B. N° 932 of 5 September 1930
3	Vopicsiana	1954	Ministerial decision of 20 October 1954 (O.B N°2194 of 12 November 1954)
4	Protected Area in the Banasa Site	1930	Decree of 13 June 1930
5	Site of Tamousida and the Facilities surrounding it	2001	Decree n° 2.01.2795 of 5 December 2001
6	Al Magana	2004	Decree n° 2.04.17 of 21 January 2004
7	Port of Mahdia and its Mosque	2018	Ministerial order n° 1738.18 of 7 July 1918
8	Kasbah Mehdiya	1916	Decree of 02 March 1916
9	Sidi Boughaba Lake	1951	Ministerial order of 15 September 1951
10	Sidi Saïd	1949	Decree of 9 Lay 1949
11	Moulay Yakoub (Aquae Dacicae)	1997	Decree n°2, 96, 392 of 4 July 1997

Source: Ministry of Youth, Culture and Communication (2022)

4) Education and Literacy

The periods of school attendance for preschool education, primary education, secondary education, and post-secondary education are 3 years, 6 years, 6 years and maximally 4 years, respectively. Regarding literacy rates by province and gender, rural areas have lower rates than urban areas in six provinces

within the Rabat-salé-Kenitra Region, except for Rabat province, which has no rural communes. In addition, the literacy rate of women is lower than that of men. The same trend is observed in Sidi Kacem and Sidi Slimane as shown in Table 3.10. It is noted Arabic is used in the target area of the Global Project.

Table 3.10 Literacy Rates by Province and Gender

Province	Gender	Urban Areas	Rural Area	Total
Rabat Province	Male	91.4	-	91.4
	Female	78.1	-	78.1
	Total	84.5	-	84.5
Salle Pref.	Male	88	66.2	86.6
	Female	72.1	43.2	70.3
	Total	79.9	55.1	78.3
Scirat Themara Province	Male	86.4	72.7	85.1
	Female	72.3	53.4	70.5
	Total	79.3	63.2	77.8
Kenitra Province	Male	85.9	58.5	74.2
	Female	69.7	35	55.7
	Total	77.6	47	64.9
Sidi Kacem Province	***Male***	***83.1***	***64.8***	***70.7***
	Female	***63.4***	***40.3***	***48.2***
	Total	***73.1***	***52.9***	***59.6***
Sidi Slimane Province	***Male***	***84.2***	***65.4***	***73.1***
	Female	***63.5***	***39***	***49.6***
	Total	***73.5***	***52.3***	***61.3***
Chemiset Province	Male	82.4	60	71.5
	Female	60.8	33.6	48.3
	Total	71	46.9	59.6
Average of Whole Region	Male	87.1	62.3	79.7
	Female	71	37.8	61.6
	Total	78.8	50.3	70.6

Source: "Monography of the Rabat-salé-Kenitra Region (2020, HCP)"[7]

5) Health and Sanitation

There are 14 governmental centers for support of public hospitals throughout the Rabat-salé-Kenitra region as shown in Table 3.11. There is one each clinic in Sidi Kacem and Sidi Slimane provinces, which do not have inpatient facility (outpatient clinic). There is neither dialysis therapy facility nor blood transfusion center. On the other hand, there are various medical facilities in the urban areas such as Rabat Province and Salé Province according to "Health by the Numbers (Ministry of Health, 2017)"[8]. In total, there are 19 public hospitals in Rabat-salé-Kenitra region, out of them, one regional hospital is located in the province of Rabat. In addition, there is one provincial hospital each in Sidi Kasem and Sidi Slimane provinces.

The total number of physicians in Rabat-salé-Kenitra region is 6,082, while those are 144 and 94 in Sidi Kasem and Sidi Slimane, respectively as shown in Table 3.11. The population covered by one doctor is 808.2 in the region as a whole, however, those in Sidi Kacem and Sidi Slimane are 3,617 and 3,502, respectively, indicating that one doctor covers big population compared to the urban areas.

Table 3.11 Number of Physicians by Prefecture

Province	Number of Physicians (persons)			Population Covered per physician (persons)*2
	Private Hospital	Public Hospital*1	Total	
Rabat Province	1,384	2,234	3,618	146.2
Salé Prefecture	434	258	692	1,607.2
Scirat Themara Province	397	148	545	1,316.9
Kenitra Province	505	228	733	1,591.5
Sidi Kacem Province	***69***	***75***	***144***	***3,616.9***
Sidi Slimane Province	***64***	***30***	***94***	***3,502.2***
Chemiset Province	140	116	256	2,110.4

[7] https://www.hcp.ma/region-rabat/docs/MonographiesRegionales/Monographie%20Regionale%202020.pdf
[8] https://www.sante.gov.ma/Publications/Etudes_enquete/Documents/2021/sante%20en%20chiffres%202017.pdf

Province	Number of Physicians (persons)			Population Covered per physician (persons)*2
	Private Hospital	Public Hospital*1	Total	
Entire Rabat-salé-Kenitra Region	2,993	3,089	6,082	808.2

Note: *1 Excluding university hospitals. *2 The population covered by one physician per physician was calculated for the population shown in
Source: "Morocco by the Numbers (2022, HCP)"[9]

6) Industry and Employment

Employed population percentages by industry show a big difference between urban and rural area. The industry showing the highest rate in urban areas is trade (21.3%), followed by construction (12.5%), while that agriculture sector accounts for the highest percentage at 67.8%. Population engaged in other industries in rural area is very limited. In other words, about 2/3 of the rural population is engaged in the agricultural sector, making agriculture the key industry in rural areas.

Table 3.12 Morocco National Population Percentage by Industry

Industry	Urban (%)	Rural (%)
Agriculture	4.6	67.8
Industry (Including Crafts)	17.0	4.4
Construction Industry	12.5	9.5
Trading Business	21.3	7.1
Transportation, Storage and Communication	7.3	2.8
Others	37.3	8.4
Tota	100.0	100.0

Source: Morocco by the Numbers (2022, HCP)

Unemployment rates in urban and rural area are 15.1% and 5.3%, respectively in Rabat-Saleh-Kenitra Region, which indicates that the unemployment rate in rural areas is lower than that in urban areas. In terms of sex, unemployment rate for women is about twice that of men in urban area, while those for men and women are almost same, approximately 5% according to "Morocco by the Numbers (HCP, 2022)".

7) Poverty

According to the Haut Commissariat au Plan (hereafter referred to as HCP)[10], which is the agency to prepare official statistics in Morocco, the domestic poverty rate in Morocco is set as "the percentage of the population whose per capita consumption is below the domestic poverty line". The thresholds are set, as of 2014, at 4,667 MAD (about $460) per person per year and 4,312 MAD/person/year (about $425) in in urban areas and rural areas, respectively[11]. The international poverty rate is also defined by the WB at $1.90/day PPP as of 2015. Based on the definition, the national and international poverty rates are 4.8% and 1.0%, respectively, according to "Overview of Poverty and Equity (WB, 2020)"[12].

8) Social Infrastructure and Services

Consumed electricity of Rabat-salé-Kenitra Region has been increased slightly from 4,138 million KWh in 2016 to 4,248 million KWh in 2017, however, there is no significant change of the percentage against

[9] https://www.hcp.ma/downloads/?tag=Maroc+en+chiffres
[10] HCP Website:. https://www.hcp.ma/methodologie-pauvrete-vulnerabilite_r497.html#:~:text=Indice%20de%20s%C3%A9v%C3%A9rit%C3%A9%20de%20la,mesure%20de%20la%20pauvret%C3%A9%20mon%C3%A9taire
[11] 1MAD = 13.079500 yen (JICA designated rate as of December 2022)
[12] Poverty and Equality Brief, Morocco 2020 (WB): https://databankfiles.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D 68AFE/Global_POVEQ_MAR.pdf

the total amount at national level (Morocco Regions (HCP, 2018)[13].

Looking at the situation regarding drinking water in the Rabat-salé-Kenitra region, the number of contractors with the National Office of Electricity and Drinking Water (ONEE) increased slightly from 2016 to 2017 (from 258.261 persons to 269,171 persons). Both sales and production of 1,000 m^3 units are on the rise, and their share against the Moroccan national total is also increased slightly (HCP, 2018).

9) Indigenous Peoples and Minorities

Any official statistical data in terms of ethnicity has not been collected by the HCP and governmental agencies. It is because that all ethnic people are regarded as Moroccan citizens equally. Indigenous peoples and ethnic minorities in and around the target area of the Global Project rarely identified (see "Figure 4.2 Ethnicity Distribution in Morocco" mentioned later). In the commune, which are located along the proposed the First Main Canal (Tête Morte Main Canal), one French landowner and four Jewish land owners are identified, and those owners stay in France and Tel Aviv, respectively, at this moment (see "Chapter 3.2 Social Conditions").Those matters will be confirmed through the socio-economic survey targeting communities around the Hricha Main Canal and stakeholder meetings to be conducted by the JICA Survey Team. According to the ORMVAG, however, the target area of the Global Project is not such a specific area for indigenous peoples and minorities. Moreover, the official personnel do not have such information.

10) Vulnerable people

HCP regards economically vulnerable people as "vulnerable people" in some official documents. Also, "Monography in Rabat-salé-Kenitra region" (2020) includes women, children and the old people also in "vulnerable people". It is planned to identify the "vulnerable people" in the target area of the Global Project through the socio-economic survey and stakeholder meetings, which are to be organized by the JICA Survey Team. Some persons with special needs are identified.

[13] Morocco of the Regions 2018 (HCP): https://www.hcp.ma/downloads/?tag=Maroc+des+r%C3%A9gions

4. LEGISLATIVE AND INSTITUTIONAL FRAMEWORK OF ENVIRONMENTAL CONSIDERATIONS

4.1 Organizations Related to Environmental Impact Assessment

Large-scale restructure of ministries and change of their roles and responsibilities have been implemented in recent years in Morocco. According to the website of the Ministry of Energy Transition and Sustainable Development (Ministère de la Transition énergétique et du Développement durable), so far, environmental assessments, monitoring, and legal affairs are shouldered by the Department of Sustainable Development (the Direction du Contrôle, du Développement durable) as illustrated in Figure 4.1.

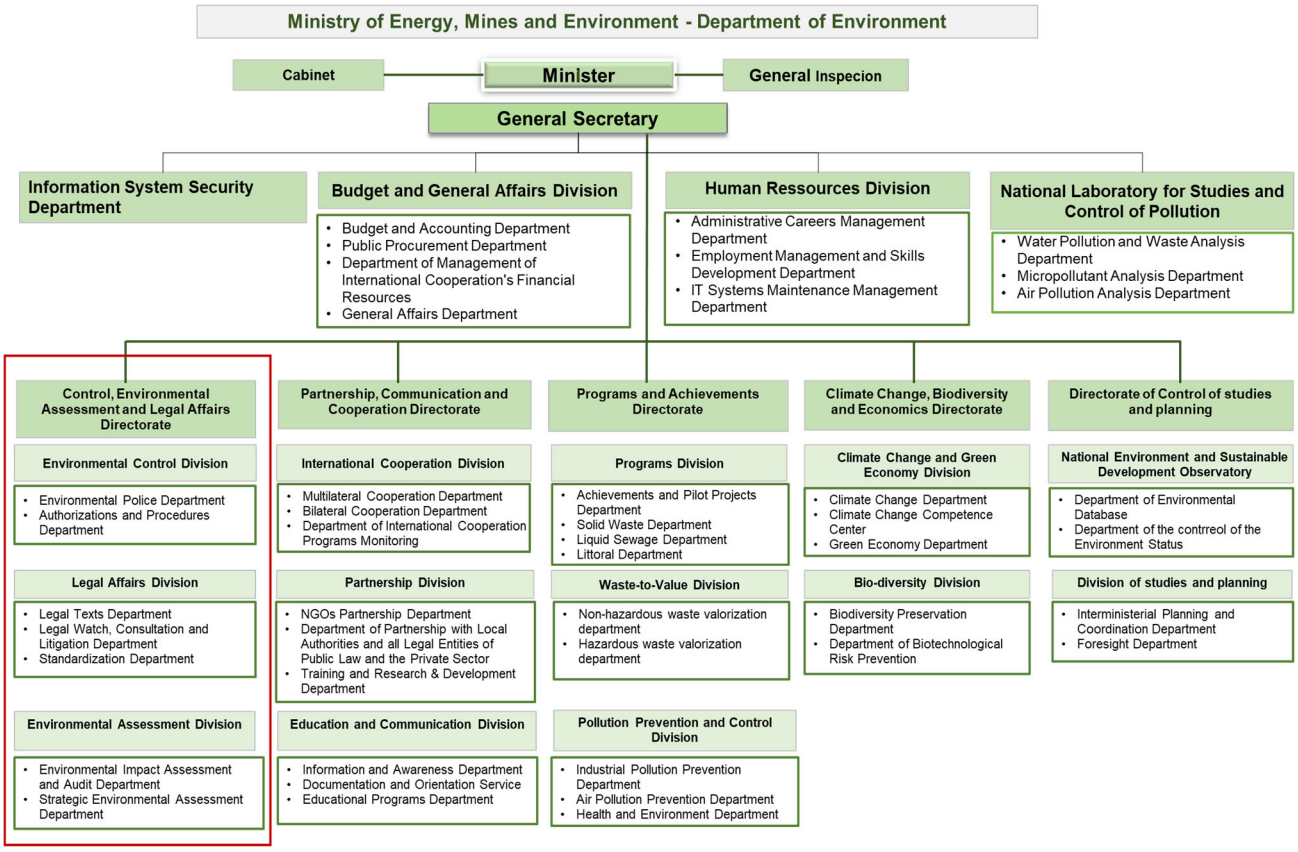


Figure 4.1 Responsible Governmental Organization for EIA
Source: HP of Ministry of Energy Transition and Sustainable Development [14]

4.2 Legal Framework

1) Main Laws/Regulations in Morocco

Morocco has a National Strategy for Sustainable Development promulgated in 2017, as well as a National Charter on the Environment and Sustainable Development (2010) and numerous legal frameworks related to environmental impact assessment. Main laws, decrees, regulations and so on are listed in Table 4.1.

Table 4.1 Main Laws/Regulations Related to Environmental Considerations

Legal Framework Name (French Name)	Contents	Year Published
Dahir du 10 Octobre 1917 (20 Hijja 1J35) sur.la conservation et 1 'exploitation des forets	Forest conservation and development	1917
Décret n°2-93-1011 du 18 Chaabane 1415 (20 Janvier 1995) relatif à la	Environmental	1995

[14] Source: https://www.environnement.gov.ma/fr/departement-de-l-environnement/2015-03-05-11-53-51/2015-03-05-11-58-41/organigramme

Legal Framework Name (French Name)	Contents	Year Published
réorganisation des organismes chargés de la protection et de l' amélioration de l'environnement	conservation	
Dahir n° 1-03-59 du 10 rabii I 1424 (12 mai 2003) portant promulgation de la loi n° 11-03 relative à la protection et à la mise en valeur de l'environnement	Environmental conservation	2003
Dahir n° 1-03-60 du 10 rabii I 1424 (12 mai 2003) portant promulgation de la loi n° 12-03 relative aux études d'impact sur l'environnement	Environmental Impact Assessment (EIA)	2003
Dahir n° 1-03-61 du 10 rabii I 1424 (12 mai 2003) portant promulgation de la loi n° 13-03 relative à la lutte contre la pollution de l'air	Pollution control	2003
Dahir n° 1-06-153 du 30 chaoual 1427 (22 novembre 2006) portant promulgation de la loi n° 28-00 relative à la gestion des déchets et à leur élimination.	Waste management and treatment	2006
Décret n° 2-04-563 du 5 kaada 1429 (4 novembre 2008) relatif aux attributions et au fonctionnement du comité national et des comités régionaux des études d 'impact sur l'environnement.	EIA and authorities of regional committee	2008
Décret n° 2-04-564 du 5 kaada 1429 (4 novembre 2008) fixant les modalités d'organisation et de déroulement de l'enquête publique relative aux projets soumis aux études d'impact sur l'environnement	Organization modality for EIA and categorization of public projects	2008
Décret n°2-09-286 du 20 hija 1430 (8décembre 2009) fixant les normes de qualité de l'air et les modalités de surveillance de l' Fixant les normes de qualité de l'air	Air quality standards and monitoring modality	2009
Charte Nationale de l'Environnement et du Développement Durable	National charter for environment and sustainable development	2010
Décret n°2-09-631 du 23 rejeb 1431 (6 juillet 2010) fixant les valeurs limites de dégagement, d'émission ou de rejet de polluants dans l 'air émanant de sources de pollution fixes et les modalités de leur contrôle	limitation values of emission or discharge of pollutants in the air from pollution and prevention methods	2010
Décret n° 2-09-683 du 23 rejeb 1431 (6 juillet 2010) Fixant les modalités d'élaboration du plan directeur régional de gestion des déchets industriels, médicaux et pharmaceutiques non dangereux, des déchets ultimes, agricoles et inertes et la procédure d'organisation de]'enquête publique afférente à ce plan	Management of non-hazardous industrial, medical, inactive agricultural and pharmaceutical wastes	2010
Dahir n° 1-12-25 du 13 ramadan 1433 (2 août 2012) portant promulgation de la loi n° 23-12 modifiant la loi n° 28-00 relative à la gestion des déchets et à leur élimination	Waste management and treatment	2012
Arrêté conjoint du ministre de l'énergie, des mines, de l'eau et de l'environnement et du ministre de l'intérieur n° 3413-11 du 20 décembre 2012 (6 safar 1434) fixant les termes de références relatifs à l'élaboration du plan directeur régional de gestion des déchets industriels, médicaux et pharmaceutiques non dangereux, des déchets ultimes, agricoles et inertes	Management of non-hazardous industrial, medical, inactive agricultural and pharmaceutical wastes	2012
Dahir n° 1-14-09 du 4 Joumada I 1435 (6 mars 2014) portant promulgation de la Loi-cadre n° 99-12 portant Charte Nationale de l'Environnement et du Développement Durable	Framework of sustainable development	2014
Référentiel des Etudes d'Impact sur l'Environnement	EIA Guidelines	2014
Arrêté conjoint du ministre de l'énergie, des mines, de l'eau et de l'environnement et du ministre de la santé n° 1653-14 du 8 rejeb 1435 (8 mai 2014) fixant les conditions et les modalités de calcul de l'indice de qualité de l'air	Air quality indicator	2014
Arrêté conjoint du ministre de l'énergie, des mines, de l'eau et de l'environnement, de la ministre déléguée auprès du ministre de l'énergie, des mines, de l'eau et de l'environnement chargée de l'environnement, du ministre de l'intérieur et du ministre de la santé n° 3750-14 du 4 moharrem 1436 (29 octobre 2014) fixant les seuils d'information, les seuils d'alerte et les modalités d'application des mesures d'urgence relatives à la surveillance de la qualité de l'air	Air quality monitoring	2014
Décret n° 2-14-758 du 23 décembre 2014	Authorities and organization for environment	2014
Décret n° 2-14-782 du 30 rejeb 1436 (19 mai 2015) relatif à l'organisation et aux modalités de fonctionnement de la police de l' environnement	Organization and operation of the environmental police	2015
Dahir n° 1-16-113 du 6 Kaada 1437 (10 Aout 2016) portant promulgation de la loi 36-15 relative à l'eau	Water	2016
Stratégie Nationale de Développement Durable (2030)	National strategy for sustainable development	2017
Arrêté conjoint n° 3286-17 (4 septembre 2017) modifiant l'arrêté conjoint n°	Limitation of discharge to	2017

Legal Framework Name (French Name)	Contents	Year Published
2942-13 (7 octobre 2013)	surface water and groundwater	
Décret n° 2.19.452 du 14 Dhu al-Qi`dah 1440 (17 juillet 2019) portant organisation du Comité National du Développement Durable	Sustainable developmnet	2019
Décret n°2-18-74 du 14 Rejeb 1440 (21 mars 2019) relatif au système national d'inventaire des émissions des gaz à effet de serre	Green house gass list	2019
Dahir n° 1-20-78 du 18 hija 1441 (8 août 2020) portant promulgation de la loi n° 49-17 relative à l'évaluation environnementale	Envionmental assessment	2020
Décret n° 2-19-721 du 3 ramadan 1441 (27 avril 2020) portant création de la commission nationale des changements climatiques et de la diversité biologique.	National committee for climate change and biodiversity	2020
Dahir n°1-16-113 du 6 kaada 1437 portant promulgation de la loi n°36-15 relative à l'eau	Approval prior to the construction works [1)]	2016

1) The State, local governments and public authorities shall have the right to carry out infrastructure works of general interest in public water basins after obtaining the approval of the relevant basin management agency. It is necessary for project proponents to notice the local government of the projects prior to the start of construction works, while the construction company should put site installation sign containing all necessary project information.

Source: JICA Survey Team (2022)

2) Necessity of Environmental Impact Assessment of the Global Project

"Dahir No. 1-03-60 on the promulgation of Law No. 12-03 on Environmental Impact Assessment", describes that it is mandatory to prepare an environmental impact assessments (EIA) report for a project and to gain the approval for the EIA report. Also, any projects, which need to conduct EIA, are stipulated in the Appendix of the Dahir. Those projects in infrastructure and agriculture sector are listed in the following table. Since irrigation project is not listed up, it is judged that it is not necessary to prepare an EIA for the Global Project. On the other hand, the Global Project is categorized as "Category A project" according to the JICA Environmental and Social Guidelines, and it is necessary to implement EIA for the Global Project.

Table 4.2 List of Projects which require EIA (in only sectors concerned to the Global Project)

Field	Project
II. Infrastructure	Road construction (national roads and highways)
	Railways
	Airports
	Development of urban areas
	Development of industrial zones
	Commercial ports and marinas
	Dams or any other installations intended to permanently retain and store water
	Tourist complexes, in particular those located on the coast, in the mountains or in rural areas
	Installations for the storage or elimination of waste, whatever their nature and the method of their elimination,
	Wastewater treatment plants and ancillary works,
	Marine evacuation outfalls
	Transportation of hazardous or toxic materials.
IV. Agriculture	Land consolidation projects
	Forestation projects with an area greater than 100 hectares,
	Projects to allocate uncultivated land or semi-natural areas for intensive farming.

Source: List of projects/sectors requiring environmental impact assessment, Law No. 12-03 on Environmental Impact Assessment

3) International Treaties Ratified by Morocco

In addition to national environmental laws mentioned above, the Government of Morocco has ratified some international environmental treaties such as the Ramsar Convention. Those treaties are as shown below (the number in the parentheses are ratified years by the Government of Morocco):

- ✓ Convention on Wetlands of International Importance especially as Waterfowl Habitat: Ramsar Convention (1980)
- ✓ Importance Especially as Waterfowl Habitat (1980)
- ✓ Convention on International Trade in Endangered Species of Wild Fauna and Flora: CITES (1987)

- ✓ Convention on Biological Diversity (1995)
- ✓ United Nations Framework Convention on Climate Change (1995)
- ✓ Kyoto Protocol to the United Nations Framework Convention on Climate Change (2002)
- ✓ Paris Agreement (2016)

4) Environmental Standards

Some environmental standards have been established in Morocco, and some standards concerned to the Global Project especially the projects which are funded by JICA are described as shown below:

4.1) Air Quality

Air quality standards in Morocco is shown in following table. There are no big differences between the national standard and the international standards such as International Fund Cooperation (IFC) Standard.

Table 4.3 Air Quality Standard

Item	National Standards *1	International Standards (IFC)*2
SO_2 (Sulfur dioxide)	For health protection:125μg/m^3 (24-hour,) For ecosystem protection:20μg/m^3 (1-year)	125μg/m^3 (24-hour, Interim target-1) 50μg/m^3 (24-hour, Interim target-2) 20μg/m^3 (24-hour, Guideline) 500μg/m^3 (10-minute, Guideline)
NO_2 (Nitrite)	For health protection:200μg/m^3 (1-hour) For health protection:50μg/m^3 (1-year) For vegetation protection :30μg/m^3 (1-year)	200μg/m^3(1-hour) 40μg/m^3(1-year)
CO (Carbon oxide)	10μg/m^3 (8-hour)	None
Particle Matter (PM)	PM10: For health protection:50μg/m^3 (24-hour)	50μg/m^3(24-hour, Guideline)
Pb (Lead)	1μg/m^3 (1-year)	None
Cadmium	5μg/m^3 (1-year)	None
Ozon (O_3)	For health protection:110μg/m^3 (8-hour) For vegetation protection:65μg/m^3 (24-hour, not to be exceeded for more than 3 consecutive days)	160μg/m^3 (8-hours, Interim target-1) 100μg/m^3 (8-hours, Guideline)
Benzene	For health protection:10μg/m^3 (1-year)	None

Source *1: Decree n°2-09-286 of 20 hija 1430 (2009) fixing the air quality standards and the modalities of air monitoring.
*2: IFC, 2007, "Environmental, Health, and Safety Guidelines, GENERAL EHS Guideline: Environmental, Air Emissions"

4.2) Noize / Vibration

Standards for noise and vibration are not in place in Morocco, though there are standards that take workers' safety into consideration. Generally, contractors in Morocco refer to a standard applied in France. However, the law does not show thresholds of noise and vibration by period of time and receptors and it shows only limitation for average and peak only. Therefore, it is necessary to apply the IFC standards for the Global Project. These criteria are listed in the following table:

Table 4.4 Standards for Noize/ Vibration

Receptor	Law in France *1	One Hour Laeq (dBA) (IFC) *2	
		Daytime (07:00 – 22:00)	Nighttime (22:00 – 07:00)
Residential; institutional; educational	102 dBA for average 118 dBA for peak	55	45
Industrial; commercial		70	70

Source *1: "Decree n° 2017-1244 of 7 august 2017 concerning the prevention of risks related to noise and amplified sounds (codified in articles R. 1336-1 to R. 1336-3 of the public health code)".
*2: IFC (2007), Environmental, Health, and Safety Guidelines, GENERAL EHS Guideline: Environmental, Noise Management
Laeq: Equivalent noise level. It does not have regularity and it is the mean noise level over the measurement period when the degree of noise is highly variable.

4.3) Waste Management

There are no specific regulations in Morocco regarding disposal of waste generated by construction works. In general, waste of irrigation project is reused as another construction material or disposed of at a locally designated site. It is common that the methods of waste disposal are stipulated in the contract in accordance with the law. Therefore, the Global Project will follow such a common practice. Also, referring to the EHS Guideline 1.5 of IFC, recycling and reuse of generated waste and residual soil due to the construction works is to be promoted.

4.4) Water Quality

Water quality of surface water and groundwater is categorized into "Excellent", "Good", "Average", "Poor" and "Very poor" based on the values of DO, BOD, COD, NH_4, Color, E. Coli, and EC. The water quality standards are as shown in Table 4.5 and Table 4.6.

Table 4.5 Water Quality Standard of Surface Water

No.	Item	Unit	Excellent	Good	Average	Poor	Very Poor	Water Quality Standard in Japan
1	Dissolved Oxygen	mgO_2/L	> 7	7 – 5	5 – 3	3 – 1	< 1	≧5 *1
2	BOD^5	mgO_2/L	< 3	3 – 5	5 – 10	10 – 25	> 25	≦8 *2
3	COD	mgO_2/L	< 30	30 -35	35 – 40	40 – 80	> 80	≦6 *1
4	NH^{4+}	$mgNH_4/L$	< 0.1	0.1 – 0.5	0.5 – 2	2 – 8	> 8	None
5	Color	mgP/L	< 0.1	0.1 – 0.3	0.3 – 0.5	0.5 – 3	> 3	None
6	E. Coli	UFC/100ml	< 20	20 – 2000	2000 – 20000	> 20000	-	None
7	Electrical Conductivity	µS/cm	< 750	750 – 1300	1300 – 2700	2700 – 3000	> 3000	≦300 *1

Source: Decree No.1275-01(2002) Definition of Water Quality of Surface Water
*1: Irrigation Water Quality (Paddy): Ministry of Agriculture, Forestry and Fisheries, 1970
*2: Environmental Standard: River for Agriculture, Agency of Environment, 1971

Table 4.6 Water Quality Standard of Groundwater

No.	Item	Unit	Excellent	Good	Average	Poor	Very Poor	WHO Standard*
1	Cl^-	mg/L	< 200	200 – 300	300 – 750	750 – 1000	> 1000	≦5
2	NO_3^-	mg/L	< 5	5 – 25	25 – 50	50 – 100	> 100	≦50
3	$NH4^+$	$mgNH_4/L$	< 0.1	0.1 – 0.5	0.5 – 2	2 – 8	> 8	None
4	COD by using potassium permanganate	mgO_2/L	< 3	3 – 5	5 – 8	> 8	-	None
5	E. Coli	UFC/100ml	< 20	20 – 2000	2000 – 20000	> 20000	-	Not detected after disinfection
6	Electrical Conductivity	µS/cm	< 400	750 – 1300	1300 – 2700	2700 – 3000	> 3000	None

Source: Decree No.2-97-787 (1997) on Water Quality and Water Pollution Inventory
*Drinking Water Guidelines (WHO,2011)

5) Protected Area by Specified by National Law

Dahir No.1-10-123 on July 16, 2010, promulgated "Law No. 22-07 relative to protected areas, stipulates the protected areas" as shown in Table 4.7. Referring to the law, National Agency for Water and Forest under MAPMDREF applies the category as shown in Table 4.8. There are not such protected areas around the target area of the Global Project (see Figure 3.11 and Figure 3.12).

Table 4.7 Definition of Protected Area Based on the Law in Morocco

Category	Definition
National park	National parks are defined as natural spaces, which have been developed and are managed for their biodiversity, landscape, and cultural values, especially interesting geological formations, and cultural, scientific, educational, recreational and tourism purposes.
Natural park	terrestrial and/or marine spaces, including natural heritage and ecosystems representing specific interests that are to be protected and developed, while ensuring the maintenance of their ecological functions and the sustainable use of natural resources
Biologic reserve	Terrestrial and/or marine space within state own lands, including rare or fragile natural environments to protect flora or fauna and their habitats for scientific and educational purposes
Natural reserve	Natural terrestrial and/or marine areas consisting of sedentary or migratory fauna, flora, soil, water, fossils, and geological and geomorphological formations of special interest to be preserved or restored for the purpose of conserving and maintaining them in good condition. It shall be used for scientific research and environmental education purposes only.
Natural site	Areas containing one or more specific natural or natural and cultural elements of exceptional or unique importance, which deserve protection because of their rarity, representativeness, aesthetic qualities or scenic, historical, scientific, cultural or legendary importance, and whose conservation or protection is of general interest.

Source: Law No.22-07 related to Protected Land

Table 4.8 Categorization of Protected Areas by National Agency Water and Forest

Category	Definition	Site Name
National park	Fully protected and where all human activities are prohibited, areas where limited access is allowed, and areas where the perimeter is designed to promote tourism and recreational activities. In addition, geological aspects, e.g., cliffs, caves, springs, flora and fauna, and endemism are treated as national parks.	1) Parc National de Toubkal, 2) Parc National de Tazekka, 3) Parc National de Souss Massa, 4) Parc National d'Iriki, 5) Parc National de Talassemtane, 6) Parc National d'Ifrane, 7) Parc National du Haut Atlas Oriental, 8) Parc National d'Al Hoceima, 9) Parc National de Khenifiss, 10) Parc National de Khenifra
Sites of Ecological and Biological Interest (BEIS)	<Biological Designed Areas> Areas that are closed or where development activities are fairly restricted or prohibited. Local residents who enter frequent the area are included in the management regime.	Coastal area: 1) Embouchure de la Moulouya, 2) Sebkha Bou Areg, 3) Cap des 3 Fourches, 4) Jbel MOUSSA, 5) Oued Tahadart, 6) Marais Larache, 7) Merja Oulad Skhar, 8) Merja Halloufa, 9) Merja Zerga, 10) Falaise Sidi Moussa, 11) Bou Regreg, 12) Ilot de Skhirat, 13) Jorf Lasfar, 14) Sidi Moussa Oualidia, 15) Dunes d'Essaouira, 16) Archipel d'Essaouira, 17) Embouchure du Tamri, 18) Cap Ghir, 19) Foum Assaka, 20) Embouchure du Drâa, 21) Embouchures des oueds Chbeyka-Al Wa'er, 22) Baie de Khnifiss, 23) Pointe d'Awfist, 24) Baie de Dakhla, 25) Lac de Sidi Boughaba Inland area : 1) Perdicaris, 2) Jbel Bouhachem, 3) Brikcha, 4) Jbel Tizirane, 5) Koudiat Tidighine, 6) Lalla Outka, 7) Azrou Akechar, 8) Beni Snassene, 9) Lalla Chafia, 10) El Aderj, 11) Bou Iblane I, 12) Bou Iblane II, 13) Bou Naceur, 14) Jbel Tichoukt, 15) Jaaba, 16) Aghbalou n'Arbi, 17) Tizi n'Aït Ouirra, 18) Jbel Tazerkount, 19) Oued Cherrat, 20) El Harcha, 21) Kharrouba, 22) Bou Riah – Beddouz, 23) Khatouat, 24) Ouardane, 25) Beni Zemmour, 26) Deroua, 27) Marais de la Palmeraie de Marrakech, 28) M'Sabih Talaa, 29) Jbel Taghioult, 30) Jbel Ayachi, 31) Tamga, 32) Aqqa Wabzaza, 33) Aghbar, 34) Aïn Asmama, 35) Jbel Amsittene, 36) Ademine, 37) Tafingoult, 38) Jbel Kest, 39) Jbel Krouz, 40) Merzouga , 41) Oued Mird, 42) Oasis de Tissint, 43) Aït Oumribet, 44) Oued Tighzer, 45) Msseyed
	<Wetland> • Areas specified based on the Ramsar Convention on Wetland International Importance as Especially Waterfowl Habitat. • Wetlands, marshes, peatlands, or bodies of water regardless of natural or artificial, permanent or temporary, static or fluid, fresh or brackish, including areas of saltwater not exceeding 6 m in	1) Aguelmams Sidi Ali – Tifounassine, 2) Archipel et dunes d'Essawira, 3) Assif Mgoun, 4) Assifs Ahançal-Melloul, 5) Assifs Réghaya-Aït Mizane, 6) Baie d'Ad-Dakhla, 7) Baie de Khnifiss, 8) Barrage Al Massira, 9) Barrage Mohammed V, 10) Cap des Trois Fourches, 11) Cap Ghir-Imsouane, 12) Complexe de Sidi Moussa-Walidia, 13) Complexe du bas Loukkos, 14) Complexe du bas Tahaddart, 15) Côte Aftissate-Boujdour, 16) Côte des Bokkoyas, 17) Embouchure de la Moulouya, 18) Embouchure de l'oued Dr'a, 19) Embouchures des oueds Chbeyka-Al Wa'e, 20) Haut Oued Lakhdar, 21) Lac d'Afennourir, 22) Lacs d'Imouzzer du Kandar, 23) Lacs Isly-Tislite, 24) Lagune et

Category	Definition	Site Name
	depth at low tide	barrage de Smir, 25) Littoral de Jbel Moussa, 26) Marais et côte du Plateau de Rmel, ***27) Merja de Fouwarate, 28) Merja Sidi Boughaba***, 29) Merja Zerga, 30) Moyenne Dr'a, 31) Oasis du Tafilalet, 32) Oued Assaquia Al Hamra à La'youne, 33) Oued Tizguite, 34) Sebkha Bou Areg, 35) Sebkhat Imlili, 36) Sebkha Zima, 37) Zones humides de l'oued El Maleh, 38) Zones humides de Souss-Massa
Biosphere reserve	Areas of terrestrial and/or coastal/marine ecosystems aiming at promoting approaches and measures to harmonize the conservation of biodiversity and its sustainable use. Proposed by governments and internationally recognized by UNESCO.	1) L'Arganeraie, 2) Les Oasis du Sud Marocain, 3) L'Intercontinentale de la Méditerranée, 4) La Cédraie (in development)

Source: National Agency for Water and Forest, and Clearing House Mechanism on Biodiversity of Morocco

6) Law related to Indigenous People

The Government of Morocco stipulates to protect indigenous peoples and minorities in accordance with laws as shown in Table 4.9. The Constitution of Morocco guarantees freedom of religion and affiliation, and the Penal Code provides penalties for such activities, which interrupt any religious behaviors and organization of religious ceremonies. In Morocco, considering that Amazighe (Berber) recognizes themselves as a distinct indigenous cultural group and they encourage the Government to increase the budget to protect their unique culture and language [15], they may be regarded as "indigenous people" according to the JICA Guidelines. On the other hand, Arabic people stay in and around the target area as indicated in Figure 4.2 in general. Also, according to the Commune offices concerned, Amazighe people do not live in the target area of the Global Project.

Figure 4.2 Ethnicity Distribution in Morocco
Source: Population of Morocco - Chronicle Fanack.com

Table 4.9 Legal Framework for Indigenous Peoples and Minorities in Morocco

Legal Framework	Published Year
Dahir du 17 octobre 2001 portant création de l'Institut Royal de la Culture Amazighe	2001
Dahir n° 1-11-91 du 27 chaabane 1432 (29 juillet 2011) portant promulgation du texte de la Constitution (BO n° 5964 bis du 30 juillet 2011)	2011
Dahir n° 1-22-64 du 27 rabii I 1444 (24 octobre 2022) organisant la communauté juive marocaine et créant la Fondation du judaïsme marocain.	2022

Source: JICA Survey Team (2022)

4.3 Gap Analysis

There are some gaps between the JICA Guidelines and Laws in Morocco. Following table describes gaps and how to take measures against the gap.

Table 4.10 Gap Analysis between Laws in Morocco and the JICA Guidelines

Item	JICA GL	Law/Guidelines in Morocco	Gaps and countermeasures
Underlying principles	Environmental impacts that may be caused by the project must be assessed and examined in the earliest possible planning stage. Alternatives	Article 7-7 of "Law 49-17 (2020)" states that measures and alternative solutions are envisaged to eliminate, reduce or compensate for the negative	There is a gap in the timing of alternative examinations. In accordance with

[15] Source: "THE INDIGENOUS WORLD 2023" (The International Work Group for Indigenous Affairs, 2023)

Item	JICA GL	Law/Guidelines in Morocco	Gaps and countermeasures
	or mitigation measures to avoid or minimize adverse impacts must be examined and incorporated into the project plan.	impacts on the environment and the health of the population. Moreover, page 39 of "Environmental Impact Assessment Guidelines (EIA Guidelines) 2014", lists some examples of alternatives" such as "alternative without project", "alternative locations" and so on. Still, there is no mention of alternative examination at an early stage.	the JICA GL, alternatives at an early stage are examined, after that, minimization and compensation of the negative impacts are examined.
Information disclosure	EIA reports must be written in the official language or in a language widely used in the country in which the project is to be implemented. When explaining projects to local residents, written materials must be provided in a language and form understandable to them. EIA reports are required to be made available to the local residents of the country in which the project is to be implemented. The EIA reports are required to be available at all times for perusal by project stakeholders such as local residents and copying must be permitted;	The Moroccan constitution gives every citizen the right to information. This right is embodied in law 31-13, which regulates citizens' access to information held by public administrations. Every citizen can thus refer to an administration or a public institution for any request. Article 2 in" Decree n° 2-04-564 of 5 Kaada 1429 (4 November 2008) fixing the modalities of organization and conduct of the public inquiry relating to projects subject to environmental impact studies" of "EIA Guidelines, 2014" states that the proponent should prepare summary documents on project components and expected environmental impacts in French and Arabic. However, there is no mention of document preparation in understandable language for the affected people.	There are some gaps. If the stakeholders cannot understand French, it is needed to utilize Arabic for them. Also, the complete EIA report should be opened to the public at any time.
Consultation meeting with stakeholders	In the case of a big-scale project, proponents consult with local stakeholders about their understanding of development needs, the likely adverse impacts on the environment and society, and the analysis of alternatives at an early stage of the project. In preparing EIA reports, consultations with stakeholders, such as local residents, must take place after sufficient information has been disclosed. Records of such consultations must be prepared	Article 9 of Law 49-17 states that it is needed to ensure stakeholders be aware of the expected environmental impacts, and that their views and suggestions should be considered in the EIA. However, there is no mention to the timing and number of times.	There are some gaps. At the scoping stage and after the preparation of the draft EA report, the proponent explains to the affected persons the expected environmental impacts and measures to be taken. Also, a series of consultation records are to be prepared.
Scope of Impacts to be Assessed	The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts, including migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social	Article 7-4 of Law 49-17 (2020), which is promulgated by the dahir n° 1-20-78 (2020) states that the proponent assesses the direct, indirect, temporary, and permanent effects of the project on humans, fauna and flora, soil, water, air, climate, natural environment, biological balance, historic properties and monuments, neighborhood amenities, hygiene, public health, and safety. The rights and interests of vulnerable people are covered by the Constitution of Morocco – Title II: Fundamental Rights and Freedoms (pages 19 to 40). On the other hand, Special consideration	There are some gaps. It is needed to pay attention to vulnerable people. Also, it is required to examine derivative and secondary impacts, cumulative impacts, and indivisible impacts.

Item	JICA GL	Law/Guidelines in Morocco	Gaps and countermeasures
	institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety. In addition to the direct and immediate impacts of projects, the derivative, secondary, and cumulative impacts as well as impacts associated with indivisible projects will also be assessed with regard to environmental and social considerations. The life cycle impact of a project period is also considered.	for vulnerable people is not require for the local regulations. Article 5 of the Law 49-17 mentioned above defines an EIA as a study to assess negative and positive impacts and its direct or indirect, permanent and temporary effects that may cause environmental impacts in the short, medium, and long term and to determine measures to eliminate, reduce or compensate for such negative impacts. On the other hand, there is no reference to indivisible or cumulative impacts.	
Monitoring, grievance redressing	Project proponents make efforts to make the results of the monitoring process available to local project stakeholders. When third parties point out, in concrete terms, that environmental and social considerations are not being fully undertaken, forums for discussion and examination of countermeasures are established based on sufficient information disclosure, including stakeholders' participation in relevant projects. Project proponents make efforts to reach an agreement on procedures to be adopted with a view to resolving problems.	According to page 29 of the EIA Guidelines (2014), a proponent provides further information, if the proposed monitoring plan seems inadequate when the EIA report is examined. However, there is no mention of disclosure of the monitoring results, when the third parties point out any issues. Also, grievance mechanism is not mandatory in Morocco	There is a gap. Monitoring results are to be opened to the public. When the third parties points out any issues, it is needed to set up a system to discuss the matter and to settle down those issues. Also, set-up of grievance mechanism is not a must.
Ecosystem and Biota	Projects must not involve significant conversion or significant degradation of critical natural habitats and critical forests.	The government of Morocco has ratified the Ramsar Convention and the Convention on Biological Diversity, which means that the government emphasizes the conservation of important natural ecosystems. Also, the Government has paid attention to forest resource conservation by developing the National Forest Programme (1998-2020) as the top-level plan for forest management policy. Also, the National River Basin Development Plan (1996) was prepared, and the 2nd phase of the plan (2018-2030) has been implemented since 2018. It means that the country emphasizes the conservation of forest resources. Law 29-05 on the protection of species of wild flora and fauna and control of business activities related to them (1-11-84 Dahir of July 21, 2011) and Dahir n ° 1 -10-123 of 3 chaabane 1431 carrying promulgation of the law n ° 22 -07	None

Item	JICA GL	Law/Guidelines in Morocco	Gaps and countermeasures
		relating to protected areas (2010) stipulate the protected areas.	
Indigenous people	Any adverse impacts that a project may have on indigenous peoples are to be avoided when feasible by exploring all viable alternatives. When, after such an examination, avoidance is proved unfeasible, effective measures must be taken to minimize impacts and to compensate indigenous peoples for their losses.	There is no specific legislation referring to the rights of indigenous peoples or minorities. In addition, there are no legal provisions on indigenous peoples' plans, which set out measures for indigenous peoples.	There are some gaps. However, indigenous people are not identified in the target area of the Global Project.

Source: JICA Survey Team (2023)

5. EXAMINATION OF ALTERNATIVES

In general, water resources for irrigation are surface water, e.g., rivers, dams, lakes, and springs, underflow water, and groundwater through shallow and deep wells. Considering scale of the Global Project, surface water is regarded as the suitable water resource. This section makes comparison between surface water and groundwater. The impact of "No-project" is also examined. Also, in terms of route and structure of the canals, alternatives of the First Main Canal (Tête Morte Main Canal), and the Second Main Canal (Hricha Main Canal) including the branch canal (Hricha Branch Canal) are discussed.

5.1 Alternatives for Water Resources

1) "No-Project"

The target area of the Global Project is divided into existing irrigation area (Beht East) and planned irrigation development areas (Zirara, Zrar Extension, Zrar, and Beht Extension) where new irrigation systems will be constructed. Existing irrigation areas have aging facilities, but the major problem is the lack of irrigation water. Under these circumstances, several water source developments were considered, but in consideration of the amount of newly developed water sources, the Ouergha River is planned to be used as the water source. Therefore, if the Global Project is not implemented, the shortage of water for irrigation will continue, resulting in continued low productivity and a decrease in the area under cultivation.

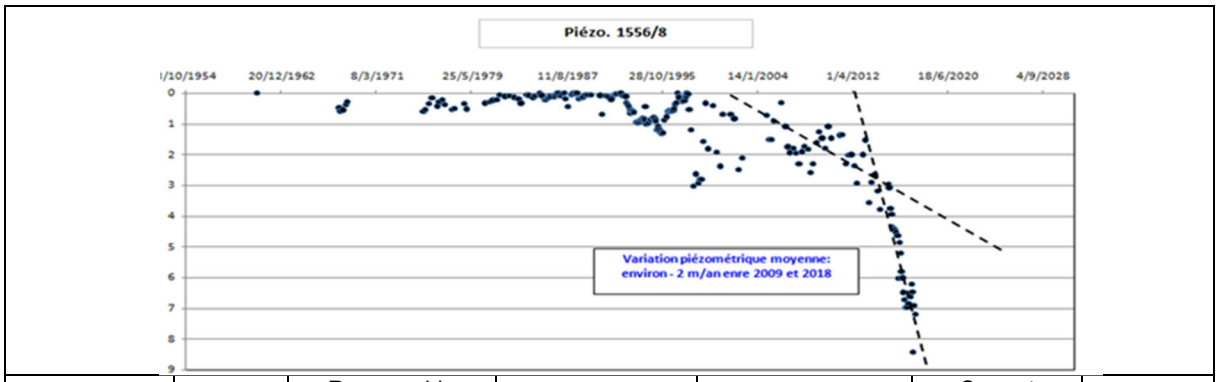
Most of farmers in the proposed irrigation expansion area except for farmers who have individual well irrigation systems are engaged in rain-fed agriculture. If the Global Project is not implemented, the farmers will have to continue unstable rain-fed agriculture with low productivity due to frequent droughts and climate change.

The abundant water resources of the Al Wahda Dam are planned not only for power generation but also for use as a source of irrigation water. In other words, if the water source after power generation is not effectively utilized for irrigation, the economic benefits of irrigated agriculture under the Global Project will be lost. Farmers who are expected to benefit from the Global Project will have no choice but to continue their low-productivity farming due to frequent droughts and unstable rainfall conditions, resulting in low income.

2) Status of Water Resources for Irrigation Development

The probable water sources for irrigation development are river water and groundwater. the target area of the Global Project is located on the Sebou River Basin, one of the most productive water basins in Morocco. Eleven dams are located in the Sebou River Basin, and the Al Wahda Dam has a storage capacity of 3 billion m^3 constructed on the Ouergha River, which is the water source of the Global Project.

If groundwater is used as a possible alternative water source, the aquifer called the Gharb Groundwater Basin will be used as the water source. The recoverable groundwater source is estimated at 170 million m^3 /year as shown in Figure 5.1. the target area of the Global Project is located in the upstream of the Gharb groundwater basin, and farmers have already been utilizing groundwater for irrigation through deep wells. In addition, many wells have already been constructed downstream for irrigation purpose. In fact, the quantity consumed of groundwater is more than the recoverable one by 34 million m^3 per year, and the groundwater level has been declining rapidly in recent years (see Figure 5.1).



Aquifer	Nature	Recoverable Groundwater Source Quantity (Million m^3 /year)	Groundwater Recharge rate (Million m^3 /year)	Annual Available Groundwater (Million m^3 /year)	Current Annual Use (Million m^3 /year)	Balance (Million m^3 /year)
12. Gharb	Deep	**174.2**	138.3	168.3	202.5	**-34.3**
13. Manasra	Phreatic	196.4	196.4	196.0	219.6	-23.6

Figure 5.1 Water Potential of Groundwater, Current Water Balance, and Groundwater Level

Source: Relevant data extracted from ABHS (2022)

2.1) Use of Ouergha River (Alternative A: Proposed Plan)

Alternative A is currently proposed by the MAPMDREF, and it plans to use Ouergha River as the water resource for irrigation development. Construction of Koudiat El Borna Barrage on the Ouergha River for water intake was started in 2020, which is located about 40 km downstream from the Al Wahda Dam. The barrage is planned to intake 60 m^3/s of water for irrigation at maximum including the irrigation water for future expansion area.

It is planned that water taken at the Ouergha River is supplied to the irrigation area through canals. The main facilities of the Global Project are water intake, sedimentation ponds, pumping station, the First Main Canal (Tête Morte Main Canal), the Second Main Canal (Hricha Main Canal), the branch canal (Hricha Branch Canal), and ancillary facilities. Irrigation water is supplied to each irrigation area in the Global Project through the Second Main Canal (Hricha Main Canal) and Hricha Branch Canal consisting of triple pipelines. In the future, irrigation areas will be expanded to the west, where it is not covered by this Global Project. Irrigation water is delivered to the terminal farms from the pumping stations by pressure. The distribution network is to be constructed in each irrigation area. The water intake systems at Koudiat El Borna Barrage and the irrigation network in the Second Main Canal (Hricha Main Canal) and branch canal (Hricha Branch Canal) are illustrated in the following figure:

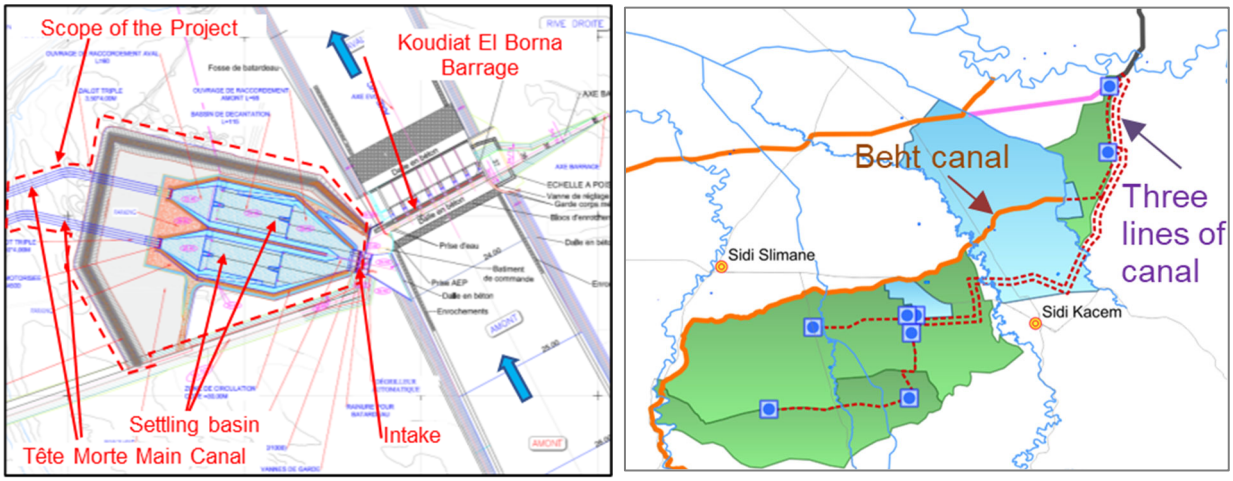


Figure 5.2 Plan of Intake and Alignment of Main Canals

Source: Feasibility study for the hydro-agricultural development of the Zirara Zone and Zrar Extension Zone (left) and JICA Survey Team (right)

2.2) Use of Groundwater (Alternative B)

Alternative B is to construct deep wells into the Gharb aquifer to obtain water resource, which is stored at deeper than 100 m. The groundwater is lifted up by using pumps and is distributed directly to the irrigation areas by the pumps or temporary stored in a reservoir/storage tank for distribution by other pumps. If the irrigation area is located on hills, a farm pond could be constructed for temporary water storage, and then the water could be distributed to the terminal farms by gravity (see Figure 5.3).

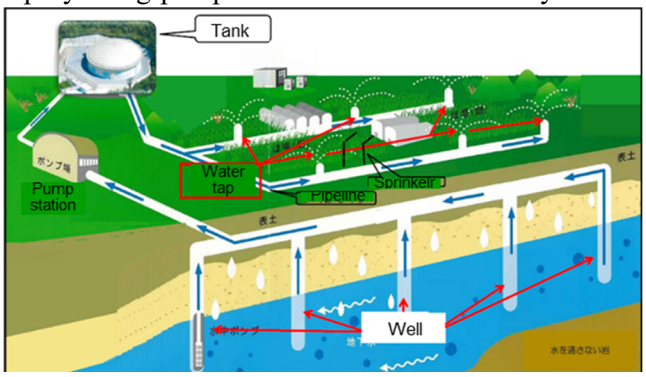


Figure 5.3 Image of Groundwater Irrigation System
Source: Prepared by the JICA Survey Team based on the Map by Land Improvement General Office, Okinawa General Bureau, Cabinet Office

The capacity of each well is calculated based on the results of pumping tests. The intervals between wells will be examined considering the wells' capacities and probable decline of groundwater level to avoid interference among wells each other.

2.3) Examination of the Alternative A and B

The whole beneficial area of the Global Project is 67,791 ha in total, consisting of 27,951 ha of the target area of the Global Project and another 39,840 ha for the future expansion. The annual irrigation water requirement is estimated at 530 million m^3/s in total, and 190 million m^3 out of the amount is needed for the target area of the Global Project. In contrast, Al Wahda Dam has a large water storage capacity, 3.3 billion m^3, and can provide irrigation water for both the Global Project command areas and the future expansion area.

The available water source in Gharb aquifer is estimated at 170 million m^3, which can cover 90% of the required irrigation water for the target area of the Global Project (27,951 ha). However, the water of aquifer has been consumed very much by many wells, which means that an excessive amount of water has been pumped up (see Figure 5.1). Further groundwater pumping up could accelerate the decline of the groundwater level and affect the existing irrigation farming and urban water supplies as well. It means that it is not recommended to use groundwater to irrigate the 67,791ha farmlands including other areas to be developed in the future. Therefore, it is recommended to apply the Alternative A.

Table 5.1 Comparison of Irrigation Development Plans

Item	Alternative A (Proposed Plan)	Alternative B (Groundwater Use)	No-Project
Summary	・ Water is taken from Koudiat El Borna Barrage, which is currently constructed at approximately 40 km downstream from Al Wahda Dam, and the taken water will be distributed to the irrigation area thorough the First Main Canal (Tête Morte Main Canal). ・ After water diversion from the First Main Canal (Tête Morte Main Canal), the water is further distributed to each irrigation block by pump and irrigation network.	・ Deep wells of 100 m and deeper will be constructed and groundwater is pumped up from the wells. Based on the available pumping water volume and irrigation water demand, necessary number of wells to be constructed is calculated. ・ Water is pumped up from each well and distributed to the irrigation zone /reservoir for irrigation blocks. ・ Design of Irrigation facilities within the irrigation block will be the same as in Alternative A.	Rain-fed farming is operated continuously.
Amount of water resources and Irrigation command area	・ Water volume is 2,000 million m^3/year. ・ Current water volume for the existing irrigation area is 400 million m^3/year. ・ Available water volume is 1,600 million m^3/year. ・ Probable new irrigation development area is approximately 146,000ha. ・ 67,791 ha of irrigated area can be developed, including the target area of the Global Project and future expansion irrigated area, which requires water of 740 million m^3/year.	・ Recoverable groundwater volume is 174.2million m^3/year (Gharb aquifer) ・ Current groundwater volume for irrigation is 202 million m^3/year. (Gharb aquifer). ・ Considering available water source is 34 million m^3/year, current use of groundwater is excessive. ・ Probable new irrigation development area is 0 ha. ・ Although the groundwater volume can command 90% of the target area of the Global Project (27,951 ha), many wells have already pumped-up water from the aquifer. It is more than the annual available groundwater quantity. Therefore, it is not recommended to use groundwater further as water resource.	Status quo
Technology	・ A large water intake facility, which can take 60 m^3/s of water, is to be constructed. ・ Large-scale irrigation facilities, namely, 11km-length the First Main Canal (Tête Morte Main Canal), 90 km-length of the Second Main Canal (Hricha Main Canal) and the branch canal (Hricha Branch Canal), and reservoirs are needed.	・ Necessary number of deep wells are to be constructed for irrigation. ・ A pipeline network should be established to pump up water from many wells to distribute water to storage tanks. ・ A power distribution network is necessary for pump operation.	Status quo
Environment	・ Since maximally 60 m^3 /s of water will be taken, there is concern about the environmental impacts on the downstream of Sebou River. However, ABHS has a plan to release 2 m^3/s water from the dam as the ecological discharge. In addition, GIZ and WFP conduct a study on the appropriate river ecological discharge in Sebou watershed, and the results will be reflected to examine river maintenance flow in the future. Ouergha River merges with Sebou River approximately 15 km downstream from Koudiat El Borna Barrage, while Barrage Garde de Sebou is located approximately 60 km downstream from Koudiat El Borna Barrage. It means that Sebou River will not be dried up due to stagnant water around Barrage Garde de Sebou. If there is no change in the downstream discharge from the Barrage Garde de Sebou, no ecological impact downstream of the weir will be caused.	・ The groundwater level decline will be accelerated since many wells have already pumped-up excessive amount of groundwater. ・ Declines of Gharb aquifer and the Manasra aquifer may give some impacts on the Ramsar sites, namely, Merja de Fouwarate and Merja Sidi Boughaba, and also ecosystems in the sites.	Status quo

Item	Alternative A (Proposed Plan)	Alternative B (Groundwater Use)	No-Project
Social Aspect	・ Approximately 62 ha of land acquisition and 7 household relocation will be needed for construction of the First Main Canal (Tête Morte Main Canal), while around 90 ha of land acquisition and one household relocation will be necessary for construction of the Second Main Canal (Hricha Main Canal) and the branch canal (Hricha Branch Canal). However, as for the relocation of the one household mentioned above, another canal route will be examined to avoid the relocation at the detailed design stage.	・ Land acquisition and resettlement would be required, however, the extent will be less than that of Alternative A.	Status quo
Cost	・ Irrigation facility construction cost per area will be higher than Alternative B (This is because Proposal A necessitates the construction of a main canal and distribution pumping stations to the beneficiary areas, whereas Proposal B does not entail the need for an extensive main canal).	・ The construction cost per unit irrigation area would be less than that of Alternative A, since main canals to distribute irrigation water to the beneficial area are not needed, as described on the left column. However, it is necessary to pump up deep groundwater and to irrigate the beneficiary area with a large number of wells in Alternative B. Thus, operating cost per irrigation water is higher than Alterative A.	None
Evaluation	・ Droughts due to climate change are observed more frequently, and irrigation development is necessary as a countermeasure. ・ It is thought that release of river maintenance flow can soften impact on the natural environment. ・ Alternative A can provide stable irrigation water to the target area of the Global Project consisting of new irrigation expansion areas, existing irrigation areas and future irrigation expansion areas. The alternative is reasonable and recommended.	・ Although the construction cost would be lower than Alternative A, operation & maintenance cost is higher. Also, the amount of groundwater resources, which has been already used, is more than recoverable quantity. Therefore, further irrigation development by using groundwater is not sustainable. Therefore, Alternative B is not recommended.	Rainfed agriculture with low productivity is not recommended.

Source: JICA Survey Team (2023)

5.2 Alternatives of the First Main Canal (Tête Morte Main Canal)

1) Alternatives of Structure of the First Main Canal (Tête Morte Main Canal)

The First Main Canal (Tête Morte Main Canal) may consist of open channel, culvert, and siphon considering topographical conditions. However, the planned route is located on the floodplain between Ouergha River and Sebou River, and when it rains, the rainwater collected can flow into the channel from the hillside. Considering those conditions, it is needed to take measures against the flood.

If open canal type is applied, the embankment height should be higher than the water level in case of floods, and the canal slope should be protected by concrete or other means from the flood water. It is also necessary to provide drainage facilities such as crossing culverts, channel bridges to discharge the flooded water to the other side of the channel. This is called as "Alternative A" for discussion of this sub-section.

Apart from such measures mentioned above, there is another alternative that entire channel is constructed as culvert for flood prevention and effective drainage. If so, issues of flooding and drainage are not necessary to be considered. This alternative is called as the "Alternative B". The construction cost of a culvert channel is higher than the cost of Alternative A, even considering cost of flood control and drainage measures for open canal. It is possible to reduce the cost by cancelling the pump station, since water level of the canal can be lower by the culvert.

Here, a comparison of Alternative A (pump intake + open and culvert channel + flood control and drainage measures) and Alternative B (natural intake + all-line culvert channel) is presented; the route and cross-section maps for Alternative A are shown in Figures 5.4 and 5.5, and those for Alternative B are shown in Figure 5.6. Table 5.2 also shows a comparison of the two alternatives, and as a result of the examination, Alternative B (all culverts type) is adopted.

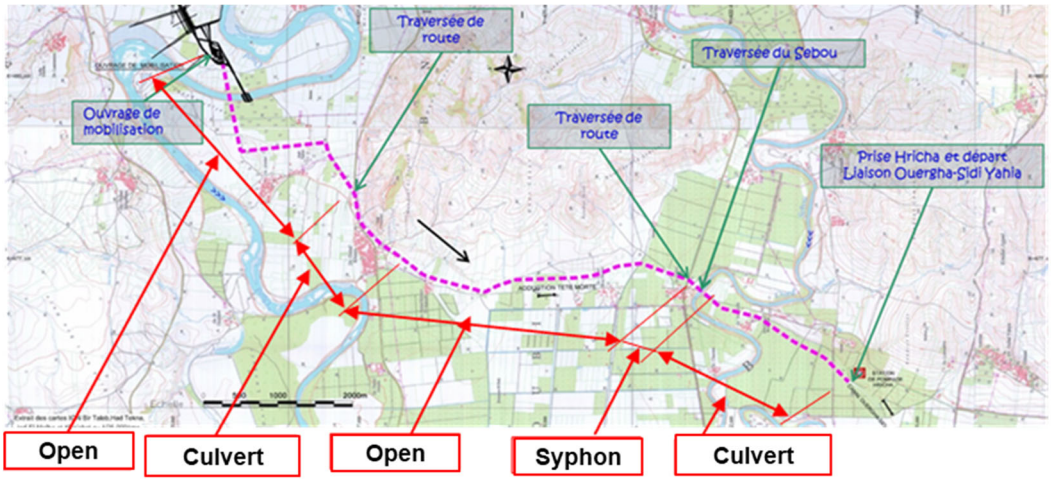


Figure 5.4 Route and Canal Structure (Alternative A)

Source: Figures from the PPT material from ORMVAG explaining the Global Project were processed by the survey team.

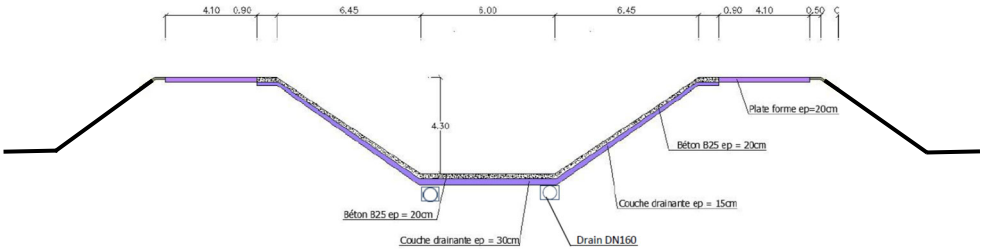


Figure 5.5 Cross Section of Open Channel

Source: Modified by the JICA Survey Team based on "Hydro-agricultural development of the South-East zone of the Gharb irrigation perimeter: Execution study of Lot 1 relating to the Oued Ouergha Upstream section of the main conveyance diagram"

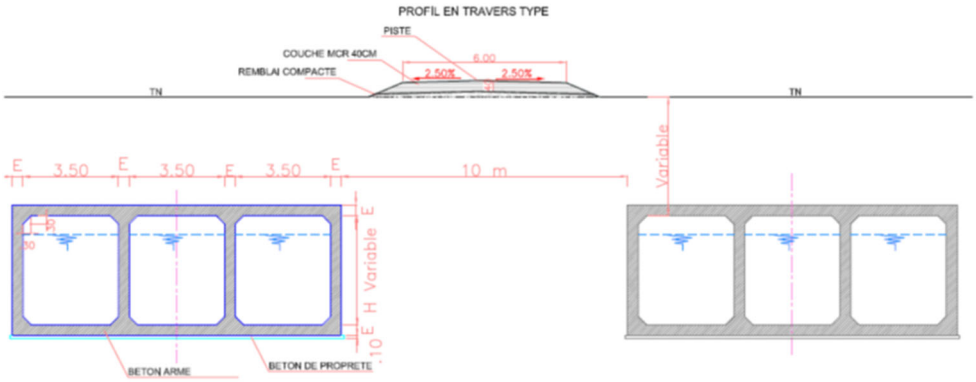


Figure 5.6 Cross Section of Culvert (Alternative B)
Source: ORMVAG (2023)

Table 5.2 Examination on Structure Alternatives of the First Main Canal (Tête Morte Main Canal)

Item	Alternative A: (Open and Channels) + Flood Control and Drainage Measures	Alternative B: Culvert
Summary	➢ After intake at Koudiat El Borna Barrage, water is pumped up (60m^3/s maximumly, head 7m) to raise water level of the First Main Canal (Tête Morte Main Canal). ➢ Open channel, culvert, and siphon are constructed depending on the topographic and environmental conditions and so on. ➢ Provide flood control measures, e.g., raise embankments and protect slopes with concrete. ➢ Provide drainage measures, e.g., setting of drainage channel on the hillside, drainage channel bridge across the First Main Canal (Tête Morte Main Canal).	➢ Water intake shall be gravity intake from the Koudiat El Borna Barrage. ➢ The entire line will be culvert-type channel. It will cross Sebou River by siphon.
Technology	➢ Operation and maintenance cost would be high due to pumping up system. ➢ Open channel construction is technically easy. ➢ Cracks are likely to be caused in the concrete lining due to exposure to the natural environment, and reinforcement work for the lining is necessary. ➢ Section of the open channel will require flood control and drainage measures.	➢ Water level would be lower than that of Alternative A, which makes the pumping capacity at the start point of the Second Main Canal (Hricha Main Canal) bigger. ➢ Flood control measure is not needed due to culvert. ➢ Maintenance work of the channel, mainly sediment removal in the channel, would be more than that of Alternative A. ➢ In order to remove sediments in the culvert, cross-section should be enough wide to accommodate construction equipment.
Environment	➢ Drainage capacity is low and drainage measures are to be taken, since the canal construction could block off water flow between the right bank and left the bank of the canal. ➢ Surface water is interrupted by the open channel, which results in poor drainage, and drainage measures are needed. ➢ Since the open channel could obstruct movement of small animals, and the ecosystem may be affected. On the other hand, the canal can provide water resources for the animals.	➢ Although some topographic changes can be caused by the construction works, e.g., excavation, most of the land will be recovered after the construction as it is. ➢ No ecological impact is anticipated, since the topographic conditions are not changed.
Social Aspect	➢ Land acquisition (approximately 49 ha) will be required. ➢ The land is blocked off by the canal construction, making traffic inconvenient compared to before. ➢ Measures to prevent people and animals from falling in canals such as fence construction are necessary.	➢ Approximately 62ha area of land acquisition and relocation of 7 households will be caused. ➢ If the land surface is restored to its original condition with soil, farming may be possible depending on the depth of the culvert.
Cost	➢ The water channel construction cost is 800,000 JPN/m (not including the siphon). ➢ Costs for both flood control and drainage measures are required.	➢ The water channel construction cost is 2.4 million JPN /m (not including the siphon). ➢ Construction costs are higher compared to Alternative A. ➢ Costs for flood control and drainage measures are not needed.

Item	Alternative A: (Open and Channels) + Flood Control and Drainage Measures	Alternative B: Culvert
Cost		➢ Cost for operation and maintenance for pumps of the Hricha Main canal costs would be higher than Alternative A.
Evaluation	Normally, this alternative would be preferred due to construction costs and operation and maintenance costs. However, considering the natural conditions of the target area of the Global Project where flood damage can be occurred, and risk that water supply could be suspended due to damage to the canal by flood, Alternative A is not recommended	The construction, operation, and maintenance costs would be higher than that of Alternative A. However, the implementing agency estimates that the life cycle cost would be almost same as that of Alternative A based on the relevant data. Thus, Alternative B is recommended in terms of flood damage control.

Source: JICA Survey Team (2023)

2) Alternatives of Route of the First Main Canal (Tête Morte Main Canal) near Oulad Khrays Douar

The First Main Canal (Tête Morte Main Canal) will pass through near Oulad Khrays Douar, and there are two options of routes: 1) the shortest way between the road near Oulad Khrays Douar and the edge of the hill (Alternative A), and 2) the route bypassing Oulad Khrays Douar and passing near the Ouergha River (Alternative B) as illustrated in the following figure. Since the culvert type for the entire alignment has already been given priority, a comparative study for the case of a culvert channel is conducted below.

Table 5.3 shows examines of those two alternatives and recommends the applicable one. The Alternative A require relocation of residents and existing structures, however, the number is just 11 structures (7 households) due to the canal structure, culverts. In addition, since it is the shortest route, the construction cost will be the lowest. Therefore, it is concluded that Alternative A is the appropriate option.

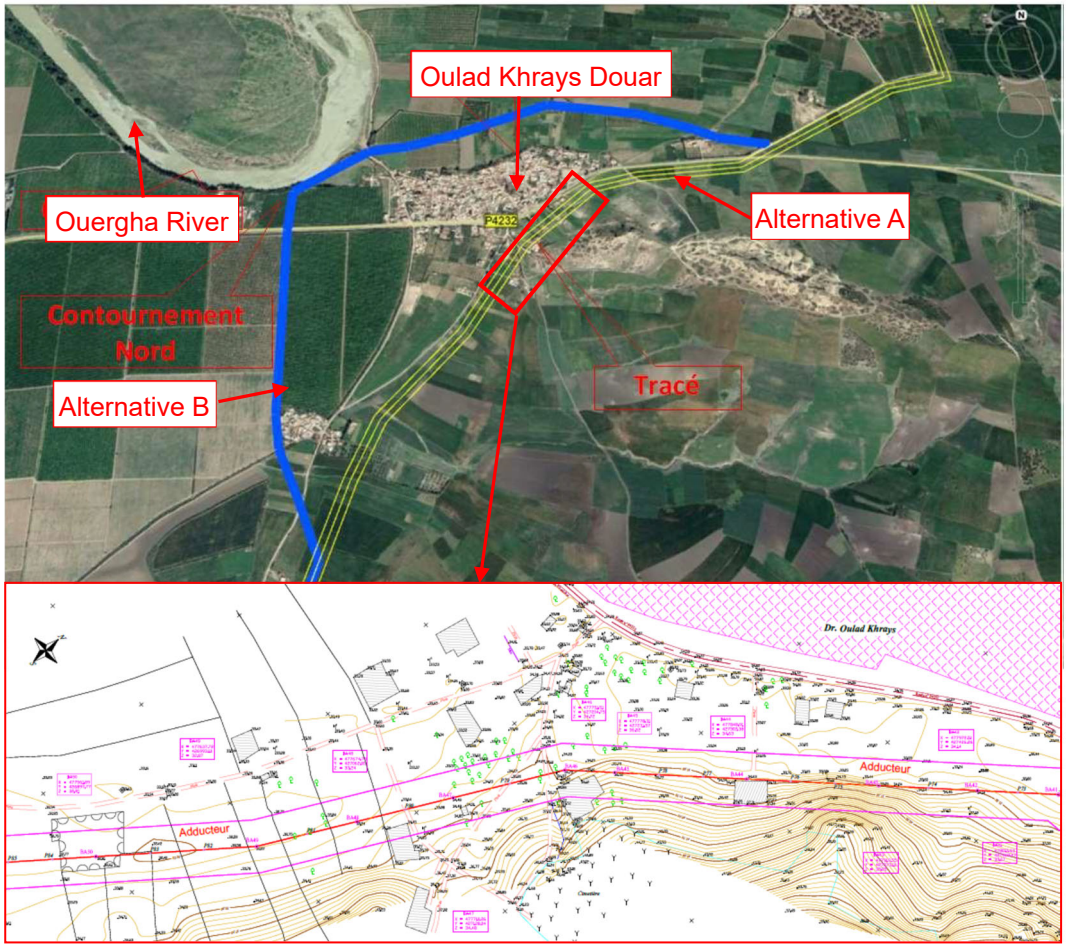


Figure 5.7 Route plan of the First Main Canal (Tête Morte Main Canal) near Oulad Khrays Douar

Source: Modified by the JICA Survey Team based on "Hydro-agricultural development of the South-East zone of the Gharb irrigation perimeter: Execution study of Lot 1 relating to the Oued Ouergha Upstream section of the main conveyance diagram"

Table 5.3 Examination on Alternatives of First Main Canal (Tête Morte Main Canal) Route near Oulad Khrays Douar

Item	Alternative A (Passing through Residential Areas)	Alternative B (Bypassing Residential Areas)
Summary	➢ Shortest route along the road to the destination	➢ It is possible to avoid residential areas for the canal construction
Technique	➢ The structure of the culvert needs to be strengthened, since the canal passes through hilly area partly. ➢ Probably it is needed to adjust the route to reduce the persons to be relocated.	➢ Since the canal passes near a river bend, there is concern about riverbank erosion. Reinforcement of riverbank by concrete, etc. will be necessary.
Environment	➢ No environmental impacts are expected, since canal structure is culvert.	➢ No environmental impacts are anticipated, since it will be culvert.
Social Aspect	➢ 11 buildings (7 households) are expected to be relocated and approximately 62ha of land will be acquired Thus, it is needed to provide compensation.	➢ Impact on residential areas is not expected. ➢ Since the canal will pass through fruit tree plantations, compensation for tree logging covering around 6.8 ha will be required.
Cost	➢ Construction cost is lower than Alternative B because of the shortest route.	➢ Due to the longer distance, construction cost will be higher by approximately 180 million JPY than that of Alternative A except for bank protection.
Evaluation	Although relocation of 11 buildings (7 households) is expected during the construction works, it is possible to restore the original conditions after the construction works. Moreover, construction cost is lower due to its shorter distance. As a whole, Alternative A is recommended.	Although relocation of residents and buildings can be avoided, compensation for fruit trees logging will be required. The construction cost will be higher than that of Alternative A due to longer distance and necessity of bank protection works. Considering these issues, Alternative B is not appropriate to be adopted.

Source: JICA Survey Team (2023)

5.3 Alternatives for the Second Main Canal (Hricha Main Canal) and Hricha Branch Canal

The Second Main Canal (Hricha Main Canal) and the branch canal (Hricha Branch Canal) are planned to distribute water from the pumping station connected to the First Main Canal (Tête Morte Main Canal) to the target area of the Global Project, 29,000 ha, and the following three major canal systems are planned based on the location of the target irrigation areas:

Line 1: Beght Extension Zone and Beght East Zone
Line 2 : Zirara Zone and Zrar Extension Zone
Line 3: Zrar Zone

Alternatives include Option A, which would pass through the higher elevations of the irrigation areas, and Option B, which would use the route of an existing canal, the Beht main canal. Total four alternatives are considered for these two options: one that uses both open canals and pipelines to deliver water as the form of the new canal (A-1 and B-1), and one that uses only pipelines to deliver water (A-2 and B-2). These are summarized in Table 5.4 and Figure 5.8.

Table 5.4 Summary of Alternatives for the Second Main Canal (Hricha Canal) and Hricha Branch Canal

Item	A-1	A-2 (Recommended)	B-1	B-2
Structure	Combination open channel and pipeline	Pipeline only	Combination open channel and pipeline	Pipeline only
Layout	An open channel is constructed from the start points of the Second Main Canal (Hricha Main Canal) to boundary between Zrar Zone and Zirara Zone, where water can be sent. A pipeline Is constructed from the points for water distribution to Zrar Zone	Pipelines are constructed from the starting point of the Second Main Canal (Hricha Main Canal) to the boundary between Zrar Zone and Zirara Zone, where water can be sent. Pipelines are constructed from the points for water distribution to Zrar Zone	Open channel is constructed at the start point of the Second Main Canal (Hricha Main Canal) and is connected to Beht Canal. Since upstream of Beht Canal is used for existing irrigation Zone, namely, Beht West and Beht Central, water is distributed from the	Triple lines of pipeline are constructed from the starting point of the Second Main Canal (Hricha Main Canal), and System-1 is connected to Beht Canal. System-2 and 3 pass through along Beht Canal to each Irrigation Zone

Item	A-1	A-2 (Recommended)	B-1	B-2
	and Zrar Extension Zone, where elevations are high, by pump pressure. Open channel is connected to the existing canal, namely, Beht Canal for water distribution to Beht East Zone.	and Zrar Extension Zone, where elevations are high, by pump pressure. One of the divided channels is connected as a pipeline to existing Beht Canal to distribute water for Beht East Zone.	boundary point of Beht East Zone to each Irrigation Zone. Since pumping is needed, entire canal is pipeline from the boundary point.	
Role of existing Beht Canal	Distribution of water to Beht East Zone	Distribution of water to Beht East Zone	Distribution of water to Beht East Zone, Zirara Zone, Zrar Extension Zone, and Zrar Zone	Distribution of water to Beht East Zone

Source: JICA Survey Team

After comparative study, Alternative A-2 is considered the most desirable, as shown in Table 5.5. Considering the time limit for pump operation and the introduction of drip irrigation, using a pipeline for the entire line would be the most advantageous in terms of system operation. In addition, although Alternative A-2 is more expensive to construct, the pipeline will be buried underground, and its environmental and social impacts will be smaller than those of using an open canal.

The construction cost of Alternative A-2 is slightly lower than that of Alternative B-2, and the pipeline will pass near a main road, making it easier to maintain and manage. Compared to Alternatives A-1 and B-1, which partially use an open channel, Alternatives A-2 and B-2 are more expensive in terms of construction cost, however, Alternatives A-2 and B-2 are superior in terms of future operation and maintenance. The evaluations of A-2 and B-2 seem similar, however, the location and extension of the waterway and the associated land acquisition area are different.

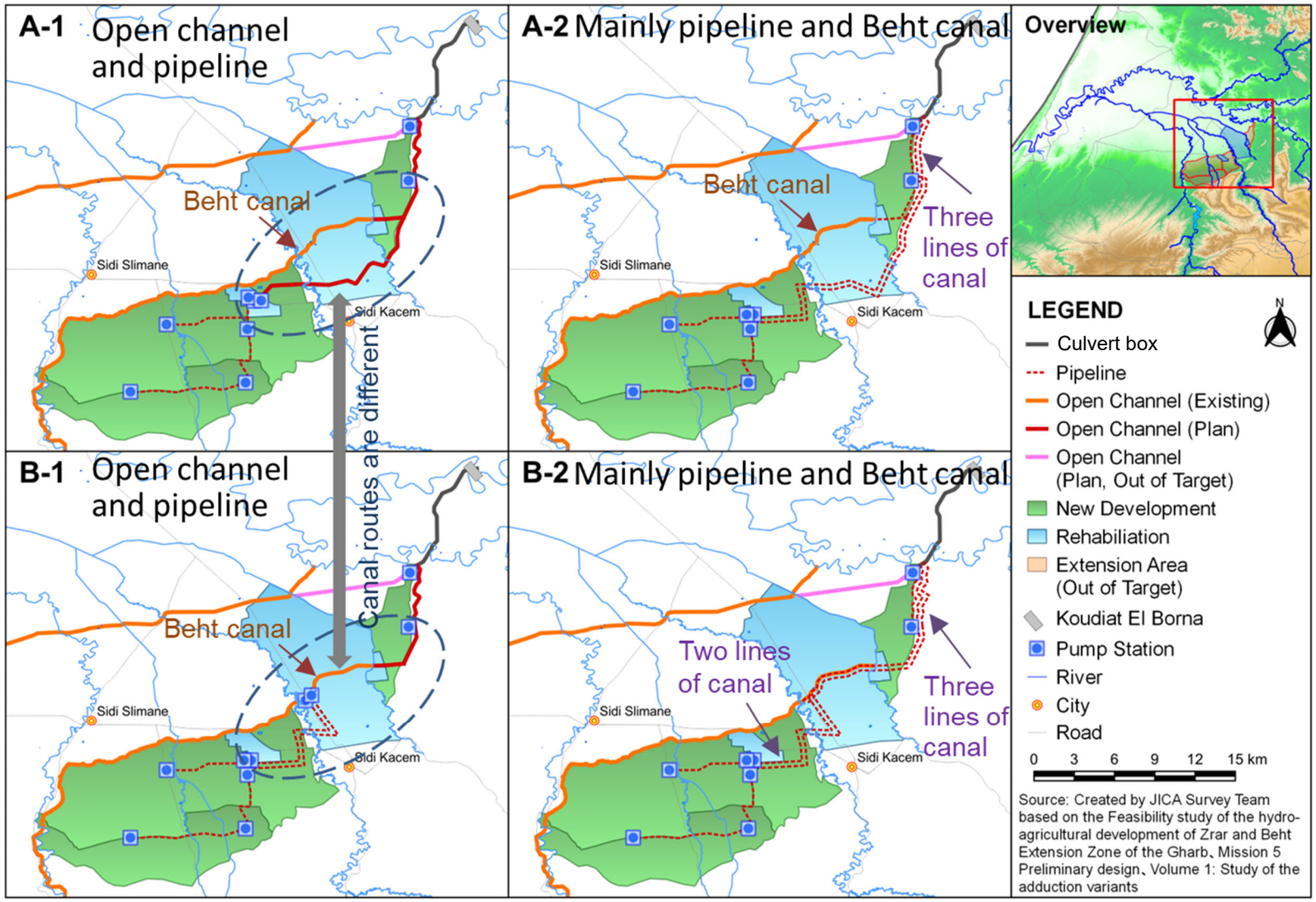


Figure 5.8 Alternatives of the Second Main Canal (Hricha Main Canal) and Hricha Branch Canal

Source: JICA Survey Team

Table 5.5 Examination of Alternatives of the Second Main Canal (Hricha Main Canal) and Hricha Branch Canal in terms of Routes and Structures

Particular	A-1	A-2 (Recommended)	B-1	B-2
Summary (Length of Channels)	➢ Newly constructed open channel: 27km ➢ Open channel (Beht Main Canal): 9km ➢ Double lines of pipeline System-2: 15km System-3: 8km Total: 59km	➢ Triple lines of pipeline as follows: System-1: 11km System-2: 42km System-3: 35km Total: 88km ➢ Open channel (Beht Canal to be connected to System-1): 9km	➢ Newly constructed open channel: 11km ➢ Open channel (Beht Canal): 9km ➢ Double lines of pipeline System-2: 27km System-3: 18km Total: 65km	➢ Triple lines of pipeline as follows: System-1: 11km System-2: 44km System-3: 35km Total: 90km ➢ Open channel (Beht Canal to be connected to System-1): 9km
Technique	➢ Open channel construction is technically easy, however, alternatives for route selection are limited due to steep ground. ➢ Concrete lining is easily to be cracked due to exposure to wind and rain. ➢ During rain, measures against water inflow from surrounding areas is needed in the section of open channel. ➢ A regulating pond is needed between the open canal and the pipeline network in the irrigation block.	➢ Compared to the open channel, water loss is small. ➢ Compared to open channel, water head loss is big. ➢ More alternatives for selection of channel routes ➢ Drainage measure is not necessary. ➢ Since pipeline can keep water full, it is easy to supply irrigation water to the pipeline network of irrigation blocks. ➢ Since water pressure of the Second Main Canal (Hricha Main Canal) can be used for the pipeline network within the irrigation block, pump capacity can be smaller than those of A-1 and B-1.	➢ Open channel construction is technically easy, however, alternatives for route selection are limited due to the topographical issue, namely, the steep ground. ➢ It is needed to wider a part of Beht Canal, where is used for the new construction. ➢ Concrete lining is easily to be cracked due to exposure to wind and rain. ➢ During rain, measures against water inflow from surrounding areas is needed in the section of open channel. ➢ A regulating pond is needed between the open canal and the pipeline network in the irrigation block.	➢ Compared to open channel, water loss is small. ➢ Compared to open channel, water head loss is big. ➢ More alternatives for selection of channel routes ➢ Drainage measure is not needed. ➢ Since pipeline can keep water full, it is easy to supply irrigation water to the pipeline network of irrigation blocks. ➢ Since water pressure of the Second Main Canal (Hricha Main Canal) can be used for the pipeline network within irrigation block, pump capacity can be smaller than those of A-1 and B-1.
Environment	➢ In the section of open channel, traffic of small animals will be obstructed. Also, the open canal is served as a water source for the animals, which can bring change on the surrounding ecosystem.	➢ Pipeline will be buried, which can cause some modification of surface area. However, the surface area could be restored as it is after construction completion. ➢ Impacts on ecosystem are not expected.	➢ In the section of open channel, traffic of small animals will be obstructed. Also, the open canal is served as a water source for the animals, which can bring change on the surrounding ecosystem.	➢ Pipeline will be buried, which can cause some modification of surface area. However, the surface area could be restored as it is after construction completion. ➢ Impacts on ecosystem are not expected.
Social Aspect	➢ Land acquisition area is the largest. ➢ In the Beht Canal (existing) section, land acquisition is not necessary. ➢ In the section of pipeline, if land surface is restored with soil, farming can be continued after the Global Project depending on the depth of the	➢ Land acquisition area is the smallest. Approximately 90 ha of land acquisition and relocation of one household will be caused. However, the route to avoid the relocation will be examined in the detailed design phase.	➢ Land acquisition area is the second largest. ➢ In the Beht Canal (existing) section, land acquisition is not necessary. ➢ In the section of pipeline, if land surface is restored with soil, farming can be operated after the Global	➢ Land acquisition area is the third largest among the alternatives. ➢ In the Beht Canal (existing) section, land acquisition is not necessary. ➢ In the section of pipeline, if land surface is restored with soil, farming can be operated after the Global

Particular	A-1	A-2 (Recommended)	B-1	B-2
	culvert. However, if land is permanently acquired, farming after the Global Project cannot be done. ➢ In the section of open channel, traffic can become inconvenient than before. ➢ Measures to prevent people and animals from falling in the open channel, installation of fences, are necessary.	➢ In the section of existing Beht Canal, land acquisition is not necessary. ➢ In the section of pipeline, if the land surface is restored with soil, farming can be operated after the Global Project depending on the depth of the culvert. However, if the land is acquired permanently, the farmland cannot be used after the Global Project.	Project depending on the depth of the culvert. However, if the land is acquired permanently, it will not be used as farmland after the Global Project. ➢ In the section of open channel, traffic can become inconvenient than before. ➢ Measures to prevent people and animals from falling in the open channel, installation of fences, are necessary.	Project depending on the depth of the culvert. However, if the land is permanently acquired, the land will not be used as farmlands after the Global Project.
Cost	Total construction cost 9,090million JPY Annua O& M cost 400 million JPY Cost of land acquisition 670 million JPY	Total construction cost 18,350million JPY Annua O& M cost 400 million JPY Cost of land acquisition 300 million JPY	Total construction cost 13,880 million JPY Annua O& M cost 510 million JPY Cost of land acquisition 490 million JPY	Total construction cost 18,430million JPY Annua O& M cost 400 million JPY Cost of land acquisition 310 million JPY
Evaluation	If a section of the channel is open, the construction cost will be lower, but the environmental and social impacts will be bigger. Since the section of open channel will be longer, more sediment and waste can be pooled in the canal. Since sprinkler or drip irrigation will be introduced, filter facilities are to be installed. Moreover, frequent filter cleaning and filter replacement are necessary.	Considering limited pump operation hours and water pressure for sprinkler and drip irrigation, whole canal pipeline is the best option in terms of operation and management. The construction cost Is higher than A-1 and B-1, since the pipeline will be buried. On the other hand, the construction cost is slightly lower than that of B-2. Expected environmental and social impacts will be smaller than those of open channel, and expected land acquisition area is limited. Since the parts of the canal along main road is longer, maintenance is relatively easy. Considering those aspects in a comprehensive way, A-2 is recommended option.	If a section of the channel is open, the construction cost will be lower, however, expected environmental and social impacts will be more significant. Since the section of open channel will be longer, more sediment and waste can be pooled in canal. Since the irrigation system will be sprinkler or drip irrigation, filter facilities are needed to be installed, moreover, frequent filter cleaning and filter replacement are necessary.	Considering limited pump operation hours and water pressure for sprinkler and drip irrigation, pipeline of whole canal is the best option in terms of system operation. The construction cost Is higher, since the pipeline will be buried. Still, environmental and social impacts will be smaller than those of open channel.

Source: JICA Survey Team (2023)

6. SCOPING

6.1 Selection of Impact Assessment Items

In general, following evaluation items for environmental and social considerations are examined for any projects supported by JICA fund as shown in Table 6.1.

Table 6.1 Evaluation Items for Environmental and Social Considerations for JICA Projects

No.	Field	Evaluation Item	No.	Field	Evaluation Item
1	Pollution	Air pollution	12	Social environment	Land acquisition and resettlement
2		Water quality	13		Livelihoods
3		Waste	14		Vulnerable people
4		Soil pollution	15		Cultural heritage
5		Noise and Vibration	16		Scenery
6		Land subsidence	17		Ethnic minorities and indigenous peoples
7		Odor	18		Water use
8	Natural environment	Protected area	19		Conflict
9		Biodiversity	20		Working environment including safety
10		Hydrology	21		Community health, safety and security
11		Topography and geology	22	Others	Transboundary impacts and climate change

Source: JICA (2022)

6.2 Scoping Results

Expected environmental impacts by the construction of the First Main Canal (Tête Morte Main Canal) and ancillary facilities such as siphon are shown in Table 6.2.

Table 6.2 Scoping Matrix for the First Main Canal (Tête Morte Main Canal) and Ancillary Facilities

Field	Evaluation item	Evaluation		Reasons for Evaluation
		Before/ During Construction	Operation Period	
Pollution	Air pollution	✓	-	**During construction**: Gases and dust are temporarily generated due to operation of construction equipment and vehicles. **Operation period**: No air pollution is expected.
	Water quality	✓	-	**During construction**: If ground improvement is needed for construction of a siphon crossing Sebou River, turbid water at the construction site is generated. The extent of impacts on water quality depends on the materials used for the ground improvement. Thus, it is needed to identify available materials in Morocco at first, and to assess the expected impacts due to the use of the materials, further, to examine the countermeasures. Since the construction workers and technicians will be hired from the surrounding areas, population influx from outside is limited, and severe increase in manure and associated deterioration of water quality are not anticipated. **Operation period**: No water pollution is expected.
	Waste	✓	-	**During construction**: Waste such as excavated soil and used construction materials, e.g., woods, generated from the construction site. On the other hand, the construction workers and technicians will be hired from surrounding areas, and population influx from outside is limited. Thus, no increase in house waste is expected. However, simple toilets will be installed at the construction site and the treatment is necessary. **Operation period**: Waste generation is not expected.
	Soil pollution	✓	-	**During construction**: Oil leakage from construction equipment and vehicles is expected, but the extent is limited. **Operation period**: Soil pollution is not expected.
	Noise and	✓	-	**During construction**: Noise and vibration will be

Field	Evaluation item	Evaluation		Reasons for Evaluation
		Before/ During Construction	Operation Period	
	Vibration			generated due to the operation of construction equipment and vehicles. **Operation period**: Any activity to cause noise and vibration is not expected.
	Land subsidence	-	-	**During construction/Operation period**: No construction or operation causing land subsidence, such as pumping of groundwater is planned.
	Bottom sediment	✓	-	**During construction:** Half of stream in the Sebou River is closed temporarily for soil excavation. Bottom of the river will be influenced in the construction period, however, the excavated soil will be fill in, which will not cause a big problem. **Operation period**: No activities affecting bottom sediment are planned.
	Odor	-	-	**During construction/Operation period**: No activities generating odors are planned.
Natural environment	Protected area	-	-	**During construction/Operation period**: The closest protected area to the target area of the Global Project is Jbel Zerhoun IBA, which is located more than 20 km away from the target area of the Global Project, which means that it will not be affected by the Global Project. Moreover, two Ramsar sites, which are located downstream of the target area of the Global Project, will not be affected, given that their water resources are rainfall or discharge from surrounding areas, instead of Ouergha River and Sebou River.
	Biodiversity	✓	✓	**During construction**: Temporary impacts on the ecosystem around the construction site are expected. **Operation period**: 60 m^3 /s water intake in the upstream area of Sebou River may cause changes in the ecosystem downstream area. However, saltwater intrusion will be prevented by Garde de Sebou Barrage. Damage to the protected areas is not expected. However, there is a possibility that rare species of birds, which get foods in the Sebou River and Ouergha River, would be influenced by the decrease of river flow.
	Hydrology	-	✓	**During construction**: No hydrological impacts are expected since normal construction works and siphon crossing Sebou River, which don't cause negative impacts, are conducted. **Operation period**: When 60 m^3 /s of water is taken in the upstream area, discharge to the downstream is reduced, which can result in hydrological changes in the downstream area.
	Topography and Geology	✓	-	**During construction**: Topographical change will be observed due to excavation. However, since a part of the First Main Canal (Tête Morte Main Canal) will be culverts, the topographically affected areas will be restored to their original condition after the Global Project completion. Moreover, no work which can cause geological change is not planned. **Operation period**: No topographical and geological alterations are planned.
Social environment	Land acquisition and resettlement	✓	-	**Pre-construction**: Permanent land acquisition will be caused if the proposed canal is constructed. Resettlement also can be expected, however, the scale of resettlement is limited. **During construction**: Due to the construction of culvert box, some residential areas and farmlands will be affected, and the owners have to be compensated for the losses. After the construction works, most of the lands will be restored to the original conditions, however, the affected lands will become public property, the original owners cannot use the lands. **Operation period**: No activities resulting in land

Field	Evaluation item	Evaluation		Reasons for Evaluation
		Before/ During Construction	Operation Period	
				acquisition and resettlement are planned.
	Livelihoods	✓	-	**During construction**: In addition to permanent land acquisition and resettlement, there are concerns about economic losses due to the temporary suspension of farming. On the other hand, a positive impact on the local economy is expected by employing local residents as construction workers. **Operation period**: The beneficiaries can access irrigation water more than before, which results in the livelihood improvement.
	Vulnerable people	✓	-	**During construction**: In addition to permanent land acquisition and resettlement, there are concerns about economic losses due to temporary suspension of farming activities on owned farmland. **Operation period**: No activities affecting vulnerable groups are planned.
	Cultural heritage	-	-	**During construction/Operation period**: No activities affecting cultural heritage are planned.
	Scenery	-	-	**During construction/Operation period**: No activities damaging to the landscape are planned.
	Ethnic minorities and indigenous peoples	-	-	**During construction/Operation period**: No activities affecting minorities and indigenous peoples are planned.
	Water use	-	✓	**During construction**: No construction work to close the river is planned, and no impact on water use is expected. **Operation period**: Water intake of 60 m^3 /s at Koudiat El Borna Barrage could affect water use in the downstream of area of Ouergha River.
	Working environment (including safety)	✓	-	**During construction**: Safe and healthy working environment is necessary to prevent accidents during the construction works. **Operation period**: No activities affecting working environment are planned.
	Accident	✓	✓	**During construction**: Construction equipment and vehicles increases the risk of traffic accidents around the construction site. **Operation perioding**: If sedimentation ponds are constructed, there would be a risk that people would tumble down. It is possible to avoid such accidents by fence setting.
	Community health, safety and security	✓	-	**During construction**: Since most construction works will be done by hiring workers from the surrounding areas, no large-scale population influx is anticipated, thus, no serious impact on local health, safety, and security is expected. However, initial training of hired workers is necessary. **Operation period**: No activities are planned that would affect the health, safety, or security of the community. Furthermore, water borne diseases e.g., Malaria and schistosomiasis are controlled adequately in Morocco, thus, the Global Project would not cause those diseases.
Others	Trans-boundary impacts and Climate change	✓	✓	**During construction**: Exhaust gases including NO_x are temporarily emitted due to the operation of construction equipment and vehicles. **Operation period**: Installation of the pump station is expected to increase electricity consumption, resulting in an increase in carbon dioxide emissions.

Source: JICA Survey Team (2023)

Expected environmental impacts by the construction of the Second Main Canal (Hricha Main Canal), the branch canal (Hricha Branch Canal) and ancillary facilities are shown in Table 6.3. After the construction works, water can be distributed to the beneficial areas, therefore, the expected impacts on

the beneficial areas are also described in the following table.

Table 6.3 Scoping Matrix for the Second Main Canal (Hricha Main Canal), the Hrich Branch Canal, Ancillary Facilities and Beneficiary Areas

Field	Evaluation item	Evaluation		Reasons for Evaluation
		Before/ During construction	Operation period	
Pollution	Air pollution	✓	-	**During construction**: Exhaust gases and dust are generated due to the operation of construction equipment and vehicles. **Operation period**: No activities generating air pollution are planned.
	Water quality	-	✓	**During construction**: The rivers around the Second Main Canal (Hricha Main Canal) is seasonal, and there is no water flow during the dry season (construction period will be only in dry season) in the rivers, therefore, impact on water quality of those rivers is not expected. **Operation period**: Introduction of sprinkler and drip irrigation systems will reduce amount of fertilizer application compared to the current gravity irrigation system, which can result in reduction in nitrate discharge to the groundwater. On the other hand, high concentrations of nitrate have been detected in groundwater outside of the target area of the Global Project in the Sebou River basin, and it is pointed out that the source is agricultural activities. At present, contamination of groundwater in the target area of the Global Project has not been identified, however, it is needed to study current groundwater quality as a baseline to assess impacts by the Global Project.
	Waste	✓	-	**During construction**: Waste such as surplus soil by excavation works and used woods are generated. On the other hand, since construction workers and technicians will be hired from the surrounding areas, a large-scale population influx from outside is not expected, which results in no increase in household waste. However, simple toilets will be installed at the construction site and disposal of the excrement is necessary. **Operation period**: No waste is expected.
	Soil pollution	✓	-	**During construction**: Oil leakage from construction equipment and vehicles is expected, however, the extent is very limited. **Operation period**: No activities causing soil pollution are planned. On the other hand, the F/S report prepared by the Government of Morocco shows soil salinity results, which soil were sampled in the four irrigation zones of the target area of the Global Project (21 sites), excluding the Beht East Zone. According to the report, EC values of the surface soil range are 0.07-0.35m^S /cm, which are suitable for agriculture. According to Moroccan national standards, soil is classified as “non-saline” if EC value of the soil is less than 0.5mS/cm. The Global Project will install sprinkler and drip irrigation systems, which can reduce the amount of irrigation water. Moreover, the Global Project will not promote salinization of soil, given that capillary phenomena (rise of the groundwater including saline water to the soil surface) will not be caused as far as applied irrigation water volume is limited. Furthermore, even if fertilizer components are accumulated on the soil surface, leaching by rainfall in winter (about 400 mm) is possible. Thus, soil pollution of the Global Project is not expected.
	Noise and vibration	✓	-	**During construction**: Temporary noise and vibration will be generated from construction

Field	Evaluation item	Evaluation		Reasons for Evaluation
		Before/ During construction	Operation period	
				equipment and vehicles. **Operation period**: No activities generating noise and vibration are planned.
	Land subsidence	-	-	**During construction/Operation period**: No groundwater pumping causing land subsidence is planned.
	Stench	-	-	**During construction/Operation period**: No activities generating odors are expected.
Natural (physical) environment	Sanctuary	-	-	**During construction/Operation period**: The closest protected area to "the Target Area of Global Project" is the Jbel Zerhoun IBA, which is located more than 20 km away from the target area of the Global Project and is not expected to be affected. In addition, two Ramsar sites are located downstream of the target area of the Global Project will not be affected, since their water resources are not Ouergha River and Sebou River.
	Biodiversity	✓	✓	**During construction**: Temporary impacts on the ecosystem around the construction site are expected due to the operation of construction equipment and vehicles. On the other hand, no impacts in the downstream area are anticipated. **Operation period**: 60 m^3 /s water intake in the upstream may cause changes in the ecosystem the downstream of Sebou River and Ouergha River. Damage to the protected areas is not expected. However, there is a possibility that rare species of birds, which get foods in the Sebou River and Ouergha River, would be influenced due to the decrease of river flow.
	Hydrology	-	✓	**During construction**: No hydrological impacts are expected, given that there is only seasonal river and no water flow during the dry season, namely, construction period. **Operation period**: if 60 m^3 /s water is taken upstream of Sebou River, discharge to the downstream will be reduced, and hydrological change will be caused.
	Topography and geology	✓	-	**During construction**: Topographical change will be caused due to excavation. Also, construction of farm ponds and pumping station could cause change in topography to some extent. However, since the second canal (Hricha Main Canal) and the branch canal (Hricha Branch Canal) will be pipeline, many areas will be restored to their original conditions after completion. No work affecting the geology is planned. **Operation period**: No topographic and geological changes/impacts are expected.
Social environment	Land acquisition and resettlement	✓	-	**During construction**: Due to the construction of the pipeline, the surrounding areas will be acquired and the land owners will be compensated for the losses. After backfilling, the land will be restored to its original conditions, however, the original land owners cannot use the lands since the lands belong to the public after the compensation. The extent and scale of land acquisition for the construction of the Canal and ancillary facilities are unknown at present. Since the affected area is currently agricultural land, large-scale resettlement is not expected, scale of the expected impact is also unknown. **Operation period**: No activities causing land acquisition and resettlement are expected.
	Livelihoods	✓	✓	**During construction**: In addition to permanent land acquisition, there is concern about economic loss

Field	Evaluation item	Evaluation		Reasons for Evaluation
		Before/ During construction	Operation period	
				due to the temporary suspension of farming by the construction works. On the other hand, since local residents will be hired as construction workers, their incomes will be improved. **Operation perioding**: The beneficiaries can access irrigation water, and agricultural income will be increased.
	Vulnerable people	✓	-	**During construction**: In addition to permanent land acquisition, there are concerns about economic losses due to the temporary suspension of farming by the construction works. **Operation period**: no activities affecting vulnerable groups are planned.
	Cultural heritage	-	-	**During construction/Operation period**: No activities affecting cultural heritage are planned.
	Scenery	-	-	**During construction/Operation period**: No activities affecting landscapes are planned.
	Ethnic minorities and indigenous peoples	-	-	**During construction/Operation period**: No activities affecting minorities or indigenous peoples are planned.
	Water use	-	✓	**During construction**: No impact on water use is expected for the new irrigation zones, as the farmers depend on rain for agriculture at this moment. For existing irrigation zones, no impact on current water use is anticipated because the existing irrigation system can be used even during the construction period. **Operation period**: The existing water use will be changed, and rules for water allocation will need to be established.
	Conflicts	-	✓	**During construction**: No conflicts of interest are expected. **Operation period**: During drought, there may be conflicts of interest among farmers on how to allocate the limited water resources.
	Working environment (including safety)	✓	-	**During construction**: A safe and healthy working environment is necessary to prevent accidents during the construction works. **Operation period**: No activities affecting the working environment are planned.
	Accident	✓	-	**During construction**: The operation of construction equipment and vehicles increases the risk of traffic accidents around the construction site. **Operation perioding**: Construction of the farm ponds will create a risk that people would tumble down. It is possible to avoid such accidents by fence setting.
	Community health, safety and security	✓	-	**During construction**: Since construction workers will be hired from the surrounding areas, no big scale population influx from outside is anticipated, which results in no serious impact on local health, safety, and security. However, initial training of hired workers is necessary. **Operation period**: No activities affecting health, safety, or security of the community are planned. Moreover, water borne diseases such as Malaria and schistosomiasis are controlled adequately in Morocco, thus, the Global Project will not cause the diseases.
Other	Transboundary impacts and climate change	✓	✓	**During construction**: Exhaust gases including Nox are temporarily emitted due to the operation of construction equipment and vehicles. **Operation period**: Installation of the pump station is expected to increase electricity consumption, resulting in an increase in carbon dioxide emissions.

Field	Evaluation item	Evaluation		Reasons for Evaluation
		Before/ During construction	Operation period	
				On the other hand, the number of cattle and sheep will be increased by 24,000 in total. However, it will be increased by less than 1%, considering that more than 3 million heads of cattle are grazed in Morocco at this moment. The impact on climate change by the Global Project will be limited.

Source: JICA Survey Team (2023)

6.3 Survey Items and Methodology

In order to evaluate and analyze environmental items, which will be affected by the Global Project, and which cannot be determined at the scoping stage, it is needed to implement a series of surveys to collect existing data and to identify baseline. Specific survey items and survey methods will be described in Table 6.4 and Table 6.5.

Table 6.4 Survey Methodology for the First Main Canal (Tête Morte Main Canal) and Ancillary Facilities

Field	Evaluation Item	Survey Item	Survey Method
Pollution control	Air pollution	(1) Field survey: 2 sites along the First Main Canal (Tête Morte Main Canal) (2) Items: sulfur dioxide, nitrous oxide, carbon monoxide, lead, cadmium, ozone, benzene (3) Frequency: 1 24-hour survey	Measurement on the sites
	Water quality around the construction site (surface water)	(1) Sampling at (a) planned siphon construction site and (b) water intake site (two sites in total) (2) Items: EC, pH, SS, DO (3) Frequency: once in winter, once in summer	Measurement on the sites
	Waste	Confirmation of waste generation for similar projects, confirmation of capacity and location of waste disposal sites around construction sites, confirmation of disposal methods for simple toilets	Confirmation of existing data, site inspection
	Soil pollution	Check for similar projects soil contamination occurrence and soil dumping sites	Confirmation of existing data
	Noise and vibration	(1) 2 locations along the First Main Canal (Tête Morte Main Canal) (2) Item: noise, vibration (3) Frequency: 1-hour surveys (one each during the day and at night)	Measurement on site
	Bottom sediment	Check for similar projects and sit survey	Confirmation of existing data, site inspection
Natural environment	Biodiversity	(1) Field survey: (a) 1 site along the First Main Canal (Tête Morte Main Canal), (b) 3 sites in about 50 km from the mouth of the Sebou river to Barrage Garde de Sebou, and (c) 1 site in about 10 km section of the Ouergha river from the downstream of pump station 1 to the confluence with the main branch of the Sebou River (2) Item: ecological survey along the First Main Canal (Tête Morte Main Canal) (reptiles, mammals, birds); for the Sebou and Ouergha rivers, survey of fish, amphibians, aquatic insects, aquatic plants and crustacea inhabiting the rivers and birds along the rivers (3) Frequency: once in winter, once in summer (4) Hearing to the local experts	Measurement and observation on the sites
	Water quality (in Sebou River in case of saline water intrusion)	(1) Water sampling points for water quality test: about 3 sites in about 50 km from the mouth of Sebou river to Barrage Garde de Sebou. (2) Items: EC, sodium, chlorine, water temperature, pH, nitrate, sulfuric acid, boron, bicarbonate, BOD, COD, SS, DO	Measurement on the sites

Field	Evaluation Item	Survey Item	Survey Method
		(3) Frequency: once in winter, once in summer	
	Terrain	Confirmation of how the topography will be affected in other similar projects, and whether any subsequent issues will be addressed.	Confirmation of existing data, site inspection
Social environment	Site acquisition and resettlement	Confirmation of the extent of impact of the Global Project (It is needed to identify affected persons, lands, structures, crops and so on.)	・ Review of results of survey conducted by the Government *1 ・ Preparation of LAP, including consideration of compensation policy based on the relevant legal framework in Morocco and examples of other cases
	Livelihoods	Confirmation of the extent of impact of the Global Project (socioeconomic status)	・ Survey of existing data (including the use of the results of the farmer survey targeting beneficiary farmers to be conducted separately under this Global Project) ・ Household surveys of affected persons (interviews, stakeholder consultations, etc.) ・ Information collection and hearings about small-scale fishery, recreation activities, transportation in Sebou River, and examination of impacts on them
	Vulnerable people	Identification of socially vulnerable groups, especially the poor	・ Survey of existing data (including review of the results of the survey conducted by the destination government*1 and the use of the results of the farmer survey targeting beneficiary farmers to be conducted separately under the Global Project) ・ Household and household surveys of affected persons (interviews, stakeholder consultations, etc.)
	Water use	Confirmation of water allocation rules for the entire watershed, including downstream areas (outside the target area of the Global Project)	・ Survey of existing data ・ Interviews with MAPMDREF, ORVMAG, existing organizations, etc.
	Working environment (including occupational safety)	Confirmation of labor standards laws, etc., regarding working environment, etc., and cases of similar cases	Survey of existing data
	Accident	Confirm details of possible accident risks and safety measures	Confirmation of the "construction safety measures" plan to be prepared separately in this study.
	Community health, safety and security	Identification of similar cases	Survey of existing data

*1 ORMVAG conducts surveys to identify land and other property affected by the Global Project and to identify their owners. Thus, additional household survey will be conducted.
Source: JICA Survey Team (2023)

Table 6.5 Survey Methodology for the Second Main Canal (Hricha Main Canals), Hricha Branch Canal, Ancillary Facilities and Beneficiary Areas

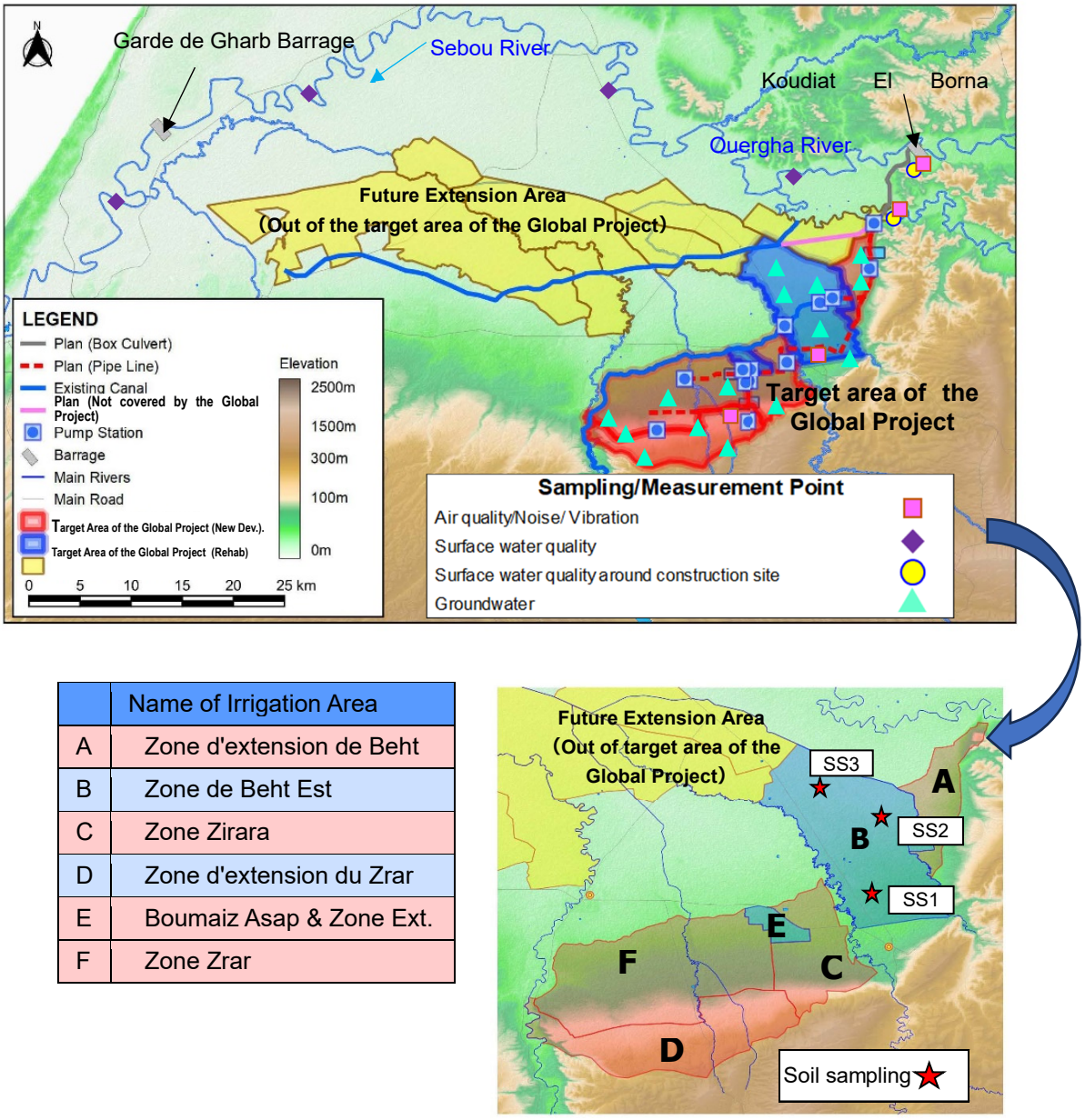
Field	Evaluation Item	Survey Item	Survey Method
Pollution control	Air pollution	(1) Each one site along the Second Main Canal (Hricha Main Canal) and Hricha Branch Canal (2) Items: sulfur dioxide, nitrous oxide, carbon monoxide, lead, cadmium, ozone, benzene (3) Frequency: 1 24-hour survey	Measured on site
	Water quality (drainage canals from beneficiary areas)	(1) Sampling points: (a) at Main drainage channel from the target area of the Global Project and (b) at Sebou River downstream of the inflow points from main drainage channels (2) Item: Nitrate (3) Frequency: once	After water samples are collected on-site, they are brought to a water quality analysis facility for analysis.
	Water quality (groundwater)	(1) Sampling sites: 10 sites in the beneficiary area of new irrigation facilities (20,000 ha) and about 5 sites in the beneficiary area of existing irrigation facilities (10,000 ha) (2) Item: Nitrate nitrogen (3) Frequency: once	After sampling from local groundwater, the water is brought to a water quality analysis facility for analysis.
	Waste	Check waste generation status of similar projects, check capacity and location of waste disposal sites around construction sites, check disposal method of simple toilets	Confirmation of existing data, site inspection
	Soil contamination by oil	Confirmation of soil contamination cases in similar projects	Confirmation of existing data
	Soil Salinization	EC measurement of soil samples in Beht East Zone (3 sites)	Soil sampling and laboratory test
	Noise and Vibration	(1) Each one site along the Second Main Canal (Hricha Main Canal) and Hricha Branch Canal (2) Item: Noise, Vibration (3) Frequency: 1-hour survey (once each during the day and at night)	Measurement on the sites
Natural environment	Biodiversity	(1) Field survey: Each one site along the Second Main Canal (Hricha Main Canal) and Hricha Branch Canal (2) Item: Ecological survey (reptiles, mammals, birds) (3) Frequency: once in winter, once in summer	Measurement on the sites
	Water Quality of Sebou River *Same as Table 6.4 above.	(1) Field survey (water quality survey): about 3 sites at the points about 50 km away from the mouth of Sebou River to Sebou tide gate. (2) Items: electrical conductivity, electrical conductivity, sodium, chlorine, water temperature, pH, nitrate nitrogen, sulfuric acid, boron, bicarbonate, BOD, COD, SS, DO (3) Frequency: once in winter, once in summer	Measurement on the sites
	Terrain	Confirmation of how the topography will be affected in other similar projects, and whether any subsequent issues will be addressed.	Confirmation of existing data, site inspection
Social environment	Site Acquisition and Resettlement	Confirmation of the feasibility of site acquisition and resettlement, estimation of the degree of impact, and confirmation of the legal framework for site acquisition and resettlement	・ Survey of existing data ・ Resettlement Framework Creation
	Livelihoods	Confirmation of possible impact on livelihoods and livelihoods and estimation of the extent of impact	・ Survey of existing data (including the use of the results of the farmer survey targeting beneficiary farmers to be conducted separately under this Global Project)

Field	Evaluation Item	Survey Item	Survey Method
			・ Resettlement Framework Creation ・ Information collection and hearings about small-scale fishery, recreation activities, transportation in Sebou River, and examination of impacts on them
	Socially vulnerable group	Confirmation of the possible presence of socially vulnerable persons and, if possible, the type and circumstances of their vulnerability.	・ Survey of existing data ・ Interviews with MAPMDREF, ORVMAG, existing organizations, etc.
	Water use	Verify the existence of water users' associations and current water allocation rules	・ Survey of existing data ・ Interviews with MAPMDREF, ORVMAG, existing organizations, etc.
	Conflicts of interest within the community	Check for instances of conflicts of interest in similar cases	・ Survey of existing data ・ Interviews with MAPMDREF, ORVMAG, existing organizations, etc.
	Working environment (including occupational safety)	Confirmation of working environment and labor standards laws, and cases of similar projects.	Survey of existing data
	Accident	Confirm details of possible accident risks and safety measures	Confirmation of the "Construction Safety Measures" plan to be prepared separately in this study.
	Community health, safety and security	Identification of similar cases	Survey of existing data
Others	Climate change	Estimation of greenhouse gas emission increase resulting from pump station set-up and increase in number of livestock	Estimation of increase of greenhouse gas emission based on the increase in number of livestock and electric consumption

Source: JICA Survey Team (2023)

7. ENVIRONMENTAL SURVEY RESULTS

For the purpose of assessment of current conditions related to air quality, water quality for surface water, drainage water and groundwater, and soil, a series of measurements and sampling were implemented. Air quality and noise were measured at the points as illustrated in the following figure, while water and soil sampling were done at each point for the laboratory test. In Beht Est Zone only, soil salinity was not tested in the F/S Report prepared by the Government. Thus, a laboratory test of soil samples taken in Beht Est Zone (B zone in Figure 7.1) was implemented.



	Name of Irrigation Area
A	Zone d'extension de Beht
B	Zone de Beht Est
C	Zone Zirara
D	Zone d'extension du Zrar
E	Boumaiz Asap & Zone Ext.
F	Zone Zrar

Figure 7.1 Location of Survey Points for Air Quality, Water Quality, Soil and Noise/Vibration

Source: Farr, T. G., and M. Kobrick, 2000, Shuttle Radar Topography Mission produces a wealth of data for the elevation, JICA Survey Team for Sampling Points and FS reports (2018, ORMVAG) for others

7.1 Air Quality

Air quality and noise/vibration were measured at four (4) points along the First Main Canal (Tête Morte Main Canal), the Second Main Canal (Hricha Main Canal) and the Branch Canal (Hricha Branch Canal) as shown in Figure 7.2. It is noted that the measurement points of air quality check and noise/vibration are the same.

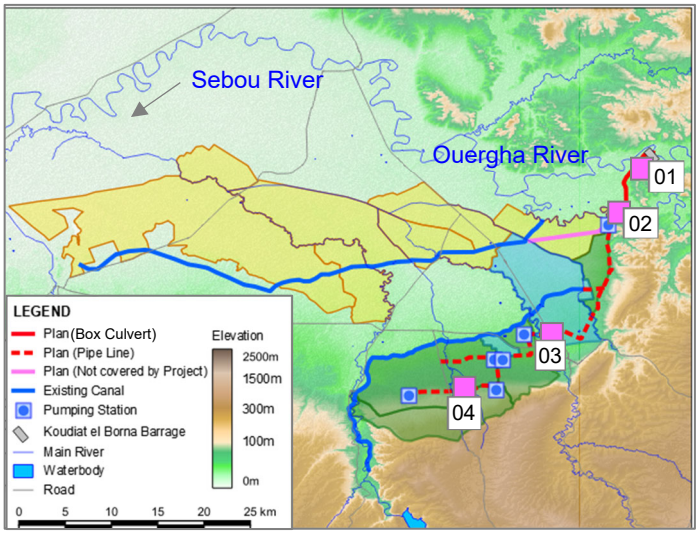


Figure 7.2 Measuring Points of Air Quality/Noise

Source: Farr, T. G., and M. Kobrick, 2000, Shuttle Radar Topography Mission produces a wealth of data for the elevation, JICA Survey Team for Sampling Points and FS reports (2018, ORMVAG) for others

General conditions of the measurement points for air quality and noise/vibration (Site 01-Site 04) are as follows:

Site 01: It is located within farmland and 60 meters from the neighboring village and around 400m south of the Ouergha River. It is along the First Main Canal (Tête Morte Main Canal).

Site 02: It is located along a rural road and farmland and 60 meters away from the neighboring village and 200m north of Sebou River. It is along the First Main Canal (Tête Morte Main Canal).

Site 03: It is located along a road and farmland and 60 meters away from the neighboring village. It is along the Second Main Canal (Hricha Main Canal).

Site 04: It is located in between houses and farmland, and it is within the target area of the Global Project. It is along the Branch Canal (Hricha Branch Canal).

The analysis results are shown in the following table, and they are within the standards set by the Government of Morocco and IFC, except for sulfur dioxide (SO_2) according to the 24 hour Guideline of IFC. For sulfur dioxide measured, the values at Site 01, Site 02, and Site 03 were beyond the Guideline of IFC for 24 hour, namely, 20µg/m^3. Especially, the value at Site 01 exceeds even the Interim Target-2 of IFC, 50µg/m^3. It may be noted that the high value of sulfur dioxide at Site 01 could have been due to a diesel irrigation pump being operated at the measurement time. In any case, however, the values of sulfur dioxide are still below the national standard of 125 µg/m^3.

Table 7.1 Air Quality Result

Item	Results of Sites				National Standards *1	International Standards (IFC)*2	WHO *3
	01	02	03	04			
SO_2 (Sulfur dioxide) (daily)	79.43	32.09	24.30	17.49	For health protection:125µg/m^3 (24-hour)	125µg/m^3 (24-hour, Interim target-1) 50µg/m^3 (24-hour, Interim target-2) 20µg/m^3 (24-hour, Guideline)	None
NO_2 (Nitrite) (per hour)	48.60	43.77	50.05	59.29	For health protection:200µg/m^3 (1-hour) For health protection:50µg/m^3 (1-year) For vegetation protection :30µg/m^3 (1-year)	200µg/m^3(1-hour) 40µg/m^3(1-year)	25µg/m^3 (Annual average)
CO (Carbon	0.48	0.69	0.98	0.24	10µg/m^3 (8-hour)	None	None

Item	Results of Sites				National Standards *1	International Standards (IFC)*2	WHO *3
	01	02	03	04			
oxide) (8-hour)							
PM10 (daily)	19.49	13.38	12.74	12.87	50 (24-hour)	50µg/m^3(24-hour, Guideline)	15µg/m^3 (Annual average)
PM2.5 (daily)	9.99	6.95	6.86	6.09	None	25µg/m3 (24-hour, Guideline)	5µg/m^3 (Annual average)
Pb (Lead) (annual average)	<LQ	<LQ	<LQ	<LQ	1µg/m^3 (1-year)	None	None
Cadmium (annual average)	ND	ND	ND	<LQ	5µg/m^3 (1-year)	None	None
Ozon (O_3) (8-hour)	51.73	56.06	80.0	64.41	For health protection:110µg/m^3 (8-hour) For vegetation protection:65µg/m^3 (24-hour, not to exceed more than 3 consecutive days)	160µg/m^3 (8-hours, Interim target-1) 100µg/m^3 (8-hours, Guideline)	None those of
Benzene (annual average)	<LQ	<LQ	<LQ	<LQ	For health protection:10µg/m^3 (1-year)	None	None

Remarks: "<LQ": Less than limitation ND: Not Detected
*1: Decree n°2-09-286 of 20 hija 1430 (2009) fixing the air quality standards and the modalities of air monitoring.
*2: IFC, 2007, "Environmental, Health, and Safety Guidelines, GENERAL EHS Guideline: Environmental, Air Emissions" *
*3 WHO, 2022, "Environmental, Health, and Safety Guidelines, GENERAL EHS Guideline: Environmental, Air Emissions"
Source: JICA Survey Team, 2023

7.2 Noise/Vibration

Noise measurement points are located along the First Main Canal (Tête Morte Main Canal), the Second Main Canal (Hricha Main Canal) and the Branch Canal (Hricha Branch Canal). From 5 May to 9 May 2023, noise had been measured at four (4) sites as shown in Figure 7.2. The four measurement sites are the same as the air quality measurement sites. The noise/vibration results are as shown below. There is a tendency that it is noisier at nighttime than in the daytime. The sampling points at Site 02 and Site 03 are along the roads, consequently, the values are higher than those of other sites. As a whole, noise/vibration values in the nighttime are beyond the IFC standard applied in residential, institutional and educational areas.

Three schools and one hospital are located along the proposed route of the Second Main Canal (Hricha Main Canal), within 100m distance from the Main Canal. However, the planned construction works will excavate soil, bury pipelines, and backfill the soil, which do not generate noise seriously. Moreover, the duration of noise generation for each receptor is limited to about one week. The maximum baseline values (LAmax) daytime are beyond the IFC standard, however, the average baseline values (LAeq) are almost within the standard. Given that noise by the construction works it will be limited to short-term, and original noise is not very serious, which will not cause severe problems.

Table 7.2 Result of Noise/Vibration Measurement

Particulars		Result of Sites (dB)				One Hour LAeq (dBA) (IFC) *1	
		01	02	03	04	Residential, institutional, educational	Industrial, commercial
Daytime (07:00 - 22:00)	LAeq	47.4	56.7	56.9	51.3	55	70
	LAmax	62.3	76.2	69.0	65.3		
Nighttime (22:00 - 07:00)	LAeq	51.6	58.9	51.5	43.6	45	70
	LAmax	62.3	82.0	70.6	72.3		

*1: IFC (2007), Environmental, Health, and Safety Guidelines, GENERAL EHS Guideline: Environmental, Noise Management
Source: JICA Survey Team, 2023

7.3 Surface Water Quality

In May 2023, surface water samples were taken at the four sites along the Sebou River and Ouergha River for analysis at a laboratory. In addition, since the construction of the First Main Canal (Tête Morte Main Canal) could cause impacts on the water quality of the Ouergha River and Sebou River near the construction sites, one water sample was collected at each river. Figure 7.3 shows the sampling points for surface water quality analysis.

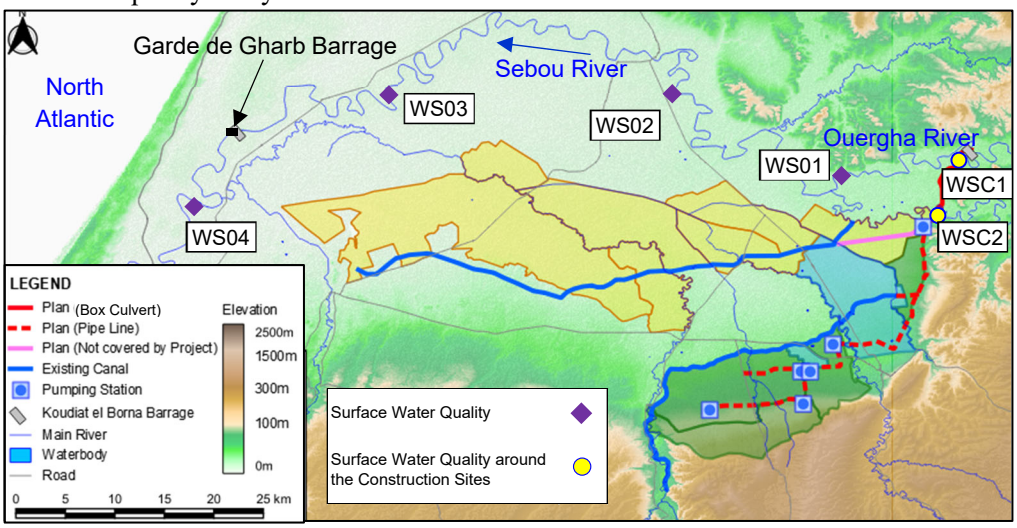


Figure 7.3 Sampling Points for Surface Water Quality Check

Source: Farr, T. G., and M. Kobrick, 2000, Shuttle Radar Topography Mission produces a wealth of data for the elevation, JICA Survey Team for Sampling Points and FS reports (2018, ORMVAG) for others

1) General Surface Water Quality

The analysis results are summarized in Table 7.3 and Table 7.4. The sampled river water is relatively saline in both winter and summer, considering that values of EC (Electric Conductivity) show more than 800µS/cm-1,100µS/cm, though, it is categorized as "Good" in Morocco. According to the FAO irrigation water guidelines, those values are classified into "slight to moderate restriction on use" for irrigation purposes. It is probably due to relatively high concentrations of Sodium (Na) and Chloride (Cl), which are higher than the standard values specified by the FAO.

Regarding SS (Suspended Solid), the river waters show diverse values, from 48mg/l-440mg/l, depending on the sampling sites. The Global Project aims to promote drip irrigation systems, on the other hand, according to Moroccan national standards, if irrigation water is mud, namely, SS exceeding 100 mg/l, it would cause problems with drip irrigation and sprinklers. FAO states that there is no problem if the concentration is 50 mg/l or less in drip irrigation from the perspective of preventing clogging. In Japan, on the other hand, the Water Quality Preservation Law (effluent standards) stipulates that SS in wastewater should be less than 200 mg/l.

Turbidities at WS02 and WS04 are very high, while those at WS01 and WS03 are not very high, which implies that turbidities are various depending on the sites. Therefore, SS values probably could be influenced by the mother rock. Since the proposed water intake point for the Global Project is at the Ouergha River (point WS01), where water quality does not have a problem as a water source for drip irrigation. It is noted that water at WS02 and WS04, where water turbidity is high, will not be used for the Global Project.

DO (Dissolved Oxygen) values are relatively low, 3.59-4.57mg/l considering the Japanese standard, they are categorized as "Average" in Morocco, though. As a whole, the quality of the sampled river water can be used for irrigation. Moreover, no significant differences were observed between winter and summer. Furthermore, nitrate (NO_3) concentrations were sufficiently low. Based on the results, water

quality at the sampled sites was judged to have no problems other than high turbidity in some sites.

Table 7.3 Result of Surface Water Quality Check in Winter Season

Item	Unit	Result				Morocco National Standard*1	International Standard	
		WS01	WS02	WS03	WS04		FAO*2	Japanese* 3 Standard
Temperature	C°	19.1	18.9	19.0	18.8			
pH		7.57	7.43	7.49	7.38	6.5-8.4	6.5-8.4	6.0-7.5
EC (Electric Conductivity)	μS/cm	819 (Good)	936 (Good)	1,139 (Good)	992 (Good)	≦2,700 (Possible for irrigation)	✓ <700: (No restriction) ✓ 700-3000: (Slight to moderate restriction)	≦300
Suspended Solids (SS)	mg/l	56	342	48	262	✓ <200 for gravity irrigation ✓ <100 for drip and sprinkler	✓ <50: No restriction ✓ 50-100: Sight to moderate restriction (for drip irrigation)	None *4
Chemical Oxygen Demand (COD)	mg/l	<10 (Excellent)	13 (Excellent)	<10 (Excellent)	23 (Excellent)	≦40 (Possible for irrigation)	None	≦6.0
Biochemical oxygen demand (BOD)	mg/l	<3 (Excellent)	<3 (Excellent)	<3 (Excellent)	<3 (Excellent)	≦10 (Possible for irrigation)	None	None
Chlorides (Cl)	mg/l	143	160	220	326	<350	<3meq/l for sprinkler (<106.5mg/l)	None
Carbonates (CO_3)	mg/l	<24	<24	<24	<24	None	None	None
Bicarbonates (HCO_3)	mg/l	111	168	156	149	<518	<5meq/l (<305 mg/l)	None
Dissolved Oxygen (DO)	mg/l	4.43 (Average)	3.59 (Average)	4.57 (Average)	4.17 (Average)	≧3 (Possible for irrigation)	None	≧6.0
Nitric Nitrogen ($N\text{-}NO_2$)	mg/l	0.91	2.01	1.72	1.50	None	None	None
Nitrate ($N\text{-}NO_3$)	mg/l	4.02 (Excellent)	8.90 (Good)	7.63 (Good)	6.63 (Good)	≦50 (Possible for irrigation)	✓ <22: No restriction ✓ 22-133: Slight to moderate restriction	None
Sulfates (SO_4)	mg/l	79.8	98.4	105	108	≦250 (Possible for irrigation)	None	None
Sodium (Na)	mg/l	90	99.5	133	110	<69	<3meq/l for sprinkler (<69mg/l)	None
Boron	μg/l	67.4	85.2	99.7	94.9	<3,000	<700	None

Description in the parentheses such as “Average” are based on “Water Resource Master Plan” (ABHS, 2011)

*1: Decree No.1275-01 (2002): Definition of Water Quality of Surface Water for EC, COD, BOD, SO_4, NO_3 and DO, while Decree No.1276-01 (2002): Definition of Water Quality for Irrigation Water for pH, SS, Chloride, Sodium, HCO^3 and Boron

*2: Water Quality for Agriculture (FAO, 1985), “Table 1: Guidelines for Interpretations of Water Quality for Irrigation” and “Table 24 Influence of Water Quality on the Potential for Clogging Problems in Localized (Drip) Irrigation Systems” for Suspended Solid (SS)

*3: Ministry of Agriculture, Forestry and Fisheries (Japan), 1970, “Irrigation Water Quality (Paddy)”

*4: Acceptable limitation of SS in the drained water is 200mg/l (150mg/l on average) by the “Water Quality Protection Law” (1974), Government of Japan.

※There are two indications to show concentration of nitrate, namely, “NO3-N” and “NO3”, and it depends on countries and regions. FAO and Japan use [NO3-N] while Morocco, WHO and EU apply “NO3”. There is a conversion formula, [NO3-N (mgN/l) = NO3 (mg/l) ×14/62]. For example, according to the FAO standard, water, which shows less than 5mg/l of NO3-N, can be used for irrigation with no restriction. It means that water, which shows less than 22mg/l of NO3, can be used for irrigation with no restriction.

Source: JICA Survey Team, 2023

Table 7.4 Result of Surface Water Quality Check in Summer Season

Item	Unit	Result				Morocco National Standard*1	International Standard	
		WS01	WS02	WS03	WS04		FAO*2	Japanese* 3 Standard
Temperature	C°	30.3	28.3	30.7	28.1			
pH		7.9	7.8	8.2	8.3	6.5-8.4	6.5-8.4	6.0-7.5
EC (Electric Conductivity)	μS/cm	826	907	1,064	1,108	≦2,700 (Possible for irrigation)	✓ <700: (No restriction) ✓ 700-3000: (Slight to moderate restriction)	≦300
Suspended Solids (SS)	mg/l	93	440	40	197	✓ <200 for gravity irrigation ✓ <100 for drip and sprinkler	✓ <50: No restriction for drip irrigation 50-100: Sight to moderate restriction for drip irrigation	None *4
Chemical Oxygen Demand (COD)	mg/l	<10	<50	13	<5	≦40 (Possible for irrigation)	None	≦6.0
Biochemical oxygen demand (BOD)	mg/l	<3	<3	<3	<3	≦10 (Possible for irrigation)	None	None
Chlorides (Cl)	mg/l	149	156	220	206	<350	<3meq/l for sprinkler (<106.5mg/l)	None
Bicarbonates (HCO_3)	mg/l	104	122	121	112	518	<5meq/l (<305 mg/l)	None
Dissolved Oxygen (DO)	mg/l	3.82	3.76	3.78	3.86	≧3 (Possible for irrigation)	None	≧6.0
Nitrate (NO_3)	mg/l	3.77	5.84	5.28	1.29	≦50 (Possible for irrigation)	✓ <22: No restriction ✓ 22-133: Slight to moderate restriction	None
Sulfates (SO_4)	mg/l	81.3	99.3	103	107	≦250 (Possible for irrigation)	None	None
Sodium (Na)	mg/l	99.5	108	142	151	<69	<3meq/l for sprinkler (<69mg/l)	None
Boron	μg/l	49.3	68.8	82.7	92.4	<3,000	<700	None

Description in the parentheses such as “Average,” are based on “Water Resource Master Plan” (ABHS, 2011)

*1: Decree No.1275-01 (2002): Definition of Water Quality of Surface Water for EC, COD, BOD, SO_4, NO_3 and DO, while Decree No.1276-01 (2002): Definition of Water Quality for Irrigation Water for pH, SS, Chloride, Sodium, HCO^3 and Boron

*2: Water Quality for Agriculture (FAO, 1985), “Table 1: Guidelines for Interpretations of Water Quality for Irrigation” and “Table 24 Influence of Water Quality on the Potential for Clogging Problems in Localized (Drip) Irrigation Systems” for Suspended Solid (SS)

*3: Ministry of Agriculture, Forestry and Fisheries (Japan), 1970, “Irrigation Water Quality (Paddy)”

*4: There is no irrigation water standard for SS, however, the maximum acceptable SS in the drained water is 200mg/l (150mg/l on average) by the “Water Quality Protection Law” (1974), Government of Japan.

※There are two indications to show concentration of nitrate, namely, “NO_3-N” and “NO_3”, and it depends on countries and regions. FAO and Japan use [NO_3-N] while Morocco, WHO and EU apply “NO_3”. There is a conversion formula, [NO_3-N (mgN/l) = NO_3 (mg/l) ×14/62]. For example, according to the FAO standard, water, which shows less than 5mg/l of NO_3-N, can be used for irrigation with no restriction. It means that water, which shows less than 22mg/l of NO_3, can be used for irrigation with no restriction.

Source: JICA Survey Team, 2023）

2) Surface Water Quality near the Construction Sites

At the proposed construction sites, two water samples were taken and analyzed at a laboratory to obtain baseline values. At Point WSC1, the SS value is satisfactorily low, while those of Point WSC2 are 508mg/l in winter season and 484mg/l in summer season, very high. Considering that SS values at Point WS01 and Point WS03 are high while those at Point WS02 and WS04 are low, there is a possibility that SS values can vary in a wide range depending on the soil conditions and water velocity in the rivers. On the other hand, EC and DO values are not very satisfactory, though the values are categorized as "Average" in Morocco. It can be said that the salinity of river waters is relatively high, given that the suitable EC value for irrigation in Japan is 300μS/cm and less.

Table 7.5 Result of Surface Water Quality Check (near the Construction Site) in Winter Season

Item	Unit	WSC1	WSC2	Morocco National Standard *1	Japanese Standard *2
pH		7.52	7.46	6.5-8.4	6.0-7.5
Electric Conductivity (EC)	μS/cm	993	1,114	≦2,700 (Possible for irrigation)	300
Suspended solids (SS)	mg/l	38	508	✓ <200 for gravity irrigation ✓ <100 for drip and sprinkler	200 *3 (150 on average)
Dissolved Oxygen (DO)	mg/l	4.29 (Average)	3.75 (Average)	≧3.0 (Possible for irrigation)	≧6.0

Description in the parentheses such as "Average" are based on Water Resource Master Plan" (ABHS, 2011)
*1: Decree No.1275-01 (2002): Definition of Water Quality of Surface Water for EC and DO, while Decree No.1276-01 (2002): Definition of Water Quality for Irrigation Water for pH and SS
*2: Ministry of Agriculture, Forestry and Fisheries (Japan), 1970, "Irrigation Water Quality (Paddy)"
*3: Acceptable limitation SS in the drained water is 200mg/l (150mg/l on average) by the "Water Quality Protection Law" (1974), Government of Japan.
Source: JICA Survey Team, 2023

Table 7.6 Result of Surface Water Quality Check (near the Construction Site) in Summer Season

Item	Unit	WSC1	WSC2	Morocco National Standard *1	Japanese Standard *1
pH		7.6	7.9	6.5-8.4	6.0-7.5
Electric Conductivity (EC)	μS/cm	901	1,163	≦2,700 (Possible for irrigation)	300
Suspended solids (SS)	mg/l	40	484	✓ <200 for gravity irrigation ✓ <100 for drip and sprinkler	200 *2
Dissolved Oxygen (DO)	mg/l	3.72	3.45	≧3.0 (Possible for irrigation)	6.0

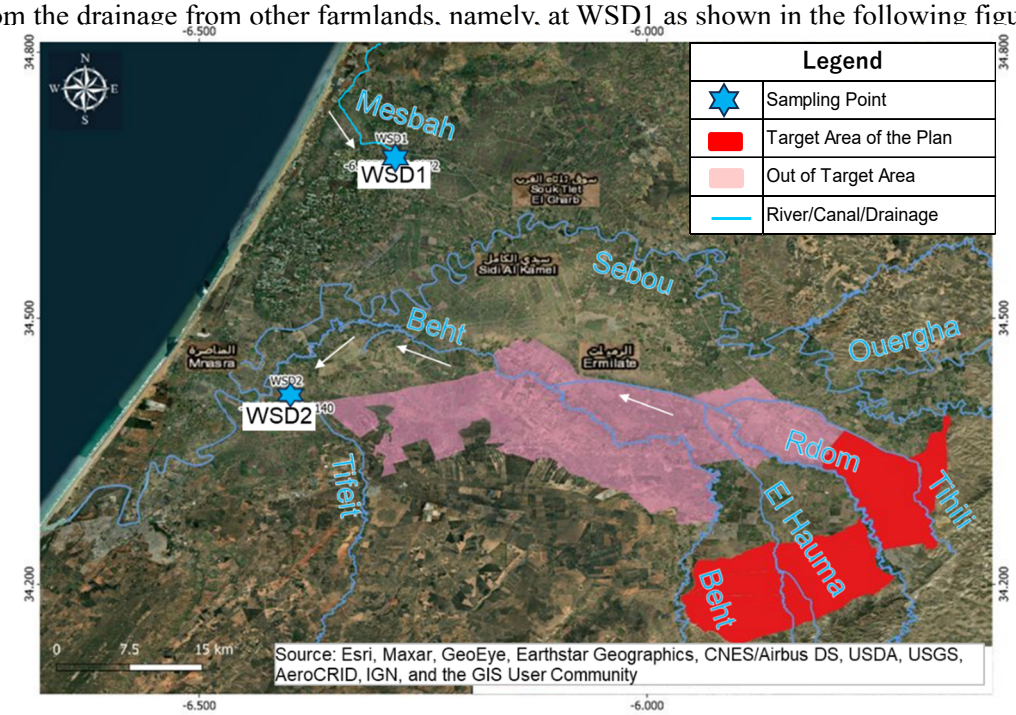
Description in the parentheses such as "Average" are based on "Water Resource Master Plan" (ABHS, 2011).
*1: Decree No.1275-01 (2002): Definition of Water Quality of Surface Water for EC and DO, while Decree No.1276-01 (2002): Definition of Water Quality for Irrigation Water for pH and SS
*2: Ministry of Agriculture, Forestry and Fisheries (Japan), 1970, "Irrigation Water Quality (Paddy)"
*3: Acceptable limitation SS in the drained water is 200mg/l (150mg/l on average) by the "Water Quality Protection Law" (1974), Government of Japan.
Source: JICA Survey Team, 2023

7.4 Drained Water Quality

Application of a big amount of chemical fertilizers could increase nitrate (NO_3) concentrations in groundwater and wastewater, causing nitrogen contamination[16]. For the purpose of identification of nitrogen pollution in drained water, water samples were collected at two drainage canals and analyzed at the laboratory. The discharged water from the target area of The Global Project flows into the Beht

[16] Nitrate (NO_3) itself is not toxic, but under certain conditions, it is deoxidized to nitrite (NO_2) in the stomach and taken up into the blood, reducing the ability to carry oxygen of the body, which sometimes may cause "blue baby syndrome".

Channel firstly and flows into the Beht River. One water sample was taken downstream of the Beht River, namely, at WSD2 shown in the following figure. For reference, another water sample was also taken from the drainage from other farmlands, namely, at WSD1 as shown in the following figure.



The Out of Target Area of the Global Project (about 42,000 ha) is an irrigation expansion area in the future. Drained water from the target area will pass through this area.

Figure 7.4 Sampling Sites of Drainage Water

Source: JICA Survey Team (Original source is described within the figure above)

The results of the drainage water quality analysis are shown in the following table. Nitrate concentrations in the drainage were less than 1 mg/l, which means that the drainage water is suitable for irrigation water in terms of nitrogen concentration considering the standard value. A certain amount of fertilizer is applied to the farmlands at this moment, which does not seem to deteriorate the drainage water.

Table 7.7 Results of Drainage Water Quality Analysis

Item	Unit	WSD1	WSD2	Morocco Standard *1	FAO *2
NO_3	mg/l	0.43	0.53	≦50 (possible for irrigation water)	✓ <22: No restriction ✓ 22-133: Slight to moderate restriction

*1: Decree No.1275-01 (2002): Definition of Water Quality of Surface Water
*2: FAO, 1985, "Table 1: Guidelines for Interpretations of Water Quality for Irrigation"
Source: JICA Survey Team (2023)

7.5 Ground Water Quality

Groundwater samples were collected at 15 sites in the target area of The Global Project (see figure below) and analyzed in a laboratory. As well as the case of analysis of drainage water, nitrate concentration was the item, and most of the 15 samples showed low nitrate concentrations, less than 10 mg/l. WHO Drinking Water Guidelines require nitrate concentrations less than 50 mg/l, the nitrate concentrations in groundwater are suitable for drinking water. The situations imply that nitrate leaching from chemical fertilizers into groundwater reaches the acceptable level, which would not cause nitrogen pollution.

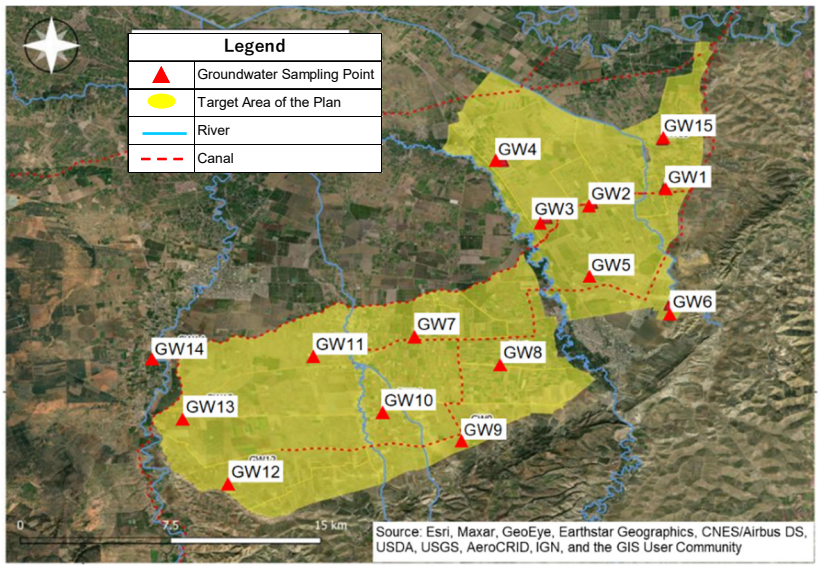


Figure 7.5 Sampling Sites of Groundwater

Source: JICA Survey Team (2023)

Table 7.8 Results of Groundwater Quality Analysis

Item	Unit	GW1	GW 2	GW 3	GW 4	GW 5	GW 6	GW 7	GW 8	GW 9	GW 10
NO_3	mg/l	11.20	1.61	1.27	0.65	2.29	3.28	5.97	1.58	1.57	10.30
Item	Unit	GW 11	GW 12	GW 13	GW 14	GW 15	Morocco Standard *1			WHO *2	
NO_3	mg/l	9.00	3.84	22.30	8.37	4.49	✓ ≦25 (Possible for drinking water after simple treatment) ✓ <5 (Possible for drinking water)			≦50mg/l for drinking	

*1 : Decree No.1275-01 (2002): Definition of Water Quality of Surface Water

NO_3 ≦50mg/l (Possible for irrigation water. It means that water showing ≦11.62mg/l in NO_3-N can be used for irrigation.

*2 : WHO, Guidelines for Drinking-water Quality, 2011

Source: JICA Survey Team, 2023

Currently, sprinkler irrigation and basin irrigation are applied in the target area of the Global Project in addition to rainfed agriculture, and chemical fertilizers have been applied. In case of such irrigation systems mentioned above, nitrogen in the applied fertilizers could be leached into the groundwater and surrounding areas by rainwater and irrigation water. Nevertheless, the measured concentration of nitrogen (nitric acid) is very low at present as shown in the Table 7.8.

The Global Project promotes drip irrigation system, which can provide irrigation water containing fertilizers, thus, crop can absorb fertilizers more efficiently. In addition, drip irrigation can minimize leaching of fertilizers into the groundwater and surrounding areas. In other words, the amount of chemical fertilizer can be decreased to minimum requirement for the crops. Even if amounts of applied fertilizer are increased due to the change of the crop, it is possible to minimize the amounts of fertilizers by means of drip irrigation system, the possibility of nitrate pollution from the Global Project is considered to be very low.

7.6 Waste

It is expected that a certain amount of waste such as soil residue is generated by the excavation works. The excavated soil, except for the surface soil containing organic matter, can be reused to backfill pipelines, still, soil would probably remain. Approximately two million m^3 of residual soil by the First Main Canal (Tête Morte Main Canal) construction can be generated, while 1.2 million m^3 of soil is to be remained due to the constructions of the Second Main Canal (Hricha Main Canal). In addition, estimated amount of residual soil by construction of the Branch Canal (Hricha Branch Canal) is 0.7

million m^3.

In Morocco, Law No. 28-00 on Waste Management and Disposal, 2006[17] stipulates treatment of construction waste, however, does not mention specific disposal methods and sites. For example, locations of soil dumping sites for any construction works are not identified. In general, such dumpling sites have to be established under the responsibility of contractors in Morocco. Namely, the locations of soil dumping sites for the Global Project are decided by the contractors. ORMVAG and the loan consultant are responsible for confirmation and approval of disposal of residual soil. Therefore, it is not possible to determine actual locations of dumping sites and disposal methods of soil at this moment.

There are four proposed dumping sites near the Koudiat El Borna Barrage, where water will be taken for the First Main Canal (Tête Morte Main Canal) (see figure below). All the proposed sites are under the management of ABHS (Agency of Sebou River Basin). If they are used as dumping sites, it is possible to accept two million m^3 of residual soil in total resulting from the construction of the canal. In addition, a part of residual soil can be reused as material for embankment construction, soil dressing in neighboring farmlands, and other construction materials, e.g., for road and house construction, backfilling and so on.

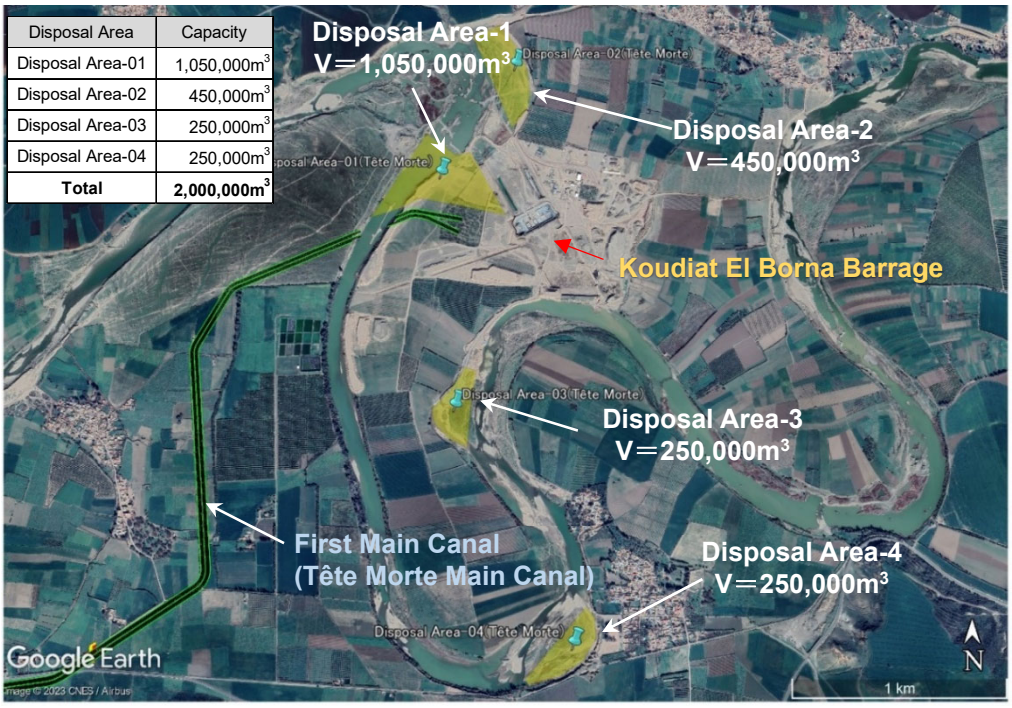


Figure 7.6 Proposed Soil Dumping Sites for the First Main Canal (Tête Morte Main Canal) Construction

Source：JICA Survey Team（2023）

As for construction works of the Second Main Canal (Hricha Main Canal), the branch canal (Hrich Branch Canal) and related facilities, specific soil dumping site is not needed. It is because that the farmlands along the Second Main Canal (Hricha Main Canal) and the Branch Canal (Hricha Branch Canal) are unlevel, and the residual soil can be reused to smoothen the rough parts in the farmland nearby by putting the residual soil. In the construction works, at first, surface soil of the farmlands will be stripped off and temporarily stored on the farmland. After that, residual soil due to the canal construction works will be applied in the farmlands and then the original surface soil will be put back on the original farmlands.

[17] Law No. 28-00 on Waste Management and Disposal, 2006 says that "Final waste, waste, agricultural waste, and non-hazardous industrial waste must be dumped at specific sites or disposal facilities by the project proponents or those who manage construction works.". However, there is no mention of specific disposal methods of residual soil generated from any construction works.

The expected amount of residual soil is approximately 7.5 m^3 per meter of the Second Main Canal (Hricha Main Canal), and if the residual soil is spread over in the farmland with 10cm thick, the width of residual soil would be approximately 75 m per meter of main canal. In the case of spreading the soil with 20 cm thick and 30 cm thick, the widths would be about 38 m and 25 m, respectively. It is possible for the contractor to reuse the residual soil based on negotiations with the farmland owners. Therefore, no specific soil dumping site is necessary for the construction of the Second Main Canal (Hricha Main Canal), the Branch Canal (Hricha Branch Canal) and related facilities. The disposal of residual soil resulting from the construction works will be done in the dry season, which will not give impacts on farming activities.

It is necessary to dispose of excrement and waste of labors during the construction works. The Labor Code (2004) in Morocco states that the employer shall ensure for his employees that the work site is kept in a clean condition, especially with regard to fire protection facilities, air circulation, sound insulation, ventilation, drinking water, water storage tanks, waste water and wash water treatment, dust and steam, changing rooms, toilets and employee sleeping facilities, and that the employee'' health It must be ensured that the necessary sanitary and hygienic conditions are in place. Therefore, all construction work must be in accordance with the Labor Code.

It is noted that the main construction works for The Global Project is to bury the pipelines, and heavy metals or other hazardous materials will not be generated. There are no cases of soil contamination in similar irrigation projects. In addition, child labor is prohibited in Morocco under Dahir No. 1-00-312 of 2 Rabil II 1424 (2003).

7.7 Impacts on Soil

1) Soil Salinity

The FS report prepared by the Government of Morocco shows that the salinity of soil samples, which were taken at 21 points in the four irrigation zones in the target area of the Global Project, excluding the Beht Est Zone, is very low (EC values of the soil samples are 0.07 to 0.35 mS /cm). On the other hand, since there is no survey in the Beht Est Zone, soil sampling was taken in May 2023 at three sites in the Beht Est Zone (see next figure) to analyze Electric Conductivity (EC) at the laboratory.

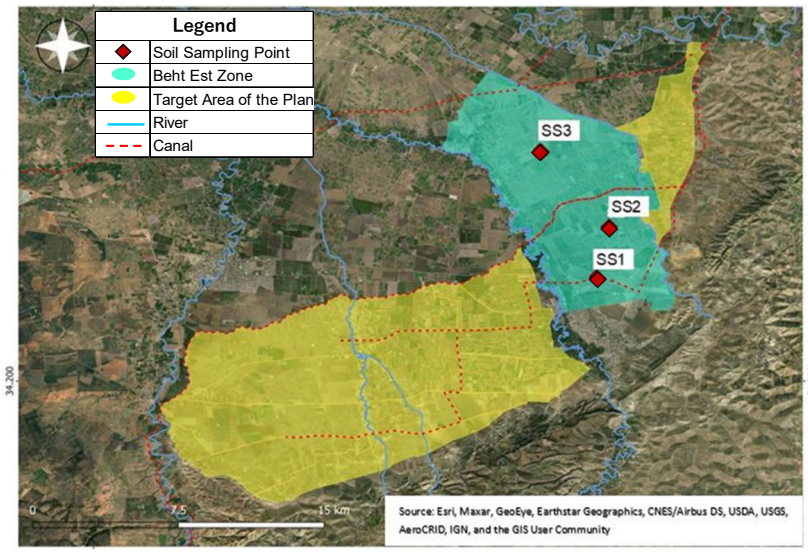


Figure 7.7 Soil Sampling Points in Beht Est Zone
Source: JICA Survey Team, 2023

As shown in the following table, EC values of the soil samples at the three sites were 71µS/cm, 76µS/cm, and 224µS/cm, respectively. They are sufficiently low since the suitable EC values of soil for crop production are regarded as between 400 and 1,000 µS/cm, according to the Ministry of Agriculture,

Forest and Fishery in Japan. Therefore, it is thought that soil salinity in the target rea of the Global Project is not a problem for farming.

Table 7.9 Results of Soil Salinity in Beht Est Zone

Item	Unit	SS1	SS2	SS3	International Standard *1
EC (Electric Conductivity)	µS/cm	71	76	224	400－1,000
Crops which are cultivated at the sampling points	-	Pomegranate	Wheat	Melon	

*1：Ministry of Agriculture, Forestry and Fisheries, Japan
https://www.maff.go.jp/j/seisan/kankyo/hozen_type/h_sehi_kizyun/attach/pdf/tottori01-1.pdf
Source: JICA Survey Team, 2023

2) Agricultural Residues

Currently, cereal, mainly wheat, is cultivated in approximately 13,000 ha of farmland in the target area of the Global Project. After the harvest of cereal, agricultural residues, mainly wheat straw, are tuned in and tillered with soil, or used for feeding. Sometimes, farmers who produce a large amount of wheat straw, sell it to other livestock farmers. In other words, wheat straw and other agricultural residues are being reused at this moment. In addition, amount of cereal production will not change, since productivity of cereals will be improved, even if cereal cultivation area will be decreased after the Global Project. It means that the amounts of agricultural residues are not expected to increase or decrease. Therefore, it is thought that agricultural residues generated by the Global Project will be properly disposed of and not be a problem.

7.8 Topographical/Geological Features

During the construction works, excavation is planned to bury culverts for the First Main Canal (Tête Morte Main Canal) and pipelines for the Second Main Canal (Hricha Main Canal). It means that temporary topographic changes can be caused, however, the excavated soil will be filled in the original places after the filling as much as possible, which will not result in a big-scale topographical change. Moreover, the Global Project does not have a plant to use quarries at any place of the rivers, and thus, not cause negative impacts on the riverbed, nor river sides.

7.9 Ecological Survey

1) Survey Spots/Points of Ecological Survey

A series of vertebrate ecological surveys, namely, birds, mammals, reptiles, fish, and amphibians, was conducted in both winter and summer of 2023. The locations of the ecological survey are illustrated in the following figure:

Category	Survey Spot										No.of spot
	1	2	3	4	5	6	7	a	b	c	
Bird	✓	✓	✓	✓	✓	✓	✓				7
Mammal								✓	✓	✓	3
Reptile								✓	✓	✓	3
Amphibian		✓	✓	✓	✓						4
Fish		✓	✓	✓	✓						4

Spot 1, 2, 3 and 4: Sebou River

Spot 5: Ouergha River

Spot 6 and Spot a: Proposed Construction Site of Tête Morte Main Canal

Spot 7 and Spot b and c: Project Target Area

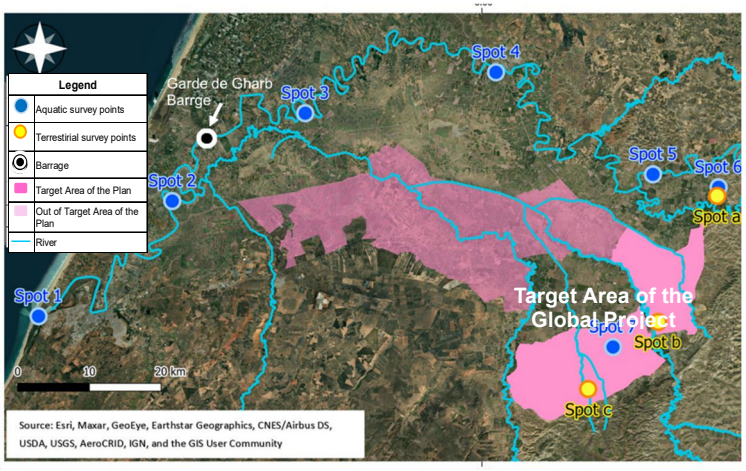


Figure 7.8 Survey Spots of Vertebrate Ecological Survey
Source: JICA Survey Team

As illustrated in the figure above, there is a barrage called as the Garde de Sebou Barrage at about 50 km upstream from the mouth of the Sebou River. Saltwater rises to the barrage from the sea , while freshwater is maintained in upstream.

Photos：Garde de Sebou Barrage located on 50km upstream of Mouth of Sebou River (left side is downstream)

In addition to the survey of vertebrate, survey of aquatic plants, aquatic insects and crustacea was implemented in Spring 2023. The purpose of the survey is to assess probable impacts on the diets of the endangered bird species, 9 rare species, which are identified in the IBA and Ramsar site around the target area of the Global Project. Those rare bird species and their range areas are described in Table 7.10.

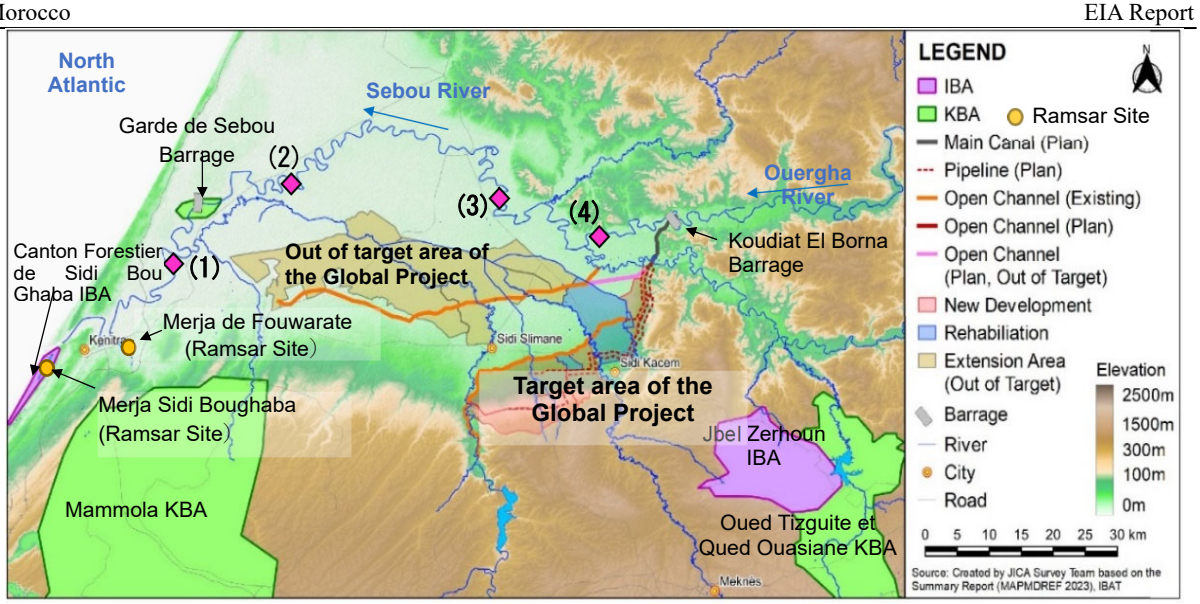
Table 7.10 Rare Bird Species Identified around the Target Area of the Global Project

Scientific Name	Common name	Identified IBA and Ramsar Site	IUCN Category
Caprimulgus ruficollis	Red-necked Nightjar	Canton Forestier de Sidi Bou Ghaba IBA	NT
Marmaronetta angustirostris	Marbled Teal	Canton Forestier de Sidi Bou Ghaba IBA Merja de Fouwarate Ramsar site Merja de Sidi Boughaba Ramsar site	NT
Oxyura leucocephala	White-headed Duck	Canton Forestier de Sidi Bou Ghaba IBA	EN
Aythya nyroca	Ferruginous Duck	Merja de Fouwarate Ramsar site Merja de Sidi Boughaba Ramsar site	NT
Limosa limosa	Black-tailed Godwit	Merja de Fouwarate Ramsar site Merja de Sidi Boughaba Ramsar site	NT
Numenius arquata	Eurasian Curlew	Merja de Fouwarate Ramsar site	NT
Aythya ferina	Common Pochard	Merja de Sidi Boughaba Ramsar site	VU
Larus audouinii	Audouin's Gull 8	Merja de Sidi Boughaba Ramsar site	VU
Vanellus vanellus	Northern Lapwing	Merja de Sidi Boughaba Ramsar site	NT

Source: IBAT、Ramsar Sites Information Service、and IUCN Red List (see Table 3.5 also), the table shows the rare bird species, which range in the IBA and Ramsar sites.

Merja de Sidi Boughaba Ramsar site (650ha) is included in Canton Forestier de Sidi Bou Ghaba IBA (952ha)。

Out of 9 species mentioned abobe, the 3 species, namely, *Marmaronetta angustirostris, Oxyura leucocephala and Aythya ferina* depend on river and coastal areas, they could come to the Sebour River around the construction sites considdering their habitats and diets. Therefore, the survey on aquatic plants, aqutic insects and[crustacea was implemneted to asess the impacts on diet of the 3 bird speceis. The survey on aquatic plants, aquatic insects and crustacea is done in both the srping and summer sesaon, since aquatic plants, aquatic insect and crustcea are active and freuqently observed in those seasons.



Survey Point	Aquatic plants	Aquatic insects	Crustacea	Remarks
(1)	✓	✓		On the Sebou River
(2)	✓	✓	✓	
(3)	✓	✓		
(4)	✓	✓	✓	On the Ouergha River

Source: Farr, T. G., and M. Kobrick, 2000, Shuttle Radar Topography Mission produces a wealth of data for the elevation, JICA Survey Team for Sampling Points and FS reports (2018, ORMVAG) for others

※Merja de Sidi Boughaba Ramsar site(650ha) is located on riparian the same area as Canton Forestier de Sidi Bou Ghaba IBA (952ha), and the area of IBA is bigger than that of the Ramsar site. In other words, the Ramsar site is included in the IBA.

Figure 7.9 Survey Points of Aquatic Plants, Aquatic Insects and Crustacea

2) Current Conditions of Ecological Survey Points for Vertebrate Animals

As shown in Figures 7.8 and 7.9, vertebrates were surveyed in Spots 1 to Spot 7 and Spot a to Spot c, while aquatic plants, aquatic insects, and crustaceans were studied in Point (1) to Point (4). Note that Sebou River and Ouergha River are heavily influenced by the discharge from the Al Wahda Dam upstream of those rivers and are therefore prone to be influenced by human activities. The current conditions of those survey points/spots are described below.

Spot 1: Merja Sidi Boughaba (Ramsar Site)

Spot 1 is located on Merja Sidi Boughaba reserve, which is a natural lake, 6 km long and 300-800 m wide, parallel to the Atlantic coast. The lake water is fed mainly from the underground water. The water is brackish, and the salinity varies depending on the season. Almost all migratory birds transiting through Morocco have been observed in Merja Sidi Boughaba. Various species can be observed here.

Spot 1: Merja Sidi Boughaba (September 2023, JICA Survey Team)

Spot 2: Sebou River (downstream of the Garde de Sebou Barrage, see Figure 7.8)

Spot 2 is located on the Sebou River with saline water due to the tidal rise of sea water from the river mouth. Water level varies from 2 to 4 m in elevation. The vegetation on the banks of the Sebor River is limited and disappears towards the sea. The dominant crops in the in and around the sampling spots are mainly cereals and fodder crops. Moreover, fishery is implemented around the spot.

Spot 2: Sebou River (March 2023, JICA Survey Team)

Spot 3: Sebou River (upstream of the Garde de Sebou Barrage, see Figure 7.8)

Spot 3 is located along the freshwater section of Sebou River, and its water depth varies depending on the season and the release of discharge from the dams constructed in the upstream of the Sebou River. The vegetation on the banks is very dense and diverse. The dominant crops in the farmland around the sampling spot are cereals, fodder crops, sugar cane and young citrus.

Spot 3: Sebou River (March 2023, JICA Survey Team)

Spot 4: Sebou River (upstream of the Garde de Sebou Barrage, see Figure 7.8)

Spot 4 is located at freshwater section of Sebou River as well as Spot 3, its depth varies depending on the season and the release of water from the dam. The vegetation on the riverbanks is very dense. On the other hand, the dominant crops of the farmlands around the sampling spot are cereals, fodder crops, sugarcane, and big-scale citrus plantations are observed. According to a fisherman, European eel (Anguilla anguilla) is often caught at this site.


Spot 4: Sebou River (March 2023, JICA Survey Team)

Spot 5: Ouergha River (upstream of the Garde de Sebou Barrage, see Figure 7.8)

Spot 5 is located along the Ouergha River. Around the spot, tree plantation dominates on the left bank, while cereals and legumes are cultivated on the right bank. Water depth is changed from 1m to 3 m, depending on season and dam releases. When water discharge reaches to the peak during March, it is observed that irrigation water is pumped up from the river from (see following photo lower right).

Spot 5: Ouergha River (March 2023, JICA Survey Team)

Spot 6 and Spot a: First Main Canal (Tête Morte Main Canal) Construction Site

Spot 6 and Spot a are located on the First Main Canal (Tête Morte Main Canal) construction sites and adjacent. They are within the farmlands, whose dominant crops are cereals and legumes, with the presence of tree crops, mainly citrus fruits.

Spot 6: Farmland around the First Main Canal (Tête Morte Main Canal) Construction Site (March 2023, JICA Survey Team)

Spot 7: Second Main Canal (Hricha Main Canal) Construction Site

Spot 7 is located on the Second Main Canal (Hricha Main Canal) construction sites, and it is in an agricultural area where cereals and citrus fruit are mainly cultivated. Surrounding area is well-watered, since it is located between Sebou River and Rdom River.

Spot 7: Farmland around the First Main Canal (Tête Morte Main Canal) Construction Site (March 2023, JICA Survey Team)

Spot a: Farmland around the construction site of the First Main Canal (Tete Morte Canal)

Spot a is located on an irrigated agricultural area and very near to the Spot 6 and conditions are almost the same as conditions around the Spot 6. Cereals and citrus are cultivated in the vicinity of the Sebou River as well as Point 6, which means that the area around Spot a is not a virgin land and influenced by the activities of surrounding residents.

Spot b: Farmland in the target Area of the Global Project

Spot b is located on the irrigated agricultural area within the target area of The Global Project and very near to Spot 7, where cereals and citrus are cultivated. The area is influenced by farming activities by the people.

Spot c: Farmland in "the Target Area of the Global Project

Around Spot c, farmlands cultivated with cereal are generally observed, and some shrub and trees are also found. The area has been developed by human activities and is a part of the target area of the Global Project.

Spot c: Farmland (March 2023, JICA Survey Team)

Point (1): Sebou River

Water depth, width of the river and water flow velocity are 0.3m-2.0m, 200m and 0.2-0.4m/s (measured by current meter). The water is generally turbid and flows over pebbles in the middle of the water flow, while gravel, sand and silt are formed in the area, where water flow is slow. This river water around the Point is heavily used by the surrounding people for their livestock, as well as for bathing, especially during the summer season.

Point (1): Sebou River (May 2023, JICA Survey Team)

Point (2): Sebou River

Water depth, width of the river and water flow velocity are 0.7m-2.0m, 200m and 0.2-0.3m/s. This spot is located near the Azouziaine douar (village). The riverbank is generally formed of silt, with some pebbles. The river is used extensively by the surrounding population for domestic use or for irrigating their farmland located on the right bank.

Point (2): Sebou River (May 2023, JICA Survey Team)

Point (3): Sebou River

Water depth, width of the river and water flow velocity are 0.2m-1.0m, 100m and around 0.1m/s. Riverbed is formed by basically gravel and sand. Many cattle come to the river for drinking water of cattle and trample riverbanks, which results in soil erosion and consequently increasing turbidity of the river around the drinking points.

Point (4): Ouergha River at upstream of confluence with Sebou River

Water depth, width of the river and water flow velocity are 0.3m-0.5m, 50m and 0.3m/s. It is located along the Ouergha River and just upstream of the confluence with Sebou River. The substrate consists mainly of pebbles, cobbles and sand. Food crops for the bird species are grown on the banks of the river.

Point (3): Sebou River (May 2023, JICA Survey Team)

Point (4): Ouergha River (May 2023, JICA Survey Team)

3) Methodology for Sampling/Observation

A series of vertebrate survey for winter season was implemented in March 2023, while survey of aquatic plants, insects and crustacea for spring was done in May 2023. The reason for the survey in spring season is that aquatic plants, insects and crustacea become active in spring and not observed in winter season. The ecological survey in summer season was implemented in July 2023. The methods and sampling dates are as shown in the following table. Except for bat, the identification of target wildlife was done based on observation and catch at the fields.

Table 7.11 Survey Methods and Dates of the Series of Ecological Survey

	Sampling/Observation Method	Sampling Date (Winter)	Sampling Date (Summer)
Bird	Observation, 30 minutes x 4 stations x 7 spots	7 March to 19 March	9 July to 18 July
Mammal	Observation, 3 hours per point x 3 spots (except bat)	8 March to 19 March	15 July to 20 July
Bat (Mammal)	Identification by using ultrasonic detector	8 March to 19 March	15 July to 17 July
Reptile	Observation, 3 hours per point x 3	14 March to 22 March	15 July to 20 Jully

	Sampling/Observation Method	Sampling Date (Winter)	Sampling Date (Summer)
	spots		
Amphibian	30 minutes X 4 station x 4 spots	14 March to 22 March	10 July to 16 July
Fish	Catching fish by fishermen	7 March to 19 March	10 July to 17 July
Aquatic plants	Observation and identification of the plants covering area between left bank top and right bank top	12-13May 2013	8 July 2023
Aquatic insects	Catch and transfer insects to a plastic basin, stored in 70° Alcohol. In the laboratory, they were identified.	12-13May 2013 (Point 1, 2, and 4) and 18 June (for Spot 3 only)	9 July to 18 July
Crustacea	Observation at the site	12-13May 2013	15 July to 20 July

Source: JICA Survey Team, 2023

4) Results of Bird Survey

In total 91 bird species were identified in winter season, in March 2023. The Spot 1, Spot 3 and Spot 6 have relatively big bird populations, while diversity of species is rich at Spot 1, since Spot 1 is located on Merja Sidi Boughaba. In the winter season, three bird species, which are categorized as rare species by IUCN were observed, and they are *Aythya ferina* (VU), and *Oxyura leucocephala* (EN) and *Sylvia undata* (VU). All of them are not endemic species to Morocco. *Aythya ferina* and *Oxyura leucocephala* were identified at Spot 1 only, while the last one was observed in Spot 4 and Spot 6. Following table shows the observed bird species in the winter season.

Table 7.12 Identified Birds Species in Winter

No.	Common Name	Scientific Name	Survey Spot							Total	Red List Category	Migratory
			1	2	3	4	5	6	7			
1	Common linnet	*Acanthis cannabina*	12	0	1	3	2	6	4	28	LC	
2	European Sparrowhawk	*Accipiter nisus*	1	0	0	0	2	0	0	3	LC	✓
3	Marsh warbler	*Acrocephallus palustris*	0	0	1	3	0	2	0	6	Not listed,	✓
4	Sedge warbler	*Acrocephalus schoenobaenus*	1	1	0	0	1	2	0	5	LC	✓
5	Eurasian skylark	*Alauda arvensis* *	0	0	0	0	2	2	3	7	LC	
6	Barbary Partridge	*Alectoris Barbara*	2	0	0	0	7	0	0	9	LC	
7	Eurasian wigeon	*Anas Penelope*	17	0	0	0	0	0	0	17	LC	✓
8	Mallard	*Anas platyrhynchos*	15	0	16	0	4	26	0	61	LC	✓
9	Common swift	*Apus apus*	0	0	0	0	0	17	6	23	LC	
10	Grey Heron	*Ardea cinerea*	2	0	0	0	0	2	0	4	LC	✓
11	Marsh Owl	*Asio capensis*	0	0	0	0	0	1	0	1	LC	
12	Long-eared owl	*Asio otus*	0	0	0	0	0	1	0	1	LC	✓
13	Little owl	*Athene Noctua*	0	0	0	0	1	3	2	6	LC	
14	Common Pochard	*Aythya ferina*	16	0	0	0	0	0	0	16	VU	✓
15	Western Cattle Egret	*Bubulcus ibis*	5	21	153	29	14	32	39	293	LC	
16	Stone-curlew	*Burhinus oedicnemus*	0	1	2	3	3	2	4	15	LC	✓
17	Long-legged buzzard	*Buteo rufinus*	0	0	0	0	0	1	1	2	LC	
18	little stint	*Calidris minuta*	0	0	3	0	0	0	0	3	LC	✓
19	Red-necked nightjar	*Caprimulagus ruficollis*	0	0	0	0	1	2	1	4	Not listed	✓
20	European Greenfinch	*Chloris chloris*	0	4	4	4	3	10	2	27	LC	
21	Caspian Tern	*Caspian water-pennywort*	0	0	2	0	0	0	0	2	Not listed	✓
22	Cetti's Warbler	*Cettia cetti*	3	0	1	0	0	2	0	6	LC	✓
23	Little ringed plover	*Charadrius dubius*	0	0	3	2	0	2	0	7	LC	✓
24	Ringed plover	*Charadrius hiaticula*	0	1	2	0	0	1	0	4	LC	✓
25	White Stork	*Ciconia ciconia*	2	4	4	8	3	8	2	31	LC	
26	Western Marsh Harrier	*Circus aeruginosus*	7	2	3	0	3	3	0	18	LC	✓
27	Montagu's harrier	*Circus Pygargus*	0	0	0	2	0	0	1	3	LC	✓
28	Zitting Cisticola	*Cisticola juncidis*	1	0	0	1	1	1	0	4	LC	
29	Western Jackdaw	*Coloeus monedula*	5	7	12	11	23	12	7	77	Not listed	
30	Rock Dove	*Columba livia*	8	12	0	6	8	15	14	63	LC	
31	Wood pigeon	*Columba palumbus*	6	0	5	0	6	6	12	35	LC	
32	European Roller	*Coracias garrulus*	0	0	0	0	1	0	0	1	LC	✓
33	Wheat quail	*Coturnix coturnix*	0	0	0	0	0	1	0	1	LC	✓

No.	Common Name	Scientific Name	Survey Spot							Total	Red List Category	Migratory
			1	2	3	4	5	6	7			
34	African Blue Tit	*Cyanistes teneriffae*	1	0	2	0	2	2	0	7	LC	
35	Little Egret	*Egretta garzetta*	6	6	4	7	10	2	0	35	LC	✓
36	European robin	*Erithacus rubecula*	2	0	0	0	0	0	0	2	LC	✓
37	Common Kestrel	*Falco tinnuculus*	2	2	2	4	3	2	4	19	LC	
38	Common Chaffinch	*Fringilla coelebs*	4	0	0	0	2	3	0	9	LC	
39	Eurasian Coot	*Fulica atra*	18	0	0	0	0	0	0	18	LC	
40	Red-knobbed Coot	*Fulica cristata*	16	0	0	0	0	0	0	16	LC	
41	Crested lark	*Galerida cristata*	3	6	6	7	6	8	14	50	LC	
42	Common Moorhen	*Gallinula* chloropus	3	0	0	2	0	5	0	10	LC	✓
43	Gull-billed Tern	*Gelochelidon nilotica*	5	0	0	0	0	0	0	5	LC	✓
44	Collared pratincole	*Glareola pratincole*	0	1	1	2	0	0	0	4	LC	✓
45	Black-winged Stilt	*Himantopus Himantopus*	0	2	0	15	2	2	0	21	LC	✓
46	Barn Swallow	*Hirudo rurubica*	13	15	17	20	44	0	18	127	LC	✓
47	Great grey shrike	*Lanius excubitor*	1	0	0	0	0	4	2	7	LC	
48	European herring gull	*Larus argentatus*	0	7	0	0	0	0	0	7	LC	
49	Lesser Black-backed Gull	*Larus fuscus*	9	6	0	0	0	0	0	15	LC	✓
50	Black-headed Gull	*Larus ridibundus*	0	84	74	0	0	0	0	158	LC	✓
51	Corn Bunting	*Emberiza calandra*	0	3	3	6	4	13	6	35	LC	✓
52	Black Kite	*Milvus migrans*	4	1	2	3	3	4	0	17	LC	✓
53	White Wagtail	*Motacilla alba*	3	6	4	3	4	5	4	29	LC	✓
54	Pointted Flycatcher	*Muscicapa striata*	2	2	2	0	1	3	1	11	LC	✓
55	Black-crowned Night heron	*Nycticorax nycticorax*	0	0	2	3	4	1	0	10	LC	✓
56	Black-eared Wheatear	*Oenanthe hispanica*	1	0	0	0	0	2	2	5	LC	✓
57	Capped (Northern) Wheatear	*Oenanthe Oenanthe*	0	1	0	0	4	2	2	9	LC	✓
58	White-headed Duck	*Oxyura leucocephala*	83	0	0	0	0	0	0	83	EN	✓
59	Great Tit	*Parus major*	0	0	0	0	0	1	0	1	LC	
60	House Sparrow	*Passer domesticus*	0	12	41	28	15	43	18	157	LC	
61	Great Cormorant	*Phalacrocorax carbo*	5	4	30	8	0	5	0	52	LC	✓
62	Greater Flamingo	*Phoenicopterus ruber*	11	0	0	0	0	0	0	11	LC	✓
63	Black redstart	*Phoenicurus ochruro*	0	0	2	1	0	0	2	5	LC	✓
64	Common Redstart	*Phoenicurus phoenicurus*	5	0	0	2	2	2	0	11	LC	✓
65	Common Chiffchaff	*Phylloscopus collybita*	2	0	8	4	2	7	5	28	LC	✓
66	Willow Warbler	*Phylloscopus trochilus*	0	0	0	6	2	5	0	13	LC	✓
67	Eurasian Magpie	*Pica pica*	12	0	6	4	2	2	2	28	LC	Ns
68	Eurasian Spoonbill	*Platalea leucorodia*	5	0	0	0	0	0	0	5	LC	✓
69	*Sickle ibis*	*Plegadis falcinellus*	0	0	0	0	14	0	0	14	LC	✓
70	Great Crested Grebe	*Podiceps cristatus*	3	0	0	0	0	0	0	3	LC	✓
71	*Grebe*	*Tachybaptus ruficollis*	3	0	0	0	0	0	0	3	LC	✓
72	Punctate Marouette	*Porzana porzana*	0	0	0	0	2	2	0	4	LC	✓
73	Common bulbul	*Pycononotis barbatus*	7	0	8	2	6	4	0	27	LC	
74	Water rail	*Rallus aquaticus*	0	0	0	0	0	1	0	1	LC	✓
75	Avocet	*Recurvirostra avosetta*	5	0	0	0	0	0	0	5	LC	✓
76	Sand martin	*Riparia riparia*	0	0	0	0	29	0	0	29	LC	-
77	Amur Stonechat	*Saxicala torquate*	1	0	0	2	2	2	2	9	Not listed	✓
78	European Serin	*Serinus serinus*	0	12	0	8	0	8	4	32	LC	✓
79	Eurasian collared-dove	*Streptopelia decaocto*	0	3	9	9	3	5	12	41	LC	
80	Spotless Starling	*Sturnus unicolor*	11	16	24	12	18	24	16	121	LC	
81	Eastern subalpine warble	*Sylvia cantillans*	4	0	1	0	1	2	4	12	LC	
82	Common whitethroat	*Sylvia cmmunis (Curruca communis)*	0	0	3	2	3	1	0	9	LC	✓
83	Sardinian Warbler	*Sylvia melanocephala*	2	0	3	0	2	2	0	9	LC	
84	Dartford Warbler	*Sylvia undata*	0	0	0	3	0	2	0	5	NT	
85	Sandwich Tern	*Thalasseus sandvicensis*	8	2	2	2	0	0	0	14	LC	✓
86	Pointted redshank	*Tringa erythropus*	2	0	0	0	0	0	0	2	LC	✓
87	Wood sandpiper	*Tringa glareola*	0	0	1	0	0	0	0	1	LC	✓
88	Common Redshank	*Tringa tetanus*	0	5	0	0	0	3	0	8	LC	✓

No.	Common Name	Scientific Name	Survey Spot							Total	Red List Category	Migratory
			1	2	3	4	5	6	7			
89	Common Blackbird	*Turdus merula*	7	4	0	7	4	11	2	35	LC	
90	Barn owls	*Tyto alba*	0	0	0	1	1	1	0	3	LC	
91	Eurasian Hoopoe	*Upupa epops*	0	2	1	3	0	2	1	9	LC	✓
	Total		372	255	470	248	282	353	219	2199		

VU: Vulnerable, NT: Near Threatened, EN: Endangered, LC: Least Concern
Source: JICA Survey Team, 2023

In total, 86 species were identified in the summer season, seven species out of them are classified as rare by the IUCN. Three of these species, Marmaronetta angustirostris, Aythya ferina, and Oxyura leucocephala, were observed in Spot 1 (Ramsar site) only. Four other rare species, namely, Caprimulgus ruficollis, Lanius senator, Streptopelia turtur, and Sylvia undata were observed at several spots, with a trend toward higher numbers upstream.

Table 7.13 Identified Birds Species in Summer

No.	Common Name	Scientific Name	Survey Spot							Total	Red List Category	Migratory
			1	2	3	4	5	6	7			
1	Common linnet	*Acanthis cannabina*	4	0	7	3	3	6	5	28	LC	
2	Marsh warbler	*Acrocephalus palustris*	0	0	2	1	1	0	0	4	LC	✓
3	Sedge warbler	*Acrocephalus schoenobaenus*	0	0	0	0	0	2	0	2	LC	✓
4	Eurasian skylark	*Alauda arvensis*	0	0	0	0	5	0	0	5	LC	✓
5	Common kingfisher	*Alcedo atthis*	0	0	0	0	1	2	0	3	LC	✓
6	Barbary Partridge	*Alectoris Barbara*	4	0	0	6	3	11	0	24	LC	
7	Mallard	*Anas platyrhynchos*	24	0	16	0	5	19	0	64	LC	✓
8	Common swift	*Apus apus*	21	31	86	33	48	48	26	293	LC	✓
9	Pallid swift	*Apus pallidus*	8	0	14	4	6	3	0	35	LC	
10	Grey Heron	*Ardea cinerea*	1	2	0	0	1	1	0	5	LC	
11	Purple Heron	*Ardea purpurea*	0	0	0	0	0	1	0	1	LC	✓
12	Squacco Heron	*Ardeola ralloides*	0	0	1	2	0	0	0	3	LC	✓
13	Little owl	*Athene Noctua*	0	0	0	1	1	1	0	3	LC	
14	Common Pochard	*Aythya ferina*	3	0	0	0	0	0	0	3	VU	✓
15	Western Cattle Egret	*Bubulcus ibis*	5	50	319	212	60	47	29	722	LC	
16	Stone-curlew	*Burhinus oedicnemus*	2	1	2	2	2	1	2	12	LC	✓
17	Long-legged buzzard	*Buteo rufinus*	0	0	0	0	1	1	1	3	LC	✓
18	Greater short-toed lark	*Calandrella brachydactyla*	0	0	0	0	0	6	6	12	LC	✓
19	Red-necked nightjar	*Caprimulgus ruficollis*	0	0	0	0	2	1	1	4	VU	✓
20	European nightjar	*Caprimulgus europaeus*	0	0	0	0	0	1	0	1	LC	✓
21	European Goldfinch	*Carduelis carduelis*	0	0	0	0	2	2	0	4	LC	✓
22	European Greenfinch	*Chloris chloris*	2	4	5	9	11	11	2	44	LC	✓
23	Rufous-tailed Scrub Robin	*Cercotrichas galactotes*	0	0	1	2	5	8	3	19	LC	✓
24	Little ringed plover	*Charadrius dubius*	5	0	0	0	5	0	0	10	LC	✓
25	White Stork	*Ciconia ciconia*	9	10	16	7	7	9	6	64	LC	✓
26	Western Marsh Harrier	*Circus aeruginosus*	15	14	8	7	4	5	1	54	LC	✓
27	Zitting Cisticola	*Cisticola juncidis*	2	3	1	2	0	2	0	10	LC	
28	Western Jackdaw	*Coloeus monedula*	8	17	14	30	51	43	30	193	LC	✓
29	Rock Dove	*Columba livia*	8	9	37	7	55	40	38	194	LC	
30	Wood pigeon	*Columba palumbus*	6	0	4	6	10	6	0	32	LC	✓
31	European Roller	*Coracias garrulus*	0	0	0	0	1	1	0	2	LC	✓
32	Common Quail	*Coturnix coturnix*	0	2	3	3	1	2	0	11	LC	✓
33	Western Orphean Warbler	*Curruca hortensis*	0	0	0	0	0	2	0	2	LC	✓

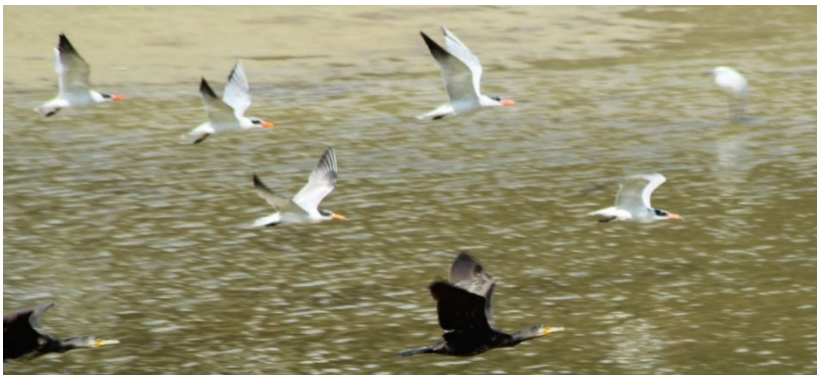
No.	Common Name	Scientific Name	Survey Spot							Total	Red List Category	Migratory
			1	2	3	4	5	6	7			
34	African Blue Tit	*Cyanistes teneriffae*	1	0	0	1	2	2	1	7	LC	
35	Northern House Martin	*Delichon urbicum*	0	0	3	5	6	3	0	17	LC	✓
36	Little Egret	*Egretta garzetta*	24	15	38	13	22	6	0	118	LC	✓
37	Corn bunting	*Emberiza calandra*	0	5	2	3	5	6	6	27	LC	✓
38	House Bunting	*Emberiza sahari*	0	0	0	4	0	0	0	4	LC	
39	Peregrine Falcon	*Falco peregrinus*	0	0	0	0	0	2	0	2	LC	✓
40	Common Kestrel	*Falco tinnunculus*	3	2	2	3	2	5	3	20	LC	✓
41	Common Chaffinch	*Fringilla coelebs*	11	0	0	10	7	9	0	37	LC	✓
42	Eurasian Coot	*Fulica atra*	8	0	0	0	0	0	0	8	LC	✓
43	Red-knobbed Coot	*Fulica cristata*	40	0	0	0	0	0	0	40	LC	
44	Crested lark	*Galerida cristata*	2	7	13	9	6	5	25	67	LC	✓
45	Thekla's lark	*Galerida theklae*	0	3	0	0	2	4	4	13	LC	
46	Common Moorhen	*Gallinula chloropus*	2	0	3	4	2	3	0	14	LC	✓
47	Collared pratincole	*Glareola pratincole*	0	2	1	1	0	0	0	4	LC	✓
48	Black-winged Stilt	*Himantopus Himantopus*	9	8	5	4	15	3	0	44	LC	✓
49	Melodious warbler	*Hippolais polyglottal*	0	0	0	0	2	1	2	5	LC	✓
50	Barn Swallow	*Hirudo rustica*	27	44	26	28	45	15	15	200	LC	✓
51	Eastern Olivaceous Warbler	*Iduna pallida*	0	0	0	1	2	2	2	7	LC	✓
52	Great grey shrike	*Lanius excubitor*	1	0	1	2	5	0	3	12	LC	✓
53	Woodchat shrike	*Lanius senator*	1	0	1	2	2	3	2	11	NT	✓
54	Common nightingale	*Luscinia megarhynchos*	0	0	1	0	0	2	0	3	LC	✓
55	Marbled Teal	Marmaronetta angustirostris	3	0	0	0	0	0	0	3	NT	✓
56	European bee-eater	*Merops apiaste*	2	0	0	3	0	6	0	11	LC	✓
57	Black Kite	*Milvus migrans*	16	12	8	4	4	5	2	51	LC	✓
58	Spotted Flycatcher	*Muscicapa striata*	2	0	0	1	2	2	1	8	LC	✓
59	Black-crowned Night heron	*Nycticorax nycticorax*	0	5	8	1	5	5	0	24	LC	✓
60	Eurasian Golden Oriole	*Oriolus oriolus*	0	0	0	0	0	1	0	1	LC	✓
61	White-headed Duck	*Oxyura leucocephala*	42	0	0	0	0	0	0	42	EN	✓
62	Great Tit	*Parus major*	0	0	0	1	0	3	1	5	LC	
63	House Sparrow	*Passer domesticus*	0	25	85	61	49	72	46	338	LC	
64	Spanish Sparrow	*Passer hispaniolensis*	0	0	0	0	0	21	51	72	LC	
65	Greater Flamingo	*Phoenicopterus ruber*	75	0	0	0	0	0	0	75	LC	✓
66	Eastern Bonelli's Warbler	*Phylloscopus bonelli*	0	0	0	0	0	2	0	2	LC	✓
67	Eurasian Magpie	*Pica pica*	5	0	2	2	4	2	2	17	LC	
68	Eurasian Spoonbill	*Platalea leucorodia*	34	0	0	0	0	0	0	34	LC	✓
69	Sickle ibis	*Plegadis falcinellus*	0	22	21	46	10	28	7	134	LC	✓
70	Great Crested Grebe	*Podiceps cristatus*	1	0	0	0	0	0	0	1	LC	✓
71	Grebe	*Tachybaptus ruficollis*	3	0	0	0	0	0	0	3	LC	✓
72	Common bulbul	*Pycononotis barbatus*	5	0	6	18	13	28	4	74	LC	
73	European Serin	*Serinus serinus*	0	5	0	6	5	13	8	37	LC	✓
74	Little Tern	*Sternula albifrons*	6	7	0	1	0	0	0	14	LC	✓
75	Eurasian collared-dove	*Streptopelia decaocto*	2	12	20	23	17	11	22	107	LC	
76	European turtle dove	*Streptopelia turtur*	3	2	9	9	9	17	4	53	VU	✓
77	Tawny owl	*Strix aluco*	1	0	1	1	0	0	0	3	LC	
78	Spotless starling	*Sturnus unicolor*	25	122	147	147	71	79	36	627	LC	
79	Eastern subalpine warble	*Sylvia cantillans*	2	0	0	0	0	1	0	3	LC	✓
80	Common whitethroat	*Sylvia cmmunis (Curruca communis)*	1	0	4	2	4	2	1	14	LC	✓

No.	Common Name	Scientific Name	Survey Spot							Total	Red List Category	Migratory
			1	2	3	4	5	6	7			
81	Spectacled Warbler	*Sylvia conspicillata*	0	0	0	0	1	2	2	5	LC	✓
82	Sardinian Warbler	*Sylvia melanocephala*	6	0	5	2	2	4	0	19	LC	✓
83	Dartford Warbler	*Sylvia undata*	0	0	0	0	1	1	2	4	NT	
84	Black-crowned tchagra	*Tchagra senegala*	1	0	0	0	0	0	0	1	LC	
85	Common Blackbird	*Turdus merula*	11	2	6	11	6	12	1	49	LC	✓
86	Barn owls	*Tyto alba*	0	0	0	0	1	1	0	2	LC	
	Total		502	443	954	766	620	671	403	4,359		

VU: Vulnerable, NT: Near Threatened, EN: Endangered, LC: Least Concern
Source: JICA Survey Team, 2023

A total of 120 bird species were observed in both winter and summer, around half of them, namely 57 species, were found in both seasons. It is probably because around half of the species are migratory birds. The observed bird number in the summer was about twice that in the winter, implying that birds are more active in summer.

Some photos of birds observed at some spots are as shown below. It is noted that they are not endangered species, and they are commonly observed.



Black headed Gull *(Larus ridibundus)* (while color bird) and Great Cormorant *(Phalacrocorax carbo)* (black color bird) at Spot 3 in March 2023

Western Cattle Egret *(Bubulcus ibis), at Spot 5* in March 2023

Corn Bunting *(Emberiza calandra),*
At Spot 6 March 2023

Great grey shrike *(Lanius excubitor)*
At Spot 6 March 2023

Photos: JICA Survey Team (March 2023)

The ecology and habitats of the identified seven rare bird species by the ecological survey in the winter and summer, namely, *Aythya ferina*, *Oxyura leucocephala*, *Sylvia undata*, *Marmaronetta angustirostris*, *Caprimulgus ruficollis*, *Lanius senator* and *Streptopelia turtur* are as shown below. Furthermore, according to a research professor of the Hassan II Institute of Agriculture and Veterinary Medicine in Morocco, the three bird species mentioned above, namely, *Aythya ferina*, *Oxyura leucocephala* and *Marmaronetta angustirostris* are mainly dependent on Merja Sidi Boughaba (Ramsar site), thus, the dependence of these bird species on the Sebou and Ouergha Rivers is low.

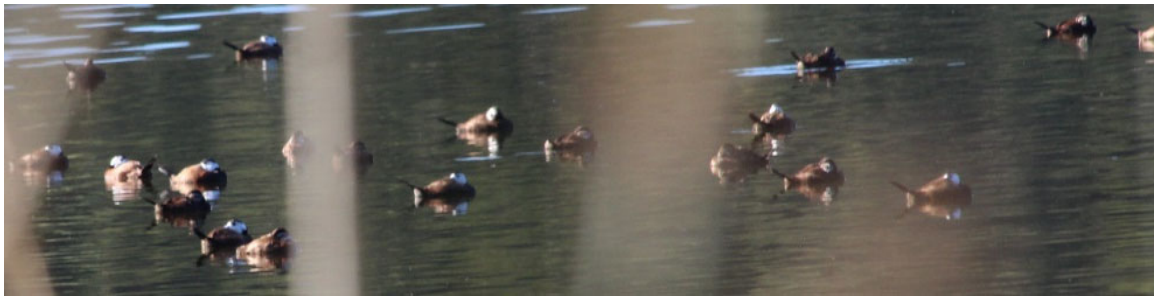
✓ Common Pochard (*Aythya ferina*) [18]

Habitats of *Aythya ferina* are terrestrial, freshwater (=inland waters) and marine. This species requires well-vegetated eutrophic to neutral swamps, marshes, lakes and slow-flowing rivers with areas of open water and abundant emergent fringing vegetation. The breeding starts from April-May, however, it is not breeding in Morocco. It is full-migratory, the species habitats in large lakes, slow-flowing rivers, reservoirs, brackish waters, marshes, weirs and flooded gravel pits during the winter. The species is omnivorous, its diet consisting of seeds, roots, rhizomes, the vegetative parts of grasses, sedges and aquatic plants as well as aquatic insects and larvae, mollusks, crustaceans, worms, amphibians and small fish. Given that the species was identified at Spot 1 only in both winter and summer and its preferable habitats are open water area, probably, the possibility that bird species move to upstream of the Sebou River and the Ouergha River will be low.

✓ White-headed Duck (*Oxyura leucocephala*)[19]

Habitats of *Oxyura leucocephala* are inland wetlands, marine coastal/supratidal, artificial/aquatic & marine. The Central and East Asian populations of this species are migratory while the populations in Spain and North Africa are non-migratory. In Mediterranean populations, although the species forms congregations at certain sites during the non-breeding season, there is no overall direction to its seasonal movements. The nest is constructed over water in emergent vegetation, usually *Phragmites spp*. or *Typha spp*. It consists of a cupped platform of leaves and stems. Its diet consists predominantly of midge (chironomid) larvae and other aquatic invertebrates such as amphipods, isopods and polychaetes. Seeds and the vegetative parts of *Potamogeton spp*., *Ruppia spp*. and other aquatic plants are also be taken. This species was identified at Spot 1 (Merja Sidi Boughaba) only. Moreover, its preferable habitats are wetlands, marine and coastal areas, the bird rarely come to the Sebou River and the Ouergha River.

[18] Source : IUCN, https://www.iucnredlist.org/ja/species/22680358/205288455
[19] Source : IUCN, https://www.iucnredlist.org/ja/species/22679814/119403602



Oxyura leucocephala (EN) at Spot 1 in March 2023 (Photos: JICA Survey Team)

✓ Marbled Teal (*Marmaronetta angustirostris*)[20]

The birds breed in shallow freshwater, brackish water, grasslands, and wetlands. Foraging habits are very various depending on season and location. Moreover, while adults feed on flies and Scirpus spp seeds, chicks feed primarily on chironomids. It was observed in summer season at Spot 1 (Ramsar site) only and was not identified around Sebou River nor Ouergha River. In other words, this bird species is unlikely to fly inland, where the Global Project will be implemented. Therefore, the impact of the Global Project on the birds is thought to be limited.

✓ Dartford Warbler (*Sylvia undata*)[21]

The species was identified at inland spots only, and the number of birds observed is only several. Its habitats are shrubland, grassland, marine intertidal, artificial/terrestrial areas. It favors dense, homogeneous scrub, forest and low shrub 0.5-1.5 m in height and dominated by species such as especially, Ulex, Erica, Calluna, Rosmarinus, Genista, Cistus and *Quercus coccifera* (Kerms Oak). It is largely sedentary but undertakes some short-distance dispersive movements and some European birds spend the non-breeding season in north-west Africa. The species feeds on mostly arthropods such as beetles, caterpillars, spiders and so on[22], but it may also eat berries outside the breeding season. Breeding will occur mostly from mid-March to August. Considering that the bird prefers scrub and low shrub as habitats and feeds on seeds, insects and spiders, the species seems to feed on terrestrial plants and arthropods. It means that it does not depend on the Sebou River and the Ouergha River, but forest areas, Thus, there is a low possibility that The Global Project will cause damage to the bird species.

✓ Red-necked nightjar (*Caprimulgus ruficollis*)

The bird species prefers pine forests, coastal forests, lowlands and hills with open scrub with eucalyptus forests, olive, vineyards and cork oaks (*Quercus suber*). In Morocco, Algeria, and Tunisia, it breeds from mid-May to August and feeds mainly on insects. The Global Project will not result in reduce the area of forest and fruit trees, and the impact on the preferable habitat of the bird species is expected to be very limited.

✓ Woodchat shrike (*Lanius senator*)[23]

The species is often observed in open forests, orchards, olive, gardens, parks and hedgerows, or in cultivated areas with some trees. It feeds mainly on insects, but also on invertebrates other than insects, rodents, lizards, frogs, and sometimes plants such as berries. Since the Global Project will increase the area planted with fruit trees, it is thought that The Global Project will bring about favorable habitat for the bird species.

[20] Source : IUCN, https://www.iucnredlist.org/ja/species/22680339/205917761#habitat-ecology
[21] Source : IUCN, https://www.iucnredlist.org/ja/species/22716984/205920935
[22] Source: Colin J. Bibby, 1979, Foods of the Dartford warbler Sylvia undata on southern English heathland (Aves: Sylviidae), Journal of Zoology Volume 188
[23] Source: IUCN, https://www.iucnredlist.org/ja/species/22705095/209744544#habitat-ecology

✓ European turtle dove (*Streptopelia turtur*)[24]

The bird is generally observed in a wide range of areas, including grasslands, desert areas, forests, and agricultural lands, including orchards. This species nests in hedgerows and shrubs and feeds primarily on weeds, grain seeds and fruits, and rarely on berries, fungi, and invertebrates. It is highly migratory and crosses the Sahara Desert. It was not observed in the winter, however, it was observed at all sites in the survey in summer season.

Cereal production in the target area of the Global Project will not be changed very much, since the planting area will decrease while the yield will increase due to irrigation. Also, orchard area will increase. It means that the feeding sources for the bird species can be increased by the Global Project in general. Moreover, the bird species ranges grasslands, farmlands and orchards, and the target area of the Global Project will be agricultural lands even after the Global Project, which will result in no damage to the species.

All of the seven rare bird species identified in the ecological survey are distributed in North African countries other than Morocco and European countries and are not endemic species to Morocco. In addition, the target area of the Global Project is used for agricultural purpose, and those bird species have adapted to the artificial ecosystem (i.e., agricultural land). There are similar farmlands in the surrounding area, and the birds would survive in other areas during the construction works.

Fruit trees located along the proposed main canals will be cut down for the construction works. Also, 0.4 ha of riparian forest around the proposed siphon of the Sebou River, which is under the management of the ABHS, will be cut down. The clearing of the fruit trees and 0.4 ha of riparian trees for the construction works will not cause significant impacts on rare bird species, since overall orchard area in the target area of the Global Project will be increased by the Global Project.

As reference, habitats and diets of the 5 rare bird species, which were not observed by the survey in winter and summer season, out of the 9 species shown in Table 7.10, are summarized in the following table. They are generally observed in stagnant waters and coastal areas such as Ramsar sites, KBAs, and IBAs near the mouth of the Sebou River, but the birds are rarely identified in inland and in flowing rivers. Therefore, it seems that they were not identified by the ecological survey, which was implemented in “the Target Area of the Global Project" and around the Sebou River and Ouergha River.

Table 7.14 Habitats and Diet of the Rare Bird Species

Scientific Name	Habitat and Diets
Aythya nyroca	The species mainly prefer stationary fresh water, and it is rarely observed in the flowing rivers.
Limosa limosa	Since the habitats are shallow waters, wetlands and grasslands, impacts on the species is rarely expected.
Numenius arquata	Its main habitats are wetlands and grasslands, and its diets are various, terrestrial insects, crustaceans, mollusks, polychaeta worms, small fish, amphibians, lizards and so on. It is thought that the possibility that the species will be damaged by the water intake for the Global Project is low.
Larus audouinii	It is observed in the coastal area mainly and it takes sardine. Moreover, it is rarely identified in the inland areas.
Vanellus vanellus	The species prefer grasslands and wetlands, and mainly takes terrestrial insects and spiders.

Source: IUCN Redlist

Aquatic plants, insects and crustacea, which range in Sebou River and Ouergha River and could be feeds for the rare species are described in 9) Results of Aquatic Plant Survey, 10) Results of Aquatic Insect Survey and 11) Results of Crustacea Survey after-mentioned.

[24] Source: IUCN, https://www.iucnredlist.org/ja/species/22690419/154373407#habitat-ecology

5) Results of Fish Survey

In total 10 fish species were observed in the winter season. Out of them, European eel (*Anguilla Anguilla*) and Sliver carp (*Hypophthalmichthys molitrix*) are categorized as rare species, as EN (Endangered) and NT（Near Threatened） based on IUCN. According to local fishermen and forest ranger, the eel is abundant at Spot 2 and Spot 4. Garde de Sebou Barrage, which has fish passes, and is located on around 50km upstream of the Sebor River mouth, can make it possible for eels and other fish to migrate between the sea and fresh water. It is noted that Nile tilapia (*Oreochromis nilaticus*) is nowadays observed as a new species, and it is abundant at Spot 3 according to the Forest Ranger.

Table 7.15 Observed Fish Species in Winter

No.	Common Name	Scientific Name	Spot 2	Spot 3	Spot 4	Spot 5	Total	Remarks
1	Europan eel	*Anguilla Anguilla*	240	35	130	8	413	CR
2	Fritsch barbel	*Carasobarbus fritschii*	0	0	0	8	8	LC
3	Thinlip mullet	*Chelon ramada*	85	14	12	24	135	LC
4	Common Carp	*Cyprinus caprio*	80	36	28	15	159	LC
5	European Seabass	*Dicentrarchus labrax*	1	0	0	0	1	LC
6	Silver Carp	*Hypophthlmichthys molitrix*	0	0	1	1	2	Not listed
7	Pumpkinseed sunfish	Lepomis jubbosus	0	8	6	4	18	Not listed
8	Maghreb barbel	*Luciobarbus magrebensis*	0	0	26	25	51	Not listed
9	Flatheagre mullet	*Mugil cephalus*	140	25	26	30	221	LC
10	Nile Tilapia	*Oreochromis nilaticus*	3	90	60	24	177	LC
	Total		549	208	289	139	1,185	

Source: JICA Survey Team, 2023

Nine fish species were identified during the summer survey, and the same fish species were observed in the summer and winter except for European Seabass (*Dicentrarchus labrax*). However, the observed number of fish in summer was bigger in the summer (see the following table). It is probably because fish are more active and easily observed in summer with high temperatures compared to that in winter.

Table 7.16 Observed Fish Species in Summer

No.	Common Name	Scientific Name	Spot 2	Spot 3	Spot 4	Spot 5	Total	Remarks
1	Europan eel	*Anguilla anguilla*	940	15	260	3	1,218	CR
2	Fritsch barbel	*Carasobarbus fritschii*	0	0	0	18	18	LC
3	Thinlip mullet	*Chelon ramada*	45	22	8	11	86	LC
4	Common Carp	*Cyprinus caprio*	72	24	18	33	147	LC
5	Silver Carp	*Hypophthalmichthys molitrix*	2	3	2	4	11	NT
6	Pumpkinseed sunfish	Lepomis jubbosus	1	12	11	3	27	Not listed
7	Maghreb barbel	*Luciobarbus magrebensis*	0	0	37	46	83	Not listed
8	Flatheagre mullet	*Mugil cephalus*	92	42	32	18	184	LC
9	Nile Tilapia	*Oreochromis nilaticus*	3	76	84	56	219	LC

Source: JICA Survey Team, 2023

Flatheagre mullet (*Mugil cephalus*)
At Spot 2, March 2023

Europan eel (*Anguilla anguilla)*
At Spot 2 March 2023

Pumpkinseed sunfish *(Lepomis jubbosus)*
At Spot 3 March 2023

Maghreb barbel *(Luciobarbus magrebensis),*
At Spot 3 March 2023

Source：JICA Survey Team, 2023

Out of the fish species identified, two species are classified as rare by the IUCN. Ecology and characteristics of those species are described below.

✓ European eal (*Anguilla anguilla*)

Anguilla anguilla are thought to spawn in the Sargasso Sea in the West Central Atlantic between late winter and early spring. The mechanisms by which leptocephali reach the European and North African coasts are not well understood. It is generally thought that the causes of decline are barriers to migration such as damage by hydropower turbines and pumps, climate change and/or changes in oceanic currents; disease and parasites, exploitation of larvae of eels, changing hydrology, habitat loss, pollutants; and predation.[25] However, according to local people and forest rangers, European eel are abundant at around Spot 2 and Spot 4.

Spot 2 is located in downstream of the Garde de Sebou Barrage and is close to the coastal area, where many fishermen are engaged in commercial fishing, not only for eels. Therefore, many eels were caught both in winter and summer at Spot 2.

At Spot 4, more European eels were caught than in other spots, since the fishermen who collaborated the survey were familiar with European eel fishing. However, there was no significant difference between Spot 4 and the other spots in terms of caught fish numbers except for European eel.

[25] https://www.iucnredlist.org/ja/species/60344/152845178

In Morocco, commercial fishery are regulated by the National Agency for Water and Forest, MAPDREF and only registered companies can catch specified amount of eel by paying license fee according to "Order providing for the annual regulation of fishing in inland waters and fixing the fishing reserves for the 2021-2022 season". The registration is updated annually. Catching European eel is done only downstream of the Garde de Sebou Barrage. It can be said that excessing fishery is controlled by the Government to a certain extent.

✓ Silver carp (*Hypophthalmichthys molitrix*)

The silver carp (*Hypophthalmichthys molitrix*) was originally found in China, Mongolia, and Russia. It has long been used as a food source in China and Taiwan and is one of the four major food fish in China. In recent years, many dams have been developed in China, resulting in a significant decline in its population. Morocco is not their original habitat, and it is highly likely that the fish was introduced from outside. According to local fishermen, it is not usually observed in the Sebou River.

The water intake point, namely, Koudiat El Borna Barrage will be equipped with a fish ladder, and there are no facilities, which prevent migration of European eel in the Sebou River. Also, the Garde de Sebou Barrage has a fish ladder, which let fish move freely in the Sebou River. Therefore, it can be said that severe impacts on the fish species by the Global Project are not expected.

6) Results of Amphibian Survey

In total only 4 amphibian species, namely. 2 frogs and 2 toads were identified in the winter and summer season. The numbers of observed species in winter and summer are the same, however, more amphibians were observed in summer, it is probably because that they are more active in summer than in winter. Among the identified species, there is no endangered species. Following tables show the results of amphibian survey in winter and summer:

Table 7.17 Observed Amphibian Species in Winter

No.	Common Name	Scientific Name	Spot 2	Spot 3	Spot 4	Spot 5	Total	Remarks
1	Mauritanian toad	*Bufo mauritanicus*	2	1	1	3	7	LC
2	European green toad	*Bufo viridis*	1	0	2	2	5	LC
3	Mediterranean tree frog	*Hyala meridionalis*	1	0	0	2	3	Not listed
4	Sahara frog	*Rana saharica*	4	0	5	7	16	LC
	Total		8	1	8	14	31	

Source: JICA Survey Team, 2023

Table 7.18 Observed Amphibian Species in Summer

No.	Common Name	Scientific Name	Point 2	Point 3	Point 4	Point 5	Total	Remarks
1	Mauritanian toad	*Bufo mauritanicus*	3	2	2	5	12	LC
2	European green toad	*Bufo viridis*	3	4	1	3	11	LC
3	Mediterranean tree frog	*Hyala meridionalis*	1	0	0	2	3	LC
4	Sahara frog	*Rana saharica*	5	2	4	8	19	LC
	Total		12	8	7	18	45	

Source: JICA Survey Team, 2023

7) Results of Mammal Survey

In total 9 mammal species except bat were identified in the winter season. In general, they are rodents and other small size animals except red fox (*Vulpes vulpes)* and, Wild boar (*Sus scrofa*). Among them, only *Eliomys quercinus* is regarded as a threatened species, NT, according to IUCN. Concerning bat, 7 species were identified by using the ultrasonic detector. Among them, 3 species are regarded as endangered species. Following table shows the identified mammals:

Table 7.19 Observed Mammal Species in Winter

No.	Common Name	Scientific Name	Survey Spot			Total	Remarks
			A	b	C		
1	North African hedgehog	Erinaceus algirus	1	2	0	3	LC: Least Concern (IUCN)
2	Cape hare	Lepus capensis	1	0	2	3	LC (IUCN)
3	European rabbit	Oryctolagus cunuculus	2	3	0	5	Not listed in IUCN
4	Norway rat/ Brown rat	Rattus norvegicus	2	5	0	7	LC (IUCN)
5	North African gerbil	Gerbillus campestris	1	0	3	4	LC (IUCN)
6	Black rat	Rattus rattus	1	3	1	5	LC (IUCN)
7	Garden dormouse	Eliomys quercinus	0	1	0	1	NT: Near Threatened (IUCN)
8	Barbary wild boar	Sus scrofa barbarous	0	5	0	5	Not listed in IUCN
9	Red fox	Vulpes vulpes	0	0	1	1	LC (IUCN)
	Total		8	19	7	34	

Source: JICA Survey Team, 2023

Table 7.20 Contacted Number of Bat in Winter

No.	Common Name	Scientific Name	Survey Spot			Total	Remarks
			A	B	C		
1	House bats	*Eptesicus isabellinus*	1	1	0	2	LC: Least Concern
2	Long-fingered bat	*Myotis Capaccini*	1	11	6	18	VU: Vulnerable
3	Greater noctule bat	*Nyctalus* lasiopterus	0	3	0	3	VU: Vulnerable
4	Lesser noctule	*Nyctalus leisleri*	0	1	0	1	LC
5	Kuhl's pipistrelle	*Pipistrellus kuhli*	77	114	72	263	LC
6	Common pipistrelle	*Pipistrellus pipistrellus*	3	15	2	20	LC
7	Grey long-eared bat	*Plecotus austriacus*	1	0	0	1	NT: Near Threatened
	Total		83	145	80	308	

Source: JICA Survey Team, 2023

In the summer survey, 14 species of mammals except for bats and 5 species of bats were identified. Compared to the winter season, more species of rodents were observed. The rare species Garden dormouse (*Eliomys quercinus*) was observed in summer also in addition to winter season.

Table 7.21 Observed Mammal Species in Summer

No.	Common Name	Scientific Name	Survey Spot			Total	Remarks
			A	b	C		
1	North African hedgehog	*Erinaceus algirus*	1	2	1	4	LC: Least Concern (IUCN)
2	Cape hare	*Lepus capensis*	2	0	1	3	LC (IUCN)
3	Greater while toothed shrew	*Crocidura russula*	0	1	0	1	LC (IUCN)
4	European rabbit	*Oryctolagus cunuculus*	3	5	0	8	Not listed in IUCN
5	Barbary Striped Grass Mouse	*Lemniscomys barbarous*	2	0	3	5	LC (IUCN)
6	Norway rat/ Brown rat	*Rattus norvegicus*	5	6	0	11	LC (IUCN)
7	North African gerbil	*Gerbillus campestris*	1	0	2	3	LC (IUCN)
8	Black rat	*Rattus rattus*	2	2	2	6	LC (IUCN)
9	House mouse	*Mus musculus*	1	1	0	2	LC (IUCN)
10	Garden dormouse	*Eliomys quercinus*	1	2	0	3	NT: Near Threatened (IUCN)
11	Barbary wild boar	*Sus scrofa barbarous*	5	1	0	6	Not listed in IUCN
12	Least weasel	*Mustela nivalis*	2	3	1	6	LC (IUCN)
13	Red fox	*Vulpes vulpes*	1	0	1	2	LC (IUCN)
14	Egyptian mongoose	*Herpestes ichneumon*	0	2	0	2	LC (IUCN)
	Total		26	25	11	62	

Source: JICA Survey Team, 2023

Table 7.22 Contacted Number of Bat in Summer

No.	Common Name	Scientific Name	Survey Spot			Total	Remarks
			A	B	C		
1	House bats	*Eptesicus isabellinus*	2	0	0	2	LC: Least Concern
2	Long-fingered bat	*Myotis Capaccini*	7	10	0	17	VU: Vulnerable
3	Kuhl's pipistrelle	*Pipistrellus kuhli*	12	218	21	367	LC

No.	Common Name	Scientific Name	Survey Spot			Total	Remarks
			A	B	C		
			8				
4	Common pipistrelle	*Pipistrellus pipistrellus*	7	32	0	39	LC
5	Savi's Pipistrelle	*Hypsugo savii*	0	0	1	1	LC: Least Concern
	Total		144	260	22	426	

Source: JICA Survey Team, 2023

General information such as habitat and diet of the four endangered mammal species identified are as follows:

✓ Garden dormouse (*Eliomys quercinus*)[26]

Its habitats are forests, rocky areas (e.g., inland cliffs, mountain peaks) and artificial/terrestrial. Its main habitat is woodland (coniferous, deciduous, and mixed), although it is sometimes found in orchards and gardens. It ranges in Europe mainly, and it is threatened in Corsica in France by direct competition with other species. The main diets are fruits and seeds, and sometimes, the species is regarded as a pest in the orchards.

✓ Long-fingered bat (*Myotis Capaccini*)[27][28]

This species depends strictly on aquatic habitats. It forages over wetlands and waterways such as canals and reservoirs. It seems to prefer clutter-free water surfaces when foraging, probably because the echolocation of preys is facilitated above them. Their main diets are Diptera and fish. The species generally roosts in underground habitats, principally caves.

✓ Greater noctule bat (*Nyctalus lasiopterus*) [29]

This species forages over mixed and deciduous forest and wooded river valleys (the latter especially on migration). It is highly dependent on mature forest: the species needs a number of old trees to support a colony, hence any tree removal is a threat. It is largely insectivorous, feeding mostly on Lepidoptera and Coleoptera.

✓ Grey long-eared bat (*Plecotus austriacus*) [30]

Grey long-eared bats are usually linked to the countryside and villages. Maternity colonies are most often found in old houses with large attics. Favorite roosting place is on or above the ridge beam or behind rafters. Bats can be found in these roosts throughout the year, though numbers are higher in the summer. Besides buildings, the species hibernates in cellars, caves, mines and other types of underground hibernacula. It forages above meadows, uncultivated fields, unimproved meadows, marshes, in open forests and at forest edges and in more urban areas, such as orchards and parks. It avoids arable fields, conifer woods and open water. The most common prey components are Lepidoptera, followed by Diptera.

Those results mentioned above can be summarized as follows; Garden dormouse feed on fruits and seeds while Greater noctule bat and Grey long-eared bat take insects such as Lepidoptera and Diptera. The Global Projectwill expand orchard area, which will not give damage to those insects. Moreover, the Global Projectwill construct canals, which can create desirable environment for Long-fingered bat prefer water area. Therefore, it can be said that the probable negative impacts on those rare species are very

[26] Source : IUCN, https://www.iucnredlist.org/ja/species/7618/12835766#geographic-range
[27] Source: IUCN, Myotis capaccinii (Long-fingered Bat) (iucnredlist.org)
[28] Source: Aihartza, J. R.; Goiti, U.; Almenar, D.; Garin, I. (2003). "Evidence of Piscivory by Myotis capaccinii (Bonaparte, 1837) in Southern Iberian Peninsula"
[29] Source: IUCN, Nyctalus lasiopterus (Giant Noctule) (iucnredlist.org)
[30] Source: IUCN, Plecotus austriacus (Gray Big-eared Bat) (iucnredlist.org)

limited.

The target rea of the Global Project has already been developed as an agricultural land and no natural ecosystem remains anymore. The above-mentioned rare mammals depend on agricultural lands including orchards, however, orchards are widely distributed even outside of the target area of the Global Project. In other words, the target area is not an important habitat for the rare species. In addition, the orchards area will be increased by the Global Project, which will result in no damages to the rare species in the Garb Regions as a whole.

8) Results of Reptile Survey

Concerning reptile, 12 species such as turtle, lizard and snake were observed in winter season. Due to cold season, when the survey was conducted, the diversity was not rich. One of observed reptiles, *Testudo graeca* (turtle), is regarded as VU, while others are categorized as LC.

Table 7.23 Observed Reptile Species in Winter

No.	Common Name	Scientific Name	Spot a	Spot b	Spot c	Total	Remarks
1	Bibron's agama	*Agama impalearis*	1	0	2	3	LC (IUCN)
2	Algerian skink	*Eumeces algeriensis*	1	1	2	4	LC (IUCN)
3	Mediterranean house gecko	*Hemidactylus turcicus*	2	2	2	6	LC (IUCN)
4	Horseshoe whip snake	*Hemorrhoea hippocrepis*	1	1	2	4	LC (IUCN)
5	North African Ocellated Lizard	*Lacerta pater*	1	2	0	3	LC (IUCN)
6	Iberian pond turtle	*Mauremys leprosa*	0	5	5	10	LC (IUCN)
7	Viperine snake	*Natrix maura*	0	2	1	3	LC (IUCN)
8	Koelliker's glass lizard	*Ophisaurus koelllikeri*	0	1	0	1	LC (IUCN)
9	Iberian wall lizard	*Podarcis* hispanica	2	3	1	6	LC (IUCN)
10	Algerian psammodromus	*Psammodromus algirus*	3	2	5	10	LC (IUCN)
11	Common wall gecko	*Tarentola mauirtanica*	1	2	1	4	LC (IUCN)
12	Greek tortoise	*Testudo graeca*	1	0	2	3	VU (IUCN)
	Total		13	21	23	57	

Source: JICA Survey Team, 2023

Seventeen reptile species including geckos, lizards, turtles, and snakes were identified in the summer survey. Two of them, namely, Greek tortoise (*Testudo graeca*) and *Chalcides minutus*, a species of lizard, are classified as rare by the IUCN.

Table 7.24 Observed Reptile Species in Summer

No.	Common Name	Scientific Name	Spot a	Spot b	Spot c	Total	Remarks
1	Spiny-footed lizard	*Acanthodactylus erythrurus*	1	1	0	2	LC (IUCN)
2	Bibron's agama	*Agama impalearis*	2	1	2	5	LC (IUCN)
3	Common Camereon	*Chamaeleo chamaeleon*	1	0	0	1	LC (IUCN)
4	Small three-toed skink	*Chalcides minutus*	0	0	1	1	VU (IUCN)
5	Many-scaled cylindrical skink	*Chalcides polylepis*	0	1	0	1	LC (IUCN)
6	Algerian skink	*Eumeces algeriensis*	1	0	1	2	LC (IUCN)
7	Mediterranean house gecko	*Hemidactylus turcicus*	3	4	5	12	LC (IUCN)
8	Horseshoe whip snake	*Hemorrhoea hippocrepis*	2	1	2	5	LC (IUCN)
9	North African Ocellated Lizard	*Lacerta pater*	2	1	0	3	LC (IUCN)
10	Montpellier snake	*Malpolon monspessulanus*	1	1	0	2	LC (IUCN)
11	Iberian pond turtle	*Mauremys leprosa*	5	40	3	48	LC (IUCN)
12	Viperine snake	*Natrix maura*	2	2	1	5	LC (IUCN)
13	Koelliker's glass lizard	*Ophisaurus koelllikeri*	0	0	1	1	LC (IUCN)
14	Iberian wall lizard	*Podarcis hispanica*	2	0	0	2	LC (IUCN)
15	Algerian psammodromus	*Psammodromus algirus*	1	1	2	4	LC (IUCN)
16	Common wall gecko	*Tarentola mauirtanica*	5	2	2	9	LC (IUCN)
17	Greek tortoise	*Testudo graeca*	3	0	0	3	VU (IUCN)
	Total		31	55	20	106	

Source: JICA Survey Team, 2023

✓ Greek tortoise（*Testudo graeca*）[31]

The species is terrestrial and herbivorous, it is known that the species feed on various herbaceous grasses and plants across their range. It is threatened by the illegal pet trade, and habitat degradation and loss, mostly as a result of overgrazing by livestock. Scientific Information/data related to the ecology of species is very few, however, it is known as a pet, which eats various vegetables. Therefore, the Global Projectwill hardly give negative impact on the species. However, orchards and farmland, which are considered as habitat areas, will be disturbed in the construction period, and the species could be influenced during the period.

✓ Small three-toed skink（*Chalcides minutus*）

The lizard ranges in Morocco, Algeria and Spain. It is generally observed in grasslands, meadows, and agricultural margins, and also even in relatively dry areas. Its population has been decreasing due to overgrazing and expansion of agricultural land. Since the target area of the Global Project has been already developed as farmland, and the area for fodder crop will be increased, the impact of the Global Project on the species is expected to be limited. However, orchards and farmland, which are considered as habitat areas, will be disturbed in the construction period, and the species could be impacted.

9) Results of Aquatic Plants Survey

In total 96 and 73 aquatic plant species were identified in the spring and summer, respectively. Various kinds of terrestrial grasses along the river were observed. On the other hand, the diversity of aquatic plants, which are floating, or submerged in the river water, was limited. Some terrestrial shrubs such as *Juncus acutus* and *Ranunculus bulbosus*, which depend on water bodies, were observed and they could be foods of the rare birds as discussed in 7.9.4. Following table summarizes the aquatic plant survey results.

Table 7.25 Observed Aquatic Plant Species in Winter

No.	Common Name	Scientific Name	Point (1)	Point (2)	Point (3)	Point (4)	Ecology	Remarks
1	Meadow Foxtail	*Alopecurus pratensis*		✓		✓	Terrestrial grass	
2	Bishop's Weed	*Ammi majus*		✓	✓	✓	Terrestrial grass	
3	Whitebuttons	*Anacyclus clavatus*	✓		✓		Terrestrial grass	
4	Anacyclus	*Anacyclus homogamos*	✓			✓	Terrestrial grass	
5	Pimpernel	*Anagallis arvensis*				✓	Terrestrial or aquatic plant	
6	Italian Bugloss	*Anchusa italica*	✓		✓		Terrestrial grass	
7	Arum	*Arum sp.*			✓		Terrestrial grass	
8	Giant reed	*Arundo donax*		✓			Aquatic plant	
9	White asparagus	*Asparagus albus*				✓	Terrestrial shrub	
10	Grey Asparagus	*Asparagus stipularis*			✓		Terrestrial shrub	
11	Yellow Milk Vetch	*Astragalus boeticus*		✓			Terrestrial grass	
12	Milk Vetch	*Astragalus sp.*				✓	Terrestrial grass	
13	Australian Saltbush	*Atriplex semibaccata*				✓	Terrestrial shrub	Food of *Marmarmaronetta angustirostris* However, the bird was not observed.
14	beet greens	*Beta vulgaris*				✓	Terrestrial grass	
15	Bunium alpinum	*Bunium alpinum*	✓				Terrestrial grass	
16	Field Marigold	*Calendula arvensis*	✓				Terrestrial grass	
17	Campanula lusitanica	*Campanula lusitanica*			✓		Terrestrial grass	
18	Caper	*Capparis spinosa*				✓	Terrestrial shrub	

[31] Source: https://www.iucnredlist.org/ja/species/61481/86153110#habitat-ecology

No.	Common Name	Scientific Name	Point (1)	Point (2)	Point (3)	Point (4)	Ecology	Remarks
19	Milk Thistle	*Carduus marianus*	✓			✓	Terrestrial grass	
20	Slenderflower Thistle	*Carduus tenuiflorus*	✓	✓	✓	✓	Terrestrial grass	
21	Rough Starthistle	*Centaurea aspera*	✓			✓	Terrestrial grass	
22	Star Thistle	*Centaurea calcitrapa*			✓	✓	Terrestrial grass	
23	European Centaury	*Centaurium pulchellum*	✓	✓	✓	✓	Terrestrial grass	
24	Chicory	*Cichorium intybus*		✓	✓	✓	Terrestrial grass	
25	Dwarf Morning Glory	*Convolvulus tricolor*				✓	Aquatic plant	
26	Brass Buttons	*Cotula coronopifolia*	✓				Terrestrial grass	
27	Dodder	*Cuscuta sp.*			✓		Terrestrial grass	
28	Bermuda Grass	*Cynodon dactylon*	✓	✓	✓	✓	Terrestrial grass	
29	Galingale	*Cyperus longus*			✓	✓	Terrestrial or aquatic plant	
30	Wild Carrot	*Daucus carota*	✓	✓			Terrestrial grass	
31	Wall-*rocket*	*Diplotaxis catholica*	✓		✓	✓	Terrestrial grass	
32	Mexican Tea	*Dysphania ambrosioides*	✓		✓		Terrestrial grass	
33	Paterson's Curse	*Echium plantagineum*		✓		✓	Terrestrial grass	
34	Joint-Pine	*Ephedra fragilis*		✓			Terrestrial grass	
35	Blue Sea Holly	*Eryngium tricuspidatum*			✓		Terrestrial grass	
36	Eucalyptus camaldulensis	*River red gum*			✓		Tree	
37	Meadow Fescue	*Festuca elatior*		✓		✓	Terrestrial grass	
38	Fennel	*Foeniculum vulgare*				✓	Terrestrial grass	
39	Jersey Cudweed	*Gnaphalium luteo-album*			✓	✓	Terrestrial grass	
40	Ivy	*Hedera helix*				✓	Terrestrial grass	
41	Sea Barley	*Hordeum maritimum*	✓	✓	✓	✓	Terrestrial grass	
42	Sharp Rush	*Juncus acutus*		✓	✓	✓	Terrestrial grass	Food of *Aythya ferina*
43	Hard Rush	*Juncus inflexus*	✓	✓	✓	✓	Terrestrial grass	Food of *Aythya ferina*
44	Lantana	*Lantana camara*			✓		Terrestrial shrub	
45	Spanish *vetchling*	*Lathyrus clymenum*				✓	Terrestrial shrub	
46	Winged Sea Lavender	*Limonium lobatum*				✓	Terrestrial grass	
47	Turkey tangle frogfruit	*Lippia nodiflora*		✓		✓	Semi-aquatic plant	
48	Wimmera Ryegrass	*Lolium rigidum*	✓				Terrestrial grass	
49	African boxthorn	*Lycium ferocissimum*				✓	Terrestrial shrub	
50	Gipsywort	*Lycopus sp.*			✓		Terrestrial grass	
51	Swamp-*loosestrife*	*Lythrum acutangulum*	✓			✓	Terrestrial grass	
52	ommon Mallow	*Malva sylvestris*	✓				Terrestrial grass	
53	Horehound	*Marrubium echinatum*		✓	✓	✓	Terrestrial grass	
54	White Horehound	*Marrubium vulgare*			✓	✓	Terrestrial grass	
55	Pennyroyal	*Mentha pulegium*	✓	✓	✓		Terrestrial grass	
56	Apple Mint	*Mentha suaveolens*				✓	Terrestrial grass	
57	Watercress	*Nasturtium officinale*	✓				Semi-aquatic plant	

No.	Common Name	Scientific Name	Point (1)	Point (2)	Point (3)	Point (4)	Ecology	Remarks
58	Oleander	*Nerium oleander*				✓	Terrestrial shrub	
59	Tree Tobacco	*Nicotiana glauca*			✓	✓	Terrestrial shrub	
60	Common Restharrow	*Ononis repens*				✓	Terrestrial grass	
61	Prickly Pear	*Opuntia ficus-indica*	✓				Terrestrial shrub	
62	Pellitory-of-the-Wall	*Parietaria mauritanica*		✓		✓	Terrestrial grass	
63	Common Reed	*Phragmites australis*				✓	Semi-aquatic plant	
64	Blue Pimpernel	*Picnomon acarna*				✓	Terrestrial grass	
65	Smilo Grass	*Piptatherum miliaceum*			✓		Terrestrial grass	
66	Mount Atlas Mastic Tree	*Pistacia atlantica*				✓	Tree	
67	Buck's-horn Plantain	*Plantago coronopus*	✓	✓		✓	Terrestrial grass	
68	Psyllium	*Plantago ovata*				✓	Terrestrial grass	
69	Annual Beard Grass	*Polypogon monspeliensis*		✓			Terrestrial grass	
70	White Poplar	*Populus alba*		✓			Tree	
71	Bulbous Buttercup	*Ranunculus bulbosus*	✓	✓			Occasionally aquatic	Food of *Marmarmaronetta angustirostris*
72	Castor Oil Plant	*Ricinus communis*	✓		✓	✓	Terrestrial shrub	
73	Elm-leaf Blackberry	*Rubus ulmifolius*	✓	✓	✓	✓	Terrestrial shrub	Food of *Aythya ferina*
74	Clustered Dock	*Rumex conglomeratus*	✓	✓	✓	✓	Terrestrial grass	
75	Dooryard Dock	*Rumex longifolius*	✓			✓	Terrestrial grass	
76	Fiddle Dock	*Rumex pulcher*	✓	✓	✓	✓	Aquatic or semi aquatic plant	
77	Marsh Dock	*Rumex palustris*	✓			✓	Terrestrial grass	
78	Purple Willow	*Salix purpurea*	✓	✓	✓	✓	Terrestrial shrub	
79	Scirpus maritimus	*Scirpus maritimus*	✓		✓		Aquatic or semi aquatic plant	Food of *Marmarmaronetta angustirostris* and *Aythya ferina*
80	Ommon Golden Thistle	*Scolymus hispanicus*	✓	✓	✓		Terrestrial grass	
81	Prickly scorpion's-tail	*Scorpiurus muricatus*				✓	Terrestrial grass	
82	Perennial Sowthistle	*Sonchus maritimus*		✓	✓	✓	Terrestrial or aquatic plant	
83	Canary Tamarisk	*Tamarix canariensis*	✓	✓	✓	✓	Terrestrial shrub	
84	Hop Trefoil	*Trifolium campestre*				✓	Terrestrial grass	
85	Strawberry Clover	*Trifolium fragiferum*	✓	✓		✓	Terrestrial grass	
86	Red Clover	*Trifolium pratens*	✓				Terrestrial grass	
87	Broadleaf cattail	*Typha latifolia*	✓	✓		✓	Aquatic plant	
88	Stinging Nettle	*Urtica dioica*	✓				Terrestrial grass	
89	Vachellia Horrida	*Vachellia horrida*	✓		✓	✓	Tree	
90	Scallop-leaved mullein	*Verbascum sinuatum*		✓	✓		Terrestrial grass	
91	Chaste Tree	*Vitex agnus castus*		✓	✓	✓	Terrestrial shrub	
92	Withania frutescens	*Withania frutescens*				✓	Terrestrial shrub	
93	Spiny Cocklebur	*Xanthium spinosum*	✓		✓		Terrestrial grass	
94	Common Cocklebur	*Xanthium strumarium*				✓	Terrestrial grass	
95	Wild jujube	*Ziziphus lotus*			✓	✓	Terrestrial shrub	

No.	Common Name	Scientific Name	Point (1)	Point (2)	Point (3)	Point (4)	Ecology	Remarks
96	Eelgrass	*Zostera marina*				✓	Aquatic plant	Food of *Aythya ferina*

Source: JICA Survey Team, 2023

Table 7.26 Observed Aquatic Plant Species in Summer

No.	Common Name	Scientific Name	Point (1)	Point (2)	Point (3)	Point (4)	Ecology	Remarks
1	Bishop's Weed	*Ammi majus*		✓	✓	✓	Terrestrial grass	
2	Anacyclus	*Anacyclus homogamos*	✓				Terrestrial grass	
3	Giant reed	*Arundo donax*		✓			Aquatic plant	
4	White asparagus	*Asparagus albus*				✓	Terrestrial shrub	
5	Grey Asparagus	*Asparagus stipularis*			✓		Terrestrial shrub	
6	Milk Vetch	*Astragalus sp.*				✓	Terrestrial grass	
7	Australian Saltbush	*Atriplex semibaccata*				✓	Terrestrial shrub	Food of *Marmarmaronetta angustirostris*
8	beet greens	*Beta vulgaris*				✓	Terrestrial grass	
9	Bunium alpinum	*Bunium alpinum*	✓				Terrestrial grass	
10	Caper	*Capparis spinosa*				✓	Terrestrial shrub	
11	Milk Thistle	*Carduus marianus*	✓			✓	Terrestrial grass	
12	Slenderflower Thistle	*Carduus tenuiflorus*	✓	✓	✓	✓	Terrestrial grass	
13	Rough Starthistle	*Centaurea aspera*	✓			✓	Terrestrial grass	
14	Star Thistle	*Centaurea calcitrapa*			✓	✓	Terrestrial grass	
15	European Centaury	*Centaurium pulchellum*	✓	✓	✓	✓	Terrestrial grass	
16	Chicory	*Cichorium intybus*		✓	✓	✓	Terrestrial grass	
17	Brass Buttons	*Cotula coronopifolia*	✓				Terrestrial grass	
18	Dodder	*Cuscuta sp.*			✓		Terrestrial grass	
19	Bermuda Grass	*Cynodon dactylon*	✓	✓	✓	✓	Terrestrial grass	
20	Galingale	*Cyperus longus*			✓	✓	Terrestrial or aquatic plant	
21	Mexican Tea	*Dysphania ambrosioides*	✓		✓		Terrestrial grass	
22	Joint-Pine	*Ephedra fragilis*		✓			Terrestrial grass	
23	Blue Sea Holly	*Eryngium tricuspidatum*			✓		Terrestrial grass	
24	Eucalyptus camaldulensis	*River red gum*			✓		Tree	
25	Meadow Fescue	*Festuca elatior*		✓			Terrestrial grass	
26	Fennel	*Foeniculum vulgare*				✓	Terrestrial grass	
27	Jersey Cudweed	*Gnaphalium luteo-album*			✓	✓	Terrestrial grass	
28	Ivy	*Hedera helix*				✓	Terrestrial grass	
29	Sea Barley	*Hordeum maritimum*	✓				Terrestrial grass	
30	Sharp Rush	*Juncus acutus*		✓	✓	✓	Terrestrial grass	Food of *Aythya ferina*
31	Hard Rush	*Juncus inflexus*	✓	✓	✓	✓	Terrestrial grass	Food of *Aythya ferina*
32	Lantana	*Lantana camara*			✓		Terrestrial shrub	

No.	Common Name	Scientific Name	Point (1)	Point (2)	Point (3)	Point (4)	Ecology	Remarks
33	Spanish *vetchling*	*Lathyrus clymenum*				✓	Terrestrial shrub	
34	Winged Sea Lavender	*Limonium lobatum*				✓	Terrestrial grass	
35	Turkey tangle frogfruit	*Lippia nodiflora*		✓		✓	Semi-aquatic plant	
36	Wimmera Ryegrass	*Lolium rigidum*	✓				Terrestrial grass	
37	African boxthorn	*Lycium ferocissimum*				✓	Terrestrial shrub	
38	Swamp-*loosestrife*	*Lythrum acutangulum*	✓			✓	Terrestrial grass	
39	Horehound	*Marrubium echinatum*		✓	✓	✓	Terrestrial grass	
40	White Horehound	*Marrubium vulgare*			✓	✓	Terrestrial grass	
41	Pennyroyal	*Mentha pulegium*	✓	✓	✓		Terrestrial grass	
42	Apple Mint	*Mentha suaveolens*				✓	Terrestrial grass	
43	Watercress	*Nasturtium officinale*	✓				Semi-aquatic plant	
44	Oleander	*Nerium oleander*				✓	Terrestrial shrub	
45	Tree Tobacco	*Nicotiana glauca*			✓	✓	Terrestrial shrub	
46	Prickly Pear	*Opuntia ficus-indica*	✓				Terrestrial shrub	
47	Common Reed	*Phragmites australis*				✓	Semi-aquatic plant	
48	Blue Pimpernel	*Picnomon acarn a*				✓	Terrestrial grass	
49	Mount Atlas Mastic Tree	*Pistacia atlantica*				✓	Tree	
50	Buck's-horn Plantain	*Plantago coronopus*	✓	✓		✓	Terrestrial grass	
51	White Poplar	*Populus alba*		✓			Tree	
52	Bulbous Buttercup	*Ranunculus bulbosus*		✓			Occasionally aquatic	Food of *Marmarmaronett a angustirostris*
53	Castor Oil Plant	*Ricinus communis*	✓		✓	✓	Terrestrial shrub	
54	Elm-leaf Blackberry	*Rubus ulmifolius*	✓	✓	✓	✓	Terrestrial shrub	Food of *Aythya ferina*
55	Clustered Dock	*Rumex conglomeratus*	✓	✓	✓	✓	Terrestrial grass	
56	Dooryard Dock	*Rumex longifolius*				✓	Terrestrial grass	
57	Fiddle Dock	*Rumex pulcher*		✓	✓	✓	Aquatic or semi aquatic plant	
58	Marsh Dock	*Rumex palustris*	✓			✓	Terrestrial grass	
59	Purple Willow	*Salix purpurea*	✓	✓	✓	✓	Terrestrial shrub	
60	Scirpus maritimus	*Scirpus maritimus*	✓		✓		Aquatic or semi aquatic plant	Food of *Marmarmaronett a angustirostris* and *Aythya ferina*
61	Ommon Golden Thistle	*Scolymus hispanicus*	✓	✓	✓		Terrestrial grass	
62	Perennial Sowthistle	*Sonchus maritimus*		✓	✓	✓	Terrestrial or aquatic plant	

No.	Common Name	Scientific Name	Point (1)	Point (2)	Point (3)	Point (4)	Ecology	Remarks
63	Canary Tamarisk	*Tamarix canariensis*	✓	✓	✓	✓	Terrestrial shrub	
64	Strawberry Clover	*Trifolium fragiferum*	✓	✓		✓	Terrestrial grass	
65	Broadleaf cattail	*Typha latifolia*	✓	✓		✓	Aquatic plant	
66	Vachellia Horrida	*Vachellia horrida*	✓		✓	✓	Tree	
67	Scallop-leaved mullein	*Verbascum sinuatum*		✓	✓		Terrestrial grass	
68	Chaste Tree	*Vitex agnus castus*		✓	✓	✓	Terrestrial shrub	
69	Withania frutescens	*Withania frutescens*				✓	Terrestrial shrub	
70	Spiny Cocklebur	*Xanthium spinosum*	✓		✓		Terrestrial grass	
71	Common Cocklebur	*Xanthium strumarium*				✓	Terrestrial grass	
72	Wild jujube	*Ziziphus lotus*			✓	✓	Terrestrial shrub	
73	Eelgrass	*Zostera marina*				✓	Aquatic plant	Food of *Aythya ferina*

Juncus acutus at Point (2)
(Photo by JICA Survey Team)

Ranunculus bulbosus at Point (2)
(Photo by JICA Survey Team)

Scirpus maritimus at Point (3)
(Photo by JICA Survey Team)

Juncus inflexus at Point (3)
(Photo by JICA Survey Team)

✓ As for *Marmaronetta angustirostris,* (one of endangered bird species), Fuentes et al. 2004 demonstrated that this bird feeds on *Atriplex spp, Ranunculus spp., Scirpus maritimus, Phragmites australis, Scirpus litoralis, Ruppia sp*.and so on[32]. Also, Green & Selva (2000)[33] suggest that the

[32] Source: Cristina Fuentes, Marta I. Sanchez, Nuria Selva, Andy J. Green, The diet of the Marbled Teal Marmaronetta angustirostris in southern Alicante, eastern Spain. Revue d'Ecologie, Terre et Vie, 2004, 59 (3)

[33] Source: Green, A.J. & Selva, N. 2000, The diet of post-breeding Marbled Teal Marmaronetta angustirostris and Mallard Anas *platyrhynchos* in the Göksu Delta, Turkey. Rev. Ecol Turkey. Rev. Ecol. (Terre et Vie), 55: 161- 169.

teal is heavily dependent on small seeds, especially *Ruppia spp* and *Scirpus spp.*

- ✓ Regarding *Oxyura leucocephala*, Avage (1965)[34] analyzed the stomach of a wintering duck in Pakistan and found mainly seeds of *Ruppia maritima* and *Melilotus indicus*. Also, Amat, J.A. et al. (1985)[35] found seeds of *Potamogeton pectinatus*, *Najar marina*, *Schoenoplestus*, and other unidentified seeds.
- ✓ *Aythya ferina,* which feeding in coastal areas including brackish water situations, is likely to feed on fruits and vegetative parts of *Polygonum spp*, *Juncus spp*, *Rubus spp*, *Scirpus spp,* and *Ranunculus spp* and *Zostera spp*.[36]

Juncus spp, Ranunculus spp, which can be diets for the three rare bird species, were identified. However, according to a researcher professor of the Hassan II Agronomic and Veterinary Institute in Morocco, those three birds don't have much interest in the Sebou River nor Ouergha River, rather, they mainly depend on Merja Sidi Boughaba Ramsar site.

It is noted that those three bird species were observed at only Spot 1, which is located on the Merja Sidi Boughaba, almost coastal area. So far, seemingly, there is a low possibility that they fly to the inland water, namely, upstream of the Sebou River to get their food. Moreover, discharges of Sebou River and Ouergha River will not be drastically decreased by the Global Project, which means that negative impacts on the aquatic plants are rarely expected. Therefore, the possibility that the Global Project causes impacts on the rare bird species is judged to be very low.

10) Aquatic Insects

In total 27 and 10 aquatic insects were identified in the spring season survey and summer survey. Most of them do not have English common names, they are classified into different species, though. Mainly identified species are mayfly, water striders, diving beetles, midge and so on. In both surveys, the most frequently observed species was *Caenis luctuosa*. The survey results are shown in the following table.

Table 7.27 Observed Aquatic Insects in Spring

No.	Common Name	Scientific Name	Point (1)	Point (2)	Point (3)	Point (4)	Total
1	Mayfly /shadfly	*Baetis rhodani*	0	0	11	10	21
2	Mayfly /shadfly	*Baetis pavidus*	0	0	0	4	4
3	Small minnow mayfly	*Acentrella almahades*	0	0	0	3	3
4	Small minnow mayfly	*Procleon sp.*	0	0	4	0	4
5	Mayfly	*Cloeon* sp.	0	0	1	0	1
6	Small square gilled mayfly	*Caenis luctuosa*	0	0	27	65	92
7	Spiny crawler mayflies	*Ephemerella* sp.	0	0	0	5	5
8	Mayfly	*Choroterpès atlas*	0	0	0	13	13
9	Mayfly	*Leptophlebia* sp.	0	0	1	0	1
10	Diving beetle	*Agabus didymus*	0	0	0	3	3
11	Water beetle	*Hydroporus lucasi*	0	0	2	0	2
12	Diving beetle	*Laccophilus hyalinus*	2	0	0	0	2
13	Water beetle	*Hydroporus* sp.	0	0	1	1	2
14	Dragonfly	*Onychogomphus costae*	0	0	3	0	3
15	Emerald Damselfly	*Lestes* sp.	0	0	1	0	1
16	Midge (non-biting)	*Orthocladius* sp.	9	0	13	7	29
17	Midge (non-biting)	*Cricotopus* sp.	4	0	2	0	6
18	Midge (biting)	*Serromyia* sp.	0	0	1	2	3
19	Shore flies brine fly	Ephydridae	1	0	0	0	1
20	None	*Dixa* sp.	2	0	0	0	2
21	Empididae	*Empis* sp.	0	0	1	0	1
22	Crane fly	*Antocha* sp.	0	0	1	0	1
23	Crane fly	*Hexatoma* sp.	0	1	0	0	1
24	Water scorpion (Nepidae)	*Nepa cinerea*	0	3	0	0	3

[34] Source: Savage, C. D. W., 1965, Whiteheaded Ducks in Pakistan. Wildfowl Trust Ann. Rep. 16: 121-126.
[35] Source: Amat, J.A. & Sanchez, A., 1982, Biología y ecología de la Malvasía Oxyura leucocephala en Andalucía.
[36] Source: Olney (1968). The food and feeding habits of the Pochard, Aythya ferina.1(1)

No.	Common Name	Scientific Name	Point (1)	Point (2)	Point (3)	Point (4)	Total
25	Water strider	*Aquarius cinereus*	0	5	0	0	5
26	Water strider	*Gerris* sp.	0		1	0	1
27	Creeping water bug and saucer bug	*Naucoris maculatus*	0	1	2	0	3
	Total		18	10	72	113	213

Source: JICA Survey Team, 2023

Table 7.28 Observed Aquatic Insects in Summer

No.	Common Name	Scientific Name	Point 1	Point 2	Point 3	Point 4	Total
1	Mayfly /shadfly	*Baetis rhodani*	0	0	7	4	11
2	Mayfly /shadfly	*Baetis pavidus*	0	0	0	1	1
3	Small square gilled mayfly	*Caenis luctuosa*	0	0	3	13	16
4	Mayfly	*Choroterpès atlas*	0	0	0	6	6
5	Agabus	*Agabus sp.*	0	0	0	1	1
6	Water beetle	*Hydroporus lucasi*	0	0	0	2	2
7	Dragonfly	*Onychogomphus costae*	0	0	1	0	1
8	Midge (non-biting)	*Orthocladius* sp.	3	0	5	1	9
9	Midge (non-biting)	*Cricotopus* sp.	1	0	1	0	2
10	Water strider	*Aquarius cinereus*	0	2	0	0	2
	Total		4	0	17	28	49

Source：JICA Survey Team, 2023

Main identified insects are Mayfly and beetles, and their photos are as follows:

Acentrella almahades *Leptophlebia* sp. *Laccophilus hyalinus*

Photos of Identified Aquatic Insects Species (May 2023, JICA Survey Team)

As mentioned before, *Oxyura leucocephala* feed on midge, which were identified in the survey. However, discharges of Sebou River and Ouergha River will not be drastically decreased by the Global Project, and the Global Project will rarely cause any negative impacts on those species. Moreover, the rare bird species were observed in the coastal area only, which means that those birds do not come to inland area of the rivers to feed on aquatic insects. Therefore, impacts on the rare bird species by the Global Project are not anticipated.

11) Crustacea

As for crustacea, 2 species, namely, shrimp and cray fish were identified at Point (2) and Point (4) in both spring and summer. The number of shrimps is big, while that of cray fish is limited. They could be foods for the 3 endangered bird species (*Marmaronetta angustirostris, Oxyura leucocephala and Aythya ferina)*. However, the river discharge will not be changed significantly, since water for the Global Project will be released from the Al Wahda Dam. Furthermore, the rare bird species were observed in the coastal area only, which means that those birds rarely come to inland area of the rivers to feed on crustacea. Therefore, the Global Project will not cause negative impacts on the crustacea, which results in no damage to the rare bird species.

Table 7.29 Observed Crustacea in Spring

Common Name	Scientific Name	Point (2)	Point (4)	Total
Shrimp, Desmarest caridin	*Atyaephyra desmaresti*	233	15	248
European crayfish	*Astacus astacus*	8	0	8
Total		241	15	256

Source: JICA Survey Team, 2023

Table 7.30 Observed Crustacea in Summer

Common Name	Scientific Name	Point 2	Point 4	Total
Shrimp, Desmarest caridin	*Atyaephyra desmaresti*	260	5	265
European crayfish	*Astacus astacus*	3	1	4
Total		263	6	269

Source: JICA Survey Team, 2023

Photos of Identified Crustacea Species (May 2023, JICA Survey Team)

12) Natural Vegetation

For the construction works, an area of 0.4 ha of natural vegetation, namely, riparian forest at the proposed siphon construction site along the Sebou River will be cleared. The area is under the management of ABHS. Due to such a narrow area to be cleared, expected impacts on the surrounding ecosystem, including wildlife, probably will be negligible. It is noted that there is no natural vegetation area to be cleared for the Global Project except for the riparian forest located on the proposed siphon site.

According to "Dahir n°1-16-113 2016 promulgation Law No. 36-15 regarding Water", it is needed to replant trees if some trees are cut down within the area managed by the Agency for Water and Forest. On the other hand, there is no mention to replantation of trees, if trees are cut down in the area managed by ABH in the Dahir. Moreover, the river cross-section area will be decreased if trees are planted inside of the river section, which can result in risk of flood. Also, there is no space for replantation of trees around the siphon site, since the area is used for agricultural purposes. Thus, it is judged that replanting to compensate trees cut down by the Global Project is not necessary.

Prior to the construction works, an agreement between the project proponent, namely, ORMVAG and ABHS in this case is to be exchanged. Since the siphon will cross over the Sebou River, ORMVAG need to submit a construction authorization request to ABHS with a user manual and execution schedule, i.e., implementation design documents. ABHS will subsequently oversee the monitoring and acceptance of the structure with ORMVAG.

7.10 Social Conditions

Due to the Global Project, land acquisition and involuntary resettlement will take place. Regarding ethnic minority people, the local authorities do not have such information. Therefore, one of the Survey Team members asked the matter to local leaders and confirmed there are almost all the people in and around the target area of the Global Project are Arabic except for one person, who has France nationality

and land ownership, and is staying in France at this moment. Thus, it can be said that there are no ethnic minority people.

Concerning religious minorities, it is confirmed that four Jewish persons have land ownership in Khnichet Commune, Sidi Kacem Province and they stay in Israel at this moment. Given that they are landowners and also have other residential areas in foreign counties, they cannot be regarded as vulnerable people, who need special consideration, they are minorities in terms of ethnicity and religion, though. Further, all citizens are regarded equally, and if such minority people are affected by any projects, e.g., land acquisition, they can access necessary compensation as well as other affected persons. Thus, the case of French and Jewish landowners will not be an issue. Moreover, there are no other social issues.

7.11 Water Use and Conflicts

1) Water Use as Irrigation Water

According to the result of the examination of water resource potential, it is possible to secure 92% of planned irrigation water volume, considering necessary discharge downstream, if 24m^3/s, namely, 0.2 billion m^3/year of water is taken from the Al Wahda Dam. In Morocco, if it is possible to secure 80% of planned irrigation water, it can be judged that such irrigation projects will be implemented. It means that the percentage, 92%, is sufficiently high to implement the Global Project.

While the Global Project will use a certain amount of stored water at the Al Wahda Dam, it is possible to provide water for irrigation in other farmlands and drinking water in urban areas. Therefore, even if water is taken at the Koudiat El Borna Barrage for the Global Project, water discharge of the Sebou River will not be decreased.

Still, in the drought year, when the Al Wahda Dam cannot store sufficient water, supplied irrigation water for the target area of the Global Project and other irrigated areas will be decreased. In such a case, the available water for them will be decreased at the same rate. Specific release amount from the Dam will be determined based on the discussion by the dam management committee, which consists of staff of ABH (River Basin Agency: Agence de Bassins Hydrauliques), ORMVAG, ONEE (National Office of Electricity and Drinking Water: Office national de l'Électricité et de l'Eau potable) and MOA.

2) Recreational Use of Water such as Fishing

Fishery is actively implemented downstream of the Garde de Sebou Barrage. Since E.L. of the riverbed downstream of the barrage is below sea level, seawater constantly flows into the river, and the downstream area will not be dried up. It means that the area will not be affected by the water intake in the Global Project, which will result in no damage to recreation or fishery downstream of the barrage.

Thus, targeting only the upstream area of the barrage, a survey to identify recreational use of river water such as fishing and boat use, was implemented. The numbers of survey points are 27 and 3 along the Sebou River and the Ouergha River, respectively, namely, 30 points in total. At each survey point, an interview with one resident was done.

According to the survey result, seven out of the 30 respondents answered that "I do some fishing by myself". 6 out of the seven respondents said that "The purpose of fishing is a hobby", while the remaining one answered that "The purposes of fishing are for house consumption and hobby". On the other hand, 13 out of the 30 respondents said that they themselves don't do fishing but have seen that other residents were fishing. Some of them have observed several residents doing it in the same area. Concerning the purpose of fishing based on observation, most of the 13 respondents said that fishing is a hobby and for house consumption, while only one respondent has seen a small-scale fish sale after fishing.

In other words, it can be assumed that a certain number of residents upstream of the Garde de Sebou Barrage enjoy fishing as their hobby, but in rare cases, fishing is a supplement livelihood. This result is shown in the following table.

The species of fish caught were generally the same as those identified in "3) Fish Survey Results" mentioned above, namely, carp, mullet, tilapia, European eel, and barbel, a species endemic to Morocco. Regarding peak season for fishing, no consistent trend was identified, as some respondents do some fishing around March, when river flow is high, while others do it in summer, when the water level is low.

Table 7.31 Interview Result about Fishing in the Sebou River and Ouergha River

Current Status of Fishing	No of Respondents	Purpose and Number of Fishermen	Fish Species
I myself do some fishing	7	Hobby: 6 Hobby and house consumption: 1	1. Maghreb barb (*Luciobarbus magrebensis*) 2. Blackspot seabream (*Pagellus bogaraveo*) 3. Common Carp (*Cyprinus carpio*) 4. Europe:an eal (*Anguilla Anguilla*) 5. Flatheagre mullet (*Mugil cephalus*) 6. Nile tilapia (*Oreochromis nilaticus*) 7. Pumpkin seed (*Lepomis jubbosus*) 8. White Seabream (*Diplodus sargus*) 9. Ray (*Raja spp*)
I don't do some fishing, while I have seen other residents do some fishing.	13	Hobby: 29 House consumption: 2 Hobby + house consumption: 22 Small-scale business: 1 （It was observed that 54 residents in total do some fishing at 13 points.	1. Maghreb barb (*Luciobarbus magrebensis*) 2. Blackspot seabream (*Pagellus bogaraveo*) 3. Cyprinus carpio (*Common carp*) 4. Europe:an eal (*Anguilla Anguilla*) 5. Flatheagre mullet (*Mugil cephalus*) 6. Nile tilapia (*Oreochromis nilaticus*) 7. Pumpkin seed (*Lepomis jubbosus*) 8. Silver carp (*Hypophthlmichthys molitrix*)
I don't do some fishing and I have never seen other do some fishing.	10		
Total	30		

Source: JICA Survey Team, 2023

Four of the 30 respondents have seen boat users in the neighborhood, one out of them is for fishing while three is for going across the river, and there is no observation of boat use for recreational purposes. The crossing over the river was charged at 1 Moroccan dirham per person for one-way, and the number of passengers is about 10 persons per day.

Considering the information gained, apart from irrigation, some people do some fishing or use boats in the Sebou River and the Ouergha River for their house consumption or to supplement their livelihoods. However, as already mentioned, irrigation for the target area of the Global Project will not reduce the flow of the Sebou River and the Ouergha River, thus, impacts on these boat owners and fishing residents are expected to be negligible.

7.12 Pesticides

The Global Project will decrease the wheat cultivation area in the target area of the Global Project, however, the total amount of production will not be changed, since yield per unit area will be increased due to irrigation development. On the other hand, areas for cultivation of fodder crops, vegetables, and fruit trees will be increased. According to the farm household economic survey (the JICA Survey Team,

2023), beneficial farmers in the target area of the Global Project have already used pesticides. In general, the amounts of pesticide application for vegetables and fruit trees are higher than those for cereals, thus, the Global Project probably could increase the amount of pesticide application as a whole.

The Office National de Sécurité Sanitaire des produits Alimentaires: ONSSA, an independent agency, is responsible for the registration, approval, and safety review of pesticides in Morocco. The ONSSA also sets the application amounts of pesticides for crops in Morocco, and the application amounts are presented on the pesticide packages for sale. ONSSA's website provides search system for users to identify necessary pesticide and its amount to be applied for each crop, including precautions for application. In addition, ONSSA collects information on pesticides in other countries, and if a pesticide is judged as harmful to the environment or human health, use of such a pesticide could be banned, even if it had previously been permitted. Residual pesticides in crops for both exported and imported are also monitored by ONSSA.

In addition to ONSSA, there is another independent agency, the Office National du Conseil Agricole: ONCA, which provides technical advices to farmers. In the Rabat-salé-Kenitra region, where the target area of the Global Project is located, there are 10 Centre de Conseil Agricole.

Based on the above mentioned, it is thought that the amount of pesticide application will be increased in the target area of The Global Project as a whole, however, a certain level of pesticide management system including utilization has been established in Morocco, and there is an institution, which provides technical advice to farmers. Therefore, it can be judged that pesticides will be applied properly after The Global Project completion. On the other hand, there are no standards for soil pollution such as limitation of heavy metal concentration in soil in Morocco.

However, there is a possibility that any accidents during pesticides application can be caused due to undesirable conditions, e.g., application with insufficient equipment, application under the strong wind or adverse wind, carelessness of farmers and so on. Therefore, it is necessary to provide techinical support related to pesticide application to the beneficiaries in the operation stage.

7.13 Accidents

Due to the construction works, increase of transportation in and around the construction sites is expected, also, some construction vehicles will be operated during the construction period. Existing roads will be used for the construction works, further, construction roads to link the existing roads and the construction sites will be established. Due to the construction vehicles, traffic will be busy, and it is necessary to pay attention to traffic safety and accident prevention based on the regulations in Morocco. Moreover, the Global Project will construct sedimentation ponds and regulation ponds. During the operation period, there is a possibility that surrounding people could gain entrance to those ponds. In such a case, some accident falls could be caused. Therefore, construction of fences around the ponds for accident prevention is strongly recommended.

As mentioned above, some accidents resulting from pesticide application could be happened, and it is needed to implement monitoring for proper application.

7.14 Climate Change

1) Estimation of Greenhouse Gas Emission due to Drip Irrigation System Installation

a) Current Greenhouse Gas Emissions

The target area of the Global Project extends over approximately 28,000 ha in total, consisting of existing irrigation area of around 8,600 ha and new irrigation area of around 19,400 ha. In the former area, such irrigation as drip, sprinkler or otherwise gravity has already been conducted, and the first two

irrigations are pump-driven with diesel or gas. In the new irrigation area, where irrigation facilities are not yet installed, some farmers utilize groundwater for their irrigation by pumping up from wells. It means that greenhouse gases (GHGs) are exhausted by using diesel/gas for pumping up the water at this moment already.

The Global Project will promote drip irrigation with high pressure from the distribution pumping stations to the whole area, around 28,000 ha. Power for the operation will be supplied from a power plant in Kenitra, which will result in GHG emission for the power generation. At this moment, about 1/3 only of the target area of the Global Project is irrigated, and the Global Project will provide irrigation water to the entire area. It means that the amount of GHG emission will be increased by the Global Project, However, the Global Project will promote drip irrigation, which is efficient irrigation method, due to its less water loss compared to other irrigation methods such as sprinkler and gravity irrigation.

This sub-chapter examines the changes in GHG emission by the Global Project through comparing three cases, namely, 1) current GHG emission, 2) GHG emission in the operation period (after installment of drip irrigation), and 3) GHG emission in the operation period in case of sprinkler irrigation. The carbon dioxide emissions can be estimated using either (A) or (B) of formulas described below. Formula (A) is applied when data of fuel consumption is available, while Formula (B) applied when data of electricity consumption is available.

(A) Carbon dioxide emissions (tCO_2) = Fuel consumption x Net calorific value x Carbon dioxide emission factor x 44 / 12
(B) Carbon dioxide emissions (tCO_2) = Electricity consumption x Carbon dioxide emission factor[37]

Parts of the target area of the Global Project have been already irrigated, and as summarized in the following table below, out of the existing irrigation area, 3,010 ha (172 ha + 2,838 ha) is irrigated by sprinkler or drip by means of pumping up water either from existing Beht Main Canal or from underground. On the other hand, for newly irrigated area, a total area of 6,410 ha is currently irrigated, as shown in Table 7.33.

Table 7.32 Area and Share by Irrigation Methods in the Existing Irrigation Area

Irrigation type	Area (ha)	Share (%)	Remarks
Gravity	5,590	65	
Sprinkler	172	2	
Drip.	2,838	33	Mostly found in S14, Boumaiz area
Total	8,600	100	

Source: JICA Survey Team (2023) based on FS report (June 2016), "Farm Household Survey in Beht Est Zone"

Table 7.33 Area and Share by Irrigation Methods in the New Irrigation Area

Zone	Area (ha)	Irrigated Area (ha)	Irrigated Area (%)	Gravity Irrigation Area (%)	Sprinkler Irrigation Area (%)	Drip Irrigation Area (%)
Beht Ext.	1,841	1,040	61	74	4	22
Zirara	3,107	2,232	66	-	-	-
Zrar	9,472	2,956	32	37	17	46
Zrar Ext.	4,931	182	4	-	-	-
Total	19,351	6,410	34	-	-	-

Source: JICA Survey Team (2023) based on FS report, "Zirara, Zrar Ext. Zone" (May 2020) and FS Report "Zrar, Beht Ext. Zone" (November 2018)

The total irrigation area by means of pumps, which depend on gas/diesel, comes to 9,420 ha (3,010 ha + 6,410 ha) at this moment before the Global Project. Under such a condition, amount of fuel used for irrigation and carbon dioxide emissions are calculated using the formula (A) mentioned above [carbon dioxide emissions (tCO_2) = fuel consumption x net calorific value x carbon dioxide emission factor x

[37] Source: Ministry of the Environment, Japan, Greenhouse Gas Emissions Calculation and Reporting Manual (Ver. 4.9) (2003) for both formulas

44 / 12] as follows:

- ✓ Fuel consumption (ℓ): 699 (ℓ/ha)[38] × 9,420 ha = 6,584,580 (ℓ)
  Fuel consumption (t): 6,584,580 (ℓ) × 0.83 (density of diesel[39]) = 5,465,201 kg = 5,465 t
  - ✓ Net calorific value: 43.0 (TJ/Gg) (The value for "Gas/Diesel Oil" in "Table 1: Net calorific value of fuels" in JICA Climate-FIT Mitigation, 2023 is applied.)
  - ✓ Emission factor: 74,100 (kg/TJ) (Applied the value of "Gas/Diesel Oil" in JICA Climate-FIT Mitigation, 2023 "Table 2 CO_2 Emission Factors of Fuels", 20.2 kg/Gg (carbon content of diesel) x 44/12) (carbon content of diesel) x 44 / 12)

Carbon dioxide emissions (t) = 5,465 (t) x 43 (TJ/Gg) x 74,100 (kg/TJ) = 17,413 (t)

b) GHG Emissions in the Operation Period (with Drip Irrigation System)

Since the amount of power for the Global Project can be calculated, the formula (B) mentioned above, namely, [Carbon dioxide emissions (tCO_2) = Amount of electricity used x carbon dioxide emission factor] should be used as:

- ✓ Annual electricity consumption: 101,424 (MWh)
- ✓ Carbon dioxide emission factor: 0.547 (value of Morocco in "Table 3 Grid Emission Factor" in JICA Climate-FIT Mitigation, 2023, Appendix)

Carbon dioxide emissions (tCO_2) = 101,424 (MWh) x 0.547 (tCO_2/MWh) = 55,479 (tCO_2).

c) GHG Emissions in the Operation Period (with Sprinkler Irrigation System)

According to the Training Manual No. 4 (FAO, 1989)[40], irrigation application efficiencies of basin/surface, sprinkler, and drip irrigation are 0.60, 0.75, and 0.90, respectively. It means that sprinkler irrigation requires 1.2 (=0.90/0.75) times more irrigation water compared to that of drip irrigation. Therefore, the carbon dioxide emissions from sprinkler irrigation can be calculated as follows:

Carbon dioxide emissions (tCO2) = 55,479 (tCO_2) x 0.90 / 0.75 = 66,575 (tCO_2)

The estimated GHG (carbon dioxide) emissions of respective cases, namely, 1) Present condition, 2) Operation period with drip irrigation, and 3) Operation period with sprinkler irrigation are summarized in the following table:

Table 7.34 Comparison of Annual GHG (Carbon Dioxide) Emissions by The Global Project

Item	Present Status (without The Global Project)	Operation Perido of The Global Project with Drip Irrigation System	Operation Period of The Global Project with Sprinkler Irrigation System*
Estimated Carbon Dioxide Emission	17,413(tCO_2)	55,479(tCO_2)	66,575(tCO_2)
Irrigation Area	9,420 ha	Approx. 28,000 ha	Approx. 28,000 ha
Calculation Formula	Fuel consumption x net calorific value x carbon dioxide emission factor x 44/12	Electricity consumption x carbon dioxide emission coefficient	Electricity consumption x carbon dioxide emission factor x 0.90 / 0.75
Parameter Applied for Estimation	Irrigation cost 1.9 MAD/m^3 Irrigation water depth: 0.5m Density of fuel: 0.83 kg/ℓ Fuel cost: 13.6 MAD/ℓ	Annual electricity consumption 101,424 MWh Carbon dioxide emission factor: 0.547	Annual electricity consumption 101,424 MWh Carbon dioxide emission factor: 0.547

[38] The average drip irrigation cost per meter^3 is 1.9 MAD/m^3, which is considered as fuel cost. 0.5 m water depth is the irrigation volume (water depth) and fuel cost is about 13.6 MAD/ℓ (unit price of diesel in Morocco in October 2023, https:// oilpricez.com/ma/morocco-diesel-price,), and 1.9 MAD/m^3 x.5m /13.6MAD/ℓ=699ℓ/ha

[39] Density of diesel is 0.80-0.85 generally, hereinafter, 0.83 kg/ℓ is applied.

[40] Source: C. Brouwer et.al; Irrigation Water Management: Irrigation Scheduling (Training manual no. 4): FAO; 1989 (http://www.fao.org/3/t7202e/t7202e08.htm#annex i: irrigation efficiencies)

Item	Present Status (without The Global Project)	Operation Perido of The Global Project with Drip Irrigation System	Operation Period of The Global Project with Sprinkler Irrigation System*
	Irrigated area: 9,420 ha Net calorific value: 43.0 TJ/Gg Emission factor: 74,100 kg/TJ		Irrigation application efficiency for drip irrigation: 0.90 Irrigation application efficiency of sprinkler irrigation: 0.75

*Fuel for sprinkler irrigation is diesel.
Source: JICA Survey Team (2023)

Estimated carbon dioxide emissions without/with the Global Project are 17,413 tons/year and 55,479 tons/year (with drip irrigation), respectively, which means GHG emission will be increased by 38,066 tons/year by the Global Project. It is because that irrigation area will be increased to around three times of the current one. On the other hand, comparing to the sprinkler irrigation system, drip irrigation system can decrease carbon dioxide emission by 11,096 tons annually, since the latter is more efficient in terms of water use.

Considering the estimated GHG emission mentioned above, the Global Project cannot be a "mitigation measure" against climate change. Rather, as the Global Project will introduce water-saving irrigation, it can be an "adaptation measure" against impacts from the climate change such as rainfall reduction and unstable rainfall pattern. It is noted that GHG emission from the agricultural sector in Morocco (CO_2 equivalent) was estimated to be 21 million tons[41] in 2012, and the Global Project will generate only 0.26% of the amount. Accordingly, it can be said that the impact of the Global Project on climate change in Morocco is extremely limited.

2) Estimation of GHG Emission due to the Increase of Livestock

As mentioned in "Climate Change" in Table 6.3 in Chapter 6, the Global Project proposes an increase of livestock. The numbers of cattle and sheep are 13,009 and 23,606, respectively, (36,615 heads in total) at this moment in the target area of the Global Project. After the Global Project, the numbers of cattle and sheep will be increased to 21,613 and 39,220, respectively (60,833 heads in total). It means that the numbers of cattle and sheep will be increased by 8,604 head and 15,614 head, respectively compared to the current situation. However, considering that the numbers of cattle and sheep in Morocco in 2021 are approximately 3.18 million and 22.73 million, respectively, the increase will be less than 1% of the total numbers. Therefore, it is unlikely that the Global Project will lead to an increase in greenhouse gas emissions.

Using the emission factors for greenhouse gases by livestock specified in Japan, the greenhouse gases can be calculated as follows:

Table 7.35 Estimated GHG (CO_2) by Increase in Number of Cattle and Sheep

	Methane Emission Factor ($kgCH_4$/head/year) * (1)	N_2O Emission Factor (kgN_2O/ head/year) * (2)	Increase in Number (3)	Global Warming Potential of Methane (4)	Global Warming Potential of N_2O (5)	CO_2 Emission (ton CO_2/year) (6) = ((1)*(3)*(4)+ (2)*(3)*(5))/1000
Cattle	106	1.79	8,604	25	298	27,390
Sheep	4.38		15,614	25		1,710
Total						29,100

*Source: Ministry of Environment, Japan, 2017, "Guidelines on Estimation of Greenhouse Gas Emissions I Warming Gass Version 1". Noted that emission of N_2O by sheep rearing is not expected.

As calculated in the table mentioned above, the increase in greenhouse gas emissions in CO_2 is 29,100 tons per year. Moreover, it is estimated that 38,066 ton of GHG emission will be increased per year due to installation of pump stations for drip irrigation system as mentioned before, and total amount of

[41] Source: Morocco Climate-Smart Agriculture Investment Plan, Morocco Climate-Smart Agriculture Investment Plan, the World Bank and FAO, 2018

increase in greenhouse emission by The Global Project is estimated to around 67,000 tons per year. However, considering that the greenhouse gas emissions in CO_2 from the agricultural sector in Morocco were 21 million tons in 2012, the impact of The Global Project on global warming is extremely limited.

8. ENVIRONMENTAL EXAMINATION

Based on the results of the winter season discussed in the previous sub-chapter, stage-wise expected impacts by the Global Project are summarized in the following tables. Table 8.1 discusses expected environmental issues caused by the construction of the First Main Canal (Tête Morte Main Canal) and ancillary facilities, while Table 8.2 describes those for the Second Main Canal (Hricha Main Canal), the Branch Canal (Hricha Branch Canal), ancillary facilities and the beneficiary areas.

Table 8.1 Environmental Examination for the First Main Canal (Tête Morte Main Canal) and Ancillary Facilities

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Reasons for Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
Pollution	Air pollution	✓	-	B-	D	**During construction**: There is a possibility that construction works can cause dust, SO_2 and NO_2. Since the baseline values are beyond the standard, it is needed to pay careful attention not to cause additional pollution. **Operation period**: No air pollution is expected.
	Water quality	✓	-	B-	D	**During construction**: Due to the construction works, turbid water is generated around the construction sites. **Operation period**: No water pollution is expected.
	Waste	✓	-	B-	D	**During construction**: Waste such as excavated soil and used construction materials, e.g., woods, are generated from the construction sites of the First Main Canal (Tête Morte Main Canal). It is needed to prepare soil disposal sites for residual soil resulting from the construction works. As for the construction workers, generally, they will be hired from neighboring communities, and a large population inflow is not expected, which will not cause severe problems, including an increase in waste. However, setting simple toilets with the treatment system and treatment of the excrement are needed. **Operation period**: Waste generation is not expected.
	Soil pollution	✓	-	D	D	**During construction**: Oil leakage from construction equipment and vehicles is expected, but probable extent and range of the soil pollution is very limited. **Operation period**: Soil pollution is not expected.
	Noise and Vibration	✓	-	B-	D	**During construction**: Noise and vibration will be generated due to the operation of construction equipment and vehicles. There are no sensitive receptors such as hospitals and schools. **Operation period**: Any activity that causes noise and vibration is not expected.
	Land subsidence	-	-	D	D	**During construction/Operation period**: No construction or operation causing land subsidence, such as pumping of groundwater, is planned.
	Bottom sediment	✓	-	B-	D	**During construction**: The construction works will be done in the dry season, which has low river discharge. Half of the stream will be temporarily closed for the

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Reasons for Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
						excavation works to bury pipelines. The pipelines are buried with concrete protection, and the same materials as the river bottom will be used for filling back. Thus, severe impacts on bottom sediment are not expected. **Operation period**: No activities generating damage to bottom sediment are planned.
	Odor	-	-	D	D	**During construction/Operation period**: No activities generating odors are planned.
Natural environment	Protected area	-	-	D	D	**During construction/Operation period**: As mentioned in Chapter 1.5, impacts on IBA and Ramsar sites are not expected, since their water resources are rain and groundwater, not the Sebou River.
	Biodiversity	✓	−	B-	D	**During construction**: As for terrestrial wildlife, four mammals and two reptiles are identified as endangered according to IUCN, as mentioned in Chapter 1.6. Expected disturbed areas by the construction works are used as farmlands including orchards along the main canal. Birds, reptiles and mammals have adapted the existing farmlands and can move to other farmlands outside the construction sites. Considering their habitats (orchards, farmlands, houses, caves, forests and so on) and diets, the species will not be damaged by the Global Project. However, there is a possibility that reptiles could be trampled by the construction vehicles. **Operation period**: The irrigation water required for the Global Project will be released from the Al Wahda Dam upstream. It means that the existing irrigation area downstream of the Koudiat El Borna Barrage, which is the intake point, will receive water as before in average years. In other words, changes in river discharge, which can affect the wildlife in the Sebou River, will not be caused. Also, the Koudiat El Borna Barrage will be equipped with a fish ladder. In drought years, irrigation water to be supplied will be reduced by the same rate for each irrigation area. It means that even in drought years, a certain amount of water will be provided to the existing irrigated areas downstream of the Koudiat El Borna Barrage. In addition, the river maintenance flow, namely, 2.0 m^3/s, will be released from the Al Wahda dam even during drought years to conserve the ecosystem. The Garde de Sebou Barrage is approximately 50 km upstream from the mouth of the Sebou River to prevent salt intrusion. The Barrage is generally closed except during floods, so the river water level and discharge downstream of the Barrage are influenced by tidal change only. Therefore, the Global Project will not cause any ecological impacts in the downstream watershed of the Garde de Sebou Barrage.

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Reasons for Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
						Considering the above, there will be no impact of the Global Project on fish, amphibians, and other aquatic animals in the Sebou River. Regarding the three rare bird species, *which* have been identified along the Sebou River according to existing information, namely, *Oxyura leucocephala*, *Marmaronetta angustirostris*, and *Aythya ferina,* all of them were observed only at Sidi Boughaba (Ramsar site) at the ecological survey. Thus, the possibility that those birds come to the inland part of the Sebor River is not high, even though there are various diets for them, e.g., seeds of grasses, aquatic insects and crustacea in the Sebou River. Furthermore, according to an expert in Morocco, the three bird species mainly stay in swamps and dams, and they do not have much interest in the Sebou River[18]. Other three rare birds, namely, *Sylvia undata*, *Lanius senator*, *Streptopelia turtu*、and *Caprimulgus ruficollisc* were additionally observed by the ecological survey as mentioned, they are not listed in the existing data (see Table 3.5). They are terrestrial and their diets are berries and arthropods. Existing terrestrial arthropods are not influenced by the Global Project, and the damage to the bird could be very limited. As for rare mammals (three vats and one mouse) and two reptiles, their preferable habitats, namely, forests, orchards, canals, and grasslands, will not be decreased. Also, those terrestrial animals feed mainly on insects, seeds, plants, and fruits, which will also not be affected by the Global Project. Therefore, it can be said that the expected impacts on biodiversity by the Global Project are negligible.
	Hydrology	-	✓	D	B^-	**During construction**: No hydrological impacts are expected, since regular construction works do not cause negative impacts. **Operation period**: Water is discharged from the Al Wahda Dam, which is the water source of the Global Project, is supplied to the existing irrigated areas in the mid to downstream of the Sebou River, It is also used for power generation, and flood control (to decrease the water level of the dam in advance). When the Global Project is operated, the amount of irrigation water required for the Global Project will be additionally released, and the discharge amount will not be changed. Therefore, any significant change in water conditions is not expected.
	Topography and Geology	✓	-	B^-	D	**During construction**: Temporary topographical change could be observed, however, it is possible to restore the current topographic conditions, given that a part of

[18] Source: Hearing from a Research Professor of Hassan II Institute of Agronomy & Veterinary Medicine, Rabat

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Reasons for Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
						the First Main Canal (Tête Morte Main Canal) will be culverts. Thus, the expected impacts on topography and geology are not very big. It needs to set up soil dumping sites to dispose of residual soil from the construction works, however, it will not change topographic conditions significantly. **Operation period**: No topographical and geological alterations are planned.
Social environment	Land acquisition and resettlement	✓	-	B^-	D	**Pre-construction**: 84.5ha of land acquisition of farmland and residential land is needed for the First Main Canal (Tête Morte Main Canal) construction. Resettlement of 7 households is also expected. Thus, proper compensation is to be provided for the affected persons. **Operation period**: No impact is expected.
	Livelihoods	✓	-	B^+/B^-	D/B^+	**During construction**: In addition to permanent land acquisition and resettlement, there are concerns about economic losses due to the farming suspension. On the other hand, employing residents as construction workers can bring about positive impacts on the local population. **Operation period**: The beneficiaries can access irrigation water more than before, which results in production increase, and further, improvement of livelihood. However, the beneficial area is limited to the farmlands in the target rea of the Global Project, while the farmlands along the First Main Canal (Tête Morte Main Canal) cannot access the irrigation water. The livelihood for the people along the First Main Canal (Tête Morte Main Canal) will not be changed after the construction works.
	Vulnerable people	✓	-	B^-	D	**During construction**: Some mental and physical disabilities are identified in "the Target Area of the Global Project", including the affected area. They will be compensated in accordance with the law and regulations as well as other affected persons. **Operation period**: No activities affecting vulnerable groups are planned.
	Cultural heritage	-	-	D	D	**During construction/Operation period**: There are no cultural assets around the construction sites. Also, no activities affecting cultural heritage are planned.
	Scenery	-	-	D	D	**During construction/Operation period**: No activities damaging to the landscape are planned.
	Ethnic minorities and indigenous peoples	✓	-	D	D	**During construction/Operation period**: In the target area of the Global Project, there are foreign landowners consisting of one French and four Jewish, but all of them stay overseas at present and are not considered to be ethnic minorities or indigenous peoples, who require special consideration. In addition, according to the local leaders, all of the people are Arabic, except for the foreigners mentioned above, which means that no persons who fall under the category of ethnic minorities or indigenous peoples reside in the commune.
	Water use	✓	✓	D	B^-	**During construction**: No construction work to close the river is planned, and no impact on

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Reasons for Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
						water use is expected. **Operation period**: Since the irrigation water for the Global Project will be released from the Al Wahda Dam, additionally, there will be no change in water use for current water users in normal years. On the other hand, in drought years, the amount of irrigation water supplied to each irrigation area will be decreased. Still, equal water distribution among the water users will be done based on consultation with the Dam Management Committee. There are people, who enjoy recreational fishing and use boats to go across the Ouergha River and the Sebou River. However, since the discharges of those rivers in the operation period will not be changed very much compared to the current level, the expected impact on the livelihoods of those people is very limited.
	Conflicts	−	-	D	D	**During construction**: No conflicts among the people within the target area of the Global Project are expected. **Operation period**: There is no beneficial area, where farmers can access the irrigation water by the First Main Canal (Tête Morte Main Canal). Such condition had been explained at the stakeholder meetings repeatedly. However, all attendants including the people along the First Main Canal (Tête Morte Main Canal) agreed the Global Project at the 3rd Stakeholder Meeting, although some of them expressed some dissatisfaction. Also, the local leaders can calm down the people. Therefore, no conflict of interest in the area is anticipated.
	Working environment (including safety)	✓	-	B-	D	**During construction**: A safe and healthy working environment for the construction works should be established. **Operation period**: No activities affecting the working environment are planned.
	Accident	✓	✓	B-	B-	**During construction**: Construction equipment and vehicles increase the risk of traffic accidents around the construction site. Thus, safety control is very necessary. **Operation perioding**: After sedimentation ponds and regulation ponds are constructed, there is a risk that people will enter the facilities and tumble down. It is possible to avoid such accidents by setting up fences.
	Community health, safety and security	✓	-	B-	D	**During construction**: Since most construction works will be done by hiring workers from the surrounding areas, no large-scale population influx is anticipated, thus, impact on local health, safety, and security will not be very big. **Operation period**: No activities are planned that would affect the health, safety, or security of the community.
Others	Trans-boundary impacts and Climate change	✓	✓	D	D	**During construction**: Exhaust gases, including NOx, are temporarily emitted due to the operation of construction equipment and vehicles. However, the extent is very limited. **Operation period**: Installation of the pump station is expected to increase electricity

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Reasons for Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
						consumption and carbon dioxide emissions. However, increase of GHG emission by the Global Project is very limited.. Thus, it can be said that the Global Project will not cause climate change.

A+/-: Significant positive/negative impact is expected.
B+/-: Positive/negative impact is expected to some extent.
C: Extent of impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)
D: No impact is expected.
SEEN: Department of Experimentation, Testing and Standardization
Source: JICA Survey Team (2023)

Table 8.2 Environmental Examination for the Second Main Canal (Hricha Main Canal), Hricha Branch Canal, Ancillary Facilities and Beneficiary Areas

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
Pollution	Air pollution	✓	-	B^-	D	**During construction**: Exhaust gases and dust are generated due to the operation of construction equipment and vehicles. Since the measured baseline values are beyond the standard, it is needed to pay careful attention not to cause further pollution. **Operation period**: No activities generating air pollution are planned.
	Water quality	-	-	D	D	**During construction**: The rivers around the Second Main Canal (Hricha Main Canal) are not perennial, and there is no river discharge during the dry season. The construction crossing over the rivers will be done only in the dry season, therefore, the impact on water quality of those rivers is not expected. **Operation period**: For surface water, the Global Project will not cause any water pollution. As for groundwater, Introduction of drip irrigation systems by the Global Project can reduce the amount of fertilizer application compared to the current gravity irrigation system, which can reduce nitrate discharge to the groundwater.
	Waste	✓	-	B^-	D	**During construction**: Due to the pipeline construction works, excavated soil and waste, such as used construction materials, e.g., wood, will be generated. Excavated soil will be reused as filling material to bury the pipeline. Still, residual soil, which cannot be recycled, is expected. Such soil residue must be reused as fill material at other construction sites or disposed of at the specified disposal sites. Construction waste also has to be disposed of at a designated place. Since construction workers will be hired from the surrounding areas, a large-scale population influx from outside is not expected, which results in no increase in household waste by the Global Project. However, simple toilets will be installed at the construction site and disposal of the excrement is necessary.

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
						Operation period: No waste is expected.
	Soil pollution	-	-	D	D	**During construction**: Oil leakage from construction equipment and vehicles is expected, however, regular maintenance and check can prevent such an issue, and probable soil pollution is very limited. **Operation period**: No activities causing soil pollution are planned. According to the F/S report prepared by the Government of Morocco, soil salinity in the target area of the Global Project (21 sites) except Beht Est Zone, EC values of the surface soil are 0.07-0.35mS /cm, which don't have any problem for agriculture. In addition, an additional soil survey in the Beht Est Zone done by the JICA Survey Team shows that EC values in the zone range 0.07-0.22 mS /cm, relatively low as well as those in other zones. According to the category in Morocco (DIAEA/SEEN、2008), the soil mentioned above is classified as "non-saline", if EC value of the soil is less than 0.5mS/cm. The Global Project will install drip irrigation systems, which can reduce the amount of irrigation water. Furthermore, even if fertilizer elements are accumulated on the soil surface, leaching by rainfall in winter (about 400 mm) is possible. Amounts of pesticide application for respective crops have been determined by ONSSA in Morocco and such information is available on the ONSSA website. In addition, pesticide residues in imported and exported crops are monitored by ONSSA. Therefore, it is thought that pesticides will be applied appropriately in the target area of the Global Project also, the amount of pesticide application will be increased due to an increase in planting area for vegetables and fruits requiring more pesticides, though. Agricultural residues, e.g., wheat straw, are currently reused by plowing them into farmland or using straw as livestock feed, which means no problems with their disposal. Since the Global Project will bring about the same amount of wheat production as the current one, and the amount of wheat straw will not be increased after the Global Project. Thus, soil pollution of the Global Project is not expected.
	Noise and vibration	✓	-	B^-	D	**During construction**: Temporary noise and vibration will be generated from construction equipment and vehicles. There are three schools and a hospital, which are located along the construction sites. Those schools are 20m, 60m and 80m away from the sites, respectively. The hospital is 80m away from the site. Still, the construction works are mainly to excavate soil, bury pipelines and backfill the soil, which will not cause noise and vibration

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
						very much. Moreover, such construction will take only one week for each receptor, which will not give damage to them. **Operation period**: Due to pump station construction, motor sound will be caused, however, the station is far away from the residential areas, and no impacts on the lives of people will be expected.
	Land subsidence	-	-	D	D	**During construction/Operation period**: No groundwater pumping causing land subsidence is planned.
	Odor	-	-	D	D	**During construction/Operation period**: No activities generating odors are expected.
Natural (physical) environment	Sanctuary	-	-	D	D	**During construction/Operation period**: No impacts on Ramsar sites and IBA are expected by the Global Project.
	Biodiversity	✓	-	B-	D	**During construction**: Temporary impacts on the ecosystem around the construction site, e.g., cutting of bushes/trees, are expected, however the extent is limited. Thus, the Global Project will not damage terrestrial rare species, namely, Garden dormouse (*Eliomys quercinus*), Greater noctule bat (*Nyctalus lasiopterus*), Grey long-eared bat (*Plecotus austriacus*), Greek tortoise (*Testudo graeca*) and small three-toed skink (*Chalcides minutus*). Still, there is a possibility that the reptiles could be trampled by the construction vehicles. **Operation period**: Discharge of the Sebou River will be rarely changed by the Global Project. Therefore, aquatic animals will not be affected by the Global Project. In drought years, the water to be supplied to each irrigation area will be reduced by the same ratio. In other words, even in drought years, a certain amount will be provided to the existing irrigated areas, which are located downstream of the Koudiat El Borna Barrage. Regarding the three rare bird species identified in the existing data, namely, *Oxyura leucocephala, Marmaronetta angustirostris, Aythya ferina*, the impacts by the Global Project on the bird species are very limited as mentioned in Table 8.1, since the species do not depend on the Sebou River and Ouergha River very much. As for the rare reptiles and mammals, no adverse impacts on them are expected, since their preferable habitats, forest, orchards, irrigation canals, and grasslands will not be reduced by the Global Project. As a whole, the expected impacts of the Global Project on terrestrial and aquatic biodiversity are very limited.
	Hydrology	-	✓	D	D	**During construction**: No hydrological impacts are expected, given that there is only a seasonal river and no water flow during the dry season, namely, the construction period.

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
						Operation period: Since water of the Second Main Canal (Hricha Main Canal) will be taken from the First Main Canal (Tête Morte Main Canal), there will be no significant impact on the hydrological conditions in the target area of the Global Project, including seasonal rivers.
	Topography and geology	✓	-	B^-	D	**During construction**: Topographical change will be caused due to the construction of regulation ponds and pump stations. The pipeline for the Second Main Canal (Hricha Main Canal) and the Branch Canal (Hricha Branch Canal) will be buried underground, and a maintenance road will be installed on the ground above the buried pipelines. However, the surrounding area will be restored to its original condition. Also, geological change by the Global Project is not expected. Residual soil generated from the construction works will be reused to smoothen the rough parts of farmlands nearby. Thus, a soil dumping site will not be needed. **Operation period**: No topographic and geological changes/impacts are expected.
Social environment	Land acquisition and resettlement	✓	-	B^-	D	**During construction**: Due to the construction works, land acquisition and resettlement will be caused. It is expected that 112.4 ha of land will be acquired for the construction of the Second Main Canal (Hricha Main Canal), the Branch Canal (Hricha Branch Canal) and ancillary facilities, and that one household will be relocated. It is noted that relocation of the one household can be avoided by changing the route during the detailed design. **Operation period**: No activities causing land acquisition and resettlement are expected.
	Livelihoods	✓	✓	B^+/B^-	B^+	**During construction**: In addition to permanent land acquisition, there is concern about economic loss due to the temporary suspension of farming by the construction works. On the other hand, since residents will be hired as construction workers, their incomes will be improved. **Operation perioding**: The beneficiaries can access irrigation water, and agricultural income will be increased. As for the water fee, the beneficiaries are expected to pay 2.0MAD/m^3 to access irrigation water. The amount can be shouldered by small-scale farmers with 2ha of land also, considering they have spent almost the same amount of the fuel cost to pump up groundwater for irrigation at this moment.
	Vulnerable people	✓	-	B	D	**During construction**: There are some persons with mental and physical disabilities in the affected area. They will be compensated in accordance with the law as well as other affected persons.

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
						Operation period: no activities affecting vulnerable groups are planned.
	Cultural heritage	-	-	D	D	**During construction/Operation period**: There are no cultural heritages around the construction sites.
	Scenery	-	-	D	D	**During construction/Operation period**: No activities affecting landscapes are planned.
	Ethnic minorities and indigenous peoples	-	-	D	D	**During construction**: According to the local leaders in the target area of the Global Project, there are no ethnic minorities or indigenous peoples in the area. Any indigenous people are not identified, and any activities affecting their culture, religion and assets of such minority people by the Global Project are not planned. **Operation period**: No activities affecting minorities or indigenous peoples are planned.
	Water use	-	✓	D	$B+^{-}$	**During construction**: No impact on water use is expected for both the new irrigation zones and existing irrigation zones, because the existing irrigation system can be used even during the construction period and the farmers in the new irrigation zones use rainwater as ever. **Operation period**: The beneficiaries will be able to access stable irrigation water due to the Global Project, which results in income improvement. On the other hand, the amount of supplied water to the existing irrigated farmlands downstream of the Koudiat El Borna Barrage will not be changed. In drought years, amount of irrigation supplied to respective areas could be less than in normal years, however, fair water distribution among the beneficiaries will be coordinated by the Dam Management Committee. There are people, who enjoy recreational fishing and use boats to go across the Sebou River and Ouergha River. However, since the river discharges in the operation period will not be changed very much from current levels, the expected impact on their livelihood is very little.
	Conflicts	-	✓	D	B^{-}	**During construction**: No conflicts of interest are expected. **Operation period**: In case of drought years, it is needed for the Dam Management Committee to allocate/adjust the water to the beneficiaries. Principally, the priority of water provision is given in the order of drinking water, irrigation water, and water for power generation, but if the water level is lower than the EL143m, which is possible to generate power, irrigation water is not provided.
	Working environment (including safety)	✓	-	B	D	**During construction**: A safe and healthy working environment for the construction works should be established. **Operation period**: No activities affecting

Field	Evaluation item	Evaluation		Evaluation Based on the Survey Results		Evaluation
		Before/In Construction Period	Operation Period	Before/In Construction Period	Operation Period	
						the working environment are planned.
	Accident	✓	✓	B-	B-	**During construction**: Construction equipment and vehicles increase the risk of traffic accidents around the construction site. Thus, safety control and safety management are very necessary. **Operation perioding**: After the sedimentation ponds and regulation ponds are constructed, there is a risk that people will enter the facilities and tumble down. It is possible to avoid such accidents by fence setting. Also, pesticide poisoning could be caused during the pesticide application in the farmlands.
	Community health, safety and security	✓	-	D-	D	**During construction**: Since most construction works will be done by hiring workers from the surrounding areas, no large-scale population influx is anticipated, thus, no serious impact on local health, safety, and security is expected. However, initial training of hired workers on safety management and hygienics is necessary. **Operation period**: No activities are planned that would affect the health, safety, or security of the community.
Others	Transboundary impacts and climate change	✓	✓	D	D	**During construction**: Exhaust gases, including NOx, are temporarily emitted due to the operation of construction equipment and vehicles. But the extent is very limited. **Operation period**: Installation of the pump station is expected to increase electricity consumption, resulting in an increase in carbon dioxide emissions. However, increase of GHG emission by the Global Project is very limited. Also, the increase in the number of livestock will increase carbon dioxide emissions. However, such emission increases are very small compared to the overall emissions in the agricultural sector in Morocco.

A+/-: Significant positive/negative impact is expected.
B+/-: Positive/negative impact is expected to some extent.
C: Extent of impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)
D: No impact is expected.
SEEN: Department of Experimentation, Testing and Standardization
Source: JICA Survey Team (2023)

9. MITIGATION MEASURES

Mitigation measures will be taken to reduce the expected environmental impacts caused by the Global Project as much as possible. Prior to the construction works, ORMVAG will provide compensation and kinds of support for the affected persons, who will lose their lands and other assets. In the construction period, on the other hand, mitigation measures will be taken by contractors under supervision of the Project Management Unit (PMU-within ORMVAG. Also, the Arrondissement d'Aménagement de la Zone SUD-EST du GHARB for the Global Project will be established for the Global Project and it will supervise the measures to be taken by the contractors at the field level.

It is proposed to organize training sessions related to proper pesticide application to prevent pesticide poisoning in collaboration with the Agricultural Development District (ADA) and Agricultural Advisory Centers during the construction stage, just before start of the operation. Moreover, fences around some facilities, e.g., pump stations, will be installed to prevent accidents such as breaking and entering the facilities, which could result in electrical shock by contact with a high-voltage generator or fall into the sedimentation ponds. Such fence establishment will be done in the construction period.

The expected environmental impact in the operation period is water use, e.g., conflict over water distribution, especially in drought years. ORMVAG is responsible for fair water distribution in the target area of the Global Project. Following table shows an Environmental Management Global Project for the First Main Canal (Tête Morte Main Canal) and ancillary facilities, which summarizes mitigation measures against the expected impacts, implementing agency, responsible organization and cost.

Table 9.1 Environmental Management Plan for the First Main Canal (Tête Morte Main Canal) and Ancillary Facilities

Item	Impacts	Mitigation Measure	Implementing Agency	Responsible Organization	Cost
Before Construction					
Land acquisition and including consideration of vulnerable persons	Impact on livelihoods due to the land acquisition	Compensation will be provided for affected land, crops and houses/buildings. In addition, livelihood restoration assistance will be provided as needed.	ORMVAG	ORMVAG	Government of Morocco
Construction Period					
Consideration for vulnerable people affected by land acquisition	Impact on livelihoods due to the land acquisition	Priority be given to employing vulnerable people, for example employees from households headed by people with special needs (physical and/or mental).	Contractor	ORMVAG	Included in construction costs
Air pollution	Air pollution in and around the construction site due to gas emission and dust generation	Water spraying and the installation of a fence to prevent dust are to be done. In addition, daily maintenance and checks of construction vehicles shall be conducted.	Contractor	PMU /ORMVAG	Included in the construction cost
Noise and vibration	Noise and vibration due to the construction works	During the nighttime, construction works around residential areas shall not be done.	Contractor	PMU /ORMVAG	Included in the construction cost
Water pollution	Turbid water during construction	Turbid water treatment facilities, e.g., settling ponds, should be installed.	Contractor	PMU /ORMVAG	Included in the construction cost
Waste	Disposal of residual soil and waste from the construction works	Residual soil will be reused and recycled for other construction projects and/or land consolidation, housing sites, etc. If surplus soil remains even after such soil reuse and recycling, the residual soil	Contractor	PMU /ORMVAG	Included in the construction cost

Item	Impacts	Mitigation Measure	Implementing Agency	Responsible Organization	Cost
		shall be disposed of in accordance with the law[19]. It is needed to dispose of waste from the construction work at the designated sites. Moreover, toilets for the construction labors will be installed properly.			
Bottom sediment	Excavation of riverbed by the construction works	After the construction, the riverbed will be restored to its original condition.	Contractor	PMU /ORMVAG	Included in the construction cost
Topography and geology	Topographic changes by laying pipelines underground	The road construction works will disturb the land over 40-50m width, where pipelines will be buried. Also, maintenance roads with 6-meter width will be constructed along the pipeline on the surface. Except for the road, affected areas are to be restored to the pre-construction condition.	Contractor	PMU /ORMVAG	Included in the construction cost
Work environment	Any damage to health of construction workers, accidents at construction sites, etc.	Training targeting workers on safety and health management, proper management of working hours of labors, establishment of sanitary working environment, introduction of guidelines for safety measures, and regular safety meetings organization are to be implemented.	Contractor	PMU /ORMVAG	Included in the construction cost
Biodiversity	Impacts on rare reptile species by the construction vehicles	Prior to the construction works, existence of the rare reptiles will be confirmed based on visual observation. In case of species identification at the construction sites, they will be moved to other places away from the sites with the same conditions.	Contractor	PMU /ORMVAG	Included in the construction cost
Accidents, including hygiene, safety and security	Traffic accidents in and around the construction sites	Traffic control in and around the construction sites shall be done. Notice of the construction works should be delivered to the surrounding communities in advance.	Contractor	PMU /ORMVAG	Included in the construction cost
Accident	There is a risk of falling into the pond when people break and enter compounds of the regulation ponds and sedimentation ponds.	Fences are to be set around the regulating ponds and sedimentation ponds.	Contractor	ORMVAG	Included in the construction cost
Operation period					
Water use	Conflict over water distribution could happen in drought years. The amount of irrigation water supplied to the Target Area of the Global Project and existing irrigated areas downstream of the Koudiat El Borna weir will be equally reduced.	The Dam Management Committee will discuss and coordinate fair water distribution. Agency for the Regions (ABH) calls a conference for the committee periodically (annually). In drought years, the committee will be held every two weeks, and ABH simulates available water resources and determines the amount of water to be distributed based on the simulation. ABH informs ORMVAG how to distribute water, and ORMVAG, in turn, notifies the farmers of the information.	Dam Management Committee (ABH, ORMVAG, ONEE, and MAPMDREF are members)	ABH, ORMVAG	

[19] Law on No. 28-00 on Waste Management and Disposal, 2006 says that ultimate waste, agricultural waste and non-hazardous industrial waste must be deposited by their generators or by persons authorized to manage them in the places and disposal facilities. Still, it does not mention disposal methods of residual soil generated from construction works.

ABH: Agency of Hydraulic Basin ONNE: National Office of Electricity and Drinking Water
MAPMDREF: Ministry of Agriculture, Fisheries, Rural Development, Water and Forests
Source: JICA Survey Team (2023)

The proposed mitigation measures against the expected impacts of the construction of the Second Main Canal (Hricha Main Canal) and the Branch Canal (Hricha Branch Canal) and its ancillary facilities are almost the same as those for the First Main Canal (Tête Morte Main Canal) and ancillary facilities described above. The Environmental Management Plan for the Hricha Main Canal and ancillary facilities and beneficiary areas are summarized in the following table:

Table 9.2 Environmental Management Plan for the Second Main Canal (Hricha Main Canal), Hricha Branch Canal, Ancillary Facilities, and Beneficiary Area

Item	Impacts	Mitigation Measure	Implementing Agency	Responsible Organization	Cost
Before Construction					
Land acquisition and involuntary resettlement, including consideration of vulnerable people	Impact on livelihoods due to relocation of residential areas and land acquisition	Compensation will be provided for affected land, crops, and houses/buildings. In addition, assistance for the restoration of livelihoods will be provided a5s needed. It is proposed to employ vulnerable people, e.g., households whose heads have physical and/or mental disabilities, with high priority.	ORMVAG	ORMVAG	Government of Morocco
Construction Period					
Consideration for vulnerable people affected by land acquisition	Impact on livelihoods due to the land acquisition	Priority be given to employing vulnerable people, for example employees from households headed by people with special needs (physical and/or mental).	Contractor	ORMVAG	Included in construction costs
Air pollution	Air pollution in and around the construction site due to gas emission and dust generation	Water spraying and the installation of a fence to prevent dust are to be done. In addition, daily maintenance and check of construction vehicles shall be conducted.	Contractor	PMU /ORMVAG	Included in the construction cost
Noise and vibration	Noise and vibration due to the construction works	At nighttime, construction works around residential areas shall not be done.	Contractor	PMU /ORMVAG	Included in the construction cost
Waste	Disposal of residual soil and waste from the construction works	Residual soil will be reused and recycled for other construction projects and/or land consolidation, housing sites, etc. If surplus soil remains even after such soil reuse and recycling, the residual soil shall be disposed of in accordance with the law[20]. It is needed to dispose of waste from the construction work at the designated sites. Moreover, toilets for the construction labors will be installed properly.	Contractor	PMU /ORMVAG	Included in the construction cost
Bottom sediment	Excavation of riverbed by the construction works	After the construction, the riverbed will be restored to its original condition.	Contractor	PMU /ORMVAG	Included in the construction cost
Topography and geology	Topographic changes associated with the burial of pipelines	The road construction works will disturb the land over 40-50m width, where pipelines will be buried. Also, maintenance roads with 6-meter width will be constructed along the pipelines	Contractor	PMU /ORMVAG	Included in the construction cost

[20] Law on No. 28-00 on Waste Management and Disposal, 2006

Item	Impacts	Mitigation Measure	Implementing Agency	Responsible Organization	Cost
		on the surface. Affected areas, except for the road, are to be restored to the pre-construction condition.			
Biodiversity	Impacts on rare reptile species by the construction vehicles	Prior to the construction works, existence of the rare reptiles will be confirmed based on visual observation. In case of species identification at the construction sites, they will be moved to other places away from the sites with the same conditions.	Contractor	PMU /ORMVAG	Included in the construction cost
Work environment	Any damage to health of construction workers, accidents at construction sites, etc.	Training targeting workers on safety and health management, proper management of working hours of labors, establishment of sanitary working environment, introduction of guidelines for safety measures, and regular safety meetings organization are to be implemented.	Contractor	PMU /ORMVAG	Included in the construction cost
Accident	Traffic accidents in and around the construction sites	Traffic control in and around the construction sites shall be done. Notice of the construction works should be delivered to the surrounding communities in advance.	Contractor	PMU /ORMVAG	Included in the construction cost
Accident	There is a risk of falling into the pond when people break and enter compounds of the regulation ponds and sedimentation ponds.	Fences are to be set around the regulating ponds and sedimentation ponds.	Contractor	ORMVAG	Included in the construction cost
Accident (pesticide poisoning)	There is a risk of pesticide poisoning due to improper pesticide application.	Training sessions for proper pesticide application are to be organized for the beneficiaries.	Agricultural Advisory Center under ONCA and ADA under ORMVAG	ORMVAG	Included in the consulting service cost
Operation Period					
Water use	Conflict over water distribution could be caused in drought years. The amount of irrigation water supplied to the Target Area of the Global Project and existing irrigated areas downstream of the Koudiat El Borna weir will be equally reduced.	The Dam Management Committee will discuss and coordinate fair water distribution. Agency for the Regions (ABH) calls a conference for the committee periodically (annually). In drought years, the committee will be held every two weeks, and ABH simulates available water resources and determines the amount of water to be distributed based on the simulation. ABH informs ORMVAG how to distribute water, and ORMVAG, in turn, notifies the farmers of the information.	Dam Management Committee (ABH, ORMVAG, ONEE, and MAPMDREF are members)	ABH, ORMVAG	
Conflicts of interest within the community	During droughts, coordination is needed on how to allocate limited water resources.	The dam management committee discusses and coordinates the distribution of irrigation water. This water distribution information is transferred to ORMVAG, which in turn transfers it to the farmers.	Dam Management Committee (ABH, ORMVAG, ONEE, and MAPMDREF are members)	ABH, ORMVAG	

ABH: Agency of Hydraulic Basin ONNE: National Office of Electricity and Drinking Water
MAPMDREF: Ministry of Agriculture, Fisheries, Rural Development, Water and Forests
Source: JICA Survey Team (2023)

10. MONITORING PLAN

A proposed monitoring plan considering the Environmental Management Plan for the First Main Canal (Tête Morte Main Canal) and ancillary facilities is shown in Table 10.1. The monitoring will be implemented in three periods: before construction, during the construction period, and operation period. Prior to the construction works, compensation will be provided to the affected persons who will be relocated and/or lose their lands by the Global Project. In the construction period, monitoring will be conducted to ensure mitigation measure implementation, and safety management for construction workers and local people based on the Labor Code. Moreover, in the operation period, monitoring whether irrigation water is distributed among the beneficiaries evenly will be implemented.

There is no big difference between the national standard values in Morocco and international ones regarding air quality and water quality (see Table 7.1 and Table 7.3), thus, national standards will be applied while international one is regarded as references for the monitoring. On the other hand, the existing standard related to noise/vibration in Morocco is for labors' environment, instead of surrounding environment. Thus, it is proposed to apply IFC standard for noise/vibration monitoring.

Table 10.1 Monitoring and its Costs in the First Main Canal (Tête Morte Main Canal) and Ancillary Facilities

Item	Mitigation Measure	Parameter	Standard	Location	Implementing Agency	Duration and frequency	Cost
Before construction							
Land acquisition and involuntary resettlement	Implementation of compensation and livelihood restoration measures	Agreements with affected persons and provision of compensation	Progress of compensation payment	Affected areas	ORMVAG	Completed prior to the start of construction	ORMVAG
Construction Period							
Land acquisition and involuntary resettlement	Priority be given to employing vulnerable people	Implementation	None	Affected areas	Contractor	In the construction period	Included in the construction cost
Air pollution	Water spray over the construction sites	Implementation	None	In and around the construction sites	Contractor	Every day	Included in the construction cost
Air pollution	Setting of fences	Installation	None	Around the facilities	Contractor	Once at the start of construction	Included in the construction cost
Air pollution	Management of construction vehicles	Daily check of construction vehicles	None	Construction sites	Contractor	Every day	Included in the construction cost
Air pollution	Air quality check	SO_2 NO_2 PM10 Ox	Decree No. 2 09-286 (2009). Noted IFC standard is just a reference.	Construction sites	Contractor	Monthly	Included in the construction cost
Noise and Vibration	Consideration of construction hours, namely, no construction at nighttime	Implementation	None	Construction sites	Contractor	Every day	Included in the construction cost
Noise and Vibration	Quantitative check	Noise/vibration	IFC standard	Construction sites	Contractor	Monthly	Included in the construction cost
Water	Installation of	Implementation	None	Construction	Contractor	Before	Included in

Item	Mitigation Measure	Parameter	Standard	Location	Implementing Agency	Duration and frequency	Cost
pollution	turbid water treatment facilities			sites		construction	the construction cost
Water pollution	Installation of turbid water treatment facilities	Suspended Solids (SS)	200mg/l (Decree No. 1276-01 (2002)	Construction sites	Contractor	Monthly	Included in the construction cost
Waste	Disposal of residual soil	Implementation	Law No.28-00 on Waste Management	Construction sites	Contractor	Appropriately	Included in the construction cost
Waste	Disposal of waste from the construction works	Implementation	Law No.28-00 on Waste Management	Construction sites	Contractor	Appropriately	Included in the construction cost
Waste	Disposal of toilets of labors	Implementation	Labor Code	Construction sites	Contractor	Every week	Included in the construction cost
Sedimentation	Backfilling of riverbed	Implementation	None	Construction sites	Contractor	Before completion of construction works	Included in the construction cost
Topography and Geology	Backfilling of land except for maintenance roads area	Implementation	None	Construction sites	Contractor	Before completion of construction works	Included in the construction cost
Biodiversity	Observation of the rare reptile species before construction works	Implementation	None	Construction sites	Contractor	Before start of construction	Included in the construction cost
Biodiversity	Relocation of the rare reptile species, if they are observed	Implementation	None	Construction sites	Contractor	Before start of construction	Included in the construction cost
Work environment	Training for workers on safety and health management	Implementation	Labor Code	Construction sites	Contractor	Before start of construction	Included in the construction cost
Work environment	Development of safety guidelines	Implementation	Labor Code	Construction sites	Contractor	Before start of construction	Included in the construction cost
Work environment	Labor management of workers	Implementation	Labor Code	Construction sites	Contractor	Every week	Included in the construction cost
Work environment	Sanitation of the working environment	Implementation	Labor Code	Construction sites	Contractor	Every week	Included in the construction cost
Work environment	Organization of regular safety meetings	Implementation	Labor Code	Construction sites	Contractor	Every week	Included in the construction cost
Accident	Notice of construction works to the surrounding communities	Implementation	None	Construction sites	Contractor	Before the construction works	Included in the construction cost
Accident	Traffic control	Implementation	None	Construction	Contractor	Every day	Included in

Item	Mitigation Measure	Parameter	Standard	Location	Implementing Agency	Duration and frequency	Cost
	around the construction site			site			the construction cost
Accident	Setting fences around regulating ponds and sedimentation ponds	Implementation	None	Construction site	Contractor	Construction period	Included in the construction cost
Operation Period							
Water use	Distribution of irrigation water by the Dam Management Committee	Implementation	None	None	Dam Management Committee	Drought years	ORMVAG
Water use	Notice to farmers about irrigation water distribution	Implementation	None	Beneficiary Area	Dam Management Committee	Drought years	ORMVAG

Source: JICA Survey Team (2023)

Table 10.2 shows the monitoring plan for the Second Main Canal (Hricha Main Canal), the Branch Canal (Hricha Branch Canal) and its ancillary facilities, and the beneficiary areas. The monitoring contents are almost the same as those in Table 10.1 mentioned above except for water pollution, since no water pollution into the river will be generated.

Table 10.2 Monitoring and Costs for the Second Main Canal (Hricha Main Canal), Hricha Branch Canal, Ancillary Facilities and Beneficiary Area

Item	Mitigation Measure	Parameter	Standard	Location	Implementing Agency	Duration and frequency	Cost
Before construction							
Land acquisition and involuntary resettlement	Implementation of compensation and livelihood restoration measures	Agreements with affected persons and provision of compensation	Progress of compensation payment	Affected areas	ORMVAG	Completed prior to the start of construction	ORMVAG
Under construction							
Land acquisition and involuntary resettlement	Priority be given to employing vulnerable people	Implementation	None	Affected areas	Contractor	In the construction period	Included in the construction cost
Air pollution	Water spray over the construction sites	Implementation	None	In and around the construction sites	Contractor	Every day	Included in the construction cost
Air pollution	Setting of fences	Installation	None	Around the facilities	Contractor	Once at the start of construction	Included in the construction cost
Air pollution	Management of construction vehicles	Daily check of construction vehicles	None	Construction sites	Contractor	Every day	Included in the construction cost
Air pollution	Routine air quality testing	SO_2 NO_2 PM10 Ox	Decree No. 2 09-286 (2009). Noted IFC standard is just a reference.	Construction sites	Contractor	Monthly	Included in the construction cost
Noise and	Consideration	Implementation	None	construction	Contractor	Every day	Included in

Item	Mitigation Measure	Parameter	Standard	Location	Implementing Agency	Duration and frequency	Cost
Vibration	of construction hours (no construction at night)			site			the construction cost
Noise and Vibration	Quantitative check	Noise/vibration	IFC standard	Construction sites	Contractor	Monthly	Included in the construction cost
Waste	Disposal of residual soil	Implementation	Law No.28-00 on Waste Management	Construction sites	Contractor	Appropriately	Included in the construction cost
Waste	Disposal of waste from construction	Implementation	Law No.28-00 on Waste Management	Construction sites	Contractor	Appropriately	Included in the construction cost
Waste	Disposal of toilets of labors	Implementation	Labor Code	Construction sites	Contractor	Every week	Included in the construction cost
Sedimentation	Backfilling of riverbed	Implementation	None	Construction sites	Contractor	Before completion of construction works	Included in the construction cost
Topography and Geology	Backfilling of land except for maintenance roads area	Implementation	None	Construction sites	Contractor	Before completion of construction works	Included in the construction cost
Biodiversity	Observation of the rare reptile species before construction works	Implementation	None	Construction sites	Contractor	Before start of construction	Included in the construction cost
Biodiversity	Relocation of the rare reptile species, if they are observed	Implementation	None	Construction sites	Contractor	Before start of construction	Included in the construction cost
Work environment	Training for workers on safety and health management	Implementation	Labor Code	Construction sites	Contractor	Before start of construction	Included in the construction cost
Work environment	Development of safety guidelines	Implementation	Labor Code	Construction sites	Contractor	Before start of construction	Included in the construction cost
Work environment	Labor management of workers	Implementation	Labor Code	Construction sites	Contractor	Every week	Included in the construction cost
Work environment	Sanitation of the working environment	Implementation	Labor Code	Construction sites	Contractor	Every week	Included in the construction cost
Work environment	Organization of regular safety meetings	Implementation	Labor Code	Construction sites	Contractor	Every week	Included in the construction cost
Accident	Notice of construction works to the	Implementation	None	Construction sites	Contractor	Before construction	Included in the construction

Item	Mitigation Measure	Parameter	Standard	Location	Implementing Agency	Duration and frequency	Cost
	surrounding communities						cost
Accident	Traffic control around the construction sites	Implementation	None	Construction site	Contractor	Every day	Included in the construction cost
Accident	Setting fences around regulating ponds and sedimentation ponds	Implementation	None	Construction site	Contractor	Construction period	Included in construction cost
Accident (pesticide poisoning)	Training for proper pesticide application	Implementation	Rules of ONCA and ONSSA	In "the Target Area of the Global Project"	Agricultural Advisory Center and ADA	Before operation	ORMVAG
Operation Period							
Water use	Distribution of irrigation water by the Dam Management Committee	Implementation	None	None	Dam Management Committee	Drought years	ORMVAG
Water use	Notice to farmers about irrigation water distribution	Implementation	None	Beneficiary Area	Dam Management Committee	Drought years	ORMVAG

ADA: Agricultural Development District ONSSA：Office National de Sécurité Sanitaire des produits Alimentaires
Source: JICA Survey Team (2023)

The proposed monitoring format is as follows.

Draft Environmental Monitoring Format

Responsible organization: ORMVAG/DIAEA

[Pre-construction period].

Announcements to the people around the construction sites

Monitoring Item	Progress
Announcement about the construction schedule to the people around the construction sites	

[Construction Period].

1) Pollution control for air quality, surface water and noise/vibration by quantitative measurement

Item	Monitoring Item	Baseline Value	Measured Values (Average)	Measured Values (Max)	National Standard	International Standard for reference	Remarks
Surface water quality	Measurement of Suspended Solid (SS)						
Air quality	Measurement of SO_2				125μg/m^3 (24-hours)	125μg/m^3 (24-hour, Interim target-1) 50μg/m^3 (24-hour, Interim target-2) 20μg/m^3 (24-hour, Guideline)	Monthly
Air quality	Measurement				For health	200μg/m^3	Monthly

Item	Monitoring Item	Baseline Value	Measured Values (Average)	Measured Values (Max)	National Standard	International Standard for reference	Remarks
	of NO_2				protection:200μg/m^3 (1-hour) For health protection:50μg/m^3 (1-year) For vegetation protection :30μg/m^3 (1-year)	(1-hour) 40μg/m^3 (1-year)	
Air quality	Measurement of PM10				50μg/m^3 (24-hour)	50μg/m^3	Monthly
Air quality	Measurement of Ozon				For health protection:110μg/m^3 (8-hour) For vegetation protection:65μg/m^3 (24-hour, not to be exceeded for more than 3 consecutive days)	160μg/m^3 (8-hours, Interim target-1) 100μg/m^3 (8-hours, Guideline)	Monthly
Noise/ Vibration	Measurement of noise				Not Available		Monthly

*International standards for air quality and noise/vibration are based on IFC while surface water quality are referred to FAO (for irrigation).

**For noise/vibration, the construction works will be implemented in only daytime, thus, the IFC standard values for daytime are applied in the monitoring form.

2) Conservation of rare species

Item	Monitoring Item	Date of Observation/ Release of Rare Species	Remarks
Biodiversity	Observation whether rare reptile species, namely, *Testudo graeca* and *Chalcides minutus* in and around the construction sites		
Biodiversity	If those rare reptile species are identified in and around the construction sites, it is needed to release them.		

3) Pollution control by taking measures.

Item	Monitoring Item	Progress	Frequency	Remarks
Air quality	Water spraying to minimize dust generation		As required	
Air quality	Fence setting around the construction sites to minimize dust generation for the surrounding people		Before start of construction works	
Air quality	Regular checks of construction vehicles		Every working day	
Noise	To avoid construction works at nighttime		Every working day	
Surface water quality	Sedimentation pond setting		Before start of construction works	
Waste	Disposal of waste from the construction sites		As required	
Waste	Disposal of soil generated by the soil excavation		As required	
Waste	Disposal of toilets at the construction sites		Weekly	
Bottom sediment/ Geological condition	Backfilling of soil at the point of the underground pipeline		Just before completion of construction works	

4) Safety and Security Control

Item	Monitoring Item	Progress	Frequency/ Timing	Remarks
Safety and	Organization of training of safety control		Before start of	

Item	Monitoring Item	Progress	Frequency/ Timing	Remarks
security control of the working environment	targeting the labors		construction works	
	Preparation of safety guidelines, proper labor management		Before start of construction works	
	Labor management		Weekly	
	Regular meetings of safety management		Weekly	
Hygiene control	Sanitary supervision of the working environment		Weekly	
Accident prevention	Notice of the construction works to the people around the sites.		Before start of the construction works	
Accident prevention	Traffic control around the construction sites		Every working day	
Accident prevention	Whether fence is constructed to prevent accidents.		To be finished before the construction completion	
Accident prevention from pesticide poisoning	Whether technical training for proper pesticide application is organized by ONCA		Just before start of the operation	
	The times of training session targeting farmers organization mentioned above			

[Operation Period]

1) Proper water distribution in case of drought

Item	Monitoring Item	Measures	Effectiveness of Measures Taken	Remarks
Notice of water distribution system to the beneficiaries	Times and places of explanation about water distribution			
Proper water distribution	Any dispute on water distribution			

Source: JICA Survey Team (2023)

11. IMPLEMENTATION SYSTEM

11.1 Environmental Management Plan [21] and Environmental Monitoring Implementation System

1) Implementation System in the Construction Period

In the construction period, the Steering Committee, chaired by the Director of DIAEA, will be established within MAPMDREF, and the Project Management Unit for the Global Project will be established within ORMVAG. In addition, the Arrondissement d'Aménagement de la Zone SUD-EST du GHARB will be established to manage the Global Project on a daily basis at the field level. One expert for environment and social employed by ORMVAG will be mobilized. Also, supervision consultants consisting of various experts are assigned. The contractor will implement the Environmental Management Plan (EMP) and environmental monitoring while PMU and the consultant and PMU will supervise the processes as shown in the following figure:

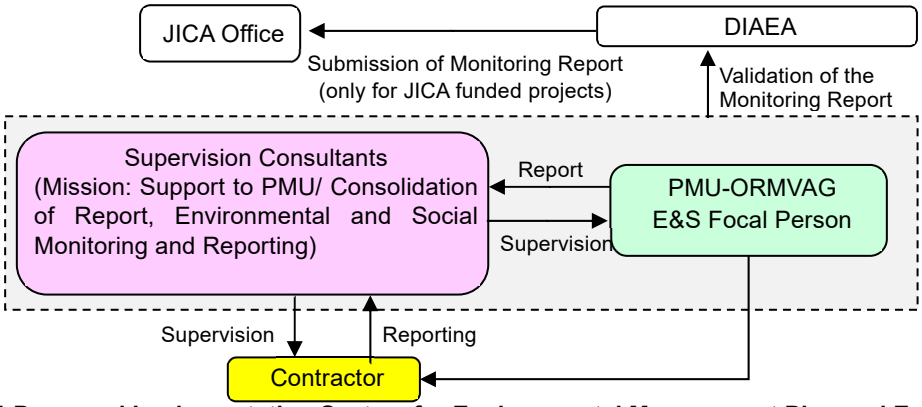


Figure 11.1 Proposed Implementation System for Environmental Management Plan and Environmental Monitoring in the Construction Period

Source: JICA Survey Team (2023)

Each contractor will employ one specific environmental manager responsible for environmental consideration. The consultant responsible for environment and social will provide technical support for the implementation of the proposed EMP and environmental monitoring. Monitoring results collected by the contractors will be submitted to the consultant and the PMU. The PMU will prepare and submit the monitoring report and get validation by DIAEA for the report. After that, DIAEA will submit the monitoring report to the JICA Office for JICA funded projects.

It is noted that the Global Project does not require an EIA according to laws and regulations in Morocco, however, it is necessary to gain approval for construction works at Sebou River basin from ABHS.

2) Implementation System in the Operation Period

After the construction completion, the Steering Committee and PMU will be disbanded. In the operation period, monitoring will be handled by ORMVAG and public-private partnership (PPP) firms. The main environmental issue in the operation period is fair water distribution, and the points will be more focused. As for the monitoring system on the water allocation in the operation period, the PPP firms will collect information and report any issues to Bureau de l'Environnement. The bureau will report the situations to Service of Study and Agricultural Development (SED) and further DDA. In turn, the report will be forwarded to Supervision Evaluation within ORMVAG. ORMVAG will compile the monitoring results and submit monitoring reports to the JICA Office after the validation of DIAEA. It is noted that Morocco is the first country, which implemented an irrigation project by means of PPP, in the world. Thus, the Global Project will be implemented without any issues. The

[21] Refer to Table 9.1 and Table 9.2 for the Environmental Management Plan.

proposed implementation structure in the operation period is illustrated in the following figure.

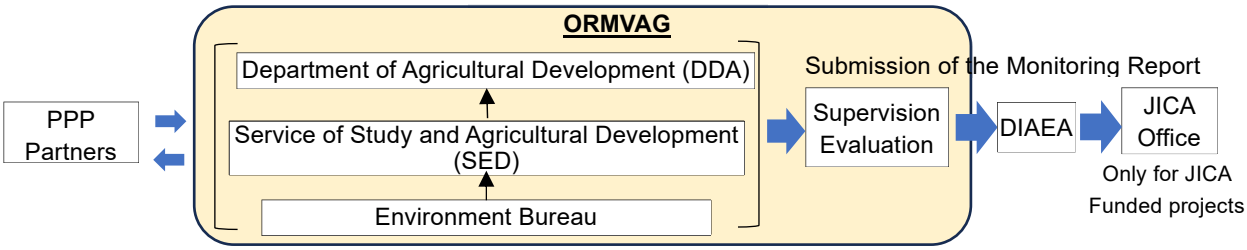


Figure 11.2 Implementation Structure for Environmental Management Plan and Environmental Monitoring in Operation Period

Source: JICA Survey Team (2023)

11.2 Grievance Handling and Reporting System

1) Grievance Handling and Reporting System in the Construction Period

Expected grievances from the people related to environmental and social aspects in the construction period are pollution, e.g., air pollution, noise and vibration, etc. If some persons wish to file a grievance, the following process can be thought as follows:

The nearest official personnel for the people are *Muqaddam*, the head of the villages (*Douar*), or the *Cheikh*, the head of several villages, who are assigned by the Ministry of Interior. On the other hand, there is a Commune Council at Commune consisting of Head and some members, who are elected by the local population. There is no administrative body at the village level in Morocco, and the lowest administrative level is *Caidat*, headed by *Caid*. People consult with the Commune Council or *Caid* when a problem is caused in a community. They are accessible to vulnerable people e.g., women and people with special needs. Commune Head /*Caid* can play a role as a focal point, in case of any issues as usual case.

If the existing system cannot fix the problem, the persons or their local leader, such as Caid, will file a grievance with the implementing agency. At first, "the Arrondissement d'Aménagement de la Zone SUD-EST du GHARB", including environment and social expert, which will be established at the field level of the Global Project, will be the focal point to receive the grievances. If the problem cannot be solved at the field level, it will be transferred to the PMU in ORMVAG. The PMU will discuss the issue with the supervision consultants, who will then instruct the contractor on how to fix the issue. The the Arrondissement will then provide feedback to the persons on the situation.

The PMU is expected to prepare a monitoring report, including such a grievance handling system, and submit the report to the JICA Office. Response to a grievance is expected to be done to the applicant within one week after receiving the grievance. The grievance handling system mentioned above is illustrated in the following figure.

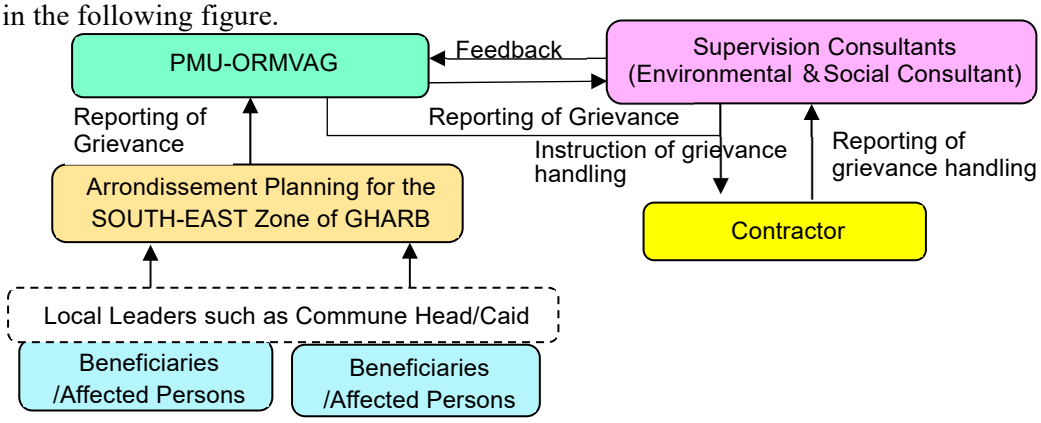


Figure 11.3 Proposed Grievance Handling System in the Construction Period

Source: JICA Survey Team (2023)

2) Grievance Handling and Reporting System in the Operation Period

The grievances in the operation period could be related to water distribution for the Global Project. After the construction completion, the PMU will be dissolved, and the grievance will be handled by ORMVAG, particularly, field level organizations under the Department of Management of Irrigation and Drainage Network (DGR) and the Department of Agricultural Development (DDA). Under the DGR, the Irrigation and Drainage Network Management Districts: AGR) and the Network Management Centers (CGR), which are assigned at field level. On the other hand, under the DDA, District of Agricultural Development (ADA) and Agricultural Development Center (CDA) are assigned. They will be responsible for the handling of the grievance in the operation period.

Since PPP firms will be involved in the Global Project, it is proposed that they report the grievances to the CGR/CDA and AGR/ADA, if any complaints are raised. After that, AGR and ADA are expected to report the grievances to ORMVAG, and ORMVAG will prepare a monitoring report, including the grievances and solutions, and submit it to the JICA Office via DIAEA. The proposed grievance handling and reporting system in the operation period is illustrated in the following figure:

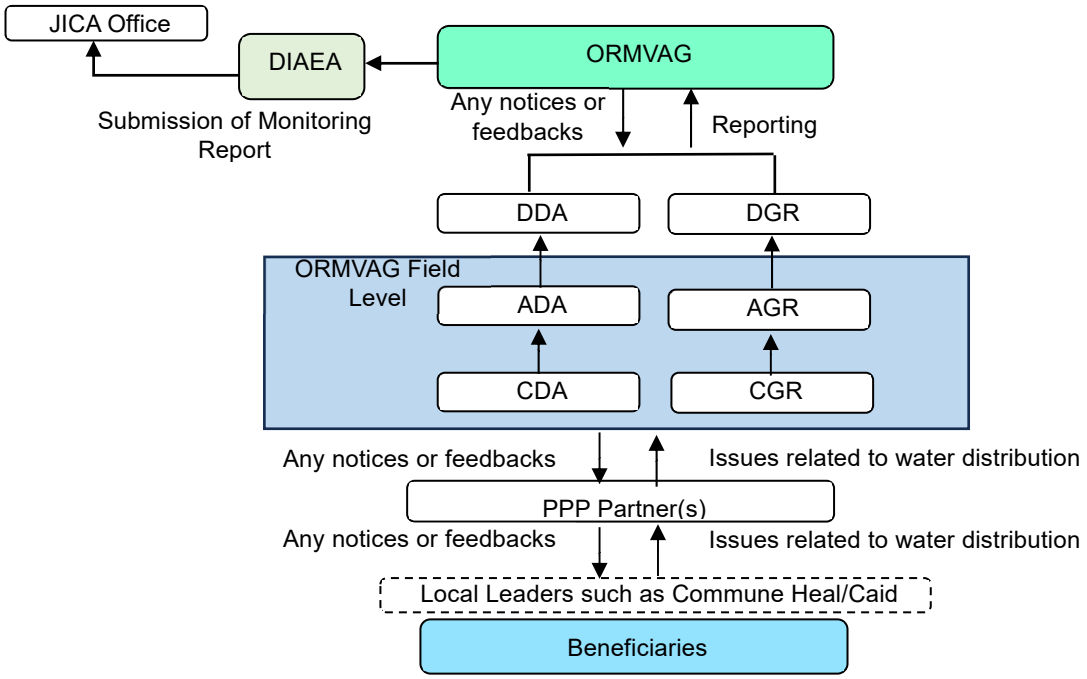


Figure 11.4 Proposed Grievance Handling System in the Operation Period

Source: JICA Survey Team (2023)

12. STAKEHOLDER CONSULTATION

12.1 Stakeholder Consultation Procedure

Figure 1.11.1 shows the administrative structure in the Target Area of the Global Project. Below the Caidat or rural commune levels, there is *Douar*, which can be regarded as a "village". However, *Douars* do not have any administrative offices. Thus, the smallest administrative unit is thought to be *Caidat* or rural commune levels. In *Douars*, there are local leaders, who are nominated by the Caidat. With such a structure, according to Moroccan custom, any project proponents must take several steps of courtesy call before approaching the local people.

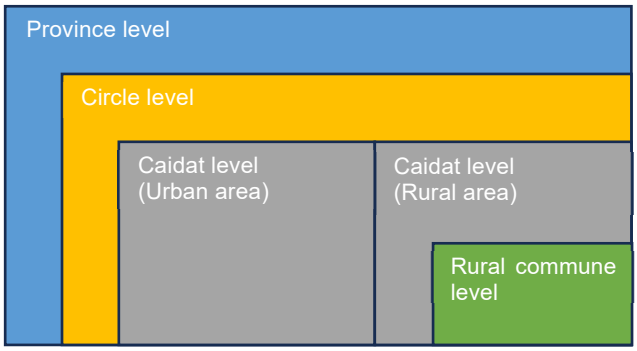


Figure 12.1 Administrative Structure in the Target Area of the Global Project
Source: JICA Survey Team (2023)

In the preparatory survey, the procedure for organizing stakeholder meetings at the scoping stage was followed, with reference to the administrative structure shown in Figure 12.2. As a result, both provincial offices in Sidi Kacem and Sidi Slimane provinces suggested the Global Project proponent to have meetings first with institutions concerned at the provincial level to share information of the Global Project before going to the next step, i.e., communicating with Circles, *Caidat*, etc.

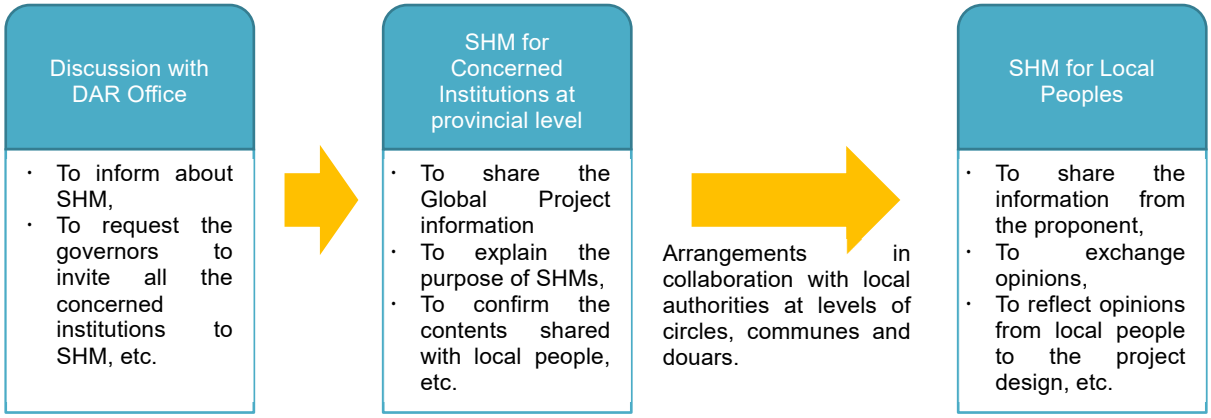


Figure 12.2 Procedure of Stakeholder Meeting (SHM)
Source: JICA Survey Team (2023)

Prior to the arrangement with the local authorities, a meeting with concerned institutions at the provincial level was organized for the final confirmation of local stakeholders. The main purpose of the meetings was not to miss out on any key stakeholders at the field level from a series of processes in the stakeholder engagement. In addition, it was also confirmed how the Global Project proponent should approach local people. The invited institutions to the meetings are as follows:

Table 12.1 Concerned Institutions Invited to the Meetings

Sector	Institution
Agricultural Sector	DIAEA
	ORMVAG
	Provincial Directorate of Agriculture (DPA)
	Regional Directorate of Agriculture (DRA)
	Agricultural Development District (ADA)

Sector	Institution
	Chamber of Agriculture (CA)
	National Agency for Agricultural Council (ONCA)
	National Agency for Food Safety (ONSSA)
	National Agency for Water, Forests, and the Fight against Desertification (ANEFLCD)
	National Institute of Agronomic Research (INRA)
Water Resource Sector	Directorate of Hydraulic Management (DAH)
	Hydraulic Basins Agency (ABH)
	National Office of Electricity and Drinking Water (ONEE)-Electricity
	ONEE-Water
Transportation Sector	National Railways (ONCF)
	Provincial Directorate of Equipment, Transportation, and Logistics (DPETL)
Hobos Sector	Provincial representative from the Ministry of Endowments and Islamic Affairs
Interior Sector	Province
	Circle
	Caidat
	Rural commune

Source: JICA Survey Team (2023)

Meetings with the official personnel in Sidi Kacem Province and Sidi Slimane Province were held on 21st March 2023 and 28th March 2023, respectively. In both meetings, any objections were not raised. Further communications with such local authorities as circles were recommended to organize the stakeholder meetings with the local people smoothly.

After the meetings mentioned above, the Global Project proponent had discussions with local authorities at the *Circles* and lower governmental offices to set the schedule for stakeholder meetings targeting the people. In addition, the Global Project proponent consulted with local authorities on whether the meetings should be organized in a gender-separated manner considering the customs in the rural area. As a result, men and women attended stakeholder meetings together in some Douars, while men and women attended other meetings separately depending on the social situation.

Around one week before, the beneficiaries and probable affected persons of the Global Project were invited by calls or oral communication with local leaders such as *Muqaddam* and *Cheikh,* who are very close to the local people. Gender balance of the attendants was also considered, and the local leaders requested both men and women to participate at the same ratio as much as possible if meetings were organized for both. The literate ratios in rural areas of Sidi Kacem Province and Side Slimane Province are around 50% only (see "Table 3.10 Literacy Rates by Province and Gender"), which makes it difficult for the people to find information on stakeholder meetings by means of the notice boards. Thus, stakeholder meetings were noticed from *Muqaddam* to the people individually.

12.2 First Stakeholder Meeting (for Scoping)

The first stakeholder meetings were held in April-May 2023. Table 12.2 shows the schedule, number of participants, and venues. The venues are commune offices or tents outdoors. The Global Project proponent explained the irrigation potential of the Gharb area, the Global Project outline including projects, location, and scale, the results of the alternatives examination, the schedule of the Survey, and proposed environmental surveys to be conducted, followed by a question-and-answer session. The native language of the participants, namely, Arabic, was used in the discussions.

Table 12.2 Schedule of the First Stakeholder Meeting

No.	Related Component	Date	No. of Participants (People including Local Leaders)			Target Area (Venue)		
			Men	Women	Total	Province	Commune	Douar
1	Hricha Main Canal and Hricha Branch Canal	11th April 2023	42	7	49	Sidi Slimane	Azghar	Tissane
2	Hricha Main Canal and	13th April 2023	50	21	71		Azghar	Difaa

No.	Related Component	Date	No. of Participants (People including Local Leaders)			Target Area (Venue)		
			Men	Women	Total	Province	Commune	Douar
3	Hricha Branch Canal	18th April 2023	74	0	74		Oulad Ben Hammadi	Ouled Belaid
4		18th April 2023	0	39	39		Oulad Ben Hammadi	Ouled Belaid
5		20th April 2023	48	0	48		Oulad Ben Hammadi	Salhya
6		20th April 2023	0	51	51		Oulad Ben Hammadi	Salhya
7	Tête Morte Main Canal	26th April 2023	25	0	25		Khenichet	Rbelat,
8		26th April 2023	24	0	24		Khenichet	Oulad Khress
9		27th April 2023	21	2	23		Khenichet	Oulad Khress
10		27th April 2023	0	22	22		Khenichet	Oulad Khress
11	Tête Morte Main Canal, Hricha Main Canal and Hricha Branch Canal	2nd May 2023	31	0	31	Sidi Kacem	Birtaleb	Oulad Yahya
12		3rd May 2023	19	5	24		Birtaleb	Ibn Hazm
13		5th May 2023	19	5	24		Birtaleb	Elfokra
14	Hricha Main Canal and Hricha Branch Canal	09th May 2023	26	3	29		Zirara	
15		10th May 2023	29	0	29		Zirara	
16		12th May 2023	101	2	103		Zirara	

Source: JICA Survey Team (2023)

The meeting minutes of all stakeholder meetings are attached in Appendix. Throughout all the stakeholder meetings held, the main comments and questions from the participants can be summarized in the following six points.

1) Accessibility to the Irrigation Water along the First Main Canal (Tête Morte Main Canal)

In the communes along the First Main Canal (Tête Morte Main Canal), some participants raised the question of whether they would be able to take irrigation water from the canal[22]. It should also be noted that some female participants raised their objections because they thought that they would not get irrigation water. Still, part of their lands would be forcibly taken without proper compensation.

After the stakeholder meetings, the DIAEA, ORMVAG and JICA Survey Team shared and discussed this matter in a regular Working Group meeting. According to DIAEA and ORMVAG, the possibility of including the concerned area in the beneficiary area will be discussed among them. In addition, they confirmed that the lands to be acquired will be compensated appropriately. In the following stakeholder meetings for the Global Project, the feedback on the issue should be provided to the stakeholders.

2) Water Fee after the Global Project Completion

Some participants raised a question of how much the water cost has been commissioned. In this regard, the majority of the participating stakeholders did not answer about a specific amount of the willingness to pay, but they hope the costs could be less than the current ones they have been spending to obtain irrigation water.

[22] According to the current design of the First Main Canal (Tête Morte Main Canal), the water level is set lower than the surrounding agricultural ground level because of the planned underground culvert structure. Therefore, it functions mainly as a water conduit (water conveyance channel) and is not designed to irrigate surrounding farmlands (no pumping stations or other facilities are planned to irrigate surrounding farmland).

After the stakeholder meetings, DIAEA explained to the JICA Survey Team that the cost would be determined based on the contract between the beneficiary farmers and the PPP entities. On the other hand, the firms, which offer the best price in the bidding, will be selected as the PPP entities. The Government of Morocco will subsidize the initial construction costs, which will be shouldered by the PPP entities, in order to ensure reasonable water costs for the beneficiaries.

3) Participation in the Global Project

Some participants, who have already used their own wells for irrigation farming, raised a question of whether they will have to use the irrigation water to be provided by the canals upon the Global Project completion. Since they use groundwater from their wells without paying water charges except for fuel costs for pumping up groundwater, they do not want to spend the water for the irrigation water supplied by the Global Project.

Regarding the issue, the DIAEA, ORMVAG and the JICA Survey Team discussed at the regular Working Group meeting, and they concluded that it is not preferable to force the farmers to participate in the Global Project. On the other hand, the DIAEA said that the government may intervene or even prohibit use of groundwater, if groundwater source is decreased, namely, a decline in water level is identified. Based on the conditions, the Global Project proponent explained the merits and demerits caused by the Global Project to the local people to enhance their understanding of the Global Project.

4) Irrigation Method and On-farm Structure

Some participants asked whether the Global Project could provide the on-farm structures for drip irrigation since it is needed to install drip irrigation systems instead of gravity irrigation to conserve water resources. Basically, the Global Project requests the farmers to arrange on-farm drip irrigation systems by themselves. However, they could receive subsidies from the government, which can cover all the necessary costs.

5) Crop Selection

Some participants raised a question of whether they can select the crops by themselves after the Global Project implementation. The reason for the question could be that the farmers could not select the crops before 1987 due to the instruction of the government. The beneficiaries can select any crops, as they like, except when the government needs to intervene to allocate limited water resources due to water shortage.

6) Support for Women's Groups

There are women’s associations which focus on post-harvest activities, such as processing the harvested raw products into oils and dairy by-products in the Target Area of the Global Project. At the stakeholder meetings, some association members raised a question of whether the Global Project could support their income generating activities. Their main interests are equipment for post-harvest activities, storage to keep products, space for drying products, etc. It means that they want the Global Project to procure such equipment for them.

In response to the question mentioned above, DIAEA said at a regular Working Group meeting that other governmental organizations focus on cooperative activities, including support for women, youth, etc., as a part of the agricultural strategy. However, DIAEA and ORMVAG said that it is necessary to work with the departments concerned on such value chain improvement, since they cannot directly support such activities. In addition, it was confirmed that DIAEA and ORMVAG can connect the female groups to the governmental agencies concerned.

At the series of first stakeholder meetings, meetings targeting only women were organized in two

villages (Oulad Belaid village and Salhya village in Oulad Ben Hammadi Commune, and Oulad Khress village in Khenichet Commune). Questions and comments on the Global Project in the meetings are presented in the following table. Overall, there were no significant differences between the women's and men's comments. In addition, the female participants have no idea about the current water use fee, as household budgets are generally under the responsibility of men. The questions and comments from the female participants at the meetings are presented in Table 12.3 and Table 12.4.

Table 12.3 Responses to Questions from Female Participants at Ouled Belaid Village

Questions	Response from the Project Proponent
How can JICA assist us? Can we receive direct financial support from Japan?	JICA is the acronym for Japanese International Cooperation Agency, the task is to implement the projects that JICA finances by means of the loan agreement with the Ministry of Agriculture.
The roads to the farmlands are not maintained well and become muddy in the winter, namely in the rainy season. As a result, it is difficult for vehicles to reach the farmlands for collection and sale of crops. We are afraid that such poor road conditions will prevent the success of the Global Project.	The communal council has taken care of the roads as an important issue, and road construction is considered as a main component, which will be implemented in the commune. Therefore, we believe that the path roads will have been completed when the Global Project is started. （by the Vice President of the Ouled Benhammadi Commune）
We sell harvested crops to middlepersons, but the sale prices are low. Will the Global Project support the sale of crops (marketing) also?	Yes. The farmers will be monitored by the concerned offices such as ORMVAG, ONCA and ONSSA. The “Project Management Unit” for the Global Project will be created soon and will contact the farmers to give them advice and technical assistance as necessary.
Can we benefit from the Global Project even if our farmland plots are scattered?	The new irrigation system will be beneficial for all farmers, if they agree to use a common hydraulic pressure control valve for at least one ha of land and install a water meter for each farmer. Such a system will allow the farmers to pay only for consumed irrigation water, like the metering of drinking water consumption.
Even if we are not landowners, can we benefit from the Global Project?	Even though you are not landowners, once the Global Project is implemented, you can still expect to see positive effects. The demand for farm laborers will increase, creating numerous job opportunities. Furthermore, since the livestock will have sufficient pasture, they can be sold at a favorable price.
We don’t have experience in marketing. Can we receive technical support from the Global Project to establish an association or cooperative for value-added crop production and sale of them?	We are taking notes about this and will report to the concerned parties. In addition, your request will be taken into consideration.
Does the scale of benefits from the Global Project depend on the farmland size, or is it the same scale regardless of the size?	The irrigation water will be distributed by plot. In addition, the farmers should arrange the necessary structures and facilities, namely, drip irrigation systems within their land.
What kinds of negative impacts of the Global Project can be caused?	In some douars, such as “sector 6”, some land issues may disturb the Global Project. However, such issues will certainly be solved by authorities because the Global Project is more important. (by a female farmer)
The Global Project may raise conflicts among people inheriting agricultural plots, since they fight over the	When the Global Project is implemented, the “Project Management Unit” for the Global Project

Questions	Response from the Project Proponent
water use right.	will be established and will ensure the handling of such issues and organize the irrigation activities.

Source: JICA Survey Team (2023)

Table 12.4 Responses to Questions from Female Participants at Salhya Village

Questions	Response from the Project Proponent
Will the Global Project bring about benefits for landowners only? How can landless people access the benefits?	The Global Project will bring about profits for all people in the Target Area of the Global Project, even if you do not own agricultural lands, you can work on livestock breeding, or work as a workforce in other people's farmlands, which brings about income.
It is needed to plan any income generation activities. However, we don't have enough know-how to initiate and manage the activities. Will the Global Project support us to establish an association or cooperative?	We take note of your comment and will inform the concerned parties of it. In addition, the Ministry of Agriculture will provide all the necessary monitoring of all your activities. *1)
Is it possible for the Global Project to provide financial assistance for the cooperative?	If JICA can provide any assistance, it will be done in the partnership framework between the Government of Morocco and the Government of Japan.
We have already created an association called ENNOUR for making couscous. However, we have stopped the activity since the spread of COVID-19. Can we get assistance from the Global Project?	ORMVAG has a department, which handles such matters. Please contact and request the official personnel of the department for the solution. Then, they will give some support as much as possible. *2)
In some cases, plural persons have inherited a certain farmland plot and have conflicts and hostility among them. How can all of them access irrigation water?	When the Global Project is implemented, the "Project Management Unit" for the Global Project, responsible for handling all problems, will be established, and such persons will find some acceptable arrangement so that all of them will benefit from irrigation.
We want to get your technical advice about the best crops in terms of yield and quality.	Some departments under ORMVAG are the most relevant offices to advise you on this matter. In addition, ONCA supports farmers in the improvement of agricultural techniques.
Is it necessary for the landowners, who already have a drip irrigation system, to change the existing one after the Global Project?	If the equipment is in good status, it can be continuously operated. However, it is necessary to replace the existing one, if it is deteriorated.

*1) DIAEA and ORMVAG will transfer necessary information to the department of the Ministry of Agriculture, which is in charge of agricultural extension, etc. to make it possible for the beneficiaries to access such department.

*2) After the Stakeholder Meeting, the JICA Survey Tean discussed with ORMVAG and DIAEA on the matters, and it was confirmed that DIAEA and ORMVAG can link official department concerned and the women groups, even though they cannot support the groups directly.

Source: JICA Survey Team (2023)

Table 12.5 Responses to Questions from Female Participants at Oulad Khress Village

Questions	Response from the Project Proponent
We heard that we will not access irrigation water from men, who attended today's morning meeting, and that only some persons will get compensation for the land losses. We are not happy with the Global Project, and we want to get benefit from irrigation water.	This area will not get irrigation from the Global Project. However, the affected persons will get compensation for the land acquisition.
I am not a landowner, but I am working in the farmlands and breed livestock. If the farm owners are negatively affected by the Global Project, we also will be affected by the impact.	We want to examine some solutions to mitigate negative impacts.
We are against the Global Project, and we will prepare	We will transfer these comments to concerned

Questions	Response from the Project Proponent
complaints to the concerned authorities. It is not acceptable that irrigation water crosses our lands and we do not get any profit from it.	parties.
In this area, women have no Income Generating Activities. Can you assist us in this aspect?	A "Project Management Unit" for the Global Project will be established and will take in charge all your requests. Department of under ORMVAG and ONCA also will provide you with all the assistance as much as possible.

Source: JICA Survey Team (2023)

After the above stakeholder consultations, individual interviews with female landowners were implemented. The interview results revealed that some female landowners are actively involved in agriculture and business, however others are not.

Most of the female participants in Oulad Belaid are landowners, who have inherited their land from their deceased husbands or fathers. Since the lands are registered in their own names, those women are responsible for decision-making on economic activities, the sale of products, and financing activities. As for farming activities in the field, women are in charge of light farm work, while male laborers are hired for heavy labor.

In the case of a female landowner in Salhya village, the situation is different from that in Oulad Belaid. The land is registered in her name with her signature, but actual activities, e.g., investment, sales of crops, and loan applications, are carried out by her husband, children, or male relatives, instead of herself. Women are responsible for limited farm work, such as caring for livestock, milking cows, and processing dairy products.

12.3 Second Stakeholder Meeting (for Sharing Environmental Survey Results)

Since the environmental survey was completed at the end of July 2023, a series of second stakeholder meetings were held in September 2023 to share the results. Preliminary discussions were held with DARs in Sidi Qasem Province and Sidi Slimane Province, and it was decided to hold the meetings at the commune level rather than at the village (Douar) level, since it is not needed to assemble men and women separately, and the purpose of the second stakeholder meeting is to share the results of the environmental survey.

As well as the first stakeholder meeting, the JICA Survey Team requested the Sidi Kasem Province and Sidi Slimane Province to invite the beneficiaries and affected persons of the Global Project. Also, the Team requested the official personnel to secure the gender balance of participants as much as possible. The information of the second stakeholder meetings was transferred from the provinces to the Caidat offices and from the Caidat offices to Muqaddams, in turn. Moreover, the information was transferred from Muqaddam to the individuals. The dates of the series of second stakeholder meetings are as shown below:

Table 12.6 Schedule of the Second Stakeholder Consultation

No.	Project Concerned	Date	No. of Participants (People including Local Leaders)			Target Area (Venue)	
			Men	Women	Total	Province	Commune
1	Hricha Main Canal and Hricha Branch Canal	8th Sep. 2023	39	11	49	Sidi Slimane	Oulad Ben Hammadi
2	Tête Morte Main Canal	12th Sep. 2023	45	9	54	Sidi Kacem	Khnichet
3	Tête Morte Main Canal, Hricha Main	13th Sep. 2023	40	1	41	Sidi Kacem	Birtaleb

No.	Project Concerned	Date	No. of Participants (People including Local Leaders)			Target Area (Venue)	
			Men	Women	Total	Province	Commune
	Canal and Hricha Branch canal						
4	Hricha Main Canal and Hricha Branch Canal	15th Sep. 2023	34	1	35	Sidi Kacem	Zirara
5		19th Sep. 2023	24	1	25	Sidi Slimane	Azghar
6		26th Sep. 2023	22	0	22	Meknes *1)	Ain Jemaa

*1) A small part of Meknes Prefecture is included in the target area of the Global Project, thus, the people concerned were invited to the stakeholder meeting.

Source: JICA Survey Team (2023)

In the series of the second stakeholder meetings, a review of the first stakeholder meeting and results of the environmental survey, including the study methodology, expected environmental impacts of the Global Project, mitigation measures, monitoring plan, and grievance handling system, were explained. After that, question and answer sessions were organized. Minutes of each stakeholder meeting are attached in the Appendix.

At the second stakeholder meeting, in addition to sharing the environmental survey results, it was also mentioned that the third stakeholder meeting will be organized in November 2023 to present compensation measures against resettlement and land acquisition. The Global Project proponent also explained responses from ORMVAG to the questions raised by the participants at the first stakeholder meeting as follows:

Table 12.7 Responses to Questions from Participants in the First Stakeholder Meeting

No.	Questions at the First Stakeholder Meeting	Responses at the Second Stakeholder Meeting
1	Accessibility of farmland along the First Main Canal (Tête Morte Main Canal) to irrigation water (Noted that farmland along the main canal was not included in the original design.)	1,500 ha of farmland along the First Main Canal (Tête Morte Main Canal) could access irrigation water. Remarks: When the Irrigation Expansion Area (42,000ha) is implemented in the future, the irrigation along the Tête Morte Main Canal will also be examined.
2	Will the cost of irrigation water be lower after the Global Project than the current price?	Although the specific amount of the water cost has yet to be determined, it will be lower than the current fuel price for pumping up water from wells.
3	Is it needed for me to participate in the Global Project even though I use groundwater for irrigation at this moment?	Since groundwater levels tend to decline and groundwater conservation is one of the government's policies, participation in the Global Project is recommended. In addition, the government has a plan to subsidize the Global Project with a drip irrigation system.
4	I understand that drip irrigation systems will be installed. In such a case, will the government provide the facilities?	The beneficiaries are expected to purchase drip irrigation systems by themselves, as the government will not provide the facilities. However, the cost will be covered by government subsidies.
5	Can farmers select crops to be planted by themselves after the Global Project is implemented?	You can select any crops as you like.
6	Please support for Women's Groups.	DIAEA and ORMVAG cannot directly support women's groups, however, it is possible to introduce and/or coordinate relevant governmental organizations, which can support such groups.

Source: JICA Survey Team (2023)

Despite the above explanation, the participants repeatedly raised the same questions, e.g., “Do we have to participate in the Global Project (use the irrigation water provided by the Global Project)?”. Moreover, there were no objections to the Global Project, including concerns about expected environmental impacts. Those questions and comments received are as follows.

Table 12.8 Responses to Questions from Participants in the Second Stakeholder Meeting

No.	Questions and Comments from the Participants	Responses from ORMVAG and Local Authority
1	Which areas are subject to the land acquisition? Please indicate the route of the main canal and the location of the pump stations.	The detailed routes and locations will be shared at the third stakeholder meeting, which will be organized in November 2023.
2	When will the construction works start?	It is planned to start the construction works at the end of 2024, and the accurate schedule will be informed to the people concerned prior to the start of construction works.
3	Will individual farmers own the irrigation water valves, or will plural farmers share one valve?	Basically, a valve is owned by a respective farmer, however, when farmland plots are very small, valves are owned by some farmers jointly.
4	It is strongly proposed that the main canal will be constructed along roads as much as possible to minimize the area to be acquired.	Noted.
5	How much will the water fee be? Also, how much volume of irrigation water will be supplied per hectare?	Both the amount of irrigation water and water fee are under the discussion at this moment.
6	Can we plant crops on the proposed construction site at this moment since it is almost seeding season?	Since you will have enough time until the start of construction, you can plant crops now. Once a detailed construction schedule is determined, the people concerned will be informed.
7	After the construction works is completed, can we use the farmland on the surface of the buried pipelines?	After the lands are acquired for the Global Project, they will be public lands and cannot be used for private farming activities, however, the land loss will be compensated.
8	Are there any profits for the farmers, who have already used drip irrigation systems by using groundwater?	Since the Global Project will be implemented by the government, even farmers, who have already owned drip irrigation facilities, will benefit from the Global Project. They will also help with the maintenance of their existing drip irrigation systems. Note: The statement above was made by the head of the Oulad Ben Hammadi commune, but the latter part, namely, “They will benefit from maintenance of the existing drip irrigation system." means that the farmers can contact field staff of ORMVAG or PPP firms to be deployed, to ask about maintenance and management methods.
9	Irrigation water is obtained from groundwater at present, but salinity is very high so that I have to choose crops with salinity tolerance.	After the completion of this Global Project, you can access irrigation water taken from the river, which is not very salty, and you can select any crops that you want to plant.
10	There are some cases where owners have died without land registration certificates for allocated lands by the agrarian reforms between 1960 and 1980. As a result, some disputes of land inheritance among successors, mainly sons, are observed. In such cases, who is entitled to compensation for land acquisition by the Global Project?	The National Property Directorate should be consulted to obtain a land registration certificate to settle the matter. In addition, compensation for disputed land can be pooled until the issue is fixed.
11	Is it possible for many beneficiaries to use irrigation water at the same time, even in summer when water is scarce?	The amount of irrigation water to be allocated is set after taking into account the peak water use, so that beneficiaries can access the same amount of irrigation water at the same time.

Source: JICA Survey Team (2023)

13. GRIEVANCE HANDLING SYSTEM

As described in "11.2 Grievance Handling and Reporting", various organizations at different levels will be in charge of grievance handling resulting from environmental impacts in the construction period and operation period.

In the construction period, grievances will be filed with the Arrondissement d'Aménagement de la Zone SUD-EST du GHARB for the Global Project through the local leaders, e.g., *Muqaddam,* the village head, and *Caid*, the head of *Caidat*, who are close to the people. If the Arrondissement cannot fix an issue raised by the people, the issue will be transferred to the PMU. The PMU will consult the Supervision Consultants, who will give instructions to the contractors for the resolution.

It is noted that both the people and local leaders in "the Target Area of the Global Project" are Arabic speakers, and it is not difficult for the people to file complaints and/or express their opinions orally to their local leaders as required. In addition, as far as the stakeholder meetings were observed, the people were able to express their opinions and ask questions of Caid or other community leaders easily.

In the operation period, it is proposed that grievances from the beneficiaries will be handled by the PPP firms, which will be contacted through the local leaders. If the PPP firms cannot resolve the problem, the problem will be forwarded to AGR/ADA responsible for the Global Project, an organization under ORMVAG, and the CGR/CDA, which are also subordinate organizations of ORMVAG. If those organizations still cannot handle the problem, the AGR/ADA or CGR/CDA will further raise the problem to ORMVAG, which will then address the problem.

APPENDIX

Minutes of Meetings

Appendix

CONTENTS

I. Minutes of Institution Meeting in Sidi Kacem Province in the Scoping Period (21st March 2023)

1. Date & Time

11:30 to 12:45, 21st March 2023

2. Venue

Conference Room, Sidi Kacem Province Office

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 29 persons in total (see, "Attachment: Participant List").

(1) 11 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 18 persons from the citizen side (male: 13, and female: 5)

5. Discussion Contents

5.1 Opening remarks by General Secretory of Sidi Kacem Province Office

We are happy to have all concerned institutions and people from JICA to talk about this project that will help our region's agriculture.

Unfortunately, the Governor cannot attend the meeting with us, but the Director (of ORMVAG) and I will attend instead.

5.2 Introduction by Director, ORMVAG

As the General Secretary said, this project will help our region a lot, and taking into consideration the importance of the Gharb region in agriculture, the project will help us on the national level as well.

So, we will make sure everything is well prepared for the project to go in the best conditions.

5.3 Presentation about the Project

- Potential about Gharb Region,
- Project component; national strategy, location and size of the project, and
- Engagement plan for the Stakeholder Meetings (SHM)

5.4 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments
1	**Representative from Ouled Nouel**: If the Project will intake water from Koudiat El Borna Barrage, it would affect the water resource of Ouergha river which is an important source of Sebou river's water as well, thus Sebou river will be affected as well.
2	**Representative from Regional Chamber of Agriculture of Sidi Kacem**: The Project is good for the people. In 2013, we were supposed to have a similar irrigation project, but it did not get implemented. Previously, some lands in Sidi Kacem and Sidi Slimane provinces were irrigated, but the irrigation facilities were destroyed. I would like to clarify whether the Boumaiz area will be irrigated by water intake from Koudiat El Borna Dam or other dams. (General secretory then, stopped him and said that let's keep talking about this

No.	Comments
	project and no other issues) The most important thing is that the Project should be controlled. Further, I would like to propose the Project to install stores for people to sell agricultural products, as well.
3	**Head of Chrarda Circle, in Khenichat**: Communication between stakeholders is the most important thing to proceed with the Project smoothly. We will support your field activities; thus, a pre-explanation meeting at local authority level is necessary prior to the access to local people.
4	**Representative of Khenichat:** Considering the entire Kingdom, the Project is helpful.
5	**Representative from NPCT Zirara:** We should inform the people and communes concerned about the details of canal alignments in advance. Due to this, it can prevent people from cultivating plants in the affected area, etc.
6	**Representative from ONCA:** The Project could be good for the local community.

5.5 Closing remarks by General Secretory of Sidi Kacem Province Office

Is it agreed by all the participants that the project is bringing good benefits for the area.

As the Head of circle of Chrarda said, there should be other meetings at the local authority level first, and people should be informed about the project.

(END)

Attachment: Participant List

Date: 21st March 2023

Time: 11:20 AM to 12:45 PM

Venue: Conference room, Sidi Kacem Province Office

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	General Secretary of Governor	Sidi Kacem Province
2	Mr.	**********	Director	ORMVAG
3	Ms.	**********	Head of Development Office	ORMVAG
4	Mr.	**********	Project Manager, focal person for SH meetings	ORMVAG
5	Mr.	**********	ADA in Sidi Kacem	ORMVAG
6	Ms.	**********	ADA	ORMVAG
7	Mr.	**********	AGR Beht/ Sidi Slimane	ORMVAG
8	Mr.	**********	Head of Chrarda cercle	
9	Mr.	**********	Head of Ouergha cercle	
10	Mr.	**********	Caid of Wuled Noual	
11	Ms.	**********	President of Ouled Noual	
12	Mr.	**********	Caid of Khnichet	
13	Mr.	**********	Caid of Tekna Birtaleb	
14	Ms.	**********	Vice President of Birtaleb	
15	Mr.	**********	-	ONCA
16	Mr.	**********	-	ONCA Sidi Kacem
17	Mr.	**********	-	ONSSA
18	Mr.	**********	Chamber of Agriculture	Sidi Kacem
19	Ms.	**********	Head of Water Service	Sidi Kacem
20	Mr.	**********	Deputy to the delegate for state domains	
21	Mr.	**********	Provincial Director	ONEE, BE
22	Ms.	**********	Head of CDDRF	Sidi Kacem
23	Mr.	**********	-	NPCT Zirara
24	Mr.	**********	-	PCT Chbanat
25	Mr.	**********	Engineer	ADI
26	Mr.	**********	Engineer	ADI
27	Mr.	**********	Engineer	ADI
28	Ms.	**********	Social experts	JICA Survey Team
29	Mr.	**********	Survey Assistant	JICA Survey Team

II. Minutes of Institution Meeting in Sidi Slimane Province in the Scoping Period (28th March 2023)

1. Date & Time

11:15 to 13:00, 28th March 2023

2. Venue

General Secretary's Conference Room, Sidi Slimane Province Office

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 23 persons in total (see, "Attachment: Participant List").

(1) 10 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 13 persons from the citizen side (male: 11, and female: 2)

5. Discussion Contents

5.1 Opening remarks by General Secretory of Sidi Slimane Province Office

This project is coming in the framework of the projects of JICA, which is not the first project of its kind in Morocco.

So, we would like to thank JICA for their interest and for this meeting. We are willing to help you with everything we can to make this project succeed.

5.2 Introduction by Director, ORMVAG

Before going to local people for stakeholder meeting, we are having meetings with local authorities, and this meeting with your province is part of it.

5.3 Introduction by JICA Survey Team

Thank you first of all for being with us in this meeting, as the General secretory explained, this is not JICA's first project in the country, and Insha'Allah not going to be the last one, and the project is in the irrigation domain which is the number one domain the region is most known for.

Thank you for your introduction and for this meeting's organization.

5.4 Presentation about the Project

- Potential about Gharb Region,
- Project component; national strategy, location and size of the project, and
- Engagement plan for the Stakeholder Meetings (SHM)

5.5 Comments/ Questions from the Participants

Table. Contents Discussed

No.	Comments	Answer
1	**General Secretary (when ADI mentioned the sectorial strategies in slide number 8)**: Indeed, few to none agropoles (industrial poles)[*1] and packing stations[*2] are in Sidi Slimane, so this new	-

No.	Comments	Answer
	agropole that you are talking about will be important for the zone. *1: An agropole is an economic development cluster/center focused on the agri-food industry. *2: Packing stations are facilities used to process and pack agricultural products before marketing. Agricultural packing stations may include equipment such as sorters, graders, washers, peelers, packing machines, conveyors and weighing systems. This equipment is used to sort, clean, grade, package and prepare agricultural products for sale.	
2	**Representative from National Institute of Agronomic Research of Kenitra (INRA)**: When talking about people who might be affected, there are some people who are actually enjoying fishing in Sebou river, especially sportive fishing.	-
3	**General Secretary**: I just have one question, what is the next step? Because we should have a strategy so that the project can start and go in the right path.	**ADI**: First of all, we should be proud of the procedure of our national latest projects, because this Stakeholder Engagement Plan (SHEP) is very important for such big projects so that all concerned people should be informed, and to answer your question, this meeting is part of the beginning of the next step: to start workshops with local people.
	General Secretary: So, before you go out you should give schedule to DAR so that we can inform the concerned authorities.	**ADI**: Noted.
4	**General Secretary**: About Melkisation project (from collective land ownerships to individual ownerships), we should learn from it, learn from the highs, the results and objectives that we achieved; and also, from what went wrong etc. Especially in the communication with local people, this Project can refer to the case of the said project.	-
5	**General Secretary**: Is the project 100% funded by JICA?	**ORMVAG**: We are still negotiating with them so that they fund both Tete Morte and Hricha.
	General Secretary: You should just know that these people will give us money if we work in the timeline and if they see that the project has good benefits for the people. So, let's do our best to make this succeed.	**ORMVAG**: We should just be grateful that from all the country, JICA actually are funding such project in our zone.
6	**Chamber of Agriculture of Rabat-Sale-Kenitra Region**: I am very happy and positive for this project and were actually waiting for this for a long time, and from my experience with farmers, everyone will be happy with this project and even do some positive promotion to the project.	**Deputy of Provincial council**: The chamber of agriculture of Rabat-Sale-Kenitra Region has actually a great experience in Azghar, as he was the first one to take a lot of initiatives to help the agricultural sector in the zone, now there are 37 people with him in the cooperative.
7	**Provincial Director of ONCF**: For the point about where the canal will cross the railway, it is better to give us information prior to the beginning of the project.	**JICA Survey Team**: We actually have the satellite coordinates of the probable point of the crossing, and we can share it with you.

5.6 Closing remarks by General Secretory of Sidi Slimane Province Office

Thank you again, and now I will leave and let you discuss and fix the schedule for next meetings to hold, and I think you will need to have them in the level of the Caidas.

(END)

Attachment: Participant List

Date: 28th March 2023

Time: 11:15 AM to 13:00 PM

Venue: General Secretary's Conference room, Sidi Slimane Province Office

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	General Secretary of Governor	Sidi Slimane Province
2	Ms.	**********	Head of Development Office	ORMVAG
3	Mr.	**********	-	ORMVAG
4	Mr.	**********	Former Head of Development Office	ORMVAG
5	Mr.	**********	ADA in Sidi Sidi Slimane	ORMVAG
6	Mr.	**********	AGR Beht/ Sidi Slimane	ORMVAG
7	Mr.	**********	Deputy Director	Provincial Council
8	Mr.	**********	Head of circle	Circle of Sidi Slimane
9	Mr.	**********	Head of Division of Rural Affairs	DAR of Sidi Slimane
10	Mr.	**********	Representative	Chamber of agriculture of Rabat-Sale-Kenitra Region
11	Mr.	**********	Director of Electricity Branche	ONEE- Sidi Slimane
12	Mr.	**********	Deputy to the delegate for state domains	Delegation of the State domains of Kenitra
13	Mr.	**********	-	ONCA-Kenitra
14	Mr.	**********	-	Regional Directorate of Equipment and Water Sidi Slimane
15	Ms.	**********	Director of Control and plant protection Service	ONSSA-Sidi Slimane
16	Ms.	**********	Cadastre Service	ANCFCC
17	Mr.	**********	Provincial Director	National Agency of Water and Forestry
18	Mr.	**********	Researcher	National Institute of Agronomic Research-Kenitra
19	Mr.	**********	Provincial Director	ONCF
20	Mr.	**********	Land Conservation Service	ANCFCC
21	Mr.	**********	Engineer	ADI
22	Mr.	**********	Engineer	ADI
23	Mr.	**********	Survey Assistant	JICA Survey Team

III. 1st Minutes of Stakeholder Meeting in the Scoping Period (11th April 2023)

1. Date & Time

11:15 to 13:30, 11th April 2023

2. Venue

Tisane, Azghar, Sidi Slimane Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 60 persons in total (see, "Attachment: Participant List").

(1) 11 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 49 persons from the citizen side (male: 42, and female: 7)

5. Discussion Contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Vice President of Azghar Commune:** I must just specify the importance of the Project for all the stakeholders and their great commitment to follow the instructions of his majesty the king and come up with positive results.	None
2	**Farmer and Representative of Chamber of Agriculture**: We are very happy the Project that used to be considered as a dream and will come into reality. We are ready and fully engaged to make it successful and will always work for solving any problems or constraints that may be encountered. The population has suffered great damages due to the latest droughts' period and other disasters. We are optimistic that the Project will give many job opportunities and bring better chances to all farmers, in both Sidi Kacem and Sidi Slimane provinces.	None
2	**Male farmer:** 1. Are all the Agricultural Reform Cooperatives covered by this Project or not? 2. Will the internal facilities in farmlands be provided by	**ADI members:** 1.Yes. All the cooperatives will benefit from the Project. 2.The purpose of the Project is for people to use drip irrigation. The irrigation water will come next to your land,

No.	Comments/Questions	Answer
	the Project? 3. Is the irrigation system using the same pipeline design as in Loukouss area with box culvert? In addition, how and where will the water meter be put?	but each landowner should prepare their own internal facilities. 3.Yes. The irrigation system will be similar to the one in Loukouss area. As for the water meter, it could be same.
3	**Male farmer:** 1. What are the projects' objectives concerning the crops? Should it target the cereals, or any other crops can be cultivated? In my opinion, 'dessert' crops should be avoided. 2. Will collectively owned lands called "soulalia" which are under Minister of Interior, be beneficiary from the Project?	**ADI member:** 1.Crops to be cultivated are not imposed or compulsory on the farmers by the Project nor government. The farmers can cultivate any crops they want. 2.This is a question that should be forwarded to the concerned parties and will give you feed back later.
4	**Vice President of Provincial Council**: This is a big day because we are meeting you, farmers. We had a meeting in the province and saw the presentation. In addition, we felt the importance of irrigation development. We told JICA and ADI that Azghar farmers are very positive and optimistic for the Project. We do not need just an agriculture that will feed us. We should think about what we will have as extra to scale our agriculture and develop livelihood. We should be honest and explain that the Project might take a small part of your land for the pipeline but will give you more benefits.	None
5	**Male farmer**: 1. Will the land acquisition and/or resettlement be conducted with compensation? 2.Will the irrigation water be charged or for free? 3.How can you deal with the water meter or any other facilities? Should it be owned by one person, or by the landowners even when the land has many owners?	**ADI member:** 1.The land acquisition and/or resettlement is just for a part of the land. Of course, there will be a certain compensation that will be decided later. 2. It will be charged, but the price that will be paid is for the service and not for water itself. 3. From our experiences, the water meters are provided to farmers based on some rules. For example, 1 ha surface will have one water meter with distribution system for all the farmers within the small surface. One of them is in charge of the water meter and it is registered in his name. This is because the whole plot is small and not as big. The purpose is to reduce the costs and make the management of water easier.
6	**Male farmer**: Will the irrigation water be divided by titleholder or by whole plot?	**ADI member**: The water will be by plot. In addition, farmers should engage to provide the necessary structures and facilities within their land and prepare their lands to drip irrigation.
7	**Male farmer**: It is evident that this is a very important Project that will improve the irrigation system in Azghar. However, how can it be possible to have water only for irrigation while most population do not have access to drinkable water? In addition, is the project under the framework of the national program for the supply of drinking water and irrigation water 2020-2027?	**ORMVAG**: We have no answer now, but we will confirm and give the feedback you later about drinking water. The project is under the national program as an ADI member explained.

5.3 Comments from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

99%: Rainfed

1%: Drip irrigation from wells*

*Some of farmers has their own wells. Recently, however, with the increase of droughts the rate of salinity is also increasing up to 5.7%.

(2) What is current irrigation water source?

99%: Rainfed

1%: Underground

(3) How much do you spend for the irrigation annually/monthly at present?

For the small number who use wells for irrigation, it should be 900 MAD/ 5000 m^3 (0.18 MAD/m^3).

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

0%: No

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

According to the participants, the current cost of irrigation is around 20 dh /1000litre. Based on this, the following two answers were raised from them. Most are willing to apply the new irrigation system and are ready to pay the tariff suggested by the managing system if there is. Some of them suggested HALF the existing cost, and some said the same cost is good (About 4 people in total)

1) What the irrigation by well currently costs: 900 MAD/ 5000 m^3

2) Half of what the irrigation by well costs: 450 MAD/ 5000 m^3

II. Agricultural water users' association activity

According to the participants, there is no such association in Azghar, Tisane Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		
	3) 3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		
	8) Other housework activities		100%		
Land Ownership	1) Registration of the ownership on farmland	90%*	10%		
	2) Decision-making of buying/ selling/ leasing/ renting farmland	90%	10%		
	3) Making priority in inheritance of farmland (law and general)	90%	10%		
Agricultural Machinery	1) Ownership of agricultural machinery	90%	10%		
	2) Decision-making of buying/ renting	90%	10%		

Item		Male	Female	Both	Not Necessary/ NA
	agricultural machinery				
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	90%	10%		
	2) Decision-making of investment for purchase of agricultural inputs	90%	10%		
	3) Decision-making of selling prices	90%	10%		
	4) Preparing land	90%	10%		
	5) Planting, transplanting, broadcasting	90%	10%		
	6) Weeding	90%	10%		
	7) Watering	90%	10%		
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	90%	10%		
	9) Harvesting	90%	10%		
	10) Post-harvesting, processing	90%	10%		
	11) Transporting products to selling place	90%	10%		
	12) Selling products	90%	10%		
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	90%	10%		
	2) Name of account, obligor, etc.	90%	10%		
	3) Management of household budget	90%	10%		

Note: * The person who takes all decisions (except Housework which is unanimously done by women) is the landowner (Man or Woman).

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	We need agricultural water from the dam and facilities in the lands.
Female	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied : 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	We need a water from the dam.

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	We need better drinking water because its quality is bad.
Female	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	We need better drinking water because its quality is bad.

Supplemental information: The female participants were only 3. They are also landowners as they inherited land from a dead husband or parent, so they are doing most activities in the household and extra activities such as decision making of investment for purchase, selling products or even applying for financial services including loans etc., because the land is registered under their names. As for the field farming activities, they do smaller tasks that they are able to handle, or they hire male workers for harder tasks.

(END)

Attachment: Participant List

Date: 11th April 2023

Time: 11:15 AM to 13:30 PM

Venue: Tisane, Azghar, Sidi Slimane Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Caid	Azghar
2	Mr.	**********	Vice president of provincial council	Sidi Slimane Province
3	Mr.	**********	Vice president of commune Azghar	Azghar
4	Mr.	**********	Communal Councilor	Azghar commune
5	Mr.	**********	Expert in communication	ADI
6	Ms.	**********	Engineer	ADI
7	Mr.	**********	Engineer	ADI
8	Mr.	**********	Engineer	ADI
9	Ms.	**********	Survey assistant	JICA Survey Team
10	Mr.	**********	Survey Assistant	JICA Survey Team
11	Mr.	**********	ADA	ORMVAG
12	Mr.	**********	Farmer	
13	Mr.	**********	President of agricultural chamber/farmer	
14	Mr.	**********	Farmer	
15	Ms.	**********	Farmer	
16	Mr.	**********	Agricultural chamber	
17	Ms.	**********	Farmer	
18	Ms.	**********	Farmer	
19	Ms.	**********	Farmer	
20	Mr.	**********	Farmer	
21	Mr.	**********	Farmer	
22	Mr.	**********	Farmer	
23	Mr.	**********	Farmer	
24	Mr.	**********	Farmer	
25	Mr.	**********	Farmer	
26	Mr.	**********	Farmer	
27	Mr.	**********	Farmer	
28	Mr.	**********	Farmer	
29	Mr.	**********	Farmer	
30	Mr.	**********	Farmer	
31	Mr.	**********	Farmer	
32	Mr.	**********	Farmer	
33	Mr.	**********	Farmer	
34	Mr.	**********	Farmer	
35	Mr.	**********	Farmer	
36	Mr.	**********	Farmer	
37	Mr.	**********	Farmer	
38	Mr.	**********	Farmer	
39	Mr.	**********	Farmer	
40	Mr.	**********	Farmer	
41	Mr.	**********	Farmer	
42	Mr.	**********	Farmer	
43	Mr.	**********	Farmer	
44	Mr.	**********	Farmer	
45	Mr.	**********	Farmer	
46	Mr.	**********	Farmer	
47	Mr.	**********	Farmer	
48	Mr.	**********	Farmer	
49	Mr.	**********	Farmer	
50	Ms.	**********	Farmer	
51	Ms.	**********	Farmer	
52	Ms.	**********	Farmer	
53	Mr.	**********	Farmer	
54	Mr.	**********	Farmer	
55	Mr.	**********	Farmer	
56	Mr.	**********	Farmer	
57	Mr.	**********	Farmer	
58	Mr.	**********	Farmer	

No.	Mr./Ms.	Full Name	Position	Organization
59	Mr.	**********	Farmer	
60	Mr.	**********	Farmer	

IV. 2nd Minutes of Stakeholder Meeting in the Scoping Period (13th April 2023)

1. Date & Time

11:15 to 13:30, 13th April 2023

2. Venue

Difaa, Azghar, Sidi Slimane Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 80 persons in total (see, "Attachment: Participant List").

(1) 9 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 71 persons from the citizen side (male: 50, and female: 21)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Male farmer:** We have got information about the Project and are aware that it is very beneficial to all people. Therefore, we are engaged to assist in any required ways.	None
2	**Male farmer**: What about the price of the water?	**ADI Member**: As we said the other day, we actually want to reach that phase to discuss this point. The price is not discussable right now. In addition, it's decided by the government. However, it will most likely be less than the cost of the present irrigation (by wells). The right answer will come later, it's impossible to fix an amount because of many reasons right away. The project will start functioning in the future 2 years, at that time we can find how to fix it.
3	**Vice president Azghar Commune**: 1.The price of the water: is it by hour or by m3? By hour is expensive with 0.60 DH per m3 2.For an individual person who have just 1 ha, should he be with other farmers? He suggests that the cost be no	**ADI member**: 1.and 2. Water will come till the land and used by drip irrigation, so it is going to be paid per m3. The suggestion of 0.10 dh per m3 for example will be noted in our reports and submitted to the concerned entities. That's the purpose of these meetings.

No.	Comments/Questions	Answer
	more than 0.10 DH. 3.What about the subsidies from the government concerning the equipment and facilities of drip irrigation? What is the scale of subsidies? Is it same for all farmers or depending on the surface? Is it necessary to create cooperatives for this case to benefit from the ADA's (Agricultural development agency) assistance? 4.The pipeline should be secured so as to avoid vandalism, have you prepared security guards to manage this?	**Chamber of Agriculture**: 3.There are 7 existing cooperatives, we will legalize them, and also create new associations with the help of JICA. **ADI member**: 4.The security is available and will be managed according to the responsible entity.
4	**Male Farmer**: For collectively used lands, can just one person be responsible for the irrigation for all the people?	**ADI member**: Each land will benefit from irrigation water, and if the surface is big enough each person from these collective lands will have his water meter in his part.
5	**Representative of Chamber of Agriculture**: Please ask all the questions you have so that everything can be clearer.	None
6	**Female Farmer**: What about inheritors that have just 1 ha for example?	**ADI member**: Same thing for inheritors as well, they will have their own water meters. But if the surface is less than 1 ha for example, multiple lands/landowners might share 1 water meter.
7	**Ms. President of Zohour Hassnaouia Cooperative* (Female)**: 1. Our objective is to improve the activities in our cooperative and get more benefit. We want to know how this project can assist us as women's cooperative. 2. we have started our cooperative only with 15 women and have no financial means. Luckily, however, now we have reached a good situation and participated in many agricultural big events even in foreign countries (France). In addition, we are having vocational training in some important institutes. Thus, I encourage all people to go ahead and work hard to achieve best results.	**ADI member**: According to a previous experience in another zone, the product got increased price from 70 dh in 2007 to 350 dh in 2010. Thus, when you valorize your products, of course you will get more benefit and raise the standards of living.
8	**Male farmer:** We are very happy to get so much information; we didn't know exactly the project contents before this meeting. But now, we understand it better.	None
9	**Respectful elder in the community**: We are with you, and we thank you so much. We are aware that this project will be a very positive and we will encourage it by all means.	None
10	**Representative of Chamber of Agriculture:** Firstly, I would like to thank the Caid for chairing this meeting and also the first meeting of Tuesday. We would like to thank ADI for giving their time to giving the information and taking notes for all our concerns and questions. We would like to thank also JICA members, and to explain to them that this is really important for the farmers. We would like to thank ORMVAG also. Finally, we ensure our full engagement to assist the project and push it forward.	None
11	**Male farmer:** This project is social and human before being technical. Now, the progress is reaching new levels. However, we are still discussing agricultural issues. We want to think of how to create transformation units and factories to valorise our products and target international marketing. We want to reach higher levels of water saving irrigation methods, not only drip irrigation but even more developed methods.	None
12	**Male farmer**: For drip irrigation, it is not possible to use it for cereals.	**ADI Member:** We have experienced drip irrigation in another area

No.	Comments/Questions	Answer
		(Marrakesh Elhaouz) and it proved to be very useful for cereals as well and gave good results.

Note: * Cooperative of Women producing and selling agricultural products.

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

95%: Rainfed

5%: Drip irrigation from wells

(2) What is current irrigation water source?

95%: Rainfed

5%: Underground

(3) How much do you spend for the irrigation annually/monthly at present?

For the 5% of people who use wells for irrigation, it is about 0.18 MAD/m^3.

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

0%: No

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

Majority of participants said that it should be less than irrigation from wells. In addition, few people said "Why not ask for it to be even just 0.10 MAD/m^3?"

II. Agricultural water users' association activity

According to the participants, there is no such association in Difaa, Azghar Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		
	3) 3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		
	8) Other housework activities		100%		

Item		Male	Female	Both	Not Necessary/ NA
Land Ownership	1) Registration of the ownership on farmland	85%*	15%		
	2) Decision-making of buying/ selling/ leasing/ renting farmland	85%	15%		
	3) Making priority in inheritance of farmland (law and general)	85%	15%		
Agricultural Machinery	1) Ownership of agricultural machinery	85%	15%		
	2) Decision-making of buying/ renting agricultural machinery	85%	15%		
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	85%	15%		
	2) Decision-making of investment for purchase of agricultural inputs	85%	15%		
	3) Decision-making of selling prices	85%	15%		
	4) Preparing land	85%	15%		
	5) Planting, transplanting, broadcasting	85%	15%		
	6) Weeding	85%	15%		
	7) Watering	85%	15%		
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	85%	15%		
	9) Harvesting	85%	15%		
	10) Post-harvesting, processing	85%	15%		
	11) Transporting products to selling place	85%	15%		
	12) Selling products	85%	15%		
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	85%	15%		
	2) Name of account, obligor, etc.	85%	15%		
	3) Management of household budget	85%	15%		

Note: * The person who takes all decisions (except Housework which is unanimously done by women) is the landowner (Man or Woman).

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	We need this water and facilities in our lands so that we can use this water.
Female	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied : 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	We need just water from this project.

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	We actually need drinking water as well
Female	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	Drinking water is needed

Supplemental information:

In comparison to the former SH meeting, the number of participants is larger. In addition, the number of women attendants is also more important. The main reason is that the people in the first workshop

have shared the information with other people, and some persons have even shared the sheets that were distributed on Tuesday 11th April.

Moreover, we have been informed that the first workshop (Tissane) was live broadcasted in Facebook and therefore many citizens are curious to get more details.

The attendants have mentioned that they have heard about the project during the two former surveys and the Geo-technical study.

[Gender aspect]

The number of female attendants was bigger than the last workshop. However, the participants preferred to hold one mixed workshop together with males. They have willingly answered all the questions and some of them mentioned that they noted their phone numbers and will be ready to answer any more questions if necessary.

(END)

Attachment: Participant List

Date: 13th April 2023

Time: 11:15 AM to 13:30 PM

Venue: Difaa, Azghar, Sidi Slimane Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Caid	Azghar
2	Ms.	**********	Vice president of Azghar commune	Azghar commune
3	Mr.	**********	Vice president of Azghar commune	Azghar
4	Mr.	**********	President of agricultural chamber/farmer	Azghar commune
5	Mr.	**********	ADA	ORMVAG
6	Ms.	**********	Engineer	ADI
7	Mr.	**********	Engineer	ADI
8	Mr.	**********	Engineer	ADI
9	Ms.	**********	survey assistant	JICA Survey Team
10	Mr.	**********	Survey Assistant	JICA Survey Team
11	Mr.	**********	President of Cooperative	Hassnaouia Cooperative
12	Mr.	**********	President of Cooperative	Alghazia Cooperative
13	Mr.	**********	Farmer	Hassnawa Cooperative
14	Mr.	**********	Farmer	
15	Mr.	**********	Farmer	
16	Mr.	**********	Farmer	
17	Mr.	**********	Farmer	
18	Ms.	**********	Farmer	
19	Mr.	**********	President of Cooperative	Hassnawa Cooperative
20	Mr.	**********	Farmer	
21	Mr.	**********	Farmer	Difaa 2
22	Mr.	**********	Farmer	Salah
23	Mr.	**********	Farmer	
24	Mr.	**********	Farmer	Difaa 1
25	Mr.	**********	Farmer	Difaa 2
26	Mr.	**********	Farmer	Difaa 2
27	Mr.	**********	Farmer	Difaa 1
28	Mr.	**********	Farmer	Difaa 2
29	Mr.	**********	Farmer	Difaa 2
30	Mr.	**********	Farmer	Difaa 1
31	Mr.	**********	Farmer	
32	Mr.	**********	Farmer	
33	Mr.	**********	Farmer	
34	Mr.	**********	Farmer	
35	Mr.	**********	Farmer	
36	Mr.	**********	Farmer	
37	Mr.	**********	Farmer	

No.	Mr./Ms.	Full Name	Position	Organization
38	Mr.	**********	Farmer	
39	Mr.	**********	Farmer	
40	Mr.	**********	Farmer	
41	Mr.	**********	Farmer	
42	Mr.	**********	Farmer	
43	Ms.	**********	Farmer	
44	Mr.	**********	Farmer	
45	Ms.	**********	Farmer	
46	Ms.	**********	Farmer	
47	Ms.	**********	Farmer	
48	Ms.	**********	Farmer	
49	Ms.	**********	Farmer	
50	Ms.	**********	Farmer	
51	Ms.	**********	Farmer	
52	Mr.	**********	Farmer	
53	Mr.	**********	Farmer	
54	Ms.	**********	Member of Cooperative	Zohour Hassnaouia Cooper.
55	Ms.	**********	Manager of Cooperative	Zohour Hassnaouia Cooper.
56	Ms.	**********	Member of Cooperative	Zohour Hassnaouia Cooper.
57	Ms.	**********	Member of Cooperative	Zohour Hassnaouia Cooper.
58	Ms.	**********	Member of Cooperative	Zohour Hassnaouia Cooper.
59	Ms.	**********	Member of Cooperative	Zohour Hassnaouia Cooper.
60	Ms.	**********	Member of Cooperative	Zohour Hassnaouia Cooper.
61	Ms.	**********	Member of Cooperative	Zohour Hassnaouia Cooper.
62	Ms.	**********	Member of Cooperative	Zohour Hassnaouia Cooper.
63	Ms.	**********	Member of Cooperative	Zohour Hassnaouia Cooper.
64	Ms.	**********	Member of Cooperative	Zohour Hassnaouia Cooper.
65	Mr.	**********	Farmer	
66	Mr.	**********	Farmer	
67	Mr.	**********	Farmer	
68	Mr.	**********	Farmer	
69	Mr.	**********	Farmer	
70	Mr.	**********	Farmer	
71	Mr.	**********	Farmer	
72	Mr.	**********	Farmer	
73	Mr.	**********	Farmer	
74	Mr.	**********	Farmer	
75	Mr.	**********	Farmer	
76	Mr.	**********	Farmer	
77	Mr.	**********	Farmer	
78	Mr.	**********	Farmer	
79	Mr.	**********	Farmer	
80	Mr.	**********	Farmer	

V. 3rd Minutes of Stakeholder Meeting in the Scoping Period (18th April 2023)

1. Date & Time

11:30 to 13:30, 18th April 2023

2. Venue

Ouled Belaid, Ouled Benhammadi Commune, Sidi Slimane Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 79 persons in total (see, "Attachment: Participant List").

(1) 5 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 74 persons from the citizen side (male: 74)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Head of Oulad Ben Hammadi Commune (to farmers):** Efforts are made so that the region of Azghar and Oulad Ben Hammadi gets the irrigation water by this project. Please facilitate and do not block anything concerning this project. The pipelines will be buried underground, and this is of course for the good of the area. If you have any problem or issue or question about the Project, do not hesitate to come to the commune or Caida and ask. Even if the Project takes part of your land, the procedure of expropriation will be implemented, and you will be compensated.	None
2	**Caid of Oulad Ben Hammadi (to farmers):** This project is yours. Or let's say it is the project of your children's. That's why there should be no problems or issues from your side. Once a land gets irrigation water, and it gets its facilities. Then, the value of the land increases significantly, without even mentioning the crops in the land. You will be able to cultivate new types of crops that are more valuable. The water quality here is as you know, not even good	None

No.	Comments/Questions	Answer
	for drinking let alone irrigation. JICA already participated in other projects before,10 to 15 years later, and they are still coming to see and monitor from time to time.	
3	**Head of Oulad Ben Hammadi Commune (to farmers):** If the lands are facilitated and prepared, Agricultural Loans will become more easily accessible.	None
4	**Male farmer:** We would like to thank you all, and to thank you Mr. Head of Commune for your efforts.	None
5	**Male farmer:** No problem about expropriation, because it is for a bigger purpose that is irrigation for a big area.	None
6	**Male farmer:** Make the project urgent so that we can see it, we are old.	None

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

80%: Drip irrigation from wells that they have

20%: Rainfed

(2) What is current irrigation water source?

20%: Rainfed

80%: Underground water

(3) How much do you spend for the irrigation annually/monthly at present?

For underground water the average cost is about 0.20 MAD/ m^3

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

The five participants said that it is better if it's less than the cost of irrigation from underground, 0.15 MAD or 0.10 MAD/ m^3.

II. Agricultural water users' association activity

According to the participants, there is no such association in Azghar, Tisane Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		

Item		Male	Female	Both	Not Necessary/ NA
	3) 3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		
	8) Other housework activities		100%		
Land Ownership	1) Registration of the ownership on farmland	95%	5%		
	2) Decision-making of buying/ selling/ leasing/ renting farmland	95%	5%		
	3) Making priority in inheritance of farmland (law and general)	95%	5%		
Agricultural Machinery	1) Ownership of agricultural machinery	95%	5%		
	2) Decision-making of buying/ renting agricultural machinery	95%	5%		
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	95%	5%		
	2) Decision-making of investment for purchase of agricultural inputs	95%	5%		
	3) Decision-making of selling prices	95%	5%		
	4) Preparing land	95%	5%		
	5) Planting, transplanting, broadcasting	95%	5%		
	6) Weeding	95%	5%		
	7) Watering	95%	5%		
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	95%	5%		
	9) Harvesting	95%	5%		
	10) Post-harvesting, processing	95%	5%		
	11) Transporting products to selling place	95%	5%		
	12) Selling products	95%	5%		
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	95%	5%		
	2) Name of account, obligor, etc.	95%	5%		
	3) Management of household budget	95%	5%		

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: Satisfied: Normal: **Dissatisfied: 100%** Very dissatisfied:	Very satisfied: Satisfied: Normal: **Dissatisfied: 100%** Very dissatisfied:	Dam water to arrive to their lands as soon as possible.

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: Satisfied: **Normal: 100%** Dissatisfied: Very dissatisfied:	Very satisfied: Satisfied: **Normal: 100%** Dissatisfied: Very dissatisfied:	Drinking water quality needs to be increased.

(END)

Attachment: Participant List

Date: 18th April 2023

Time: 11:30 to 13:30

Venue: Oulad Belaid, Oulad Ben Hammadi Commune, Sidi Slimane Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Caid	Oulad Ben Hammadi
2	Mr.	**********	Head of Commune	Oulad Ben Hammadi
3	Mr.	**********		ORMVAG
4	Mr.	**********	Farmer	
5	Mr.	**********	Farmer	
6	Mr.	**********	Farmer	
7	Mr.	**********	Farmer	
8	Mr.	**********	Farmer	
9	Mr.	**********	Farmer	
10	Mr.	**********	Farmer	
11	Mr.	**********	Farmer	
12	Mr.	**********	Farmer	
13	Mr.	**********	Farmer	
14	Mr.	**********	Farmer	
15	Mr.	**********	Farmer	
16	Mr.	**********	Farmer	
17	Mr.	**********	Farmer	
18	Mr.	**********	Farmer	
19	Mr.	**********	Farmer	
20	Mr.	**********	Farmer	
21	Mr.	**********	Farmer	
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25	Mr.	**********	Farmer	
26	Mr.	**********	Farmer	
27	Mr.	**********	Farmer	
28	Mr.	**********	Farmer	
29	Mr.	**********	Farmer	
30	Mr.	**********	Farmer	
31	Mr.	**********	Farmer	
32	Mr.	**********	Farmer	
33	Mr.	**********	Farmer	
34	Mr.	**********	Farmer	
35	Mr.	**********	Farmer	
36	Mr.	**********	Farmer	
37	Mr.	**********	Farmer	
38	Mr.	**********	Farmer	
39	Mr..	**********	Farmer	
40	Mr.	**********	Farmer	
41	Mr.	**********	Farmer	
42	Mr.	**********	Farmer	
43	Mr.	**********	Farmer	
44	Mr.	**********	Farmer	
45	Mr.	**********	Farmer	
46	Mr.	**********	Farmer	
47	Mr.	**********	Farmer	
48	Mr.	**********	Farmer	
49	Mr.	**********	Farmer	
50	Mr.	**********	Farmer	
51	Mr.	**********	Farmer	
52	Mr.	**********	Farmer	
53	Mr.	**********	Farmer	
54	Mr.	**********	Farmer	
55	Mr.	**********	Farmer	
56	Mr.	**********	Farmer	
57	Mr.	**********	Farmer	
58	Mr.	**********	Farmer	
59	Mr.	**********	Farmer	
60	Mr.	**********	Farmer	
61	Mr.	**********	Farmer	
62	Mr.	**********	Farmer	
63	Mr.	**********	Farmer	
64	Mr.	**********	Farmer	

No.	Mr./Ms.	Full Name	Position	Organization
65	Mr.	**********	Farmer	
66	Mr.	**********	Farmer	
67	Mr.	**********	Farmer	
68	Mr.	**********	Farmer	
69	Mr.	**********	Farmer	
70	Mr.	**********	Farmer	
71	Mr.	**********	Farmer	
72	Mr.	**********	Farmer	
73	Mr.	**********	Farmer	
74	Mr.	**********	Farmer	
75	Mr.	**********	Farmer	
76	Mr.	**********	Farmer	
77	Mr.	**********	Farmer	
78	Mr.	**********	Eigineer	ADI
79	Mr.	**********	Survey Assistant	JICA Survey Team

VI. 4th Minutes of Stakeholder Meeting in the Scoping Period (18th April 2023)

1. Date & Time

11:30 to 13:00, 18th April 2023

2. Venue

Ouled Belaid, Ouled Benhammadi Commune, Sidi Slimane Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 41 female persons in total (see, "Attachment: Participant List").

(1) 2 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 39 persons from the citizen side (female: 39)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Female farmer**: We want to know how the Japanese cooperation can help us in this project. Do we get direct financial assistance as farmers?	**JICA Survey Team**: JICA is the acronym for **J**apanese **I**nternational **C**ooperation **A**gency, its task is the implementation of this Project through a loan agreement with the Ministry of Agriculture.
2	**Female farmer**: We understand the importance of this project and how beneficial it is for us as local people. However, we are afraid that it cannot be successful because there are no efficient roads to have access to the agricultural land and during rainy wintertime the roads are so muddy that no vehicle can reach the plots to collect the crops for marketing.	**Farmer & vice president of the commune Ouled Benhammadi**: The communal council has taken care of the roads as an important issue and are considered among the main projects that will be implemented in the commune. Therefore, we believe that by the time the Project is put in work the path-roads will have been completed.
3	**Female farmer**: Most of our crops are sold at a cheap price to intermediary traders. Can the Project assist us in marketing our products?	**ADI Member**: Yes. The farmers will be monitored by the concerned offices such as ORMVAG, ONCA and ONSSA. The "Project Management Unit" will be created soon and be in contact with the farmers to give them advice and technical assistance as necessary.
4	**Female farmer**: In the case of persons having inherited a certain farmland	**ADI Member**: The new irrigation system will be beneficial for all farmers,

No.	Comments/Questions	Answer
	which is divided into many plots, can they also benefit from the Project?	provided they agree to use a common hydraulic pressure control valve for at least one hectare of land and install a water meter for each farmer. This will allow farmers to pay only for irrigation water consumed, similar to the metering of drinking water consumption.
5	**Female armer**: What about the persons who are not landowners? Are we also concerned with the project?	**ADI Member**: Yes. Although you are not landowners, once the Project is implemented, you can still expect to see positive effects. The increase in workforce required for the farming activities will create numerous job opportunities. Furthermore, since the livestock will have ample pasture, they can be sold at a favorable price.
6	**Female farmer**: Since we have no experience in marketing, is it possible to assist us in creating associations or cooperatives to valorize our agricultural products through this project?	**ADI member**: We are taking notes about this and will report to the concerned parties. In addition, your request will be taken into consideration.
7	**Female farmer**: Will the farmers benefit according to the size of their farmland or at equal scale?	**ADI member**: The water will be by plot. In addition, farmers should engage to provide the necessary structures and facilities within their land and prepare their lands to drip irrigation.
8	**JICA Survey Team**: If you have any concerns about negative impacts by the Project, please give us example.	**Female farmer**: In some area such as a douar named “sector 6”, some land issues may cause hindrance to the Project. However, such issues will certainly be solved by authorities because the Project is more important.
9	**Elderly female farmer**: The Project may raise some conflicts among people inheriting agricultural plots as they may fight over the right to have their lands irrigated first.	**ADI member**: When the Project is implemented, there will be an entity “the Project Management Unit” to ensure the managing of such issues and organize the irrigation activities.

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

10 %: Rainfed

90 %: Irrigation well (i.e., drip irrigation).

(2) What is current irrigation water source?

10 %: Rainfed

90%: Irrigation well

(3) How much do you spend for the irrigation annually/monthly at present?

Since the financial matters are handled by males in general, females are not familiar with this matter. Thus, they do not have any concrete image on this question and not give any precise amount.

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

00%: No

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

They have no idea about the exact amount. However, they hope it will not be too expensive.

II. Agricultural water users' association activity

According to the participants, there is no such association in Ouled Benhammadi Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		
	3) 3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		
	8) Other housework activities		100%		
Land Ownership	1) Registration of the ownership on farmland	90%	10%		
	2) Decision-making of buying/ selling/ leasing/ renting farmland	90%	10%		
	3) Making priority in inheritance of farmland (law and general)	90%	10%		
Agricultural Machinery	1) Ownership of agricultural machinery	90%	10%		
	2) Decision-making of buying/ renting agricultural machinery	90%	10%		
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	90%	10%		
	2) Decision-making of investment for purchase of agricultural inputs	90%	10%		
	3) Decision-making of selling prices	90%	10%		
	4) Preparing land	90%	10%		
	5) Planting, transplanting, broadcasting	90%	10%		
	6) Weeding	90%	10%		
	7) Watering	90%	10%		
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	90%	10%		
	9) Harvesting	90%	10%		
	10) Post-harvesting,	90%	10%		

Item		Male	Female	Both	Not Necessary/ NA
	processing				
	11) Transporting products to selling place	90%	10%		
	12) Selling products	90%	10%		
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	90%	10%		
	2) Name of account, obligor, etc.	90%	10%		
	3) Management of household budget	90%	10%		

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities.

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Female	Very satisfied: 0% Satisfied:0% **Normal:100%** Dissatisfied:0% Very dissatisfied:0%	Very satisfied : 0% Satisfied:0% **Normal:100%** Dissatisfied:0% Very dissatisfied:0%	We need more agricultural water and facilities in the lands.

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Female	Very satisfied: 0% **Satisfied:100%** Normal:0% Dissatisfied:0% Very dissatisfied:0%	Very satisfied: 0% **Satisfied:100%** Normal:0% Dissatisfied:0% Very dissatisfied:0%	None.

Supplemental information: The female participants are mostly landowners as they inherited land from a dead husband or parent. Under such a circumstance, they are doing most activities in the household and activities that are generally done by male such as decision making of investment for purchase, selling products or even applying for financial services including loans etc., because the land is registered under their names. As for the field farming activities, they do smaller tasks that they can handle, or they hire male workers for harder tasks.

(END)

Attachment: Participant List

Date: 18th April 2023

Time: 11:30 AM to 13:00 PM

Venue: Ouled Belaid, Ouled Benhammadi Commune, Sidi Slimane Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Ms.	**********	Engineer	ADI
2	Ms.	**********	Survey Assistant	JICA Survey Team
3	Ms.	**********	Farmer	Ouled Benhammadi
4	Ms.	**********	Farmer	Ouled Benhammadi
5	Ms.	**********	Farmer	Ouled Benhammadi
6	Ms.	**********	Farmer	Ouled Benhammadi
7	Ms.	**********	Farmer	Ouled Benhammadi
8	Ms.	**********	Farmer	Ouled Benhammadi
9	Ms.	**********	Farmer	Ouled Benhammadi

No.	Mr./Ms.	Full Name	Position	Organization
10	Ms.	**********	Farmer	Ouled Benhammadi
11	Ms.	**********	Farmer	Ouled Benhammadi
12	Ms.	**********	Farmer	Ouled Benhammadi
13	Ms.	**********	Farmer	Ouled Benhammadi
14	Ms.	**********	Farmer	Ouled Benhammadi
15	Ms.	**********	Farmer	Ouled Benhammadi
16	Ms.	**********	Farmer	Ouled Benhammadi
17	Ms.	**********	Farmer	Ouled Benhammadi
18	Ms.	**********	Farmer	Ouled Benhammadi
19	Ms.	**********	Farmer	Ouled Benhammadi
20	Ms.	**********	Farmer	Ouled Benhammadi
21	Ms.	**********	Farmer	Ouled Benhammadi
22	Ms.	**********	Farmer	Ouled Benhammadi
23	Ms.	**********	Farmer	Ouled Benhammadi
24	Ms.	**********	Farmer	Ouled Benhammadi
25	Ms.	**********	Farmer	Ouled Benhammadi
26	Ms.	**********	Farmer	Ouled Benhammadi
27	Ms.	**********	Farmer	Ouled Benhammadi
28	Ms.	**********	Farmer	Ouled Benhammadi
29	Ms.	**********	Farmer	Ouled Benhammadi
30	Ms.	**********	Farmer	Ouled Benhammadi
31	Ms.	**********	Farmer	Ouled Benhammadi
32	Ms.	**********	Farmer	Ouled Benhammadi
33	Ms.	**********	Farmer	Ouled Benhammadi
34	Ms.	**********	Farmer	Ouled Benhammadi
35	Ms.	**********	Farmer	Ouled Benhammadi
36	Ms.	**********	Farmer	Ouled Benhammadi
37	Ms.	**********	Farmer	Ouled Benhammadi
38	Ms.	**********	Farmer	Ouled Benhammadi
39	Ms.	**********	Farmer	Ouled Benhammadi
40	Ms.	**********	Farmer	Ouled Benhammadi
41	Ms.	**********	Farmer	Ouled Benhammadi

VII. 5th Minutes of Stakeholder Meeting in the Scoping Period (20th April 2023)

1. Date & Time

11:30 to 13:30, 20th April 2023

2. Venue

Salhya, Oulad Ben Hammadi Commune, Sidi Slimane Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 53 female persons in total (see, "Attachment: Participant List").

(1) 5 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 48 persons from the citizen side (male: 48)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Head of Oulad Ben Hammadi Commune (to farmers):** Efforts are made so that the region of Azghar and Oulad Ben Hammadi in general, water, electricity and even a football field. This irrigation project is important for us as a commune and for local people. There will be no problems, and I am asking farmers not to block the construction companies. Irrigation water is very important because it will impact the livelihood as well. The pipelines will be buried underground, and this is of course for the good of the area, and touched lands will be compensated of course.	None
2	**Male farmer**: What is the price of irrigation water from the project?	**Caid of Oulad Ben Hammadi (to farmers)**: The question about price is still far. As the ADI member explained, the use of irrigation water from the Project is optional and normally the price will be less in comparison with irrigation by wells. **ADI member**: Water is from God; the price is actually for the service and facilities.

No.	Comments/Questions	Answer
3	**Head of Oulad Ben Hammadi Commune (to farmers)**: The Project should start first then we can talk about other issues. We are welcoming this project, because the cost of operation of wells is high, and the water quality is not good. Thus, we are thinking the water from the Dam is better.	None
4	**Male farmer**: 1. Is there any fee for drainage facilities, as in other lands nearby us? 2. What are crops to be cultivated? Are there any obliged crops?	**Head of Oulad Ben Hammadi Commune (to farmers)**: The internal facilities should be prepared by people themselves, without talking about potential subsidies. **ADI member**: A study to see what's better to cultivate in lands will be done. However, the last decision is for the land user. **Head of Oulad Ben Hammadi Commune (to farmers)**: The farmers will know after the study which crops are better in the region. In addition, the farmers know what to do in their lands, but even Farmers who do not know can ask about crops, of course.
5	**Male farmer:** We see that no matter how much the cost is, is it still less because we will always have access to water anytime.	None

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

90%: Drip irrigation from wells that they have

10%: Rainfed

(2) What is current irrigation water source?

10%: Rainfed

90%: Underground water

(3) How much do you spend for the irrigation annually/monthly at present?

For underground water the average cost (of all people's answer) is about 0.5 MAD/1 m^3

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

All the participants said that it is better if it's less than the cost of irrigation from underground; thus, it can be said less than 0.5 MAD per 1 m^3. However, they did not specify how much they want it to be.

II. Agricultural water users' association activity

According to the participants, there is no such association in Salhya, Oulad Ben Hammadi Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	9) Cooking		100%		
	10) Interior/ outside cleaning		100%		
	11) 3) Laundry		100%		
	12) Shopping cooking ingredient, commodities, etc.		100%		
	13) Drawing water for drinking, cooking, etc.		100%		
	14) Buying materials for firing such as coal		100%		
	15) Caregiving of family members such as infants, children, and elderly person		100%		
	16) Other housework activities		100%		
Land Ownership	4) Registration of the ownership on farmland	95%	5%		
	5) Decision-making of buying/ selling/ leasing/ renting farmland	95%	5%		
	6) Making priority in inheritance of farmland (law and general)	95%	5%		
Agricultural Machinery	3) Ownership of agricultural machinery	95%	5%		
	4) Decision-making of buying/ renting agricultural machinery	95%	5%		
Farming Activities	13) Decision-making of crops to be cultivated in the coming season	95%	5%		
	14) Decision-making of investment for purchase of agricultural inputs	95%	5%		
	15) Decision-making of selling prices	95%	5%		
	16) Preparing land	95%	5%		
	17) Planting, transplanting, broadcasting	95%	5%		
	18) Weeding	95%	5%		
	19) Watering	95%	5%		
	20) Operation and maintenance of irrigation facilities including cleaning canals, etc.	95%	5%		
	21) Harvesting	95%	5%		
	22) Post-harvesting, processing	95%	5%		
	23) Transporting products to selling place	95%	5%		
	24) Selling products	95%	5%		
Finance	4) Decision-making in applying for financial services including loans, micro-credit, etc.	95%	5%		
	5) Name of account, obligor, etc.	95%	5%		
	6) Management of household budget	95%	5%		

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	Dam water to arrive to their lands as soon as possible because underground water costs more and has higher degree of salinity.

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Drinking water should be considered.

(END)

Attachment: Participant List

Date: 20th April 2023

Time: 11:30 AM to 13:30 PM

Venue: Salhya, Oulad Ben Hammadi Commune, Sidi Slimane Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Caid	Oulad Ben Hammadi
2	Mr.	**********	Head of Commune	Oulad Ben Hammadi
3	Mr.	**********	farmer	
4	Mr.	**********	farmer	
5	Mr.	**********	farmer	
6	Mr.	**********	farmer	
7	Mr.	**********	farmer	
8	Mr.	**********	farmer	
9	Mr.	**********	farmer	
10	Mr.	**********	farmer	
11	Mr.	**********	farmer	
12	Mr.	**********	farmer	
13	Mr.	**********	farmer	
14	Mr.	**********	farmer	
15	Mr.	**********	farmer	
16	Mr.	**********	farmer	
17	Mr.	**********	farmer	
18	Mr.	**********	farmer	
19	Mr.	**********	farmer	
20	Mr.	**********	farmer	
21	Mr.	**********	farmer	
22	Mr.	**********	farmer	
23	Mr.	**********	farmer	
24	Mr.	**********	farmer	
25	Mr.	**********	farmer	
26	Mr.	**********	farmer	
27	Mr.	**********	farmer	
28	Mr.	**********	farmer	
29	Mr.	**********	farmer	
30	Mr.	**********	farmer	
31	Mr.	**********	farmer	
32	Mr.	**********	farmer	
33	Mr.	**********	farmer	
34	Mr.	**********	farmer	
35	Mr.	**********	farmer	
36	Mr.	**********	farmer	
37	Mr.	**********	farmer	
38	Mr.	**********	farmer	
39	Mr.	**********	farmer	
40	Mr.	**********	farmer	
41	Mr.	**********	farmer	
42	Mr.	**********	farmer	
43	Mr.	**********	farmer	
44	Mr.	**********	farmer	
45	Mr.	**********	farmer	
46	Mr.	**********	farmer	
47	Mr.	**********	farmer	
48	Mr.	**********	farmer	
49	Mr.	**********	farmer	
50	Mr.	**********	farmer	
51	Mr.	**********		ORMVAG
52	Mr.	**********	Engineer	ADI
53	Mr.	**********	Survey Assistant	JICA Survey Team

VIII. 6th Minutes of Stakeholder Meeting in the Scoping Period (20th April 2023)

1. Date & Time

11:15 to 13:30, 20th April 2023

2. Venue

Salhya, Oulad Ben Hammadi Commune, Sidi Slimane Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 53 female persons in total (see, "Attachment: Participant List").

(3) 2 persons from the Project side including executing agency, the JICA Survey Team, etc.

(4) 51 persons from the citizen side (Female: 51)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Female farmer:** Is the project beneficial only to landowner? If so, how can people with no land get some benefit?	**ADI member:** The Project will be beneficial to all people, even if you do not own agricultural lands, you still can work on livestock breeding, or as workforce in other people's lands, you can create Income Generating Activities (IGA).
2	**Female farmer:** We need to formulate income generation activities. However, we do not know how to start a project, and how to manage it. Thus, can this project assist us in creating associations or cooperatives?	**ADI member:** We are taking notes about this and will inform the concerned parties about your request. In addition, we can assure you that the Ministry of Agriculture will provide all the necessary monitoring to all your activities.
3	**Female farmer:** We know that the Japanese are very serious and hard-working people. Is it possible that they can provide us with financial assistance to create some associations and make some income?	**JICA Survey Team member:** As ADI member said we take note of this request and inform the concerned parties. If JICA can provide any assistance it will be in the framework of partnership with the Moroccan Government.
4	**Female farmer:** We have already created an association called ENNOUR for making couscous. However, we have stopped since the spread of corona virus. Is it possible for us to get assistance from the Project?	**ADI member:** The ORMVAG have some centers to assist in this matter. Please just make your request to them firstly. Then, they will give all the possible assistance.

No.	Comments/Questions	Answer
5	**Female farmer:** In case of many persons who have inherited a certain plot and have conflicts and hostility among them, how can they all have access to irrigation water?	**ADI member:** When the Project is finally implemented, the "Project Management Unit" in charge of solving all such problems will be established, and the persons in the same plot will find some acceptable arrangement so that all will benefit from irrigation.
6	**Female farmer**: We want your advice concerning the best crops that will give higher yield and good quality when harvested.	**ADI member:** The ORMVAG centers are the most relevant office to advise you on this matter. In addition, there is also ONCA in charge of all follow up of farmers.
7	**Female farmer:** Should the landowners who already have drip irrigation equipment change this equipment after the Project?	**ADI member:** If the equipment is in good state it can be kept. However, it must be changed if it is deteriorated.

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

90%: Rainfed.

10%: Drip Irrigation from wells (underground water).

(The farmers who have wells are all using drip irrigation, but they explain that water is getting higher salinity degree because of draughts)

(2) What is current irrigation water source?

90% Rainfed irrigation.

(3) How much do you spend for the irrigation annually/monthly at present?

Since the financial matters are handled by males in general, females are not familiar with this matter. Thus, they did not have any concrete image on this question and not answer any precise amount.

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

00%: No

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

They have no idea about the exact amount.

II. Agricultural water users' association activity

The women agreed that they haven't heard about such association.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		
	3) 3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		
	8) Other housework activities		100%		
Land Ownership	1) Registration of the ownership on farmland	90%	10%		
	2) Decision-making of buying/ selling/ leasing/ renting farmland	90%	10%		
	3) Making priority in inheritance of farmland (law and general)	90%	10%		
Agricultural Machinery	1) Ownership of agricultural machinery	90%	10%		
	2) Decision-making of buying/ renting agricultural machinery	90%	10%		
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	90%	10%		
	2) Decision-making of investment for purchase of agricultural inputs	90%	10%		
	3) Decision-making of selling prices	90%	10%		
	4) Preparing land	90%	10%		
	5) Planting, transplanting, broadcasting	90%	10%		
	6) Weeding	90%	10%		
	7) Watering	90%	10%		
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	90%	10%		
	9) Harvesting	90%	10%		
	10) Post-harvesting, processing	90%	10%		
	11) Transporting products to selling place	90%	10%		
	12) Selling products	90%	10%		
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	90%	10%		
	2) Name of account, obligor, etc.	90%	10%		
	3) Management of household budget	90%	10%		

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities.

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Female	Very satisfied: 0% Satisfied:0% Normal:10%	Very satisfied : 0% Satisfied:0% Normal:10%	We need agricultural water and facilities in the lands.

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
	Dissatisfied:90% Very dissatisfied:0%	**Dissatisfied:90%** Very dissatisfied:0%	

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Female	Very satisfied: 0% Satisfied:0% **Normal:90%** **Dissatisfied:10%*** Very dissatisfied:0%	Very satisfied: 0% **Satisfied:100%** Normal:0% Dissatisfied:0% Very dissatisfied:0%	We need that all the households should be supplied with drinking water.

Note: The participants answered that they have access to drinking water in their households and are quite satisfied with quality and quantity. However, 5 women said that the drinking water network didn't cover their area and they must move around two kilometers to get it from a public fountain.

Supplemental information:

- Most female participants were illiterate, and we had taken time to write down their names in the attendants' lists.
- Although some of them are landowners, most activities such as decision making of investment for purchase, selling products or even applying for financial services including loans etc., were done by males either husbands or kids or near relatives. Females must be present when the documents require their signature because the land is registered under their names. As for the field farming activities, females do smaller tasks and they help only with livestock breeding and other tasks related to it such as milking cows, preparation of dairy products, etc.

(END)

Attachment: Participant List

Date: 20th April 2023

Time: 11:15 AM to 13:30 PM

Venue: Salhya, Oulad Ben Hammadi Commune, Sidi Slimane Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Ms.	**********	Engineer	ADI
2	Ms.	**********	Survey assistant	JICA Survey Team
3	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
4	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
5	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
6	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
7	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
8	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
9	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
10	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
11	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
12	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
13	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
14	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
15	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
16	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
17	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
18	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
19	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
20	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
21	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
22	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
23	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA

No.	Mr./Ms.	Full Name	Position	Organization
24	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
25	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
26	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
27	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
28	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
29	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
30	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
31	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
32	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
33	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
34	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
35	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
36	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
37	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
38	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
39	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
40	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
41	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
42	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
43	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
44	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
45	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
46	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
47	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
48	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
49	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
50	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
51	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
52	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA
53	Ms.	**********	Farmer	Ouled Benhammadi/SALHIYA

IX. 7th Minutes of Stakeholder Meeting in the Scoping Period (26th April 2023)

1. Date & Time

11:30 to 13:30, 26th April 2023

2. Venue

Rebilet, Khenichet Commune, Sidi Kacem Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 32 female persons in total (see, "Attachment: Participant List").

(1) 7 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 25 persons from the citizen side (male: 25)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Male farmer:** We want to benefit from the irrigation water as well. If we could get that through the Project, we do not need compensation. The problem is that the pipelines are going through lands that are rainfed, and they don't benefit from irrigation.	**ADI member**: Your opinion is taken, and we will give it to concerned parties.
2	**Male farmers collectively:** It seems that the project side thinks that we have irrigation water because of a recent project done in the 2000s. Actually, however, we do not have it. In addition, we need water from the Project, and perhaps even more than Sidi Slimane.	**ADI member**: Your opinion is taken, and we will give it to concerned parties.

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

100%: Rainfed

(2) What is current irrigation water source?

100%: Rainfed

(3) How much do you spend for the irrigation annually/monthly at present?

There is no irrigation.

(4) Do you want to apply the new irrigation system by the Project?

There was no answer because participants did not want to answer to this question.

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

There was no answer because participants did not want to answer to this question.

II. Agricultural water users' association activity

According to the participants, there is no such association in Rebilet, Khenichet Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

There was no answer because participants did not want to answer to this question.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking	-	-	-	-
	2) Interior/ outside cleaning	-	-	-	-
	3) 3) Laundry	-	-	-	-
	4) Shopping cooking ingredient, commodities, etc.	-	-	-	-
	5) Drawing water for drinking, cooking, etc.	-	-	-	-
	6) Buying materials for firing such as coal	-	-	-	-
	7) Caregiving of family members such as infants, children, and elderly person	-	-	-	-
	8) Other housework activities	-	-	-	-
Land Ownership	1) Registration of the ownership on farmland	-	-	-	-
	2) Decision-making of buying/ selling/ leasing/ renting farmland	-	-	-	-
	3) Making priority in inheritance of farmland (law and general)	-	-	-	-
Agricultural Machinery	1) Ownership of agricultural machinery	-	-	-	-
	2) Decision-making of buying/ renting agricultural machinery	-	-	-	-
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	-	-	-	-
	2) Decision-making of investment for purchase of agricultural inputs	-	-	-	-
	3) Decision-making of selling prices	-	-	-	-
	4) Preparing land	-	-	-	-
	5) Planting, transplanting, broadcasting	-	-	-	-
	6) Weeding	-	-	-	-
	7) Watering	-	-	-	-
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	-	-	-	-
	9) Harvesting	-	-	-	-
	10) Post-harvesting, processing	-	-	-	-
	11) Transporting products to selling place	-	-	-	-

Item		Male	Female	Both	Not Necessary/ NA
	12) Selling products	-	-	-	-
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	-	-	-	-
	2) Name of account, obligor, etc.	-	-	-	-
	3) Management of household budget	-	-	-	-

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% Normal: 0% Dissatisfied: 0% Very dissatisfied: 100%	Very satisfied: 0% Satisfied: 0% Normal: 0% Dissatisfied: 0% Very dissatisfied: 100%	We need water also from this project.

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% Normal: 100% Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 100% Dissatisfied: 0% Very dissatisfied: 0%	Our needs are just about the water from the project, we want it.

(END)

Attachment: Participant List

Date: 26th April 2023

Time: 11:00 AM to 13:30 PM

Venue: Rbelat, Khenichet Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Representative of local authority	Douar Ouled Belhoussain
2	Mr.	**********	Representative of local authority	Douar Ouled Belhoussain
3	Mr.	**********	Representative of local authority	Douar Aabidat Lhajra
4	Mr.	**********	Engineer	ADI
5	Ms.	**********	Engineer	ADI
6	Ms.	**********	Survey Assistant	JICA Survey Team
7	Mr.	**********	Survey assistant	JICA Survey Team
8	Mr.	**********	Farmer	Douar Rbelat
9	Mr.	**********	Farmer	Douar Rbelat
10	Mr.	**********	Farmer	Douar Rbelat
11	Mr.	**********	Farmer	Douar Rbelat
12	Mr.	**********	Farmer	Douar Rbelat
13	Mr.	**********	Farmer	Douar Rbelat
14	Mr.	**********	Farmer	Douar Rbelat
15	Mr.	**********	Farmer	Douar Rbelat
16	Mr.	**********	Farmer	Douar Rbelat
17	Mr.	**********	Farmer	Douar Rbelat
18	Mr.	**********	Farmer	Douar Rbelat
19	Mr.	**********	Farmer	Douar Ouled Belhoussain
20	Mr.	**********	Farmer	Douar Ouled Belhoussain
21	Mr.	**********	Farmer	Douar Ouled Belhoussain
22	Mr.	**********	Farmer	Douar Ouled Belhoussain
23	Mr.	**********	Farmer	Douar Ouled Belhoussain

No.	Mr./Ms.	Full Name	Position	Organization
24	Mr.	**********	Farmer	Douar Ouled Belhoussain
25	Mr.	**********	Farmer	Douar Ouled Belhoussain
26	Mr.	**********	Farmer	Douar Aabidat Lhajra
27	Mr.	**********	Farmer	Douar Aabidat Lhajra
28	Mr.	**********	Farmer	Douar Aabidat Lhajra
29	Mr.	**********	Farmer	Douar Aabidat Lhajra
30	Mr.	**********	Farmer	Douar Aabidat Lhajra
31	Mr.	**********	Farmer	Douar Aabidat Lhajra
32	Mr.	**********	Farmer	Douar Aabidat Lhajra

X. 8th Minutes of Stakeholder Meeting in the Scoping Period (26th April 2023)

1. Date & Time

15:00 to 17:00, 26th April 2023

2. Venue

Oulad Khress, Khenichet Commune, Sidi Kacem Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 28 persons in total (see, "Attachment: Participant List").

(1) 4 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 24 persons from the citizen side (male: 24)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Male farmer**: Kodiat Elborna Dam is located at 1 km away from our lands. We should be able to use irrigation water, as well. Currently, it is not possible to get the water even our lands are close from the water source. We should get the benefit from it. The irrigation for people here is the most important thing.	**ADI member**: We will transfer this comment to the concerned parties, even if Tete Morte canal between the two rivers is not irrigating those lands principally.
2	**Male farmer**: There are people who have the intention of building a house in that area for residency. If so, they would be expropriated, then they will lose their lands.	**ADI member**: We are still not sure about the fixed alignment yet.
3	**Male farmer**: Even water underground had a high degree of salinity. Thus, we should be the priority for the Project, and we really need this water.	**ADI member**: So, we will deliver this comment regarding salinity of water to concerned parts, and that you want irrigation water.
4	**Male farmer**: Is the compensation value of lands the same?	**ADI member**: It depends on the crops on the land and the structures if any. Details will be fixed later by the concerned committee.

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

0%: Drip irrigation from wells that they have

100%: Rainfed

(2) What is current irrigation water source?

100%: Rainfed

0%: Underground water

(3) How much do you spend for the irrigation annually/monthly at present?

There is no irrigation.

(4) Do you want to apply the new irrigation system by the Project?

There was no answer because participants did not want to answer to this question.

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

There was no answer because participants did not want to answer to this question.

II. Agricultural water users' association activity

According to the participants, there is no such association in Oulad Khreis, Khenichet Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

There was no answer because participants did not want to answer to this question.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking	-	-	-	-
	2) Interior/ outside cleaning	-	-	-	-
	3) 3) Laundry	-	-	-	-
	4) Shopping cooking ingredient, commodities, etc.	-	-	-	-
	5) Drawing water for drinking, cooking, etc.	-	-	-	-
	6) Buying materials for firing such as coal	-	-	-	-
	7) Caregiving of family members such as infants, children, and elderly person	-	-	-	-
	8) Other housework activities	-	-	-	-
Land Ownership	1) Registration of the ownership on farmland	-	-	-	-
	2) Decision-making of buying/ selling/ leasing/ renting farmland	-	-	-	-
	3) Making priority in inheritance of farmland (law and general)	-	-	-	-
Agricultural Machinery	1) Ownership of agricultural machinery	-	-	-	-
	2) Decision-making of buying/ renting agricultural machinery	-	-	-	-
Farming	1) Decision-making of crops to be cultivated in	-	-	-	-

Item		Male	Female	Both	Not Necessary/ NA
Activities	the coming season				
	2) Decision-making of investment for purchase of agricultural inputs	-	-	-	-
	3) Decision-making of selling prices	-	-	-	-
	4) Preparing land	-	-	-	-
	5) Planting, transplanting, broadcasting	-	-	-	-
	6) Weeding	-	-	-	-
	7) Watering	-	-	-	-
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	-	-	-	-
	9) Harvesting	-	-	-	-
	10) Post-harvesting, processing	-	-	-	-
	11) Transporting products to selling place	-	-	-	-
	12) Selling products	-	-	-	-
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	-	-	-	-
	2) Name of account, obligor, etc.	-	-	-	-
	3) Management of household budget	-	-	-	-

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% Normal: 0% Dissatisfied: 0% **Very dissatisfied: 100%**	Very satisfied: 0% Satisfied: 0% Normal: 0% Dissatisfied: 0% **Very dissatisfied: 100%**	We should have this water as well, we need it.

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	What's important is that we must have this water as well.

(END)

Attachment: Participant List

Date: 26th April 2023

Time: 15:00 PM to 17:30 PM

Venue: Oulad Khress, Khenichet Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Engineer	ADI
2	Ms.	**********	Engineer	ADI
3	Ms.	**********	Survey Assistant	JICA Survey Team
4	Mr.	**********	Survey assistant	JICA Survey Team
5	Mr.	**********	Farmer	Douar Ouled Aamara
6	Mr.	**********	Daily worker	Douar Ouled Khress
7	Mr.	**********	Farmer	Douar Ouled Khress
8	Mr.	**********	Farmer	Douar Ouled Khress
9	Mr.	**********	Daily worker	Douar Ouled Khress
10	Mr.	**********	Daily worker	Douar Ouled Khress
11	Mr.	**********	Daily worker	Douar Ouled Khress

No.	Mr./Ms.	Full Name	Position	Organization
12	Mr.	**********	Daily worker	Douar Ouled Khress
13	Mr.	**********	Farmer	Douar Ouled Khress
14	Mr.	**********	Farmer	Douar Ouled Khress
15	Mr.	**********	Daily worker	Douar Ouled Khress
16	Mr.	**********	Daily worker	Douar Ouled Khress
17	Mr.	**********	Farmer	Douar Ouled Khress
18	Mr.	**********	Daily worker	Douar Ouled Khress
19	Mr.	**********	Farmer	Douar Ouled Khress
20	Mr.	**********	Farmer	Douar Ouled Khress
21	Mr.	**********	Farmer	Douar Ouled Khress
22	Mr.	**********	Farmer	Douar Ouled Khress
23	Mr.	**********	Farmer	Douar Ouled Khress
24	Mr.	**********	Daily worker	Douar Ouled Khress
25	Mr.	**********	Farmer	Douar Ouled Khress
26	Mr.	**********	Daily worker	Douar Ouled Khress
27	Mr.	**********	Farmer	Douar Ouled Khress
28	Mr.	**********	Farmer	Douar Ouled Khress

XI. 9th Minutes of Stakeholder Meeting in the Scoping Period (27th April 2023)

1. Date & Time

11:30 to 13:30, 27th April 2023

2. Venue

Oulad Khress, Khenichet Commune, Sidi Kacem Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 27 persons in total (see, "Attachment: Participant List").

(1) 4 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 23 persons from the citizen side (male: 21, and female: 2)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Male farmer**: Are lands between Ouergha and Sebou going to have compensation for expropriation AND irrigation water or just compensation for land acquisition?	**ADI member**: For the current alignment and with complete honesty, there is no irrigation for these lands, just compensation for land acquisition.
2	**Male farmer**: People who irrigate from Ouergha river will no longer be able to have water if you take all water from the river to the project.	**ADI member**: Water quantity will be slightly decreased for sure but, the project will not take all the water.
3	**Male farmer**: Please tell the concerned people that the area needs water because we have is just from the river and will be decreased as you explained.	**ADI member**: We will transfer these comments to concerned parties.

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

20%: Drip irrigation from wells that they have

80%: Rainfed

(2) What is current irrigation water source?

80%: Rainfed

20%: Underground water

(3) How much do you spend for the irrigation annually/monthly at present?

For underground water, the average cost is about 150 MAD/ Day

(4) Do you want to apply the new irrigation system by the Project?

There was no answer because participants did not want to answer to this question.

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

There was no answer because participants did not want to answer to this question.

II. Agricultural water users' association activity

According to the participants, there is no such association in Oulad Khreis, Khenichet Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

There was no answer because participants did not want to answer to this question.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking	-	-	-	-
	2) Interior/ outside cleaning	-	-	-	-
	3) 3) Laundry	-	-	-	-
	4) Shopping cooking ingredient, commodities, etc.	-	-	-	-
	5) Drawing water for drinking, cooking, etc.	-	-	-	-
	6) Buying materials for firing such as coal	-	-	-	-
	7) Caregiving of family members such as infants, children, and elderly person	-	-	-	-
	8) Other housework activities	-	-	-	-
Land Ownership	1) Registration of the ownership on farmland	-	-	-	-
	2) Decision-making of buying/ selling/ leasing/ renting farmland	-	-	-	-
	3) Making priority in inheritance of farmland (law and general)	-	-	-	-
Agricultural Machinery	1) Ownership of agricultural machinery	-	-	-	-
	2) Decision-making of buying/ renting agricultural machinery	-	-	-	-
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	-	-	-	-
	2) Decision-making of investment for purchase of agricultural inputs	-	-	-	-
	3) Decision-making of selling prices	-	-	-	-
	4) Preparing land	-	-	-	-
	5) Planting, transplanting, broadcasting	-	-	-	-
	6) Weeding	-	-	-	-
	7) Watering	-	-	-	-

Item		Male	Female	Both	Not Necessary/ NA
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	-	-	-	-
	9) Harvesting	-	-	-	-
	10) Post-harvesting, processing	-	-	-	-
	11) Transporting products to selling place	-	-	-	-
	12) Selling products	-	-	-	-
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	-	-	-	-
	2) Name of account, obligor, etc.	-	-	-	-
	3) Management of household budget	-	-	-	-

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% Normal: 0% Dissatisfied: 0% **Very dissatisfied: 100%**	Very satisfied: 0% Satisfied: 0% Normal: 0% Dissatisfied: 0% **Very dissatisfied: 100%**	We need this irrigation water from the project, maybe even more than other beneficiaries.
Female	Very satisfied: 0% Satisfied: 0% Normal: 0% Dissatisfied: 0% **Very dissatisfied: 100%**	Very satisfied: 0% Satisfied: 0% Normal: 0% Dissatisfied: 0% **Very dissatisfied: 100%**	We need this irrigation water from the project, maybe even more than other beneficiaries.

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	All what we need is irrigation water from the project.
Female	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	All what we need is irrigation water from the project.

(END)

Attachment: Participant List

Date: 27th April 2023

Time: 11:30 AM to 13:00 PM

Venue: Oulad Khress, Khenichet Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Engineer	ADI
2	Ms.	**********	Engineer	ADI
3	Ms.	**********	Survey Assistant	JICA Survey Team
4	Mr.	**********	Survey assistant	JICA Survey Team
5	Mr.	**********	Farmer	Douar Aabidat Lamharir
6	Mr.	**********	Farmer	Douar Aabidat Lamharir
7	Mr.	**********	Farmer	Douar Aabidat Lamharir
8	Mr.	**********	Farmer	Douar Aabidat Lamharir
9	Mr.	**********	Farmer	Douar Aabidat Lamharir

No.	Mr./Ms.	Full Name	Position	Organization
10	Ms.	**********	Farmer	Douar Aabidat Lamharir
11	Mr.	**********	Farmer	Douar Aabidat Lamharir
12	Mr.	**********	Farmer	Douar Aabidat Lamharir
13	Mr.	**********	Farmer	Douar Aabidat Lamharir
14	Mr.	**********	Farmer	Douar Aabidat Lamharir
15	Mr.	**********	Farmer	Douar Aabidat Lamharir
16	Mr.	**********	Farmer	Douar Aabidat Lamharir
17	Mr.	**********	Farmer	Douar Aabidat Lamharir
18	Mr.	**********	Farmer	Douar Aabidat Lamharir
19	Mr.	**********	Farmer	Douar Aabidat Lamharir
20	Mr.	**********	Farmer	Douar Aabidat Lamharir
21	Mr.	**********	Farmer	Douar Aabidat Lamharir
22	Mr.	**********	Butcher	Douar Aabidat Lamharir
23	Mr.	**********	Farmer	Douar Aabidat Lamharir
24	Ms.	**********	Farmer	Douar Aabidat Lamharir
25	Mr.	**********	Farmer	Douar Aabidat Lamharir
26	Mr.	**********	Farmer	Douar Aabidat Lamharir
27	Mr.	**********	Farmer	Douar Aabidat Lamharir

XII. 10th Minutes of Stakeholder Meeting in the Scoping Period (27th April 2023)

1. Date & Time

15:00 to 15:30, 27th April 2023

2. Venue

Oulad Khress, Khenichet Commune, Sidi Kacem Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 26 persons in total (see, "Attachment: Participant List").

(1) 4 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 22 persons from the citizen side (female: 22)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Female farmer:** We heard from men who attended today's morning meeting that we are not benefitting from irrigation water, and that only some people will get compensation for their lands. We are completely against this, and we want to get benefit from irrigation water.	**ADI member**: According to the primary studies this area is not getting irrigation from the Project. However, some people will get compensation for land acquisition.
2	**Female farmer:** I am not a landowner, but I am working in farmlands and practicing some livestock breeding. If the farm owners are negatively affected by the Project, we will certainly suffer from the impact.	**ADI member**: We hope that some solutions will be found to mitigate negative impacts.
3	**Female farmer:** We are against the Project, and we will prepare complaints to the concerned authorities. It is not acceptable that irrigation water crosses our lands and we do not get any profit from it.	**ADI member**: We will transfer these comments to concerned parties.
4	**Female armer**: In this area, women have no Income Generating Activities. Can you assist us in this aspect?	**ADI member**: A "Project Management Unit" will be created and will take in charge all your requests. The ORMVAG centers and ONCA will also give you all the possible assistance.

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

10%: Drip irrigation from wells that they have

90%: Rainfed

(2) What is current irrigation water source?

90%: Rainfed

10%: Underground water

(3) How much do you spend for the irrigation annually/monthly at present?

Men are responsible of these matters. Therefore, women cannot give answer any precise amount.

II. Agricultural water users' association activity

According to the participants, there is no such association in Oulad Khress, Khenichet Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		
	3) 3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		
	8) Other housework activities		100%		
Land Ownership	1) Registration of the ownership on farmland	100%			
	2) Decision-making of buying/ selling/ leasing/ renting farmland	100%			
	3) Making priority in inheritance of farmland (law and general)	100%			
Agricultural Machinery	1) Ownership of agricultural machinery	100%			
	2) Decision-making of buying/ renting agricultural machinery	100%			
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	100%			
	2) Decision-making of investment for purchase of agricultural inputs	100%			
	3) Decision-making of selling prices	100%			
	4) Preparing land	100%			
	5) Planting, transplanting, broadcasting	100%			
	6) Weeding	100%			
	7) Watering	100%			
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	100%			
	9) Harvesting	100%			
	10) Post-harvesting, processing	100%			
	11) Transporting products to selling place	100%			

Item		Male	Female	Both	Not Necessary/ NA
	12) Selling products	100%			
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	100%			
	2) Name of account, obligor, etc.	100%			
	3) Management of household budget	100%			

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities.

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Female	Very satisfied: 0% Satisfied: 0% Normal: 0% Dissatisfied: 0% **Very dissatisfied: 100%**	Very satisfied: 0% Satisfied: 0% Normal: 0% Dissatisfied: 0% **Very dissatisfied: 100%**	We need irrigation water and facilities in the lands.

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Female	Very satisfied: 0% Satisfied: 0% **Normal: 60%** **Dissatisfied:40%** Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	We need that all the households should be supplied with drinking water.

(END)

Attachment: Participant List

Date: 27th April 2023

Time: 15:00 PM to 17:30 PM

Venue: Oulad Khress, Khenichet Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Engineer	AD
2	Ms.	**********	Engineer	ADI
3	Ms.	**********	Survey Assistant	JICA Survey Team
4	Mr.	**********	Survey assistant	JICA Survey Team
5	Ms.	**********	Farmer	Douar Aabidat Lamharir
6	Ms.	**********	Farmer	Douar Aabidat Lamharir
7	Ms.	**********	Farmer	Douar Aabidat Lamharir
8	Ms.	**********	Farmer	Douar Aabidat Lamharir
9	Ms.	**********	Farmer	Douar Aabidat Lamharir
10	Ms.	**********	Farmer	Douar Aabidat Lamharir
11	Ms.	**********	Farmer	Douar Aabidat Lamharir
12	Ms.	**********	Farmer	Douar Aabidat Lamharir
13	Ms.	**********	Farmer	Douar Aabidat Lamharir
14	Ms.	**********	Farmer	Douar Aabidat Lamharir
15	Ms.	**********	Farmer	Douar Aabidat Lamharir
16	Ms.	**********	Farmer	Douar Aabidat Lamharir
17	Ms.	**********	Farmer	Douar Aabidat Lamharir
18	Ms.	**********	Farmer	Douar Aabidat Lamharir
19	Ms.	**********	Farmer	Douar Aabidat Lamharir
20	Ms.	**********	Farmer	Douar Oulad Kheress
21	Ms.	**********	Farmer	Douar Oulad Kheress
22	Ms.	**********	Farmer	Douar Oulad Kheress
23	Ms.	**********	Farmer	Douar Oulad Kheress

No.	Mr./Ms.	Full Name	Position	Organization
24	Ms.	**********	Farmer	Douar Oulad Kheress
25	Ms.	**********	Farmer	Douar Oulad Kheress
26	Ms.	**********	Farmer	Douar Aabidat Lamharir

XIII. 11th Minutes of Stakeholder Meeting in the Scoping Period (2nd May 2023)

1. Date & Time

11:30 to 13:00, 2nd May 2023

2. Venue

Oulad Yahya, Birtaleb Commune, Sidi Kacem Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 36 persons in total (see, "Attachment: Participant List").

(1) 5 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 31 persons from the citizen side (male: 31)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Male farmer:** Will the government and JICA take care of the facilities?	**ADI member**: JICA will fund the external facilities such as Tete Morte Main Canal. However, internal facilities in farmlands are not part of the loan, and farmers need to prepare it by themselves. Despite of it, there could be subsidies from the government.
2	**Male farmer:** Is it certain that the land with the width of 30 to 70 meters will be acquired for the construction of the pipeline?	**ADI member**: The width of Right of Way (ROW) including diameter of the pipeline plus the road will be in total 13 to 15 meters. I am afraid to say, but the information that you had is incorrect. The 70 meters you heard is just what the topographic surveyors measured as of where the pipeline can go through, so that they choose from those 70 meters the exact alignment of the pipeline.
3	**Male farmer:** What about the compensation for the Project?	**ADI member**: Compensation will be paid for affected lands, trees, crops, and structures that the Project will acquire for the pipeline. A concerned commission decides the amount of compensation.

No.	Comments/Questions	Answer
4	**Farmer (who's land is between Sebou River and the beginning of Hrisha canal):** We know that we are not beneficiating from the Project. However, we should benefit from it, as well.	**ADI:** This is what the people who have land between Ouergha and Sebou rivers told us. That is why, we have such meetings with you, so that we can also take your ideas and questions and try to get answers from the concerned parties about the reasons behind their decisions and if there is for example maybe further project coming for this area!

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

30%: Drip irrigation from wells that they have

70%: Rainfed

(2) What is current irrigation water source?

30%: Rainfed

70%: Underground water

(3) How much do you spend for the irrigation annually/monthly at present?

For underground water the average cost is about 42 MAD/Hour

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

The majority of the participants thinks that if it can be at the same price of underground water or less.

II. Agricultural water users' association activity

According to the participants, there is no such association in Birtaleb Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		
	3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		

Item		Male	Female	Both	Not Necessary/ NA
	8) Other housework activities		100%		
Land Ownership	1) Registration of the ownership on farmland	100%			
	2) Decision-making of buying/ selling/ leasing/ renting farmland	100%			
	3) Making priority in inheritance of farmland (law and general)	100%			
Agricultural Machinery	1) Ownership of agricultural machinery	100%			
	2) Decision-making of buying/ renting agricultural machinery	100%			
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	100%			
	2) Decision-making of investment for purchase of agricultural inputs	100%			
	3) Decision-making of selling prices	100%			
	4) Preparing land	100%			
	5) Planting, transplanting, broadcasting	100%			
	6) Weeding	100%			
	7) Watering	100%			
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	100%			
	9) Harvesting	100%			
	10) Post-harvesting, processing	100%			
	11) Transporting products to selling place	100%			
	12) Selling products	100%			
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	100%			
	2) Name of account, obligor, etc.	100%			
	3) Management of household budget	100%			

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	None

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	None

(END)

Attachment: Participant List

Date: 2nd May 2023

Time: 11:30 AM to 13:00 PM

Venue: Oulad Yahya, Birtaleb Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Engineer	ADI
2	Ms.	**********	Engineer	ADI
3	Ms.	**********	Survey Assistant	JICA Survey Team

No.	Mr./Ms.	Full Name	Position	Organization
4	Mr.	**********	Survey assistant	JICA Survey Team
5	Mr.	**********	CAID	Tekna-Birtaleb
6	Mr.	**********	Farmer	Douar Nouafla
7	Mr.	**********	Farmer	Douar Oulad Yahya
8	Mr.	**********	Farmer	Douar Oulad Yahya
9	Mr.	**********	Farmer	Douar Oulad Fraj
10	Mr.	**********	Farmer	Douar Oulad Fraj
11	Mr.	**********	Farmer	Douar Oulad Yahya
12	Mr.	**********	Farmer	Douar Oulad Fraj
13	Mr.	**********	Farmer	Cooperative Ennajah
14	Mr.	**********	Vice president of collective land	Birtaleb
15	Mr.	**********	Farmer	Douar Oulad Fraj
16	Mr.	**********	Farmer	Douar Oulad Fraj
17	Mr.	**********	Farmer	Douar Oulad Yahya
18	Mr.	**********	Farmer	Douar Oulad Yahya
19	Mr.	**********	Farmer	Douar Oulad Yahya
20	Mr.	**********	Farmer	Cooperative Ennajah
21	Mr.	**********	Farmer	Douar Oulad Yahya
22	Mr.	**********	Vice president of collective land	Oulad Taleb
23	Mr.	**********	Farmer	Cooperative Ennajah
24	Mr.	**********	Butcher	Cooperative Ennajah
25	Mr.	**********	Farmer	Douar Oulad Yahya
26	Mr.	**********	Farmer	Cooperative Ennajah
27	Mr.	**********	Farmer	Douar Oulad Fraj
28	Mr.	**********	Farmer	Douar Oulad Yahya
29	Mr.	**********	Farmer	Douar Oulad Yahya
30	Mr.	**********	Farmer	Douar Oulad Yahya
31	Mr.	**********	Farmer	Douar Oulad Yahya
32	Mr.	**********	Farmer	Douar Oulad Yahya
33	Mr.	**********	Farmer	Douar Oulad Yahya
34	Mr.	**********	Representative of local authority	Douar Lahouaoura
35	Mr.	**********	Representative of local authority	Douar Nouafla
36	Mr.	**********	Representative of local authority	Douar Chmoucha

XIV. 12th Minutes of Stakeholder Meeting in the Scoping Period (3rd May 2023)

1. Date & Time

11:30 to 13:00, 3rd May 2023

2. Venue

Ibn Hazm, Birtaleb Commune, Sidi Kacem Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 28 persons in total (see, "Attachment: Participant List").

(1) 4 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 24 persons from the citizen side (male: 19, and female: 5)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Female farmer:** What is about the price of irrigation water?	**ADI member**: The price is for the service and will be fixed by the government later.
2	**Male farmer:** Will the internal facilities in farmlands be included to the Project?	**ADI member**: JICA will potentially take care with our government of the external facilities till the beginning of the lands. However, the internal facilities should be prepared individually, and there is a high chance of the government taking care of them if farmers become collective and go ask for subsidies collectively.
3	**Male farmer:** Are we obliged to do specific crops or trees?	**ADI member**: No. You are free to do any crops or trees you want. ONCA and other institutions will give you advice and support.
4	**Male farmer:** Is the paying for irrigation water per hour or per consumption?	**ADI member**: It is per consumption, exactly like water facilities at home, you pay what you consume.
5	**Male farmer:** Can we pay the charge of irrigation water after we get the cash due to the sales of products? Or should we pay it immediately after consumption?	**ADI member**: Normally, farmers should pay immediately after consumption. From experience, however, the government might wait for farmers to produce first.

No.	Comments/Questions	Answer
		Anyway, this will be decided later.

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

30%: Drip irrigation from wells that they have

70%: Rainfed

(2) What is current irrigation water source?

30%: Rainfed

70%: Underground water

(3) How much do you spend for the irrigation annually/monthly at present?

For underground water the average cost is about 40 MAD/Hour

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

The price should be less than 40 MAD/Hour.

II. Agricultural water users' association activity

According to the participants, there is no such association in Birtaleb Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		
	3) 3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		
	8) Other housework activities		100%		
Land Ownership	1) Registration of the ownership on farmland	100%			
	2) Decision-making of buying/ selling/ leasing/ renting farmland	100%			
	3) Making priority in inheritance of farmland (law and general)	100%			
Agricultural Machinery	1) Ownership of agricultural machinery	100%			
	2) Decision-making of buying/ renting	100%			

Item		Male	Female	Both	Not Necessary/ NA
	agricultural machinery				
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	100%			
	2) Decision-making of investment for purchase of agricultural inputs	100%			
	3) Decision-making of selling prices	100%			
	4) Preparing land	100%			
	5) Planting, transplanting, broadcasting	100%			
	6) Weeding	100%			
	7) Watering	100%			
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	100%			
	9) Harvesting	100%			
	10) Post-harvesting, processing	100%			
	11) Transporting products to selling place	100%			
	12) Selling products	100%			
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	100%			
	2) Name of account, obligor, etc.	100%			
	3) Management of household budget	100%			

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	We need agricultural water and facilities in the lands.
Female	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	We need agricultural water and facilities in the lands.

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	None
Female	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	None

(END)

Attachment: Participant List

Date:3rd May 2023

Time: 11:30 AM to 13:00 PM

Venue: Ibn Hazm, Birtaleb Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Engineer	ADI

No.	Mr./Ms.	Full Name	Position	Organization
2	Ms.	**********	Engineer	ADI
3	Ms.	**********	Survey Assistant	JICA Survey Team
4	Mr.	**********	Survey assistant	JICA Survey Team
5	Mr.	**********	Farmer	Douar Oulad Amer
6	Mr.	**********	Farmer	Douar Oulad Amer
7	Mr.	**********	Farmer	Douar Oulad Aamira Saflyin
8	Mr.	**********	Farmer	Douar Oulad Aamira Saflyin
9	Mr.	**********	Farmer	Douar Semhane Laagla
10	Mr.	**********	Farmer	Douar Oulad Jellal
11	Mr.	**********	Farmer	Douar Oulad Aamira Saflyin
12	Mr.	**********	Farmer	Douar Nouafla
13	Mr.	**********	Farmer	Douar Nouafla
14	Mr.	**********	Farmer	Douar Oulad Amer
15	Mr.	**********	Farmer	Douar Oulad Aamira Saflyin
16	Mr.	**********	Farmer	Douar Semhane Laagla
17	Mr.	**********	Farmer	Douar Oulad Aamira Saflyin
18	Mr.	**********	Farmer	Douar Ouled Mbarek
19	Mr.	**********	Farmer	Douar Oulad Jellal
20	Mr.	**********	Farmer	Birtaleb centre
21	Mr.	**********	Farmer	Douar Oulad Amer
22	Mr.	**********	Representative of local Authority	Douar Oulad Aamira Saflyin
23	Mr.	**********	Representative of local Authority	Douar Chmoucha
24	Ms.	**********	Farmer	Douar Ouled Chbel-Oulad Jellal
25	Ms.	**********	Farmer	Douar Oulad Benkhelil
26	Ms.	**********	Farmer	Douar Oulad Jellal
27	Ms.	**********	Farmer	Douar Benkhelil
28	Ms.	**********	Farmer	Douar Oulad Jellal

XV. 13th Minutes of Stakeholder Meeting in the Scoping Period (5th May 2023)

1. Date & Time

11:30 to 13:30, 5th May 2023

2. Venue

Elfokra, Birtaleb Commune, Sidi Kacem Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 30 persons in total (see, "Attachment: Participant List").

(1) 6 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 24 persons from the citizen side (male: 19, and female: 5)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Male farmer:** Regarding the Project schedule, are the six years for the completion of irrigated area of all lands or just few lands?	**ADI member**: It is planned that the Project will start in 2024 and will be completed for the entire area concerned in 2030.
2	**Male farmer**: We need just to be collective and not have problems so that everything goes smoothly.	**ADI member**: Yes, exactly. There should be no problems in the beginning of the Project, and also construction should not be blocked for example.
3	**Male farmer**: There are people who already have wells. Wouldn't they block the project because they do not need it?	**ADI member**: Actually, the Project is to reduce the usage of underground water so that we do not use it all. In addition, the irrigation water provided through the project will be better than wells in terms of water quality.
4	**Male farmer**: I have 3.5 ha and my neighbor has 3.5 ha. Why did authorities tell us that we should have one single title for the whole 7 ha?	**ADI member**: That is about ownership project* and not about our current project.

Note: It means "Melkisation Project" that is enhancing the change of land ownership from collectively owned lands to individually owned lands.

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

10%: Sprinkle irrigation

50%: Drip irrigation from wells

40%: Rainfed

(2) What is current irrigation water source?

40%: Rainfed

60%: Underground water

(3) How much do you spend for the irrigation annually/monthly at present?

The participants literally do not know.

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

The participants do not have any concrete amount on it. However, they just want it to be relatively cheap.

II. Agricultural water users' association activity

According to the participants, there is no such association in Birtaleb Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		
	3) 3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		
	8) Other housework activities		100%		
Land Ownership	7) Registration of the ownership on farmland	100%			
	8) Decision-making of buying/ selling/ leasing/ renting farmland	100%			
	9) Making priority in inheritance of farmland (law and general)	100%			
Agricultural Machinery	5) Ownership of agricultural machinery	100%			
	6) Decision-making of buying/ renting agricultural machinery	100%			

Item		Male	Female	Both	Not Necessary/ NA
Farming Activities	25) Decision-making of crops to be cultivated in the coming season	100%			
	26) Decision-making of investment for purchase of agricultural inputs	100%			
	27) Decision-making of selling prices	100%			
	28) Preparing land	100%			
	29) Planting, transplanting, broadcasting	100%			
	30) Weeding	100%			
	31) Watering	100%			
	32) Operation and maintenance of irrigation facilities including cleaning canals, etc.	100%			
	33) Harvesting	100%			
	34) Post-harvesting, processing	100%			
	35) Transporting products to selling place	100%			
	36) Selling products	100%			
Finance	7) Decision-making in applying for financial services including loans, micro-credit, etc.	100%			
	8) Name of account, obligor, etc.	100%			
	9) Management of household budget	100%			

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% Normal: 0% **Dissatisfied: 100%** Very dissatisfied: 0%	None

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	None

(END)

Attachment: Participant List

Date: 5th May 2023

Time: 11:30 AM to 13:30 PM

Venue: Elfokra, Birtaleb Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Engineer	ADI
2	Ms.	**********	Engineer	ADI
3	Mr.	**********	Expert in communication	ADI
4	Ms.	**********	Survey Assistant	JICA Survey Team
5	Mr.	**********	Survey assistant	JICA Survey Team
6	Mr.	**********	Farmer	Douar Dgouga
7	Mr.	**********	Farmer	Douar Oulad Chbel
8	Mr.	**********	Farmer	Douar Oulad Chbel
9	Mr.	**********	Farmer	Douar Semhane
10	Mr.	**********	Farmer	Douar Dgouga

No.	Mr./Ms.	Full Name	Position	Organization
11	Mr.	**********	Farmer	Douar Oulad Chbel
12	Mr.	**********	Farmer	Douar Elfoqra
13	Mr.	**********	Farmer	Douar Chablia
14	Mr.	**********	Farmer	Douar Chablia
15	Mr.	**********	Farmer	Douar Oulad Chbel
16	Mr.	**********	Farmer	Douar Dgouga
17	Mr.	**********	Farmer	Douar Oulad Chbel
18	Mr.	**********	Farmer	Douar Oulad Chbel
19	Mr.	**********	Farmer	Douar Oulad Chbel
20	Mr.	**********	Farmer	Douar Oulad Chbel
21	Mr.	**********	Farmer	Douar Elfoqra Lfahlin
22	Mr.	**********	Farmer	Douar Oulad Chbel
23	Mr.	**********	Farmer	Douar Oulad Chbel
24	Mr.	**********	Farmer	Douar Boumaiz Chamalia
25	Mr.	**********	Farmer	Douar Oulad Chbel
26	Mr.	**********	Farmer	Douar Oulad Chbel
27	Mr.	**********	Farmer	Douar Oulad Chbel
28	Mr.	**********	Officer	Douar Oulad Chbel
29	Mr.	**********	Farmer	Douar Oulad Chbel
30	Mr.	**********	Representative of local authority	Douar Oulad Chbel

XVI. 14th Minutes of Stakeholder Meeting in the Scoping Period (9th May 2023)

1. Date & Time

11:30 to 13:30, 9th May 2023

2. Venue

Zirara Commune, Sidi Kacem Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 37 persons in total (see, "Attachment: Participant List").

(1) 8 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 29 persons from the citizen side (male: 26, and female: 3)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Caid of Zirara**: The pipeline alignment should be clarified to people as you showed me in the circle meeting.	**ADI member**: We are here for the first time to inform everyone generally about the Project. The detailed pipeline will be shared once it is definitive. We will give you survey results and more details later.
2	**Male farmer:** Is drip irrigation good for old trees?	**ADI member**: Yes, it is good for old trees, as well.
3	**Male farmer:** Previously, we tried drip irrigation for old trees, and it did not work properly.	**ADI member**: It does not work in the beginning, or just the few first months, because its roots are long, and they got used to a large amount of water. They need time to adapt to drip irrigation, and then it will be sufficient for them.
4	**Male farmer:** What would it be the cost of irrigation water?	**ADI member**: We still do not have the exact price, and it will be decided by the government. In addition, the government might take into consideration subsidies.
5	**Male farmer:** What about internal facilities?	**ADI member**: Basically, they should be prepared by the farmers themselves. The government helps in internal facilities for collectively organized farmers.

No.	Comments/Questions	Answer
6	**Male farmer:** If Al Wahda Dam became empty, what is the plan B of the Project?	**ADI member**: There is no plan B. We are hoping that there is water always in the dam.
7	**Male farmer:** Will people be required to use the irrigation water from the Project, even if they already have wells?	**ADI member**: The irrigation water from the Project will be more beneficial than wells. However, no one will force farmers to use it.
8	**Male farmer:** Should the activity in the land be stopped during the construction period?	**ADI member**: If the pipeline arrives to a land, that means that the part from that land is already acquired, and other parts of the land can be used with no problem normally.
9	**Male farmer:** I suggest that this project is at the same time as the Agropole Project.	**ORMVAG:** The Agropole Project is still in the study phase, and it will be ready by 2030.

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

60%: Drip irrigation from wells

40%: Rainfed

(2) What is current irrigation water source?

40%: Rainfed

60%: Underground water

(3) How much do you spend for the irrigation annually/monthly at present?

One Farmer explaining in the place of everyone: 35 MAD/Hour (About 0.70 MAD/m3)

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

Around 0.5 MAD/m^3

II. Agricultural water users' association activity

According to the participants, there is no such association in Zirara Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		
	3) 3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		

Item		Male	Female	Both	Not Necessary/ NA
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		
	8) Other housework activities		100%		
Land Ownership	1) Registration of the ownership on farmland	100%			
	2) Decision-making of buying/ selling/ leasing/ renting farmland	100%			
	3) Making priority in inheritance of farmland (law and general)	100%			
Agricultural Machinery	1) Ownership of agricultural machinery	100%			
	2) Decision-making of buying/ renting agricultural machinery	100%			
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	100%			
	2) Decision-making of investment for purchase of agricultural inputs	100%			
	3) Decision-making of selling prices	100%			
	4) Preparing land	100%			
	5) Planting, transplanting, broadcasting	100%			
	6) Weeding	100%			
	7) Watering	100%			
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	100%			
	9) Harvesting	100%			
	10) Post-harvesting, processing	100%			
	11) Transporting products to selling place	100%			
	12) Selling products	100%			
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	100%			
	2) Name of account, obligor, etc.	100%			
	3) Management of household budget	100%			

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Facilitation of selling their agricultural products
Female	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Facilitation of selling their agricultural products

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	None
Female	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	None

(END)

Attachment: Participant List

Date: 9th May 2023

Time: 11:30 AM to 13:30 PM

Venue: Zirara Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Caid	ADI
2	Mr.	**********	Engineer	ADI
3	Ms.	**********	Engineer	ADI
4	Mr.	**********	Expert in communication	ADI
5	Mr.	**********	Engineer	ORMVAG
6	Ms.	**********	Survey Assistant	JICA Survey Team
7	Mr.	**********	Survey assistant	JICA Survey Team
8	Ms.	**********	Survey assistant	JICA Survey Team
9	Mr.	**********	Farmer	Douar Ait Yous Lwad
10	Mr.	**********	Farmer	Douar Ait Yous Lwad
11	Mr.	**********	Farmer	Douar Ait Yous Lwad
12	Mr.	**********	Farmer	Douar Ait Yous Lwad
13	Mr.	**********	Farmer	Douar Ait Yous Lwad
14	Ms.	**********	Farmer	Idrissia Cooperative
15	Ms.	**********	Farmer	Idrissia Cooperative
16	Ms.	**********	Farmer	Idrissia Cooperative
17	Mr.	**********	Farmer	Idrissia Cooperative
18	Mr.	**********	Farmer	Idrissia Cooperative
19	Mr.	**********	Farmer	Idrissia Cooperative
20	Mr.	**********	Farmer	Douar Ait Yous Lwad
21	Mr.	**********	Farmer	Zirara
22	Mr.	**********	Farmer	Idrissia Cooperative
23	Mr.	**********	Farmer	Idrissia Cooperative
24	Mr.	**********	Farmer	Lhassanya Cooperative
25	Mr.	**********	Farmer	Douar Ait Yous Lwad
26	Mr.	**********	Farmer	Douar Trabna lwad
27	Mr.	**********	Farmer	Douar Ait Yous Lwad
28	Mr.	**********	Farmer	Zirara
29	Mr.	**********	Farmer	Douar Trabna lwad
30	Mr.	**********	Farmer	Douar Trabna lwad
31	Mr.	**********	Farmer	Douar Trabna lwad
32	Mr.	**********	Farmer	Douar Trabna lwad
33	Mr.	**********	Farmer	Awamer Ghnnama
34	Mr.	**********	Farmer	Douar Trabna lwad
35	Mr.	**********	Farmer	Douar Trabna lwad
36	Mr.	**********	Farmer	Douar Ait Yous Lwad
37	Mr.	**********	Farmer	Douar Trabna lwad

XVII. 15th Minutes of Stakeholder Meeting in the Scoping Period (10th May 2023)

1. Date & Time

11:30 to 13:00, 10th May 2023

2. Venue

Zirara Commune, Sidi Kacem Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 36 persons in total (see, "Attachment: Participant List").

(1) 10 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 26 persons from the citizen side (male: 29)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Male farmer**: What will the farmers benefit?	**ADI member**: Irrigation water from the dam, support measures, subsidies and other benefits for collectively organized farmers are expected.
2	**Male farmer**: Can just one person manage the whole land for inheritors?	**ADI member**: One person can be responsible for the whole land, and also each person can take responsibility for his own part if each part has its separate internal facilities.
3	**Male farmer**: Will we get any amount of irrigation water we want, or will it be kind of limited?	**ADI member**: Based on studies in the zone, the Project decides how much irrigation water for each soil, crops and area need. In addition, the Project gives each one what's enough for them.
4	**Male farmer**: We want to know the diameter of the pipeline, the length etc.	**ADI member**: All of these details will be explained in further surveys and meetings.

5.3 Questions from the Project

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

90%: Drip irrigation from wells

10%: Rainfed

(2) What is current irrigation water source?

10%: Rainfed

90%: Underground water

(3) How much do you spend for the irrigation annually/monthly at present?

One farmer explained about 1 MAD/m^3 for one year, where he has 8 ha, and finds water in 50 meters in his well.

Other participants said that it costs definitely more expensive for them, because they find water a little deeper than the above farmer (probably, it would be more than 50 meters).

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

Around 0.5 MAD/m^3

II. Agricultural water users' association activity

According to the participants, there is no such association in Zirara Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		
	3) 3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		
	8) Other housework activities		100%		
Land Ownership	1) Registration of the ownership on farmland	100%			
	2) Decision-making of buying/ selling/ leasing/ renting farmland	100%			
	3) Making priority in inheritance of farmland (law and general)	100%			
Agricultural Machinery	1) Ownership of agricultural machinery	100%			
	2) Decision-making of buying/ renting	100%			

Item		Male	Female	Both	Not Necessary/ NA
	agricultural machinery				
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	100%			
	2) Decision-making of investment for purchase of agricultural inputs	100%			
	3) Decision-making of selling prices	100%			
	4) Preparing land	100%			
	5) Planting, transplanting, broadcasting	100%			
	6) Weeding	100%			
	7) Watering	100%			
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	100%			
	9) Harvesting	100%			
	10) Post-harvesting, processing	100%			
	11) Transporting products to selling place	100%			
	12) Selling products	100%			
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	100%			
	2) Name of account, obligor, etc.	100%			
	3) Management of household budget	100%			

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Facilitation of selling their products

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	None

(END)

Attachment: Participant List

Date: 10th May 2023

Time: 11:30 AM to 13:00 PM

Venue: Zirara Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Caid	ADI
2	Mr.	**********	Engineer	ADI
3	Ms.	**********	Engineer	ADI
4	Mr.	**********	Expert in communication	ADI
5	Mr.	**********	Engineer	ORMVAG
6	Ms.	**********	Survey Assistant	JICA Survey Team
7	Mr.	**********	Survey assistant	JICA Survey Team
8	Mr.	**********	Farmer	Hassania Cooperative
9	Mr.	**********	Farmer	Hassania Cooperative

No.	Mr./Ms.	Full Name	Position	Organization
10	Mr.	**********	Farmer	Hassania Cooperative
11	Mr.	**********	Farmer	Nassr Cooperative
12	Mr.	**********	Farmer	Mohammadya Cooperative
13	Mr.	**********	Farmer	Hassania Cooperative
14	Mr.	**********	Farmer	Hassania Cooperative
15	Mr.	**********	Farmer	Hassania Cooperative
16	Mr.	**********	Farmer	Widad Cooperative
17	Mr.	**********	Farmer	Hassania Cooperative
18	Mr.	**********	Farmer	Zirara
19	Mr.	**********	Farmer	Zirara
20	Mr.	**********	Farmer	Hassania Cooperative
21	Mr.	**********	Farmer	Nassr Cooperative
22	Mr.	**********	Farmer	Mohammadya Cooperative
23	Mr.	**********	Farmer	Hassania Cooperative
24	Mr.	**********	Farmer	Hassania Cooperative
25	Mr.	**********	Farmer	Hassania Cooperative
26	Mr.	**********	Farmer	Hassania Cooperative
27	Mr.	**********	Farmer	Hassania Cooperative
28	Mr.	**********	Farmer	Hassania Cooperative
29	Mr.	**********	Farmer	Hassania Cooperative
30	Mr.	**********	Farmer	Hassania Cooperative
31	Mr.	**********	Farmer	Hassania Cooperative
32	Mr.	**********	Farmer	Hassania Cooperative
33	Mr.	**********	Farmer	Hassania Cooperative
34	Mr.	**********	Representative of local authority	Mohammadya Cooperative
35	Mr.	**********	Representative of local authority	Hassania Cooperative
36	Mr.	**********	Representative of local authority	Nassr Cooperative

XVIII. 16th Minutes of Stakeholder Meeting in the Scoping Period (12th May 2023)

1. Date & Time

11:00 to 13:00, 12th May 2023

2. Venue

Zirara Commune, Sidi Kacem Province

3. Language

Presentation material and discussion in Arabic

4. Participants

Total participants were 110 persons in total (see, "Attachment: Participant List").

(1) 7 persons from the Project side including executing agency, the JICA Survey Team, etc.

(2) 103 persons from the citizen side (male: 101, and female: 2)

5. Discussion contents

5.1 Presentation about the Project

- Potential about Gharb Region,
- Project outline including the project title and its components: national strategy, location and size of the Project,
- Engagement plan for the Stakeholder Meetings (SHM),
- Result of exanimating alternative plans that were considered to mitigate the negative impacts in the initial stage of the Project,
- Entire schedule of the preparatory survey, and
- Anticipated impacts by the Project.

5.2 Comments/ Questions from the participants

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Male farmer**: We really prefer the Project, and we are welcoming it.	None
2	**Male farmer:** We are already engaged in this project in 2017, but it has not been commenced, so far.	**ADI member**: This is a different project. The projects from 2002, 2010, 2017 or any others were not same. For this one, JICA is also a very important partner.
3	**Male farmer:** Will the current crops be cancelled?	**ADI member**: Farmers have the right to do any crops or trees they want. From our side, we will just give you advice.
4	**Male farmer:** Will irrigation water be stopped from Hricha and go to Sidi Yahya if the water level of Al Wahda Dam is low?	**ADI member**: The development of Hricha is the first phase in the Project. We can say that it has priority in irrigation water and that it will not normally be stopped from water.
5	**Male farmer:** Will drip irrigation work for old trees?	**ADI member**: Yes, it will.

5.3 Questions from the Project side

The Project side made following questions to the participants to grasp the current situation, etc. at the field.

I. Irrigation System

(1) How do you get irrigation water currently (irrigation system)?

90%: Drip irrigation from wells

10%: Rainfed

(2) What is current irrigation water source?

10%: Rainfed

90%: Underground water

(3) How much do you spend for the irrigation annually/monthly at present?

Farmers explained that it is about 1 MAD/m^3.

(4) Do you want to apply the new irrigation system by the Project?

100%: Yes

(5) If you can get the water by the new irrigation system, how much can you pay water tariff annually/monthly?

Participants said it should be less than 1 MAD/m^3.

II. Agricultural water users' association activity

According to the participants, there is no such association in Zirara Commune.

III. Gender aspects

(1) Please tell us the work demarcation by gender in your household.

Item		Male	Female	Both	Not Necessary/ NA
Housework	1) Cooking		100%		
	2) Interior/ outside cleaning		100%		
	3) 3) Laundry		100%		
	4) Shopping cooking ingredient, commodities, etc.		100%		
	5) Drawing water for drinking, cooking, etc.		100%		
	6) Buying materials for firing such as coal		100%		
	7) Caregiving of family members such as infants, children, and elderly person		100%		
	8) Other housework activities		100%		
Land Ownership	1) Registration of the ownership on farmland	100%			
	2) Decision-making of buying/ selling/ leasing/ renting farmland	100%			
	3) Making priority in inheritance of farmland (law and general)	100%			
Agricultural Machinery	1) Ownership of agricultural machinery	100%			
	2) Decision-making of buying/ renting agricultural machinery	100%			
Farming Activities	1) Decision-making of crops to be cultivated in the coming season	100%			
	2) Decision-making of investment for purchase of agricultural inputs	100%			

Item		Male	Female	Both	Not Necessary/ NA
	3) Decision-making of selling prices	100%			
	4) Preparing land	100%			
	5) Planting, transplanting, broadcasting	100%			
	6) Weeding	100%			
	7) Watering	100%			
	8) Operation and maintenance of irrigation facilities including cleaning canals, etc.	100%			
	9) Harvesting	100%			
	10) Post-harvesting, processing	100%			
	11) Transporting products to selling place	100%			
	12) Selling products	100%			
Finance	1) Decision-making in applying for financial services including loans, micro-credit, etc.	100%			
	2) Name of account, obligor, etc.	100%			
	3) Management of household budget	100%			

(2) Please tell us the current situation of accessibility and needs on the water resources.

1) Water resources related to the agricultural activities

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Facilitation of selling their products
Female	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Facilitation of selling their products

2) Water Resources related to the domestic use (excluding the agricultural activities)

Respondents	Current Situation on Quantity	Current Situation on Quality	Needs
Male	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	None
Female	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	Very satisfied: 0% Satisfied: 0% **Normal: 100%** Dissatisfied: 0% Very dissatisfied: 0%	None

(END)

Attachment: Participant List

Date: 12th May 2023

Time: 11:00 AM to 13:00 PM

Venue: Zirara Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	CAID	Zirara
2	Mr.	**********	Engineer	ADI
3	Ms.	**********	Engineer	ADI
4	Mr.	**********	Expert in communication	ADI

No.	Mr./Ms.	Full Name	Position	Organization
5	Mr.	**********	Engineer	ORMVAG
6	Ms.	**********	Survey Assistant	JICA Survey Team
7	Mr.	**********	Survey assistant	JICA Survey Team
8	Mr.	**********	Farmer	Douar Semhane Lkentra
9	Mr.	**********	Farmer	Douar Zwaya
10	Mr.	**********	Farmer	Douar Khnafif
11	Mr.	**********	Farmer	Douar Zwaya
12	Mr.	**********	Farmer	Douar Zwaya
13	Mr.	**********	Farmer	Douar Zwaya
14	Mr.	**********	Farmer	Douar Nabawya
15	Mr.	**********	Farmer	Cooperative Elola
16	Mr.	**********	Farmer	Cooperative Elola
17	Mr.	**********	Farmer	Cooperative Lamsaada
18	Mr.	**********	Farmer	Douar Khnafif
19	Mr.	**********	Farmer	Douar Zwaya
20	Mr.	**********	Farmer	Cooperative Lkifah
21	Mr.	**********	Farmer	Cooperative Elfalah
22	Mr.	**********	Farmer	Cooperative Elaalmia
23	Mr.	**********	Farmer	Cooperative Elfalah
24	Mr.	**********	Farmer	Cooperative Takadoum
25	Mr.	**********	Farmer	Cooperative Nabawya
26	Mr.	**********	Farmer	Cooperative Ljadd
27	Mr.	**********	Farmer	Douar Oulad Bouqaddou
28	Mr.	**********	Farmer	Douar Oulad Bouqaddou
29	Mr.	**********	Farmer	Douar Oulad Bouriss
30	Mr.	**********	Farmer	Oulad Boughdou Chrouq
31	Mr.	**********	Farmer	Oulad Boughdou Chrouq
32	Mr.	**********	Farmer	Cooperative Ljadd
33	Mr.	**********	Farmer	Cooperative ljtihad
34	Mr.	**********	Farmer	Douar Oulad Boughdou
35	Mr.	**********	Farmer	Douar Oulad Boughdou
36	Mr.	**********	Farmer	Cooperative Takadoum
37	Mr.	**********	Farmer	Cooperative Takadoum
38	Mr.	**********	Farmer	Cooperative Elaalmia
39	Mr.	**********	Farmer	Cooperative Elaalmia
40	Mr.	**********	Farmer	Cooperative Elaalmia
41	Mr.	**********	Farmer	Cooperative Lamsaada
42	Mr.	**********	Farmer	Cooperative Lmajd
43	Mr.	**********	Farmer	Cooperative Lamsaada
44	Mr.	**********	Farmer	Cooperative Lamsaada
45	Mr.	**********	Farmer	Douar Semhane Lkentra
46	Mr.	**********	Farmer	Douar Semhane Lkentra
47	Mr.	**********	Farmer	Douar Semhane Lkentra
48	Mr.	**********	Farmer	Douar Semhane Lkentra
49	Mr.	**********	Farmer	Douar Semhane Lkentra
50	Mr.	**********	Farmer	Cooperative Lmajd
51	Mr.	**********	Farmer	Douar Semhane Lkentra
52	Mr.	**********	Farmer	Cooperative Takadoum
53	Mr.	**********	Farmer	Cooperative Elfalah
54	Mr.	**********	Farmer	Cooperative Elfalah
55	Mr.	**********	Farmer	Cooperative ljtihad
56	Mr.	**********	Farmer	Cooperative Ljadd
57	Mr.	**********	Farmer	Cooperative Elfalah
58	Mr.	**********	Farmer	Cooperative ljtihad
59	Mr.	**********	Farmer	Cooperative ljtihad
60	Mr.	**********	Farmer	Cooperative Ljadd
61	Mr.	**********	Farmer	Cooperative Ljadd
62	Mr.	**********	Farmer	Douar Oulad Boughdou
63	Mr.	**********	Farmer	Douar Dreyed Chbanat
64	Mr.	**********	Farmer	Cooperative Lkifah
65	Mr.	**********	Farmer	Cooperative lmansoura
66	Mr.	**********	Farmer	Cooperative Ittihad
67	Mr.	**********	Farmer	Douar Semhane Lkentra
68	Mr.	**********	Farmer	Cooperative Takadoum
69	Mr.	**********	Farmer	Cooperative Takadoum
70	Mr.	**********	Farmer	Cooperative Nabawya

No.	Mr./Ms.	Full Name	Position	Organization
71	Mr.	**********	Farmer	Cooperative lmansoura
72	Mr.	**********	Farmer	Cooperative Nabawya
73	Mr.	**********	Farmer	Douar Khnafif
74	Mr.	**********	Farm Worker	Douar Semhane Lkentra
75	Mr.	**********	Farm Worker	Cooperative Ittihad
76	Mr.	**********	Farmer	Douar Oulad Boughdou
77	Mr.	**********	Farm Worker	Cooperative lmansoura
78	Mr.	**********	Farmer	Cooperative Ljadd
79	Mr.	**********	Farmer	Cooperative Lkifah
80	Mr.	**********	Farmer	Douar Oulad Boughdou
81	Mr.	**********	Farmer	Cooperative Ittihad
82	Mr.	**********	Daily worker	Cooperative Lmajd
83	Mr.	**********	Farm Worker	Douar Oulad Bouriss
84	Ms.	**********	Farmer	Douar Zwaya
85	Ms.	**********	Farmer	Douar Zwaya
86	Mr.	**********	Farmer	Cooperative Ljadd
87	Mr.	**********	Farmer	Douar Bourali
88	Mr.	**********	Farmer	Douar Zwaya
89	Mr.	**********	Farmer	Cooperative Lmssaada
90	Mr.	**********	Farmer	Douar Dreyed
91	Mr.	**********	Farmer	Douar Dreyed
92	Mr.	**********	Farmer	Douar Semhane Lkentra
93	Mr.	**********	Farmer	Douar Oulad Bouriss
94	Mr.	**********	Farmer	Douar Semhane Lkentra
95	Mr.	**********	Farmer	Douar Oulad Boughdou
96	Mr.	**********	Farmer	Cooperative Takadoum
97	Mr.	**********	Farmer	Cooperative Ljadd
98	Mr.	**********	Farmer	Douar Oulad Boughdou
99	Mr.	**********	Farmer	Cooperative Takadoum
100	Mr.	**********	Farmer	Douar Oulad Boughdou
101	Mr.	**********	Farmer	Cooperative Lmajd
102	Mr.	**********	Farmer	Cooperative Lmssaada
103	Mr.	**********	Farmer	Cooperative Ljadd
104	Mr.	**********	Farmer	Cooperative ljtihad
105	Mr.	**********	Farmer	Cooperative Ljadd
106	Mr.	**********	Farmer	Cooperative Ljadd
107	Mr.	**********	Farmer	Cooperative Lamal
108	Mr.	**********	Farmer	Douar Ljharna
109	Mr.	**********	Farmer	Douar Oulad Bouriss
110	Mr.	**********	Farmer	Cooperative ljtihad

XIX. 1st Minutes of Stakeholder Meeting for Sharing Environment Survey Results (8th September 2023)

1. Date & Time

10:45 to 11:30, 8th September 2023

2. Venue

Tent near the Salhiya Cooperative's dispensary in Oulad Ben Hammadi commune. Sidi Slimane Province

3. Languages for Explanation

Presentation material and discussion in Arabic

4. Participants

Total participants were 53 persons in total (see, "Attachment: Participants List").

(1) 3 persons from the JICA Survey Team

(2) 1 person from ORMVAG

(3) 7 persons from Local Authorities: 6 (male) and 1 (female)

(4) 42 persons from the citizen side: 32 (male) and 10 (female)

5. Discussion Contents

5.1 Presentation about the Project

- Project Summary
- ORMVAG intervenes to address the questions raised during the initial stakeholder meetings, and the responses are as follows:

No.	Question raised at the 1st SHM	Answers
1	Access to irrigation water for people living along the Tête Morte Main Canal	DIAEA and ORMVAG still discussing it.
2	Water tariff after the project	The water tariff will be low compared with the current one. In addition, the government can provide a number of subsidies.
3	Will there be a change in the use of groundwater for irrigation?	Groundwater users are advised to use the project's irrigation water to preserve groundwater resources. The government will subsidize drip irrigation systems.
4	Who pays for new equipment such as drip irrigation systems?	Farmers have to purchase new equipment such as drip irrigation systems, but the government can subsidize the purchase.
5	Crop selection after completion of project	Farmers can grow any crop they wish.
6	Any support provided by the project to women's groups	DIAEA cannot directly support women's groups. But it's possible to help other governmental organizations support women's groups.

- JST has explained the following points by presenting the results of Ecological survey:
  - Air Quality and Noise
  - Surface Water Quality
  - Drainage water quality
  - Groundwater Quality

- Ecological Survey Results

・ JST explained the anticipated environmental impacts both before and during the construction phase (temporary impacts) as well as during the operational phase, also elaborated on the proposed mitigation measures for both the construction and operational periods.

・ Presentation of the Grieves Redress Scheme

・ November Stakeholder Meeting: Sharing Socio-Economic Survey Results and Compensation Measures.

5.2 Comments/Questions from the participants

The head of Commune intervenes throughout the meeting to reiterate in the local language what JST presented to the participants.

Table. Contents Discussed

No.	Comments/Questions	Answer
1	**Farmer**: For farmers who already have drip irrigation systems in place, will they benefit from the Project or not?"	**Head of Commune**: This project is subsidized by the Moroccan government, and all farmers will benefit from it, including those who have already had drip irrigation equipment. They can also benefit from equipment maintenance.
2	**Farmer**: You mentioned that we are free to cultivate any type of crops after the completion of the Project, but the issue we are facing is groundwater salinity, which is at 5%, limiting us to selecting only cereal crops.	**Head of Commune:** After the completion of the project, with the abundance of water coming from the Koudiat El Borna Dam, the salinity level will be reduced, allowing you to diversify crops.
3	**Head of Commune:** The timing of the third meeting is not favorable for the farmers as they will be occupied with harvesting. Additionally, this period coincides with the harvest month, so if construction begins in November, farmers will lose their crops	**JST**: Firstly, construction will start in late 2024. Secondly, the third stakeholders' meeting will focus on sharing socio-economic survey results and compensation measures. **JST:** Before Construction, farmers will be informed in advance about the exact construction period. **Head of commune**: Well, we agree with that because farmers need a lot of time to consider the measures they will adopt before construction.

(END)

Attachment: Participants List

Date: 8th September 2023

Time: 10:45 AM to 11:30 AM

Venue: Tent near the Salhiya Cooperative's dispensary in Oulad Ben Hammadi commune.

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	*Qaid*	Oulad Ben Hammadi *Qaidat*
2	Mr.	**********	Head of Commune	Oulad ben Hammadi commune
3	Mr.	**********	*Cheikh*	Cooperative Salhiya
4	Mr.	**********	*Maqaddam*	Douar Oulad Lafqih
5	Mr.	**********	*Maqaddam*	Douar Oulad Ben Moussa
6	Mr.	**********	*Maqaddam*	Cooperative Zouiniya
7	Mr.	**********	*Maqaddam*	Douar Oulad Lafqih
8	Mr.	**********	Farmer	Douar Oulad Ben Moussa
9	Mr.	**********	Farmer	Cooperative Salhiya
10	Mr.	**********	Farmer	Cooperative Zouiniya
11	Mr.	**********	Farmer	Douar Oulad Ben Hammadi
12	Ms.	**********	Farmer	Douar Oulad Ben Hammadi
13	Mr.	**********	Farmer	Cooperative Zouiniya

No.	Mr./Ms.	Full Name	Position	Organization
14	Mr.	**********	Farmer	Cooperative Zouiniya
15	Mr.	**********	Farmer	Cooperative Salhiya
16	Mr.	**********	Farmer	Cooperative Zouiniya
17	Mr.	**********	Farmer	Cooperative Zouiniya
18	Mr.	**********	Farmer	Cooperative Zouiniya
19	Mr.	**********	Farmer	Cooperative Zouiniya
20	Mr.	**********	Farmer	Cooperative Zouiniya
21	Mr.	**********	Farmer	Cooperative Salhiya
22	Mr.	**********	Farmer	Cooperative Salhiya
23	Ms.	**********	Farmer	Cooperative Salhiya
24	Ms.	**********	Farmer	Cooperative Salhiya
25	Ms.	**********	Farmer	Cooperative Salhiya
26	Ms.	**********	Farmer	Cooperative Salhiya
27	Ms.	**********	Farmer	Cooperative Salhiya
28	Mr.	**********	None	Cooperative Salhiya
29	Ms.	**********	Farmer	Cooperative Salhiya
30	Ms.	**********	Farmer	Cooperative Salhiya
31	Ms.	**********	Farmer	Cooperative Salhiya
32	Mr.	**********	Farmer	Cooperative Salhiya
33	Mr.	**********	Farmer	Cooperative Salhiya
34	Mr.	**********	Farmer	Cooperative Salhiya
35	Mr.	**********	Farmer	Cooperative Salhiya
36	Mr.	**********	Farmer	Cooperative Salhiya
37	Mr.	**********	Farmer	Cooperative Salhiya
38	Mr.	**********	Farmer	Cooperative Salhiya
39	Mr.	**********	Farmer	Cooperative Salhiya
40	Mr.	**********	Farmer	Cooperative Salhiya
41	Mr.	**********	Farmer	Cooperative Salhiya
42	Mr.	**********	Farmer	Cooperative Salhiya
43	Mr.	**********	Farmer	Cooperative Zouiniya
44	Mr.	**********	Farmer	Cooperative Salhiya
45	Mr.	**********	Farmer	Cooperative Salhiya
46	Mr.	**********	Farmer	Cooperative Zouiniya
47	Mr.	**********	Farmer	Cooperative Salhiya
48	Mr.	**********	Farmer	Cooperative Salhiya
49	Ms.	**********	Farmer	Cooperative Salhiya
50	Mr.	**********	Project Manager, focal person for SH meetings	ORMVAG
51	Ms.	**********	Environmental experts	JICA Survey Team
52	Mr.	**********	Survey Assistant	JICA Survey Team
53	Ms.	**********	Survey Assistant	JICA Survey Team

XX. 2nd Minutes of Stakeholder Meeting for Sharing Environment Survey Results (12th September 2023)

1. Date & Time

11:25 to 12:10, 12th September 2023

2. Venue

Conference Room, Dar Al-Talib Social Welfare Foundation, Khnichet Commune, Sidi Kacem Province

3. Languages for Explanation

Presentation material and discussion in Arabic

4. Participants

Total participants were 58 persons in total (see, "Attachment: Participants List").

(1) 3 persons from the JICA Survey Team

(2) 1 person from ORMVAG

(3) 5 persons from Local Authorities (Male)

(4) 49 persons from the citizen side: 40 (male) and 9 (female)

5. Discussion Contents

5.1 Introduction by JICA Survey Team

5.2 Presentation by JICA Survey Team

- Project Summary.
- Answers to questions raised during the 1st stakeholder meetings, and the responses as shown below:

Question raised at the 1st SHM	Answers
1- Access to irrigation water for people living along the Tête Morte Main Canal	DIAEA and ORMVAG still discussing it.
2- Water tariff after the project	The water tariff will be low compared with the current one. In addition, the government can provide a number of subsidies.
3- Will there be a change in the use of groundwater for irrigation?	Groundwater users are advised to use the Project's irrigation water to preserve groundwater resources. The government will subsidize drip irrigation systems.
4- Who pays for new equipment such as drip irrigation systems?	Farmers have to purchase new equipment such as drip irrigation systems, but the government can subsidize the purchase.
5- Crop selection after completion of Project	Farmers can grow any crop they wish.
6- Any support provided by the Project to women's groups	DIAEA cannot directly support women's groups. But it's possible to help other governmental organizations support women's groups.

- JST has explained the following points by presenting the results of Ecological survey:
  - Air Quality and Noise

- Surface Water Quality
- Drainage water quality
- Groundwater Quality
- Ecological Survey Results

- JST explained the anticipated environmental impacts both before and during the construction phase (temporary impacts) as well as during the operational phase, also elaborated on the proposed mitigation measures for both the construction and operational periods.
- Presentation of the Grieves Redress Scheme
- The 3rd Stakeholder Meeting in November: Sharing Socio-Economic Survey Results and Compensation Measures.

5.3 Comments/Questions from the participants

Table. Contents Discussed

Comments/Questions	Answer
Farmer: November is a harvest month, if construction begins, we will incur crop losses	**JST**: The construction is scheduled to start at the end of 2024, while the 3rd Stakeholder meeting will primarily focus on sharing socio-economic survey results and compensation measures. Before Construction, farmers will be informed in advance about the exact construction period. If farmers intend to plant, they should stop, if they plant something they should remove them. **Farmer:** I have olive trees, in this case, should we cut down the trees by ourselves? **JST:** No, you don't have cut down olive trees by yourselves. If they are within the affected areas and cut down, and you will be compensated for it.
Farmer: After the construction, will we have the ability to use our lands, particularly above the canal?	**JST**: The Canal will be buried, therefore, planting trees or building structures will not be allowed. **ORMVAG**: concerning the right of way of the canal in a 50-meter box culvert, it will belong to the Government, farmers could not use it, but they will be compensated for it.
Farmer: We request that the canal will not traverse through the middle of the farmland; instead, it should be situated between farmland plots or in close proximity to the main road.	**JST:** This matter will be discussed with DIAEA and ORMVAG. *
Farmer: Lands crossed by the canal, will be compensated or not?	**JST:** All land, structures and trees affected by the construction will be compensated.
Farmer: I live 2 km from the Koudiat El borna dam, can I benefit from irrigation? **Farmer:** Will the irrigation water be supplied from the starting point of canal?	**ORMVAG**: Throughout the 11-kilometer, 1,500 hectares will benefit from irrigation, but the specific area in question has not been determined yet. ➢ **Farmer**: Priority of irrigation area (1,500ha) should be given to landowners in proximity to Koudiat El Borna Dam. ➢ **Farmer**: Priority of irrigation area (1,500ha) should be granted to lands, which are along the canal.
Farmer*: I reside near the main road. Will the canal pass through the middle of my land or beside the road?	**JST:** By November, the canal alignment will be finalized, and you will be informed about this during the upcoming meeting.
Farmer: In the case of disputed land, will compensation cover all those associated with the land, or only the current users?	***Cheikh* (Khnichet Commune):** Compensation should be applied if there are no disputes, and all land-related issues are resolved.

*It will be examined by the Government of Morocco when the future expansion zone (42,000ha), outside of the target area, will be implemented.

Cheikh: the person is responsible for management of plural douars (village) and supervision of plural Maqaddam

* *KARMACHI Lakbir*, the owner of the affected house “A2”, which is to be resettled by the Project.

(END)

Attachment: Participants List

Date: 12th September 2023

Time: 11:25 to 12:10, 12th September 2023

Venue: Conference Room, Dar Al-Talib Social Welfare Foundation, Khnichet Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	*Cheikh*	Khnichet Commune
2	Mr.	**********	*Cheikh*	Douar Oulad Said
3	Mr.	**********	*Muqaddam*	Douar Oulad Khriss/ Aabidat Mharir
4	Mr.	**********	*Muqaddam*	Khnichet Commune
5	Mr.	**********	*Muqaddam*	Douar Aabidat Lhajra
6	Mr.	**********	None	Douar Oulad Khriss
7	Mr.	**********	Farmer	Douar Oulad Khriss
8	Mr.	**********	Farmer	Douar Oulad Khriss
9	Mr.	**********	Farmer	Douar Aabidat Mharir
10	Mr.	**********	Farm Worker	Douar Oulad Khriss
11	Mr.	**********	Farmer	Douar Oulad Khriss
12	Mr.	**********	Farmer	Douar Aabidat Mharir
13	Mr.	**********	Farmer	Douar Oulad Khriss
14	Mr.	**********	Farmer	Douar Oulad Khriss
15	Mr.	**********	Day Laborer	Douar Oulad Khriss
16	Mr.	**********	Day Laborer	Douar Oulad Khriss
17	Mr.	**********	None	Douar Oulad Khriss
18	Mr.	**********	Farmer	Douar Aabidat Mharir
19	Mr.	**********	Farmer	Douar Aabidat Mharir
20	Mr.	**********	Farmer	Douar Oulad Khriss
21	Mr.	**********	Farmer	Douar Aabidat Mharir
22	Mr.	**********	Farmer	Douar Oulad Khriss
23	Mr.	**********	Farm Worker	Douar Oulad Aamara
24	Mr.	**********	Farmer	Douar Aabidat Mharir
25	Ms.	**********	Farmer	Douar Oulad Bouaaban
26	Mr.	**********	Farmer	Douar Oulad Bouaaban
27	Mr.	**********	Farmer	Douar Oulad Bouaaban
28	Mr.	**********	Farmer	Douar Aabidat Mharir
29	Mr.	**********	Farmer	Douar Oulad Khriss
30	Mr.	**********	Farmer	Douar Aabidat Mharir
31	Mr.	**********	Farmer	Douar Aabidat Mharir
32	Mr.	**********	Farmer	Douar Oulad Khriss
33	Mr.	**********	Farmer	Douar Aabidat Mharir
34	Mr.	**********	Farmer	Douar Oulad Khriss
35	Mr.	**********	Farmer	Douar Rbilat
36	Mr.	**********	Farmer	Douar Oulad Khriss
37	Mr.	**********	Farmer	Douar Oulad Khriss
38	Mr.	**********	Farmer	Douar Oulad Khriss
39	Mr.	**********	Farmer	Douar Aabidat Mharir
40	Mr.	**********	Farmer	Douar Aabidat Lhajra
41	Ms.	**********	Farmer	Douar Oulad Khriss
42	Mr.	**********	Farmer	Douar Aabidat Lhajra
43	Mr.	**********	Farmer	Douar Aabidat Lhajra
44	Ms.	**********	Farmer	Douar Oulad Khriss
45	Ms.	**********	Farmer	Douar Oulad Khriss
46	Ms.	**********	Farmer	Douar Oulad Khriss
47	Ms.	**********	Farmer	Khnichet
48	Ms.	**********	Farmer	Khnichet
49	Ms.	**********	Farmer	Khnichet
50	Ms.	**********	Farmer	Douar Aabidat Mharir
51	Mr.	**********	Farmer	Douar Aabidat Mharir
52	Mr.	**********	Farmer	Douar Rbilat

No.	Mr./Ms.	Full Name	Position	Organization
53	Mr.	**********	Farmer	Douar Aabidat Mharir
54	Mr.	**********	Farmer	Douar Oulad Khriss
55	Mr.	**********	Project Manager, focal person for SH meetings	ORMVAG
56	Ms.	**********	Environmental experts	JICA Survey Team
57	Mr.	**********	Survey Assistant	JICA Survey Team
58	Ms.	**********	Survey Assistant	JICA Survey Team

XXI. 3rd Minutes of Stakeholder Meeting for Sharing Environment Survey Results (13th September 2023)

1. Date & Time

11:20 to 12:00, September 13th, 2023.

2. Venue

Conference Room, Bir Taleb Commune, Sidi Kacem Province

3. Languages for Explanation

Presentation material and discussion in Arabic

4. Participants

Total participants were 45 persons in total (see, "Attachment: Participants List").

(1) 3 persons from the JICA Survey Team

(2) 1 person from ORMVAG

(3) 1 person from Local Authorities (Caid)

(4) 40 persons from the citizen side: 39 (male) and 1 (female)

5. Discussion Contents

5.1 Introduction by Caid of Tekna Bir Taleb

5.2 Presentation by JICA Survey Team

- Project Summary.
- Answers to questions raised during the initial stakeholder meetings, and the responses are as follows:

Question raised at the 1st SHM	Answers
1- Access to irrigation water for people living along the Tête Morte Main Canal	Around 1,500 ha will be irrigated and DIAEA and ORMVAG will fix the exact surface later. *
2- Water tariff after the project	The water tariff is not yet defined but it certainly will be lower in comparison with the current one. In addition, the government can provide subsidies in the framework of this Project.
3- Will there be a change in the use of groundwater for irrigation?	The Project's purpose is to reduce the pressure on the groundwater. Therefore, it's advisable to preserve the groundwater for severe drought cases.
4- Who pays for new equipment such as drip irrigation systems?	Farmers have to purchase new equipment such as drip irrigation systems. Moreover, the government can subsidize the purchase up to 100% for less a surface no more than 5 ha.
5- Crop selection after completion of Project	Farmers are free to grow any crops they wish and the ONCA services will be ready to assist them and advise them on the choice of the most suitable crops.

*It will be examined by the Government of Morocco when the future expansion zone (42,000ha), outside of the target area, will be implemented.

- JST has explained the following points by presenting the results of Ecological survey:
  - Air Quality and Noise
  - Surface Water Quality
  - Drainage water quality

- Groundwater Quality
- Ecological Survey Results

・ JST explained the anticipated environmental impacts both before and during the construction phase (temporary impacts) as well as during the operational phase, also elaborated on the proposed mitigation measures for both the construction and operational periods.

・ Presentation of the Grieves Redress Scheme

・ November Stakeholder Meeting: Sharing Socio-Economic Survey Results and Compensation Measures.

5.3 Comments/Questions from the participants

Table. Contents Discussed

Comments/Questions	Answer
Farmer: Is it currently possible to plant crops in the areas where the irrigation canal will run through?	**JST**: By November, farmers will be informed about compensation measures, there will be no construction. When it's time for construction, you will be informed in advance so that people who have crops in their land can harvest them before construction. **Caid**: The planting season has just begun, and numerous farmers are actively preparing their fields for sowing. It's advisable to utilize the available land promptly rather than leaving it idle. The construction work for the Project will proceed gradually, with the irrigation canal passing through only certain designated zones. Farmers affected by this will receive compensation.
Farmer: I was informed that the pump station basin will be very near my house, is it possible to move it a bit farther?	**JST**: The final alignment is not yet fixed. But you will certainly be informed beforehand. **Caid**: There are many procedures to be followed before the construction starts. So, you will know the exact affected areas very soon.
Farmer: We are aware that this Project will play a significant role in advancing the development of our region. Therefore, we greatly appreciate this Project and extend our heartfelt thanks to JICA for their invaluable support. Our gratitude goes out to the people of Japan.	

(END)

Attachment: Participants List

Date: 13th September 2023

Time: 11:20 to 12:00,

Venue: Conference Room, Bir Taleb Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Caid	Tekna Bir Taleb Caidat
2	Mr.	**********	Farmer	Douar Oulad Ben Khlil
3	Mr.	**********	Farmer	Douar Oulad Ben Khlil
4	Mr.	**********	Farmer	Douar Oulad Ben Khlil
5	Mr.	**********	Farmer	Douar Semhane
6	Mr.	**********	Farmer	Cooperative Najah
7	Mr.	**********	Farmer	Douar Nouafla
8	Mr.	**********	Representative of Ethnic Collectivity	Douar Oulad Yehya
9	Mr.	**********	Farmer	Douar Nouafla
10	Mr.	**********	Farmer	Douar Nouafla
11	Mr.	**********	Avocat	Douar Semhane
12	Mr.	**********	Farmer	Douar Semhane
13	Mr.	**********	Farmer	Douar Semhane
14	Mr.	**********	Farmer	Douar Semhane
15	Mr.	**********	Farmer	Douar Oulad Ben Khlil
16	Mr.	**********	Farmer	Douar Nouafla
17	Mr.	**********	Farmer	Douar Nouafla
18	Mr.	**********	Farmer	Douar Nouafla
19	Mr.	**********	Farmer	Douar Nouafla
20	Mr.	**********	Farmer	Cooperative Najah
21	Mr.	**********	Farmer	Douar Nouafla
22	Mr.	**********	Farmer	Douar Nouafla
23	Mr.	**********	Farmer	Douar Nouafla
24	Mr.	**********	Farmer	Douar Oulad Ben Khlil
25	Mr.	**********	Farmer	Douar Dgouga
26	Mr.	**********	Farmer	Douar Khnafif
27	Mr.	**********	Farmer	Douar Nouafla
28	Mr.	**********	Farmer	Douar Oulad Ben Khlil
29	Mr.	**********	Farmer	Cooperative Najah
30	Mr.	**********	Farmer	Douar Lahouaoura
31	Mr.	**********	Farmer	Centre Bir Taleb
32	Ms.	**********	Farmer	Douar Oulad Aamira Sefliya
33	Mr.	**********	Farmer	Douar Oulad Chbel
34	Mr.	**********	Farmer	Douar Nouafla
35	Mr.	**********	Farmer	Douar Nouafla
36	Mr.	**********	Farmer	Douar Nouafla
37	Mr.	**********	Farmer	Centre Bir Taleb
38	Mr.	**********	Farmer	Douar Oulad Yehya
39	Mr.	**********	Farmer	Douar Nouafla
40	Mr.	**********	Farmer	Douar Oulad Ferj
41	Mr.	**********	Farmer	Douar Nouafla
42	Mr.	**********	Project Manager, focal person for SH meetings	ORMVAG
43	Ms.	**********	Environmental experts	JICA Survey Team
44	Ms.	**********	Survey Assistant	JICA Survey Team
45	Mr.	**********	Survey Assistant	JICA Survey Team

XXII. 4th Minutes of Stakeholder Meeting for Sharing Environment Survey Results (15th September 2023)

1. Date & Time

11:25 to 12:40, 15th September 2023

2. Venue

Conference Room, Zirara Commune, Sidi Kacem Province

3. Languages for Explanation

Presentation material and discussion in Arabic

4. Participants

Total participants were 39 persons in total (see, “Attachment: Participants List”).

(1) 3 persons from the JICA Survey Team

(2) 1 person from ORMVAG

(3) 14 persons from Local Authorities

(4) 21 persons from the citizen side: 20 (male) and 1 (female)

5. Discussion Contents

5.1 Introduction by JICA Survey Team

5.2 Presentation by JICA Survey Team

- Project Summary.
- Answers to questions raised during the initial stakeholder meetings, and the responses are as follows:

Question raised at the 1st SHM	Answers
1- Water tariff after the project	The water tariff will be low compared with the current one. In addition, the government can provide a number of subsidies.
2- Will there be a change in the use of groundwater for irrigation?	Groundwater users are advised to use the Project's irrigation water to preserve groundwater resources. The government will subsidize drip irrigation systems.
3- Who pays for new equipment such as drip irrigation systems?	Farmers have to purchase new equipment such as drip irrigation systems, but the government can subsidize the purchase.
4- Crop selection after completion of Project	Farmers can grow any crop they wish.

- JST has explained the following points by presenting the results of Ecological survey:
  - Air Quality and Noise
  - Surface Water Quality
  - Drainage water quality
  - Groundwater Quality
  - Ecological Survey Results

- JST explained the anticipated environmental impacts both before and during the construction phase (temporary impacts) as well as during the operational phase, also elaborated on the proposed mitigation measures for both the construction and operational periods.
- Presentation of the Grieves Redress Scheme
- November Stakeholder Meeting: Sharing Socio-Economic Survey Results and Compensation Measures.

5.3 Comments/Questions from the participants

Table. Contents Discussed

Comments/Questions	Answer
Farmer: If the canal goes through someone's land, can the landowner whether or not to use it?	**JST**: If the canal goes through someone's land, the land will undergo expropriation, thus becoming government property, and the farmer won't have the right to use it, but he will receive compensation in return.
Farmer: There are existing main roads between lands that should not be affected by the canal alignment. We ask that the canal alignment be defined in such a way as to pass through between plots.	**JST:** The request will be addressed to the relevant authorities
Farmer: When will the construction be started?	**JST**: The construction is scheduled to start at the end of 2024. Farmers will be informed in advance about the exact construction period.
Farmer: After the construction, will we still be able to use the existing canal that draws water from the Idriss 1st Dam?	**Caid:** The Project is designed to improve water management and eliminate random irrigation. Once implemented, the existing canal will no longer be used.
Farmer: Can the canal alignment be modified?	**JST:** Initial study has been conducted to determine the canal alignment, but it is not yet finalized. **ORMVAG**: The canal alignment is currently under study with NOVEC, to be determined by the end of 2023.
Farmer: Some "**Land under Agrarian reform"** (see *1 shown below) can be affected, however, some owners don't have land ownership certificates, and there are some conflicts among inheritors. Even though there are disputes on the land ownership among inheritors (generally among brothers), are they compensated? **Farmer:** In the case of inheritors who have divided the land amicably among themselves, if one of these inheritors is affected by the Project, who will be compensated? All the inheritors or just the one who is directly affected by the Project? Especially since the certificate of ownership is always in the name of the deceased.?	**Caid:** Before any compensation-related matters, all the inheritors must contact the State Properties Directorate to obtain the release of the land's ownership, ensuring that each inheritors obtains an official ownership certificate for their portion of the land (see *2 shown below) To facilitate the compensation procedures, it is necessary to address this issue first, and everything must be legally resolved.
Farmer: Has the expropriation decision been issued?	**ORMVAG:** No, it hasn't been issued yet.
Farmer: Will I receive compensation if my well, which isn't directly affected by the construction, is demolished due to vibration effects?	No answer, and this matter will be discussed with relevant entities.
Farmer: In the case of disputed land, will compensation cover all those associated with the land, or only the current users?	**Caid:** It is usual for compensation to be deposited in the CDG fund until the court settles the dispute.
Farmer: After the construction, will we have the ability to use our lands, particularly above the canal?	**ORMVAG**: The lands will belong to the Government, and farmers will not be able to use them, but they will be compensated for them.
Farmer: After construction, will the water flow be the same for all irrigation water recipients, especially during the summer season when farmers use a lot of water for irrigation? Also, will all farmers receive the same amount of water even people using it at the same time?	**ORMVAG**: the Peak Flow is taken into consideration, thus guaranteeing that all farmers will benefit from the same water flow, especially during the summer season when water requirements for irrigation are greater.

*1 Lands under Agrarian reform:

"Lands under Agrarian reform" are lands, which were distributed to farmers between 1966 and 1980 as part of agrarian reform. These lands originated from state ownership. Typically, farmers received lands area ranging from 7 to 10 hectares, respectively. These lands were allocated with the aim of promoting a more equitable land distribution and fostering cooperation among farmers.

*2 Ownership certificates after landowners (generally, fathers) passed away

Some individuals, who have been granted the right to use the “Lands under Agrarian reform”, have passed away without obtaining land ownership certificate. The lands are divided among the inheritors, however, they don’t have land ownership certificates. It is needed to for each inheritor to get the land certificates.

(END)

Attachment: Participants List

Date: 15th September 2023

Time: 11:25 to 12:40, 15th September 2023

Venue: Conference Room Zirara Commune, Sidi Kacem Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Caid	Zirara Caidat
2	Ms.	**********	Environmental experts	JICA Survey Team
3	Ms.	**********	Survey Assistant	JICA Survey Team
4	Mr.	**********	Survey Assistant	JICA Survey Team
5	Mr.	**********	Project Manager, focal person for SH meetings	ORMVAG
6	Mr.	**********	Khlifa	Zirara Caidat
7	Mr.	**********	Head of Commune	Zirara Commune
8	Mr.	**********	Officer	Zirara Caidat
9	Mr.	**********	Cheikh	Zirara Caidat
10	Mr.	**********	Cheikh	Zirara Caidat
11	Mr.	**********	Cheikh	Zirara Caidat
12	Mr.	**********	Maqaddam	Zirara Caidat
13	Mr.	**********	Maqaddam	Zirara Caidat
14	Mr	**********	Officer	Chbanat Commune
15	Mr.	**********	Maqaddam	Chbanat Commune
16	Mr.	**********	Maqaddam	Chbanat Commune
17	Mr.	**********	Maqaddam	Chbanat Commune
18	Mr.	**********	Representant of Ethnic Collectivity	Zirara
19	Mr.	**********	Employee/ Farmer	Grinat Sidi Kacem
20	Mr.	**********	Farmer	Grinat Sidi Kacem
21	Mr.	**********	Farmer	Grinat Sidi Kacem
22	Mr.	**********	Farmer	Grinat Sidi Kacem
23	Mr.	**********	Farmer	Cooperative Mansoura
24	Mr.	**********	Farmer	Douar Oulad Boughaddou
25	Mr.	**********	Farmer	Cooperative Ittihad
26	Mr.	**********	Farmer	Douar Khnafif
27	Mr.	**********	Farmer	Douar Saleh
28	Mr.	**********	Farmer	Douar Belaabdia
29	Mr.	**********	Farmer	Cooperative Elfalah
30	Mr.	**********	Farmer	Cooperative Alamal
31	Mr.	**********	Farmer	Cooperative Nahda
32	Mr.	**********	Farmer	Cooperative Nahda
33	Mr.	**********	Farmer	Cooperative Nassr
34	Mr.	**********	Farmer	Cooperative Nahda
35	Ms.	**********	Farmer	Cooperative Nahda
36	Mr.	**********	Farmer	Cooperative Nassr
37	Mr.	**********	Farmer	Cooperative Islahiya
38	Mr.	**********	Farmer	Cooperative Elhasania
39	Mr.	**********	Farmer	Cooperative Elhasania

XXIII. 5th Minutes of Stakeholder Meeting for Sharing Environment Survey Results (19th September 2023)

1. Date & Time

11:00 to 11:30, 19th September 2023

2. Venue

Conference Room, Azghar Commune, Sidi Slimane Province

3. Languages for Explanation

Presentation material and discussion in Arabic

4. Participants

Total participants were 27 persons in total (see, "Attachment: Participants List").

(1) 2 persons from JICA Survey Team

(2) 1 person from local authorities

(3) 24 persons from the citizen side: (Male: 23, and Female: 1)

5. Discussion Contents

5.1 Introduction by Caid of Azghar Caidat, Sidi Slimane Province

5.2 Presentation by JICA Survey Team

- Project Summary.
- Answers to questions raised during the initial stakeholder meetings, and the responses are as follows:

Question raised at the 1st SHM	Answers
Water tariff after the project	The water tariff will be low compared with the current one. In addition, the government can provide a number of subsidies.
Will there be a change in the use of groundwater for irrigation?	Groundwater users are advised to use the project's irrigation water to preserve groundwater resources. The government will subsidize drip irrigation systems.
Who pays for new equipment such as drip irrigation systems?	Farmers have to purchase new equipment such as drip irrigation systems, but the government can subsidize the purchase.
Crop selection after completion of project	Farmers can grow any crop they wish.

- JST has explained the following points by presenting the results of Ecological survey:
  - Air Quality and Noise
  - Surface Water Quality
  - Drainage water quality
  - Groundwater Quality
  - Ecological Survey Results
- JST explained the anticipated environmental impacts both before and during the construction phase (temporary impacts) as well as during the operational phase, also elaborated on the proposed mitigation measures for both the construction and operational periods.

- Presentation of the Grieves Redress Schem
- November Stakeholder Meeting: Sharing Socio-Economic Survey Results and Compensation Measures.

5.3 Comments/Questions from the participants

Table. Contents Discussed

Comments/Questions	Answer
Caid: For individuals who didn't attend the previous meeting, if you have any questions, don't hesitate to ask. JICA survey team is present to address your inquiries and recap all the points that have been discussed.	**Farmer**: We have no questions or inquires, we are delighted about the Project, eagerly looking forward to all the positivity it brings to the land and to the community.
Caid: We appreciate your presence at this 2nd meeting and we look forward to your attendance at the 3rd meeting in November to keep you updated on the project's progress. It's an opportunity to ask questions, especially if the construction have started, and to discuss the construction study results.	**JST:** The 3rd meeting will focus on sharing the results of the socio-economic survey and discussing compensation measures. Construction is scheduled to begin at the end of 2024, and farmers will be informed in advance about the exact construction period.

(END)

Attachment: Participants List

Date: 19th September 2023

Time: 11:00 am to 11:30 am

Venue: Conference Room, Azghar Commune, Sidi Slimane Province.

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Caid	Azghar Caidat
2	Mr.	**********	Survey Assistant	JICA Survey Team
3	Ms.	**********	Survey Assistant	JICA Survey Team
4	Mr.	**********	Farm Worker	Cooperative Difaa 1
5	Mr.	**********	Farmer	Cooperative Difaa 1
6	Mr.	**********	Farm Worker	Cooperative Difaa 2
7	Mr.	**********	Farm Worker	Cooperative Difaa 1
8	Mr.	**********	Farm Worker	Cooperative Rafahiya
9	Mr.	**********	Farm Worker	Cooperative Difaa 1
10	Mr.	**********	Farmer	Cooperative Difaa 1
11	Mr.	**********	Farmer	Cooperative Difaa 1
12	Mr.	**********	None	Cooperative Difaa 1
13	Mr.	**********	Farmer	Cooperative Izdihar
14	Mr.	**********	Farmer	Cooperative Elghazia
15	Mr.	**********	Farmer	Cooperative Elghazia
16	Mr.	**********	Farmer	Cooperative Elghazia
17	Ms.	**********	Farmer	Cooperative Elaatf
18	Mr.	**********	Farmer	Cooperative Difaa 1
19	Mr.	**********	Farm Worker	Cooperative Difaa 1
20	Mr.	**********	Farmer	Cooperative Difaa 2
21	Mr.	**********	Construction Worker	Sidi Slimane
22	Mr.	**********	Construction Worker	Sidi Slimane
23	Mr.	**********	Farmer	Cooperative Elaatf
24	Mr.	**********	Farmer	Cooperative Izdihar
25	Mr.	**********	Farmer	Cooperative Difaa 1
26	Mr.	**********	Farmer	Douar Aaouaouda
27	Mr.	**********	Farmer	Douar Chbika

XXIV. 6th Minutes of Stakeholder Meeting for Sharing Environment Survey Results (26th September 2023)

1. Date & Time

11:15 to 12:45, 26th September 2023

2. Venue

Conference Room, Ain Jemaa Commune, Meknes Province

3. Languages for Explanation

Presentation material and discussion in Arabic

4. Participants

Total participants were 25 persons in total (see, "Attachment: Participants List").

(1) 2 persons from the JICA Survey Team

(2) 1 person from ORMVAG

(3) 3 persons from Local Authorities

(4) 19 persons from the citizen side: 19 (male)

5. Discussion Contents

5.1 Introduction by JICA Survey Team

5.2 Presentation by JICA Survey Team

- Project Summary.
- Answers to questions raised during the initial stakeholder meetings, and the responses are as follows:

Question raised at the 1st SHM	Answers
1- Water tariff after the project	The water tariff will be low compared with the current one. In addition, the government can provide a number of subsidies.
2- Will there be a change in the use of groundwater for irrigation?	Groundwater users are advised to use the Project's irrigation water to preserve groundwater resources. The government will subsidize drip irrigation systems.
3- Who pays for new equipment such as drip irrigation systems?	Farmers have to purchase new equipment such as drip irrigation systems, but the government can subsidize the purchase.
4- Crop selection after completion of Project	Farmers can grow any crop they wish.

- JST has explained the following points by presenting the results of Ecological survey:
  - Air Quality and Noise
  - Surface Water Quality
  - Drainage water quality
  - Groundwater Quality
  - Ecological Survey Results

- JST explained the anticipated environmental impacts both before and during the construction phase (temporary impacts) as well as during the operational phase, also elaborated on the proposed mitigation measures for both the construction and operational periods.
- Presentation of the Grieves Redress Scheme
- November Stakeholder Meeting: Sharing Socio-Economic Survey Results and Compensation Measures.

5.3 Comments/Questions from the participants

Table. Contents Discussed

Comments/Questions	Answer
Farmer: Is the irrigation going to cover the left side or the right side of the canal?	**ORMVAG:** The exact irrigated area will be known later with the last version of the alignment.
Farmer: Will each farmer have his own valve, or will there be a shared collective one?	**ORMVAG:** Normally each farmland will have its own valve, but in case of micro lands, setting of a valve for plural land plots might be an option. But we will know the exact details later.
Farmer: When will the construction be started?	**JST**: The construction is scheduled to start at the end of 2024. Farmers will be informed of the exact schedule in advance.
Farmer: How much water does one hectare need?	**ORMVAG:** Each land will get enough amount of water according to its needs, this matter will be fixed later.
Farmer: What is the designated water tariff to be paid?	**ORMVAG:** The water tariff is not fixed yet, and the information will be shared after we have it.
Farmer: Where is the irrigation command area in Oulad Ben Hammadi commune?	**ORMVAG:** The exact irrigation area is not yet fixed as the alignment itself is not fixed. Hopefully, next SHM we might present such information.
Farmer: Will the *Ain Jemaa* (commune) area benefit from irrigation water or not?	**ORMVAG:** As I told you, the information about alignment and about irrigated area will be finalized later, and then shared with you. Then we will know exactly which area is irrigated by the project.
Farmer: The canal should run alongside the lands without crossing through them. otherwise, it will have a significant impact on the micro-parcels.	**JST:** We took note of your suggestion, and we will forward it to concerned parties.

(END)

Attachment: Participants List

Date: 26th September 2023

Time: 11:15 to 12:45

Venue: Conference Room Ain Jemaa Commune, Meknes Province

No.	Mr./Ms.	Full Name	Position	Organization
1	Mr.	**********	Khalifa	Caidat Ain Jemaa
2	Mr.	**********	Maqaddam	Douar Jaaouna
3	Mr.	**********	Maqaddam	Ain Jemaa
4	Mr	**********	Project Manager, focal person for SH meetings	ORMVAG
5	Ms.	**********	Survey Assistant	JICA Survey Team
6	Mr.	**********	Survey Assistant	JICA Survey Team
7	Mr.	**********	Farm Worker	Douar Sidi Aissa Ramdi
8	Mr.	**********	Farm Worker	Douar Sidi Aissa Ramdi
9	Mr.	**********	Farmer	Douar Sidi Aissa Ramdi
10	Mr.	**********	Farm Worker	Douar Sidi Aissa Ramdi
11	Mr.	**********	Farmer	Douar Oulad Ben Hammadi
12	Mr.	**********	Farmer	Douar Oulad Ben Hammadi
13	Mr.	**********	Farmer	Douar Sidi Aissa Ramdi
14	Mr.	**********	Farmer	Douar Oulad Ben Hammadi
15	Mr.	**********	Farmer	Douar Oulad Ben Hammadi

No.	Mr./Ms.	Full Name	Position	Organization
16	Mr	**********	Farm Worker	Douar Sidi Aissa Ramdi
17	Mr.	**********	Farm Worker	Douar Sidi Aissa Ramdi
18	Mr.	**********	Officer	Domaine OTETA
19	Mr.	**********	Farmer	Ain Jemaa
20	Mr.	**********	Farmer	Douar Oulad Ben Hammadi
21	Mr.	**********	Farmer	Douar Sidi Aissa Ramdi
22	Mr.	**********	Farmer	Douar Sidi Aissa Ramdi
23	Mr.	**********	Farm Worker	Douar Sidi Aissa Ramdi
24	Mr.	**********	Farmer	Ain Jemaa
25	Mr.	**********	Farmer	Ain Jemaa

XXV. Photos of the Stakeholder Meetings

Participants at Oulad ben hammadi-Oulad Belaid in Sidi Slimane for women on April 18th, 2023

Participants at Oulad ben hammadi -Salhya in Sidi Slimane Province for women on April 20th, 2023

Participants at Rbelat Khenichet in Sidi Kacem on 26th April, 2023

Participants at Bir Taleb in Sidi Kacem on May 3rd, 2023

Participants at Ouled Ben Hammadi in Sidi Slimane on September 8th, 2023

Explanation by the ORMVAG staff at Khenichet in Sidi Kacem on September12th, 2023