



Project Information Document (PID)

Appraisal Stage | Date Prepared/Updated: 25-Jan-2022 | Report No: PIDA32621

**BASIC INFORMATION****A. Basic Project Data**

Country Morocco	Project ID P175747	Project Name Resilient and Sustainable Water in Agriculture	Parent Project ID (if any)
Region MIDDLE EAST AND NORTH AFRICA	Estimated Appraisal Date 24-Jan-2022	Estimated Board Date 21-Mar-2022	Practice Area (Lead) Water
Financing Instrument Investment Project Financing	Borrower(s) Kingdom of Morocco	Implementing Agency Ministry of Agriculture - Directorate of Irrigation	

Proposed Development Objective(s)

The project development objectives (PDO) are to: (i) enhance the governance of Water in Agriculture; (ii) improve the quality of irrigation services; and (iii) increase access to advisory services and to modern on-farm irrigation technologies in the project areas.

Components

Component 1: Enhancement of governance of WIA in a context of increasing water scarcity

Component 2: Modernization of Irrigation and Drainage services

Component 3: Improvement of access to advisory services and to modern on-farm irrigation technologies

Component 4: Project Management

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	184.18
Total Financing	184.18
of which IBRD/IDA	150.00
Financing Gap	0.00

DETAILS**Private Sector Investors/Shareholders**

Equity	Amount	Debt	Amount
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Government Contribution	179.93		
Government Resources	29.93		
IBRD	150.00		
Non-Government Contributions	4.26		
Private Sector Equity	4.26		
Total	184.19		0.00

Payment/Security Guarantee

Total	0.00
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Environmental and Social Risk Classification

Substantial

Decision

The review did authorize the team to appraise and negotiate

Other Decision (as needed)

B. Introduction and Context

Country Context

1. **The COVID-19 pandemic has pushed the Moroccan economy into a historic recession.** During the second quarter of 2020, which broadly coincided with the period of lockdown due to COVID19, the country saw a 14.2 percent year-on-year decline of real GDP, the most severe on record. Economic activity began to recover somewhat during the second half of 2020, driven primarily by external demand. However, this partial recovery has been insufficient to offset a comparatively large overall economic contraction in 2020, with real GDP declining by 6.3 percent. Partly because of the strong performance of the agricultural sector—after two years of drought—real GDP is expected to grow by 5.3 percent in 2021, although this rebound will not match pre-pandemic levels of economic activity until 2022.
2. **The crisis has resulted in a temporary increase in poverty and vulnerability.** Two decades of sustained growth backed by large public investments and structural reforms resulted in a large reduction in poverty (including the eradication of extreme poverty) between 2000 and 2019. However, following the pandemic outbreak the poverty rate (US\$3.2 per day PPP line) is estimated to have increased from 5.4 percent in 2019 to 6.6 percent in 2020, an increase that could have been worse, but for the cash transfer programs deployed to mitigate the effects of COVID-19. In 2021,



poverty is expected to decline, but not to return to pre-crisis levels. Extreme poverty (US\$1.90 PPP line) should remain below 1 percent, while the poverty rate (US\$3.2 PPP line) is expected to fall below the 6 percent threshold, the 2017 level. The percentage of the population defined as vulnerable (US\$5.5 PPP line) is expected to slowly decrease in 2021 to about 26.7 percent from 28.2 in 2020. This decline is expected to continue thereafter, but poverty indicators are not expected to return to pre-Covid-19 levels until 2023.

3. **Climate change combined with population growth is putting increased pressure on water and land resources and is likely to have severe impacts on the economy.** Morocco has experienced considerable warming trends, with the mean annual temperature increasing by 0.9°C since the 1960s and observed average increases of 0.2°C per decade¹. Meanwhile, precipitation trends in recent decades reflect an overall decline in rainfall with increased frequency and intensity of extreme events such as droughts and heat waves. This has reduced river flows and increased evaporation and siltation in water storage dams, leading to a 20 percent reduction in overall water resource availability over the past 30 years². Future projections show that by 2050 climate change impacts will increase the mean annual temperature by between 1.5°C and 3.5°C, and significantly reduce average annual rainfall across the country by 10 percent to 20 percent (up to 30 percent in some regions)³. Hotter and drier conditions are expected to increase the water requirement of crops by up to 12 percent, increasing demand for irrigation and subjecting limited water resources to further stress. Drought also entails proliferation of the Hessian fly, thereby increasing risk of damage to wheat crops. Rising temperatures are expected to reduce yields of rainfed crops by 50–75 percent during dry years. Erratic precipitation and increased aridity and drought conditions will result in shorter growing seasons, reduced yields and lower productivity⁴.

Sectoral and Institutional Context

4. **The agri-food sector is a major driver of economic and social development.** It amounts to 21 percent of the GDP and accounts for nearly 39 percent of employment (33 percent in primary production and 6 percent in the agro-industry). In rural areas, this proportion increases to 68 percent, which positions agriculture at the center of economic and social challenges. Moreover, agriculture and food systems constitute 23 percent of exports. As such, the country's economic performance as a whole hinges significantly on the agricultural sector⁵. For instance, between 2018 and 2020, when there was a significant reduction in agriculture production, agriculture's share of GDP contracted by around 13.4 percent (as a result of two successive years of drought) and dragged down overall GDP growth from 3.1 percent in 2018 to -7 percent in 2020.
5. **Approximately 80.6 percent of 8.7 million hectares of agricultural land are rainfed**, with yields varying from one year to another and highly dependent on climatic conditions. Although only 19.4 percent of cultivated land is irrigated (roughly 1.7 million ha), that area accounts for 45 percent of agricultural value added (up to 75 percent in years with erratic rainfall)⁶ and 75 percent of total agricultural exports⁷. In terms of scale and institutional structure, there are three main types of

1 World Bank: Climate Risk Profile: Morocco (2021).

2 USAID (2016): Climate Change Risk Profile – Morocco.

3 Direction de la Recherche et de la Planification de l'Eau : Changement climatique et ressources en eau au Maroc: Synthèse bibliographique des principaux résultats et conclusions relatifs à l'évolution et changement du climat et leurs impacts sur les ressources en eau au Maroc (2019).

4 World Bank: Climate Risk Profile: Morocco (2021).

5 World Bank: Climate Variability, Drought, and Drought Management in Morocco's Agricultural Sector (2018).

6 UNECE (2014), *Ibid.*

7 The World Bank: Growing Morocco's Agricultural Potential, Feature Study July 28, 2018.



irrigation in Morocco: (i) large scheme irrigation (LSI) managed by the Regional Agricultural Development Offices (ORMVAs)⁸, (ii) small and medium irrigation schemes (SMIS) managed by Water Users Associations (WUAs), and (iii) private (individual) irrigation (PI), mostly using groundwater.

6. **Increasing water scarcity and interannual variability affect both surface and groundwater.** Water resources in Morocco are limited and unequally distributed in space and time with 70 percent concentrated in the north of the country, which barely represents 15 percent of national territory.⁹ The availability of water resources has been historically reducing from 22 billion m³/year on average between 1945 and 1979, to only 15 billion m³/year between 1980 and 2018. Water availability per capita is estimated at 620 m³/year, far below the water scarce level (1,000 m³/capita/year) and the country is getting close to the threshold of absolute scarcity (500 m³/capita/year). Indeed, renewable water resources per person have declined by almost 60 percent since 1960 due to non-climate stressors such as population growth in the north, the expansion of irrigation, and urban, industrial and tourism development. Such water shortages have led to a vicious cycle of overexploitation of groundwater, primarily caused by the agriculture sector. This also involved increased energy-related GHG emissions due to deeper groundwater pumping.
7. **Irrigated agriculture in general, and the collective irrigation schemes in particular, have been severely hit by water restrictions over the years, especially in Oum Er-Rbia and Tensift river basins.** On average, over the last three irrigation seasons (2018–20), only 42 percent of the targeted water allocation has been actually supplied in these two basins¹⁰. The lack of access to surface water for LSI and SMIS as well as increased development of the PI schemes, which mainly rely on groundwater use, have led to rampant—and utterly unsustainable—groundwater use that nationally consumes, on average, 125 percent of renewable groundwater¹¹. In addition to water restrictions, irrigation managers need to adapt to an increasing variability of interannual water allocations¹², by putting in place agile and flexible mechanisms to provide a reliable service to farmers. Quota¹³ systems (an annual cap for surface water) are being put in place progressively to rationalize water use and deal with interannual variability more flexibly. The Tadla scheme is the most advanced in this initiative; hence there is potential to bring this initiative to the next level by fostering the tradability of quota allocations between users.
8. **As a response to the increasing water scarcity and interannual variability, the Kingdom of Morocco launched, in 2008, the National Program for Water Savings in Agriculture (PNEEI - *Programme National d'Economie d'Eau en Irrigation*).** This ambitious program of on-farm modernization aims at

⁸ The ORMVA for Offices Régionaux de Mise en Valeur Agricole.

⁹ Ministry of Equipment, Transport, Logistics, and Water: Draft National Water Plan 2020–2050. Submitted for review to the Interministerial Water Commission, December 2019.

¹⁰ For the irrigation schemes of Haouz, Tadla and Doukkala, only 1,165 Mm³ have been allocated between 2017 and 2020, representing 42 percent of the allocation agreed in the planning documents—the PDAIRES—(2,767 Mm³) with extreme rationing in 2019/20 (only 27 percent of volume allocated). These three schemes represent 360,000 ha (more than half the area equipped of the LSI in Morocco) benefiting more than 100,000 farmers. This water rationing derives from two phenomena: (i) the decrease of precipitation; and (ii) the priority allocation, through inter-basin transfers for urban waters, to Casablanca/Safi/Jadida (300 Mm³/year) and Marrakech (100 Mm³/year). It is important to bear in mind that the main assumption taken for overall water allocation in Morocco is an average attainment of 80% of satisfaction of irrigation needs.

¹¹ The groundwater use is about 5 BCM compared to 3.9 BCM of renewable groundwater resource.

¹² The total of annual water allocation to LSI varied from 1.4 to 4.2 Mm³/year in the period 2010–2021.

¹³ The aim is to create a system of annually revisable water quotas that allow the farmer to plan production knowing exactly what the water allocation at the beginning of a season would be. If the year is dry, the allocation will be below average and farmers can modify their strategy (reducing the area, changing crop pattern, not cultivating, etc.). If the year is favorable, the quota could be increased to allow the farmer to maximize revenues as well as the agricultural segment of GDP for the country (and job creation, food security, etc.).



the increase of water productivity¹⁴ and the improvement of irrigation delivery services¹⁵, as part of the Green Morocco Plan (PMV – Plan Maroc Vert), the sectoral strategy for the 2008–2019 period. The PNEEI contributed significantly to the efforts led by Morocco in terms of Climate Change adaptation and mitigation and implementation of its Nationally Determined Contributions (after 2015), particularly through modernization of the agricultural sector to make it more competitive while promoting sustainable management of natural resources¹⁶.

9. **His Majesty King Mohamed VI recently launched the Green Generation Strategy (GGS), the new strategy for the agricultural sector for 2020–2030.** It aims to create a new generation of agricultural workers and entrepreneurs particularly among young and rural populations including women¹⁷. Promoting efficient water use in agriculture is also considered a priority for water sectoral strategies, namely the National Water Plan and the National Program for Water Supply and Irrigation 2020–2027.
10. **The draft of the National Water Plan foresees, in a business-as-usual scenario, a significant increase in water demand in the agriculture sector,** (as noted, already by far Morocco's biggest water user), with a 10 percent increase in water withdrawal expected (from 14.5 billion m³ in 2020 to 16 billion m³ in 2050)¹⁸. To forestall this increase, the plan foresees new investments, building on the PNEEI's results, combined with new Water Conservation Policies—with a view to reducing water consumption in agriculture by nearly 1.8 billion m³ per year. The National Program for Water Supply and Irrigation 2020–2027,¹⁹ set up as an emergency program to accelerate investments in water sector, aims at strengthening the supply of drinking water and irrigation to cope with the impacts of the severe droughts that the country suffered from 2015–2017. This program also plans an investment of USD 1.3 billion to support water productivity in irrigation up to 2027.
11. **The World Bank carried out a stocktaking exercise in 2020 together with the government of Morocco after twelve years of implementation of the PNEEI²⁰.** The main lessons learned are as follows: (i) the uptake of modern on-farm technology (mainly drip) has been a success for individual farmers equipping 395,000 ha (117 percent of target) with: (a) 195,000 ha in ORMVA areas of intervention (mostly small and medium farmers); and (b) 200,000 ha in Private Irrigation outside ORMVA's areas (most of them medium and large farmers, irrigating from individual wells); (ii) the adoption of this technology has been slower for small farmers targeted within collective schemes due to the heterogeneity of farmers' interests, administrative delays mainly linked to land issues and delayed works on farms and ancillary sites (off-farm) . For this category, the final target is around

¹⁴ The program includes funding for: (i) modernization of off-farm hydraulic assets for collective schemes; (ii) subsidies for on-farm equipment (80–100 percent depending on the profile of farmers); and (iii) technical assistance.

¹⁵ In the LSI schemes, the impetus is to transition from rotational surface irrigation to on-demand service with modern (drip) technology and modernization of pressurized systems using sprinklers with individualization of services at the hydrant level. This change of irrigation delivery creates the conditions for the farmer to diversify toward cash crops and intensify production (increase of land-use intensity).

¹⁶ UNFCCC, Morocco: Nationally Determined Contribution under the UNFCCC (2016). For the agriculture sector, the main adaptation objectives for 2030 are: (i) Extension of irrigation to new agricultural areas, over 260,000 hectares for an overall investment of USD 3 billion and (ii) Equipping and modernizing irrigation systems over 290,000 hectares for an overall estimated USD 2 billion. Mitigation is mainly through reduction of energy consumption and absorbing more carbon per unit of land used and/or water consumed.

¹⁷ A PfoR, cofinanced by the World Bank and the French Development Agency (*Agence Française de Développement* – AFD), has been approved to support the Green Generation Strategy (P170419) for an amount of USD 250 million for WBG and Eur 100 million for AFD.

¹⁸ Ministry of Equipment, Transport, Logistics, and Water: Draft National Water Plan 2020–2050. Submitted for review to the Inter-ministerial Water Commission, December 2019.

¹⁹ Ministry of Equipment, Transport, Logistics, and Water: Programme National pour l'Approvisionnement en Eau potable et l'Irrigation (2020)

²⁰ With the Directorate of Irrigation and development of rural territory (*Direction de l'Irrigation et de l'Aménagement de l'Espace Agricole* – DIAEA).



220,000 ha, including 48,000 ha in PROMER²¹ and PMGI²² WBG projects. Overall, a distributional analysis by farm size shows that 60 percent of the subsidies for on-farm equipment through the *Fonds de Développement Agricole* (FDA) benefitted smallholders with 10 hectares or less.

12. **Positive outcomes for farmers have been evidenced, in particular the doubling of water productivity²³** (see details in Annex 2, Section D). Nevertheless, the conversion to modern on-farm irrigation equipment did not lead systematically to a reduction in the consumption of irrigation water at farm level. This is explained by the fact that farmers tend to maximize their use of the means of production. Equipped with drip irrigation—and if not constrained in its use—irrigators tend to intensify toward crops with higher added value, thereby often consuming more water than previous crops and contributing to overexploitation of aquifers. This process is well documented worldwide and is called the Jevons paradox.
13. **The stocktaking analysis concludes that complementary Water Conservation Policies (WCPs) need to be implemented in parallel to the technology upgrade (the Water Conservation Technologies, WCT)** in order to maintain water withdrawals at a sustainable level and cope with interannual variability. Among the WCPs are: (i) improvement of enforcement by the water police, in particular for sustainable aquifer management (collective action for aquifer management such as an *aquifer contract*); and (ii) definition and enforcement of a *water quota* (allocation), defined annually in accordance with water availability and its transferability (to optimize water allocation toward more efficient use).
14. **Agriculture, in general, and family farming in particular is strongly linked to the work of rural women.** Around 60 percent of active rural women work on family farms. Their level of education tends to be low, with 90 percent of women employed in the sector holding no diploma²⁴. Their labor is generally unpaid (70.5 percent of them receive no compensation for their work). A recent regional survey found that women in agriculture earned on average 25 percent less than men even in tasks that require more qualified labor²⁵. Women are also underrepresented in rural organizations, including in Water Users Associations in irrigated areas.
15. **Lastly, farms in irrigated areas have limited access to advisory services to enhance crop diversification and increase incomes—a particular concern for smallholders.** The mandate of the National Agency for Agricultural Advisory Services (*Office National du Conseil Agricole*, ONCA) is to provide advisory services to farmers through extension services (both public and private). However, for irrigated areas, this function is being slowly transferred from the ORMVAs, with the result that the ONCA has not entirely fulfilled it.

²¹ PROMER: Oum er-Rbia Basin Irrigated Agriculture Modernization Project (Projet de Modernisation de l'Agriculture irriguée dans le Bassin de l'Oum er Rbia)

²² PMGI: Large-Scale Irrigation Modernization Project (Projet de Modernisation de la Grande Irrigation)

²³ Positive outcomes include: (a) the doubling of water productivity (from 0.25-0.5 USD/m³ to 0.5-1.0 USD/m³); (b) a significant increase of land-use intensity (from 90-100 percent to 120-140 percent); (c) the diversification of the crop pattern from cereals towards cash crop; (d) the increase of yield by 30 to 50 percent (kg/ha), and (e) overall, a notable increase of farmers' income (between 40 and 100 percent), according to ICR of WBG and ADB projects as well as results from Monitoring & Evaluation system of PMGI project.

²⁴ Haut-Commissariat au Plan: Les brefs du Plan à propos de la femme rurale au Maroc; October 2019.

²⁵ Abderrahim, B. (2016), *Le travail agricole des femmes rurales entre précarité et Empowerment : cas de la région de Sais.*, INRA Meknès Magazine, <https://mag.inrameknes.info/?p=1285>.



C. Proposed Development Objective(s)

Development Objective(s) (From PAD)

The project development objectives (PDO) are to: (i) enhance the governance of Water in Agriculture; (ii) improve the quality of irrigation services, and (iii) increase access to advisory services and modern on-farm irrigation technologies in the project areas.

Key Results

16. The PDO indicators of the Resilient and Sustainable Water in Agriculture (RESWAG) project are listed below; the first PDO indicator reflects the strengthening of the governance framework, while the second and third measure the improvement of Irrigation and Drainage Services and the fourth the improvement of access to advisory services (see details in Result Framework in Section VII):
 - **Number of irrigation areas with quota system in place** with a target of four (ORMVAs of Tadla, Haouz and Doukkala and Chtouka area using groundwater). The ORMVA of Tadla is considered in place in the baseline and this is where the quota tradability is going to be piloted under Component 1.
 - **Number of beneficiaries benefiting from modernization of irrigation and drainage services** with a target of 20,450, of which female. This indicator qualifies as Climate Indicator for adaptation and includes a breakdown according the level of modernization:
 - *Full modernization* with a target of 6,105 small farmers (2,135 in Tadla scheme and 3,970 in Massa scheme) on 20,285 ha provided with comprehensive improvement of Irrigation and Drainage service delivery including on and off-farm. The improved Irrigation & Drainage service includes: (i) modernized off-farm I&D service until the hydrants/outlets- (Component 2); and (ii) better access to on-farm modern irrigation technologies – (Component 3).
 - *Improvement of off-farm water delivery services only*, with a target of 14,345 farmers on 46,750 ha benefitting from improved irrigation and drainage services (upgrading of primary hydraulic assets on Zidania Canal in Tadla and Massa scheme in Souss-Massa). This is a corporate indicator as well as an eligible Climate indicator for Component 2.
 - **Area provided with improved irrigation and drainage services with a final target of 67,035 ha** (cf. the areas of 20,285 ha and 46,750 ha mentioned above). This is a corporate indicator as well as an eligible Climate indicator for Component 2.
 - **Farmers reached with agricultural or services with a target of 23,579 farmers** (improved access to advisory services), of which female and young farmers and rural entrepreneurs, and continued support for beneficiaries of previous projects²⁶ (corporate indicator for Component 3). This indicator also qualifies as Climate Indicator for adaptation as most of the activities have a dimension of climate resilience.

²⁶ Component 3 will also provide Advisory services to PROMER and PMGI's projects to ensure that past investments will provide the best results. The specific needs for Advisory services will be assessed before recruiting the private advisers for each group of beneficiaries.



17. The table below summarizes the main type of benefits and number of beneficiaries and the contribution of each component and main activities²⁷:

Project Components	Type of project benefits								
	Improved WiA governance			Improved whole Irrigation and Drainage Services (off and on-farm)		Improved off-farm Irrigation Services		Improved Advisory Services	
	Area (ha)	Volume better managed (Hm3)	Farmers	Area (ha)	Farmers	Area (ha)	Farmers	Area (ha)	Farmers
Component 1: Enhancement of WiA governance in a context of increasing water scarcity									
PBC 1: Implementation of the Participatory Contract Management (Aquifer contract) of Chtouka	23,700	90	7,700						
PBC 2: Implementation of a pilot platform for tradable water allocation	98,000	10	27,000						
Component 2: Modernization of Irrigation and Drainage services									
Tadla - Collective reconversion of G5- G9				4,735	2,135				
Tadla- Rehabilitation Canal Zidania						28,700	9,567		
Souss- Massa - Rehabilitation hydrants (sectors 808 and 809)				7,750	1,793				
Souss- Massa - Rehabilitation outlets (806-809)				15,550	3,970				
Souss- Massa - Rehabilitation of SP1, main canal and distribution network						18,050	4,778		
Component 3: Improvement of access to advisory services and to modern on-farm irrigation technologies									
RESWAG- Tadla								4,735	2,134
RESWAG- Souss Massa								18,050	4,778
PMGI- Tadla								12,106	3,092
PMGI- Haouz								3,080	860
PMGI - Gharb								5,197	2,280
PMGI -Doukkala								8,319	2,815
PROMER- Tadla								6,134	2,005
PROMER- Haouz								5,965	3,650
PROMER- Doukkala								7,146	1,965.0
Total (without double counting)	121.700	100	34.700	20.285	6.105	46.750	14.345	70.732	23.579

D. Project Description

18. The RESWAG project aims at contributing towards implementing adjustments to the national program and strategy as described above, by: (i) **implementing complementary Water Conservation Policies (Component 1)** to enhance the governance framework of Water in Agriculture and ensure sustainability of water withdrawals from the agricultural sector, both surface and groundwater; (ii) **scaling up benefits of irrigation modernization** (Water Conservation Technologies) to new areas (**Component 2**); and (iii) ensuring that **advisory services with adequate coverage and quality** will allow farmers to make the optimum use of investments (**Component 3**).
19. The project is an IPF-PBC organized around four components, including one component with Performance-Based Conditions (PBC), as follows: (i) **Component 1**: Enhancement of Water in Agriculture governance in a context of increasing water scarcity (with Performance-Based Conditions - PBCs); (ii) **Component 2**: Modernization of Irrigation and Drainage services; (ii) **Component 3**: Improvement of access to advisory services and to modern on-farm technologies; and (iii) **Component 4**: Project Management.

²⁷ The total of the table avoids double counting between the two lines related to investments in Massa (rehabilitation of hydrants and outlets)



20. The project costs are shown as follows, including private capital mobilizing (PCM) estimate:

Project Components	Project Costs (US\$ m.)	IBRD Financing - Loan (US\$ m.)	Counterpart financing (US\$ m.)
Component 1: Enhancement of WiA governance in a context of increasing water scarcity	9.6	8.0	1.6
PBC 1: Implementation of the Participatory Contract Management (Aquifer contract) of Chtouka	4.2	3.5	0.7
PBC 2: Implementation of a pilot platform for tradable water allocation	3.0	2.5	0.5
PBC 3: Development of digital instruments to support WiA policies	2.4	2.0	0.4
Component 2: Modernization of Irrigation and Drainage services	149.7	124.8	25.0
Tadla	76.8	64.0	12.8
Massa	72.9	60.7	12.1
Component 3: Improvement of access to advisory services and to modern on-farm irrigation technologies	15.2	12.7	2.5
Tadla	4.4	3.7	0.7
Souss-Massa	2.4	2.0	0.4
Haouz	2.9	2.4	0.5
Gharb	2.3	1.9	0.4
Doukkala	3.2	2.7	0.5
Component 4: Project Management	5.0	4.2	0.8
DIAEA	1.2	1.0	0.2
ONCA	1.4	1.2	0.2
ORMVA - Tadla	1.2	1.0	0.2
ORMVA - Souss-Massa	1.2	1.0	0.2
Sub-Total (US\$ m.)	179.6	149.6	29.9
Front End Fee	0.375	0.375	
TOTAL (US\$ m.)	179.9	150.0	29.9
Private Capital Mobilizing	4.3		
GRAND TOTAL (US\$ m.)	184.2		

21. The four components are presented succinctly in the following paragraphs:
22. **Component 1: Enhancement of governance of Water in Agriculture in a context of increasing water scarcity.** The component will look ahead to contributing to three of the major topics underpinning the sustainable management of water resources in irrigation, namely: (i) a more flexible water allocation process that is appropriately adapted to increasing interannual variability and water scarcity; (ii) enhancement of groundwater management to contribute to reversal of the process of groundwater overuse; and (iii) improved knowledge about the impacts of the water productivity programs to better inform and re-orient policies.
23. More specifically, Component 1 will finance innovative solutions and pilot operations under Performance-Based Conditions (PBCs) to support: (i) the implementation of the Aquifer contract in Chtouka to enhance sustainable groundwater management; (ii) the creation of a pilot platform for tradable water allocation (quota) in Tadla scheme and; (iii) the design, development and implementation of a suite of scalable water



management and digital tools²⁸, thereby building on advancements in remote sensing and data analytics to enhance the monitoring and impact assessment of the irrigation modernization program and projects. For all activities on Component 1, the WBG has been providing technical assistance to the Borrower during project preparation and will continue during implementation.

24. Component 1 will include 3 PBCs as described below:
25. **PBC 1: Implementation of the Participatory Contract Management (Aquifer contract) of Chtouka.** Following the signature of a **Framework Agreement** in 2015, by the main stakeholders (including farmers' representatives) and the promulgation of a decree in 2017 delimiting the **Chtouka safeguard perimeter**, the parties agreed to set up a groundwater management model based on the partial substitution of groundwater withdrawals by desalinated water for an area of around 15,000 ha dominated by greenhouses. Due to the limited human capacities of the ABH and ORMVASM, **a private partner** will be selected to carry out through a Management contract on their behalf some functions related to the Aquifer Contract. These missions are as follows: (i) plan, design and supervise the equipment of wells with water meters; (ii) communicate to the farmers the annual quota; (iii) control and monitor groundwater withdrawals; and (iv) impose fines on the farmers, in case of overuse (in excess of the quota).
26. The PBC will be considered achieved when all the following conditions are met: (a) Commission in place with main stakeholders (ABH, ORMVA, MAPMDREF, and possibly private operators) to ensure coordinated conjunctive management of water resources (combined use of surface and groundwater uses) and ascertain that feedback from institutions and farmers has been taken into account through frequent consultation; (b) Private partner recruited for the control and monitoring of water withdrawals in the safeguard perimeter of Chtouka; (c) GIS of the Aquifer Contract operational and interoperable with GIS of the concessionaire for the desalinized water. The condition will be achieved when GIS is operational (included in the private partner's contract) with effective interoperability with the SCADA of the concessionaire for the desalination plant; and (d) GIS of the ORMVASM operational (for surface water) and interoperable with GIS of the Aquifer contract and of the concessionaire for the desalinated water. The condition will be achieved when all GIS are operational and with effective interoperability to ensure conjunctive use of water resources.
27. **PBC 2 – Implementation of a pilot platform for tradable water allocation (quota) in Tadla Scheme.** The proposal is to develop a pilot of a digital platform allowing tradability of water allocation as a means to ensure better allocation of water resources between farmers. This proposal has been explicitly mentioned in the **New Development Model** as a tool that promises to improve an efficient water allocation between water users. The platform would work as follows: at the beginning of each season, based on water availability, the irrigation manager (ORMVA of Tadla) would inform each farmer about the allocation/quota available with an equal allocation based on equipped area. Every farmer will be in a position to decide whether to: (i) use their own allocation for farming; (ii) or sell a part or all of their water allocation; (iii) or request additional quantities of water through the platform.
28. The platform will ensure that water use is accorded a better value as the tariff will be set by offer and demand and water allocation will be transferred from lower levels to higher levels of water productivity. It will also improve cost recovery for the irrigation manager (as a share of the water allocation managed by the platform will generate direct revenues for the ORMVA). The platform will also have guardrail

²⁸ Development of these tools will be in connection with the proposed digital farmers advisory service and will include applications such as crop monitoring, consumptive water use (ET) monitoring, water accounting, performance benchmarking & monitoring, and yield forecasting. These will also help assess climate change impacts on the hydrological balance to help with enhancing climate adaptation and resilience of the agricultural sector.



mechanism to prevent undesirable behavior, described as ‘water grabbing’ (by capping the quantities made available to a single buyer and precluding the possibility of re-selling a water allocation).

29. This PBC will be considered achieved when all the following conditions are met: (a) Stakeholders Engagement Plan²⁹ and Communication Strategy are carried out: this is a crucial step as this platform could generate rejection from some stakeholders in case of miscommunication (e.g., from some farmers, or some ORMVA and ABH staff); in this step, special attention will be paid to the question of female and youth participation during implementation of the communication campaign (such as through focus groups); (b) Design of the platform is finalized; (c) Framework Agreement between stakeholders is signed by the main stakeholders (ABH, ORMVA, WUA and MAPMDREF); and (d) Platform Operational, with actual transactions recorded in the platform, and mechanisms in place for the provision of feedback from the farmers to improve performance.
30. **PBC 3 – Development of digital instruments to support Water in Agriculture policies.** The activities related to this PBC aim at enhancing the quality of impact evaluation and monitoring impacts in areas modernized in LSI to inform WiA policies. This is justified by the need for more data on impacts after modernization in terms of water consumption, water productivity, land use changes (diversification, increase of land use), groundwater withdrawals, and so forth. Despite the large investments made by Morocco over the last 12 years in on-farm modernization, the data available to measure impacts, especially on water resources use, are still limited and Water Accounting is still underused.
31. This PBC will be considered achieved when all the following conditions are met: (a) Digital Observatory for M&E and impact evaluation of on-farm modernization operational for Tadla scheme³⁰ to analyze the transformation and change of behaviors after modernization; and (b) Digital Observatories for M&E and impacts evaluation of on-farm modernization operational for at least three other ORMVAs. The digital observatory will combine ground data on agronomic and irrigation practices with remote sensing-based data analytics and water accounting approaches to provide scalable M&E and impact evaluation services.
32. Component 1 will also provide support to the to implement quota systems in their annual operational routine ORMVAs in four irrigation areas (Tadla, Doukkala and Haouz and Chtouka area). Quota systems will be considered in place when: (i) the necessary information about water availability will be provided to the farmers at the beginning of the irrigation season and; (ii) the irrigation managers will have procedures for monitoring of compliance and enforcement. This support will create the conditions for strengthening and scaling-up the experience of the Tadla pilot platform for quota exchangeability.
33. PBCs under Component 1 will contribute towards climate change **adaptation efforts** by putting in place complementary Water Conservation Policies (WCP) as described above. This will ensure better governance of water resources that helps the irrigated agricultural sector adapt sustainably to increasing water scarcity and competition over natural resources. The support to the aquifer contract and the implementation of an efficient allocation (quota) system will ensure better use of available water resources and control over total withdrawals, particularly of groundwater. These governance strengthening activities also aim to contribute towards climate change **mitigation efforts** through outcomes such as increased water use and energy efficiency as well as increased carbon capture by enhancing the biomass produced by each cubic meter.

²⁹ This SEP and the communication plan are different from the SEP required under ESS10. They are specific to the development of the trading platform.

³⁰ This PBC will be achieved when the pilot is operational for Tadla Scheme. Quality Infrastructure Investments (QII) Funds have been mobilized in 2021 to support the design of this pilot.



34. **Component 2: Modernization of Irrigation and Drainage services.** Component 2 will finance consulting services, goods, and works to: (i) in Tadla: build pressurized irrigation networks to replace existing open canal networks including related investments such as regulating reservoir and filtration facilities (sectors G5 and G9 for 2,135 farmers on 4,735 ha) and modernize an existing canal (Zidania Canal, supplying water to 28,700 ha for 9,567 farmers); (ii) in Massa: modernize existing headworks (main pumping station and canal) for a whole command area of 18,050 ha benefiting 4,778 farmers, and pressurized irrigation networks as well as hydrants and outlets (for sectors 806–809 for 15,550 ha and 3,970 farmers); and (iii) support the implementation of the Chtouka aquifer through the financing of water meters. Additional details are available in Annex 2, Section F.
35. For Tadla and Massa schemes, this component exclusively finances off-farm investments up to the level of the individual outlet. On-farm equipment is to be financed by the *Fonds de Développement Agricole (FDA)*; funds for smallholders for on-farm irrigation equipment have been guaranteed for the next few years. One of the objectives of Component 3 is to support the WUAs and the farmers in preparing technical studies and requests for FDA subsidies for on-farm investments.
36. Under adequate management, the modernized networks will provide farmers with an improved water service, in line with the technical requirements for improved irrigation technologies, aiming at dramatically increasing water productivity achieved in previous projects. Component 3 will also support four ORMVAs (Tadla, Doukkala, Haouz and Souss-Massa) to implement quota systems in their annual operational routine with necessary information to the farmers at the beginning of the irrigation season and monitoring of compliance, in order to create the conditions for scaling-up the experience of the Tadla pilot platform.
37. Component 2 activities will contribute toward increasing beneficiaries' climate change adaptation and mitigation by modernizing main assets and creating conditions for the improvement of irrigation service provision, which has proven in past projects to allow for doubling of water productivity (see Annex 2, Section D for an analysis of impacts of past modernization processes). Additionally, modernization towards pressurized system does not increase the consumption of energy because the new networks will operate under gravity-based pressurization. Lastly, the improvement of surface water delivery should decrease the overexploitation of groundwater resources (as well as reducing energy consumption).
38. **Component 3: Improvement of access to advisory services and to modern on-farm technologies.** Component 3 will finance small works, goods, and consulting services to strengthen ONCA to ensure that it fulfills the mission of enhancing farmers' knowledge and awareness for accessing improved on-farm micro-irrigation technologies (mainly drip irrigation) while making better use of improved water delivery in development of their agricultural activities (awareness raising on water conservation and savings, crop diversification, better revenues and better water productivity). Additional details are available in Annex 2, Section F.
39. The project aims at contributing to create the conditions to ensure continuous and effective agricultural advisory services for large irrigation schemes. More specifically, Component 3 aims at: (a) providing advisory/extension services to support the farmers in the improvement of agricultural production (diversification towards higher-value crops, support for adding value and marketing, and so forth); (b) supporting WUAs and farmers, with a specific focus on female and young farmers, in accessing and managing improved irrigation technologies (technical studies and preparation of requests for FDA's subsidies for on-farm equipment); and (c) enhancing citizen engagement processes across all the phases of project implementation.



40. To that end, Component 3 includes four subcomponents: (i) recruitment of private advisers (firms) for provision of advisory services and training for farmers; (ii) rehabilitation of 16 offices transferred recently to the ONCA from the ORMVAs; (iii) equipment of ONCA's decentralized and central offices and vehicles; and (iv) capacity building for roughly 60 public agricultural advisers (training of trainers). The component will include mechanisms for feedback provision by the beneficiaries (such as beneficiary surveys) to enhance performance of the services.
41. In terms of beneficiary coverage, it is proposed that agricultural advice be provided for beneficiaries of PROMER, PMGI and RESWAG projects, with the provision that the agricultural advisory services will need to be customized for each area (total of 23,579 farmers and 70,732 ha). The advisory services provided under Component 3 will also facilitate access to financing opportunities by supporting Water User Associations (WUAs) in jointly applying to *Fonds de Développement Agricole* for subsidies on behalf of farmers.
42. Component 3 activities contribute to adaptation and mitigation co-benefits by providing access for the small farmers to modern on-farm technologies and related advisory services to improve water productivity at farm level without consuming additional energy. The improvement of the delivery of surface water will incentivize farmers to reduce water withdrawals of surface and groundwater. This will also decrease their overall use of energy (and associated GHG emissions). Moreover, improved on-farm productivity will result in enhanced terrestrial carbon sinks through reduced soil erosion and buildup of soil carbon.
43. Thus, in summary, Components 2 and 3 both work towards reducing the vulnerability of local communities to climate change impacts (such as water scarcity and drought risk) by increasing water use efficiency through improved control over the volume and timing of water applications and a reduction in water conveyance losses. To that end, modernization and rehabilitation of irrigation systems (both on- and off-farm) are expected to address climate vulnerabilities affecting the sector by allowing users to manage the available water resources more efficiently. These efforts go hand in hand with governance measures proposed by this project, to ensure adequate allocation and management of both surface and groundwater resources.
44. **Component 4: Project Management.** Component 4 will finance small works, goods, consulting and non-consulting services related to Project Management at: (i) Central Level for the Directorate of Irrigation (DIAEA) within the Ministry in charge of Agriculture and for the Headquarters of ONCA, and (ii) Regional level for the ORMVAs and for regional offices of ONCA.
45. The component will finance technical assistance to the main stakeholders to support, in particular, the pilot initiatives that need more assistance such as the three PBCs of Component 1 as well as the implementation of Component 3 (support to central office of ONCA to manage the hiring of private advisers). Component 4 also includes the Monitoring and Evaluation system that will be expanded not only for WBG's interventions areas but also at national level (at the scale of PNEEI's interventions), in order to improve the assessment of PNEEI's impacts.
46. Component 4 will also ensure, under DIAEA's responsibilities, that the verification protocol for the Component 1 PBC will be carried out according the rules. On this aspect, the MAPMDREF has considerable experience of DLI/PBC with the two Programs for Results financed by the WB. The verification protocol for the RESWAG project will be done by the General Inspectorate of Agriculture (IGA, *Inspection Générale de l'Agriculture*), similarly to the two ongoing PforRs.



Legal Operational Policies

	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

Summary of Assessment of Environmental and Social Risks and Impacts

Environmental Risks and Impacts

47. The environmental risk is rated Substantial as certain project activities present moderate to substantial environmental risks, it is the installation of pipes for transporting irrigation water on lines of several kilometers which include sections contiguous to very frequent highways, the generation of large volumes of excavation, the management and use of which must be specified in the tender documents. The project also includes the construction of a 100,000 m³ basin within the ORMVAT perimeter. The earthworks will generate cuttings estimated at 200,000 m³, the management, elimination and/or recovery of which must be specified in the impact study. The latter carried out in April 2017, must be updated and its terms of reference should be validated by the Bank.
48. The Project is not as complex as High-Risk Projects, its scale and impact are smaller (large to medium) and the location is not in such a highly sensitive area, and some risks and impacts may be significant. Potential risks and impacts have the following characteristics: (i) they are mostly temporary and limited to the duration of works, predictable and reversible, and the nature of the project does not preclude the possibility of avoiding or reversing them; (ii) they are medium in magnitude and substantial in spatial extent; (iii) the potential for cumulative impact is less severe and more readily avoided or mitigated than for High-Risk Projects; and (iv) there is a medium to low probability of serious adverse effects to human health and the environment (e.g., due to accidents, toxic waste disposal, etc.), and there are known and reliable mechanisms available to prevent or minimize such incidents. The effects of the Project on areas of high value or sensitivity are expected to not occur because works will take place near the existing canals belonging to the ORMVAs or along the roads. Mitigatory measures may be designed more readily and be more reliable than those of High-Risk Projects.
49. The Project is being developed in a legal environment where the legislation does adequately address environmental risks and impacts of complex Projects. With regard to the risk on water resources, it is considered substantial because at this stage, the available information does not allow to rule on the absence or the existence of a potential increase in the use of water resources. The implementing agencies DIAEA (Central) and ORMVAs (Regional) gained valuable experience in dealing with WBG safeguards during the previous Program "PROMER" and the ongoing "PMGI". Unlike the ABH and ONCA, the DIAEA and the ORMVAs have well-established and staffed PMUs with ES focal points who are managing ES aspects. The implementation of the EMP is described as satisfactory in the PROMER ICR and in the last PMGI aide memoire (January 2021). However, the use of the ESF will be new for DIAEA and ORMVAs and will request more attention for ESF instruments preparation. In addition, and for component 3 that includes two (02) new players (ABH Souss Massa and ONCA), capacities, both institutional and technical, need to be assessed regarding ESF requirements for preparation and implementation.



Social Risks and Impacts

50. The social risk is rated Substantial because of the following:

51. The project will include some large civil works and the risks and impacts associated with these works are expected to be substantial as they may involve large to moderate scale land acquisition in off-farm modernization processes as it was the case in predecessor projects for pipes and small reservoirs (PROMER, PMGI). The process of land acquisition had been well managed by the ORMVAs (RPs preparation, PAPs assistance, monitoring of compensations, etc.) which have dedicated staff for these operations.
52. The ORMVAs have good established and operational Grievance Mechanisms (GM). These GMs are among the best for Morocco portfolio. All the ORMVAs were very responsive to the beneficiaries' grievances and performs well in by continuously optimizing and improving GMs. Nevertheless, the project will involve new implementing agencies such as ABH Souss Massa, ABH Oum Er Rbia, and the ONCA which are not familiar with GM and Citizen engagement requirements.
53. Stakeholders management: The ORMVAs has experience dealing and working with most of public entities (water department, ABHs...) as well as with civil society organizations and the associations (Water Users Associations - AUEAs, Gender, etc.). It's expected that this work will be sustained and supported during the implementation of this new program. In addition, the ORMVAs have the capacity to manage labor issues and most of the national regulations related to child labor and occupational health and safety are integrated into internal procedures and procurement requirements. Another social risk to also consider is related to discrimination/ and elite capture, with the possibility that larger-irrigation farmers capturing project benefits and with the consequent exclusion of some categories of poor farmers. Although the use of the ESF will be new for DIAEA and ORMVAs, DIAEA will pay more attention to these issues during the ESF instruments preparation. In addition, and for the component 3 that includes two (02) new players (ABH Souss Massa and ONCA), borrower capacities, both institutional and technical, need to be assessed regarding ESF requirements for preparation and implementation.

E. Implementation

Institutional and Implementation Arrangements

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