Ministry of Foreign Affairs

Tunesian Water Sector Inventory

Commissioned by the Netherlands Enterprise Agency

>> *Sustainable. Agricultural. Innovative. International.*

Rijksdienst voor Ondernemend Nederland

NEW GENERATION
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TUNISIAN WATER SECTOR INVENTORY

November, 2025

While he was at the table of Qutayba Ibn Muslim, Assabi stretched out his hand to ask for a drink; The servant, not knowing whether he wanted milk, mead, water, or anything else, asked him, "What drink do you want?"

Assabi replied, "The most precious when it disappears and the most accessible when it appears," and the other served him WATER.

Ciudades de las Caravanes:
alarifes del Islam en el desierto (J. Corra, 1985)

THIS REPORT IS COMMISSIONED BY

Rijksdienst voor Ondernemend Nederland

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In partnership with the Embassy of the Kingdom of Netherlands in Tunisia

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Executive Summary

Water-Agriculture Nexus in the Gabès Region, Tunisia

This inventory was commissioned by the **Netherlands Enterprise Agency (RVO)**, following a scoping study that identified **water management and Environmental footprints** as major obstacles to sustainable and inclusive economic development in the **Gabès region** of Tunisia. This report serves as a core element for the **Dutch Embassy (EKN TUN)** in defining its new multi-year strategy focused on the **agriculture-water nexus** and guiding future RVO project development.

Core Objectives of the Report

The primary objectives of this report are to:

1. **Identify Strategic Alignment:** Map the expectations and recommendations of national, regional, and international stakeholders to ensure future Dutch interventions are strictly aligned with Tunisia's **Water 2050 Strategy**.
2. **Define Actionable Priorities:** Establish a prioritized roadmap of technical, institutional, and partnership opportunities **(based on stakeholder convergence)** that maximize the impact of foreign investment.
3. **Strengthen Key Partnerships:** Provide concrete project proposals that leverage Dutch expertise in circular economy and water-energy efficiency to foster a sustainable and inclusive regional transition.

The Problem: Structural Water Stress and Competition of Use

Tunisia is under **severe structural water stress** (approx. 400 m^3/capita/year), exacerbated by climate change and unequal resource distribution, with the South facing acute shortages. This situation generates **increasing competition of use**, as agriculture consumes over 80% of resources while urban and industrial demands rise. The current management model, focused solely on mobilization, is no longer viable, leading to significant **resource inefficiencies**. This is evidenced by a Non-Revenue Water (NRW) rate reaching 45% in the drinking water distribution in certain southern networks such as Gabès, as well as substantial **water productivity gaps** in agricultural irrigation systems.

Strategic Alignment: A National Transition to Resilience

Tunisia’s strategic planning demonstrates a clear commitment to overcome scarcity. The **Water 2050 Strategy**, the **REUSE 2050 Plan**, and the **National Strategy for Ecological Transition (SNTE)** all mandate:

- **Water security** through non-conventional resources (desalination, high-quality **REUSE** of treated wastewater, which the Ministry aims to extend to industry and tourism).
- **Renewed governance** to fight overexploitation and modernize the legal framework (new Water Code).
- **Strengthening the performance of public operators** (SONEDE) and advancing institutional reforms (such as the planned transfer of GDA management to SONEDE).

The complexity of the sector's structure is detailed below, highlighting the cross-sectoral coordination required by the new national strategies:

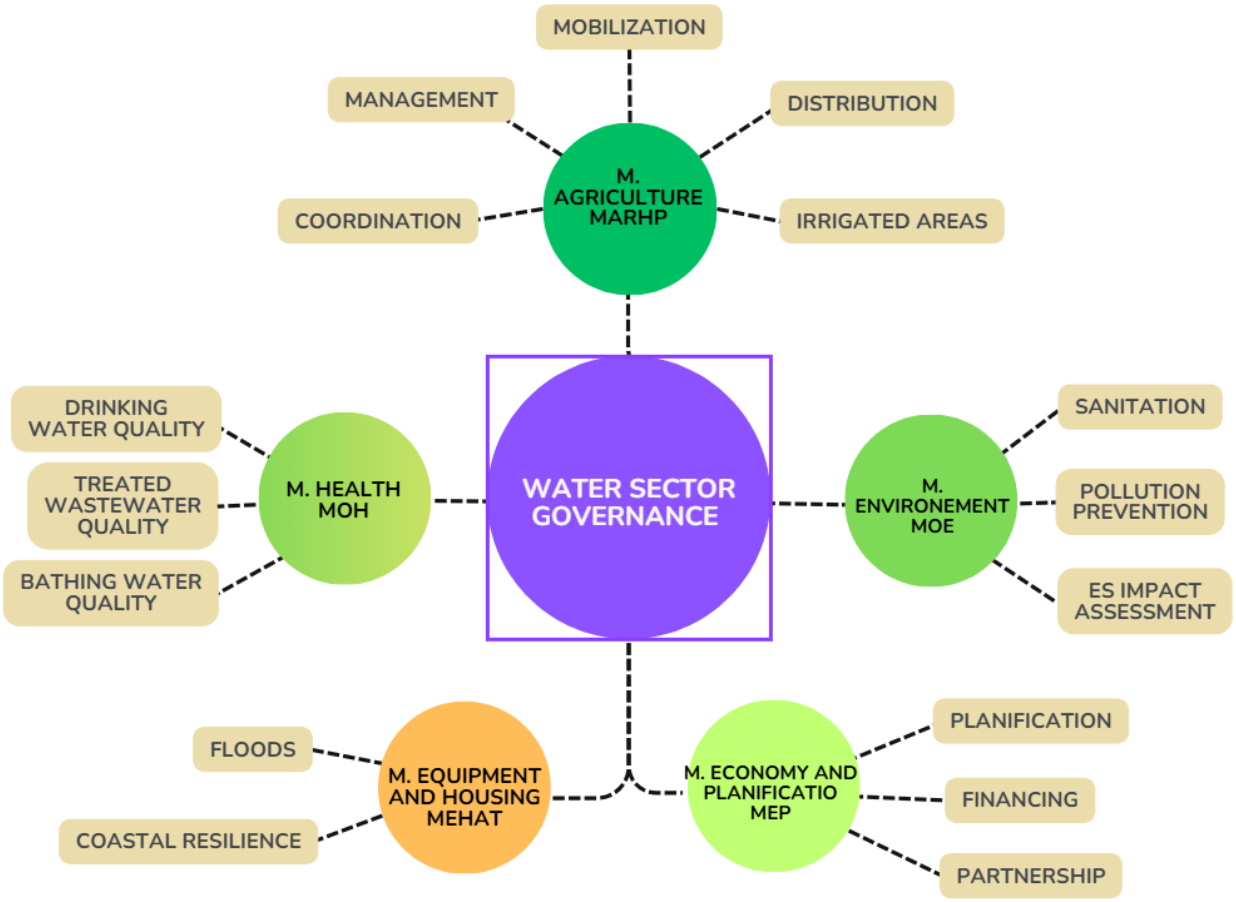

Figure 1: Water Sector Governance and Key Ministerial Roles.

Key Findings and Convergent Recommendations

A survey was conducted with **28 actors** out of **31 identified** (a 90% completion rate), covering public institutions, civil society, and international partners. The diagnosis confirms that the **traditional water management model has reached its limits**, highlighting the need for a **strategic paradigm shift** towards long-term sustainable resilience.

The breadth of stakeholders consulted in the Gabès region, from central government agencies to local development actors, is illustrated below:

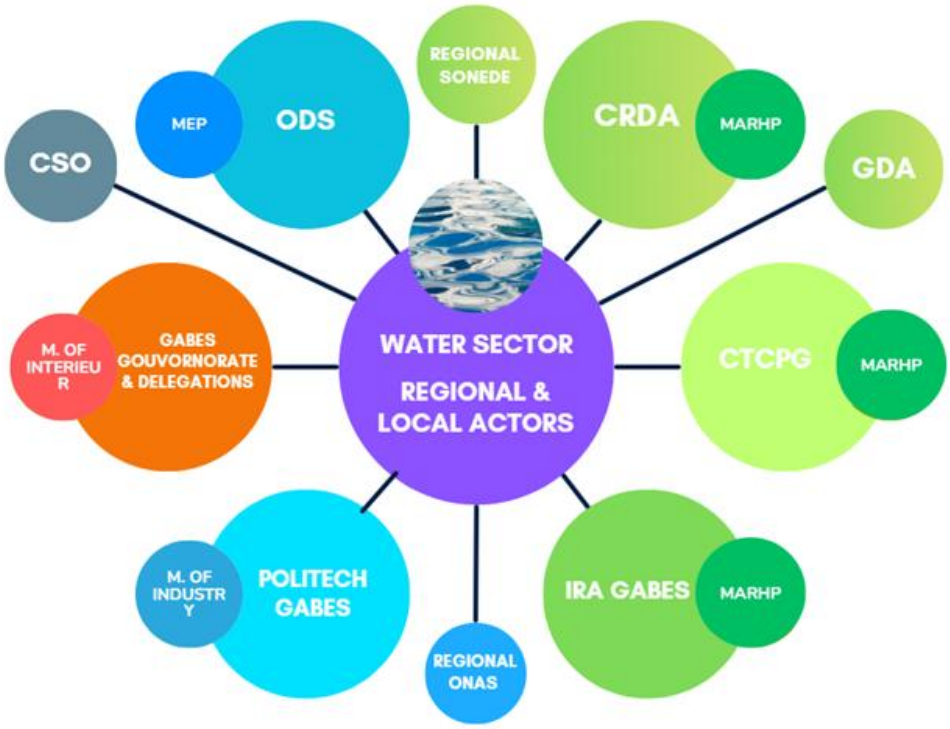

Figure 2: Mapping of Key Regional and Local Water Sector Actors in Gabès.

The resulting action plan rests on a dual imperative, led by the two highest-ranked priorities **(REUSE and Governance)** :

- **Technical Imperative:** Immediately **secure and diversify** supply through the massification of high-quality **REUSE** and the valorization of **geothermal water**, while urgently rehabilitating networks to halt substantial Non-Revenue Water. This imperative is strongly reinforced by the need to invest in Applied Research and Smart Irrigation.
- **Sustainability and Financing Imperative:** Anchor technical initiatives within a framework of clear institutional governance, strengthening key operators and a transparent, participatory local approach. This also requires **mobilizing resources** and creating effective mechanisms for **private investment and technology transfer.**

Actionable Opportunities for Dutch Cooperation

Stakeholders proposed concrete actions that offer opportunities for Dutch expertise and investment, focusing on the circular economy and smart technologies, structured around three intervention pillars:

1. **Strategic Programs (National and High-Impact)**

    - Nexus Program (Water-Energy-Food Security): Support the Ministry's 10-year (2026-2036) program (750 MTND) aimed at supplying 25,000 vulnerable families in rural dispersed areas using individual, non-collective PV solutions.
      ☞*Objective:* Achieve social equity and resilience in remote areas through integrated technology.

2. **High-Impact Pilot Projects (Infrastructure & Demonstration)**

- **REUSE and Anti-Salinity Barrier:** Implement a tertiary-treated wastewater injection project into the Gabès coastal aquifer.
  ☞*Objective:* Create a **hydraulic barrier** to counter saline intrusion and secure the local water table.

- **Geothermal Water Valorization (El Hamma):** Develop a recovery station for **Hammam Wastewater** (geothermal spent water).
  ☞*Objective:* Establish a **local circular economy model** with a targeted consumption split (**60\% for local farmers, 40\% for Dutch/partner companies**).

- **REUSE Pilot City:** Develop a full integration model of REUSE at the locality level to serve as a national blueprint.

3. **Technology, Studies, and Nature-based Solutions (Technical Support)**

- **Agricultural Innovation & Water Saving:** Invest in **Controlled Greenhouses and Smart Irrigation Pilots** to drastically reduce agricultural consumption.

- **Nature-based Solutions (NbS):** Test innovative environmental solutions for rainwater management and flood protection.
  ☞*Objective:* Enable the **valorization of rainwater** through effective flood management.

- **Strategic Feasibility Studies:** Conduct detailed technical and socio-economic studies, notably on the **Hammam Wastewater Reuse Program** and the impact of chlorination on soil.

4. **Enabling Environment and Innovation (Governance & Know-How)**

- **Data Mastery and Risk Monitoring (Pilot):** Establish a **pilot wadi monitoring system** (linked regionally/nationally) to anticipate and prevent flooding.
  ☞*Objective:* Secure watershed management and facilitate the valorization of runoff water.

- **Innovation and Know-How Transfer:** Set up mechanisms for integrating **start-ups** and local innovators, such as **"Living Labs,"** to bridge research and practical application by farmers.

- **Digitalization and Traceability:** Establish an **IT System/Platform** covering the water value chain to improve monitoring and decision-making support.

The proposed roadmap now requires firm commitment and strategic partnership funding to transform these convergences of ideas into sustainable projects. **By focusing cooperation on the Nexus approach and the dual priorities of REUSE and institutional reform,** the Netherlands is positioned as a key partner in Tunisia's water resilience transition.

TUNISIAN WATER SECTOR INVENTORY – FULL REPORT

Inventory of Water Sector in Tunisia

Contents

Acronyms

Acronyme	French version	Acronym	English version
ACDD	Association Citoyenneté et Développement Durable.	ACSD	The Association for Citizenship and Sustainable Development
AEP	Approvisionnement en eau potable	DWS	Drinking Water Supply
AFD	Agence Française de Développement	AFD	French Development Agency
AICS	Agence Italienne pour la Coopération au Développement	AICS	Italian Agency for Development Cooperation
ANPE	Agence Nationale de Protection de l'Environnement	NEPA	National Environmental Protection Agency
APAL	Agence de Protection et d'Aménagement du Littoral	CPDA	Coastal Protection and Development Agency
BAD	Banque Africaine de Développement	AfDB	African Development Bank (AfDB)
BEI	Banque Européenne de l'Investissement	EIB	European Investment Bank
BERD	Banque Européenne de la Reconstitution et du Développement	EBRD	European Bank for Reconstitution and Development
BM	Banque Mondiale	WB	World Bank
BPEH	Bureau de la Planification et des Equilibres Hydrauliques	OPHB	Office of Planning and Hydraulic Balances
CCI Sud-Est	Chambre de Commerce et D'Industrie du Sud-Est	CCISE	Chamber of Commerce and Industry of the South-East
CES	Conservation des Eaux et du Sol	WSC	Water and Soil Conservation
CGDR	Commissariat Général au Développement Régional	GCRD	General Commission for Regional Development
CITET	Centre International des Technologies de l'Environnement de Tunis	ICETT	International Center for Environmental Technologies in Tunis
CNEA	Centre National des Etudes Agricoles	NCAS	National Centre for Agricultural Studies
CNTE	Conférence nationale sur la transition écologique	NCET	National Conference on Ecological Transition
CRDA	Commissariat Régional au Développement Agricole	RCAD	Regional Commission for Agricultural Development
CTCPG	Centre Technique des Cultures Protégées et de la Géothermie	TCPCG	Technical Centre for Protected Crops and Geothermal Energy
CTGIRE	Comité Technique de GIRE	IWRM TC	IWRM Technical Committee
CTV	Cellule territoriale de Vulgarisation	TEU	Territorial Extension Unit
DDR	Direction du Développement Régional	RDD	Regional Development Directorates
DGBGTH	Direction Générale des Barrages et des Grands Travaux Hydrauliques	DGDMHW	General Directorate of Dams and Major Hydraulic Works
DGFIOP	Direction Générale de Financement, des Investissements et des Organismes Professionnels	DGFIPB	General Directorate for Financing, Investments and Professional Bodies
DGGREE	Direction Générale de Génie Rural et de l'Exploitation des Eaux	DGGREWE	Directorate-General for Rural Engineering and Water Exploitation
DGI	Direction Générale des Infrastructures	DGI	Directorate-General for Infrastructure
DGRE	Direction Générales des Ressources en Eau	DGWR	Directorate-General for Water Resources
DHMPE	Direction de l'Hygiène du Milieu et de la Protection de l'Environnement	EHEPD	Environmental Health and Environmental Protection Directorate
DHU	Direction des Hydrauliques Urbaines	UHD	Urban Hydraulics Department
DPH	Domaine Public Hydraulique	PHD	Public Hydraulic Domain
EIES	Etude d'Impact Environnemental et Social	ESIA	Environmental and Social Impact Assessment
EPA	Etablissement Public Administratif	PAE	Public Administrative Establishment
EPNA	Etablissement Public Non Administratif	NAPE	Non-administrative public establishment
EPR	Eau Potable Rurale	RDW	Rural Drinking Water

Acronyme	French version	Acronym	English version
EUT	Eaux Usées Traitées	TWW	Treated Wastewater
FA	Fonds d'Adaptation	AF	Adaptation Fund
FEMIP	Facilité euro-méditerranéenne d'investissement et de partenariat	FEMIP	Facility for Euro-Mediterranean Investment and Partnership
FONAPRAM	Fonds National de Promotion de l'Artisanat et des Petits Métiers	NFPHST	National Fund for the Promotion of Handicrafts and Small Trades
FVC	Fonds Vert pour le Climat	GCF	Green Climate Fund
GCT	Groupe Chimique Tunisien	TCG	Tunisian Chemical Group
GDA	Groupement de Développement Agricole	ADG	Agricultural Development Group
GIEC	Groupe d'Experts Intergouvernemental sur l'évolution du Climat	IPCC	Intergovernmental Panel on Climate Change
GIRE	Gestion Intégrée des Ressources en Eau	IWRM	Integrated Water Resource Management
GIZ	Coopération Allemande	GIZ	German cooperation
GRN	Gestion des Ressources Naturelles	NRM	Natural Resource Management
IDR	Indicateur de Développement Régional	RDI	Regional Development Index
IFI	Institution Financière Internationale	IFI	International Financial Institution
INAT	Institut National Agronomique de Tunis	NAIT	National Agronomic Institute of Tunis
INRGREF	Institut National de Recherche en Génie Rural, Eau et Forêt	NIRREWF	National Institute for Research in Rural Engineering, Water and Forestry
INSSPA	Instance Nationale de la Sécurité Sanitaire des Produits Alimentaires	NAFS	National Authority for Food Safety
IRA	Institut des Régions Arides	ARI	Arid Regions Institute
IRESA	Institut de Recherche et de l'Enseignement Supérieur Agricole	IARHE	Institute of Agricultural Research and Higher Education
ISSTEG	Institut Supérieur des Sciences et Techniques des Eaux de Gabès	HIWSTG	Higher Institute of Water Sciences and Techniques of Gabès
ITCEQ	Institut Tunisien de la Compétitivité et des Études Quantitatives.	TICQS	Tunisian Institute of Competitiveness and Quantitative Studies.
JICA	Agence Japonaise de la Coopéraiton Internationale	JICA	Japan International Cooperation Agency
KFW	Banque allemande de Développement	KFW	German Development Bank
MARHP	Ministère de l'Agriculture, des Ressources hydrauliques et de la Pêche	MAWRF	Ministry of Agriculture, Water Resources and Fisheries
MDCI	Ministère du Développement et de la Coopération Internationale	MDIC	Ministry of Development and International Cooperation
MDICI	Ministère du Développement, de l'Investissement et de la Coopération Internationale	MDIIC	Ministry of Development, Investment and International Cooperation
ME	Ministère de l'Environnement	MOE	Ministry of Environment
MEHAT	Ministère de l'Equipement, de l'Habitat et de l'Aménagement des Territoires	MEHTD	Ministry of Equipment, Housing and Territorial Development
MEP	Ministère de l'Economie et de la Planification	MEP	Ministry of Economy and Planning
MS	Ministère de la Santé	MOH	Ministry of Health
ODCO	Office de Développement du Centre-Ouest	CWDO	Central West Development Office
ODD	Objectifs de Développement Durable	SDG	Sustainable Development Goals
ODNO	Office de Développement du Nord-Ouest	NWDO	North West Development Office
ODRM	Office de Développement de Rejim Maatoug	RMDO	Rejim Maatoug Development Office
ODS	Office de Développement du Sud	SDO	Southern Development Office
ONAGRI	Observatoire National de l'Agriculture		National Observatory of Agriculture
ONAS	Office National de l'Assainissement	NOS	National Office of Sanitation
ORDG	Observatoire Régional de développement de gabès	GRDO	Gabes Regional Development Observatory
OSC	Organisation de la Société Civile	CSO	Civil Society Organisation

Acronyme	French version	Acronym	English version
OSS	Observatoire du Sahara et du Sahel		Sahara and Sahel Observatory
OTE	Observatoire Tunisien de l'Eau	TWO	Tunisian Water Observatory
PAEPR	Programme d'approvisionnement en Eau Potable en milieu Rural	RDWSP	Rural Drinking Water Supply Program
PAGIRE	Plan d'action pour la Gestion Intégrée des Ressources en Eaux	APIWRM	Action Plan for Integrated Water Resources Management
PAP	Projet d'Amélioration des Performances du Réseau	NPIP	Network Performance Improvement Project
PDAI	Projet de Développement Agricole Intégré	IADP	Integrated Agricultural Development Project
PDGG	Programme de Dépollution du Golfe de Gabès	GGDP	Gulf of Gabes Depollution Program
PDL	Plan de Développement Local	LDP	Local Development Plans
PDN	Plan de Développement National	NDP	National Development Plan
PDR	Plan de Développement Régional	RDP	Regional Development Plan
PDRI	Plan de Développement Régional Intégré	IRDP	Integrated Rural Development Projects
PGES	Plan de Gestion Environnementale et Sociale	ESMP	Environmental and Social Management Plan
PME	Petites et Moyennes Entreprises	SME	Small and Medium-Sized Enterprises
PNAQ	Programme National d'Amélioration de la Qualité de l'Eau Potable	NPIDWQ	National Program for Improving Drinking Water Quality
PNUD	Programme des Nations Unies pour le Développement	UNDP	United Nations Development Programme
PPI	Périmètres Publics Irrigués		Irrigated public perimeters
PPP	Partenariat Public Privé	PPP	Public-Private Partnerships
PSD	Private Sector Development	PSD	Private Sector Development
PTF	Plateforme Technique et Fiinancière	TFP	Technical and Financial Platform
RCP	Representative Concentration Pathways		Representative Concentration Pathways
REUSE	Réutilisation des Eaux Usées Traitées	RTWW	Reuse of Treated Wastewater
REUT	Réutilisation des Eaux Usées Traitées	RTWW	Reuse of Treated Wastewater
RNE	Rapport National sur l'Eau	NWR	National Water Report
SDARE	Schémas Directeurs d'Aménagement des Régions Économiques	MPDER	Master Plans for the Development of Economic Regions
SNTE	Stratégie Nationale de la Transition Ecologique	NSET	National Strategy for Ecological Transition
SONEDE	Société Nationale de l'Exploitation et de la Distribution des Eaux	NCEDW	National Company for the Exploitation and Distribution of Water
STEP	Station de Traitement des Eaux Polluées	WWTP	wastewater treatment plant
URAP	Union Régionale de l'Agriculture et de la Pêche	RUAF	Regional Union of Agriculture and Fisheries

INTRODUCTION

PURPOSE OF THE INVENTORY

Supporting stability, job creation in the agricultural sector and sustainable water management are important objectives for the Netherlands in Tunisia.

In addition, the Embassy will develop a new multi-year strategy for the country, which will focus in particular on water management in relation to food security. Currently, there is an interest in the Gabes region where the Netherlands aims to facilitate sustainable and inclusive economic development.

In order to stimulate sustainable agricultural production and employment, as well as local support for Dutch agricultural facilities in this water-scarce region, RVO Private Sector Development (PSD) commissioned a scoping study to identify relevant themes and map all active and relevant actors in the El Hicha and El Hamma sub-regions in Gabes. This exploratory project was carried out by the RVO GebiedsGewijs team between February and June 2024 and identified several crucial themes for the sustainable development of the Gabès region. Stakeholders most often cited water management and Environmental footprints around the region. Water management is also crucial for local support and the sustainability of the investments supported by the PSD.

Therefore, the main recommendation was to focus on this topic and study how the Dutch government can contribute to facilitating sustainable and inclusive economic development in the region, especially in the El Hicha and El Hamma sub-regions in Gabes.

Before undertaking any activity, it is essential to understand national and regional policies and priorities related to the agriculture-water nexus and to ensure that they are aligned with regional and local needs and objectives.

As most public institutions could not be consulted for the scoping study, it is essential to collaborate with them on a regular basis, and just as importantly, to assess their engagement, participation and support for small local initiatives on stakeholder collaboration to address water challenges in the Gabes region

The objective of the inventory is to map the actors in the sector as well as current strategies and plans and ongoing programmes and activities, in order to explore opportunities for cooperation in the Gabès region, where Dutch companies are located.

LONG-TERM GOALS

This report we will be an important element in the decision and further discussion with EKN TUN on how to continue the development of RVO project activities relating to the agriculture-water nexus in this region

OVERVIEW OF CORE STEPS

CHAPTER I

GENERAL SITUATION OF THE WATER SECTOR IN TUNISIA

CHAPTER I: GENERAL SITUATION OF THE WATER SECTOR IN TUNISIA

1.1. Current Situation of Water Resources in Tunisia

1.1.1. General data

Tunisia is facing a situation of structural water stress, with an estimated availability of renewable water of about 400 m³ per capita per year, well below the water stress threshold set at 1,000 m³. This situation is all the more worrying as the average annual rainfall is largely in deficit, reaching 172 mm in 2020-2021 compared to an interannual average of 232 mm. In the last five years, four have been in deficit, reflecting a persistent drought. Inputs to dams have fallen drastically, reaching only 804 million m³ in 2020-2021 out of an estimated annual average of 1,888 million m³, leading to a significant reduction in the filling rate of dams from 43% to 33% during the year 2021. In November 2023, this rate even reached a critical level of 22%. Climate change is worsening this situation, with **2023 recorded as the third warmest year on record in Tunisia**, and an increase in evapotranspiration of 35 mm per decade between 1986 and 2023. This intensification of the water crisis, from simple stress to absolute scarcity, is not only the result of natural factors. A significant part of the usable water deficit comes from the inefficiency of infrastructure. Physical losses in SONEDE's distribution networks can reach 24% at the national level, and up to 30% in some regions, to which are added unauthorized consumption representing about 8% of losses. The siltation of dams also reduces their storage capacity. These losses, resulting from suboptimal management and aging infrastructure, are a major source of waste.

Tunisian Water Resource Overview (Key Data)

Tunisian Population:
12.2 Million inhabitants

Renewable Resources Mobilized (Volume):*2.5 to 2.7 Billion m^3 per year*

Total National Consumption (All Uses):
420 m^3 per capita per year

Domestic/Drinking Water Consumption:
43.8 m^3 per capita per year

The distribution of water resources is unevenly distributed across the territory, with the North holding 55% of groundwater resources and 81% of surface water, while the South has only 15% of groundwater and 8% of surface water. This geographical imbalance necessitates extensive inter-basin water transfer systems from surplus areas to deficit areas, particularly from the North-West to the North-East and the Centre-East. Such reliance creates **significant supply sensitivity** for receiving regions, especially if the source areas face increased local demand or climatic stress.

Faced with the depletion of conventional resources, **Tunisia is strategically turning to non-conventional waters, such as seawater desalination and the reuse of treated wastewater**. The current desalination capacity is 50,000 m³/day, with an ambition to reach 775,000 m³/day by 2035. The country has 127 wastewater treatment plants, with a total capacity of about 1 million m³/day. However, this transition to unconventional sources represents a considerable energy and financial cost, with SONEDE's energy bill having increased by 10% between 2022 and 2023.

The implementation of the national water strategy for 2050 requires the mobilization of 70 billion dinars.

Water Demand by Sector

Agriculture remains the most water-intensive sector in Tunisia, consuming more than **80% of the country's water resources**. This predominance poses a major challenge for sustainable water management, especially since the export of agricultural products, such as dates (an irrigated date requires 50 liters of water), represents a "virtual" water export in a water-stressed country. The "Water 2050" strategy aims to reduce the amount of water allocated to agriculture from over 80% to 70%, with the remaining 30% going to national consumption, tourism and industry.

At the same time, the need for water for urban consumption and industry is significant and growing. At the national level, the volume of water withdrawn by water supply utilities (SONEDE) is between 1316.9 and 1584.0 million m³ per year, while the volume withdrawn directly by economic agents (including agriculture) varies between 1034.0 and 1137.0 million m³ per year.

1.1.2. National governance

1.1.2.1. Roles and responsibilities of key departments and institutions

The main ministries involved in the water sector in Tunisia are the **Ministry of Agriculture**, which is the main actor in the management of water resources from mobilization to irrigation, and **the Ministry of the Environment**, which positions itself as the guarantor of its quality and sustainability, focusing on the aspects of sanitation and pollution control.

- **Ministry of Agriculture, Water Resources and Fisheries (MARHP):** It is the main actor in water governance. It is responsible for policy formulation and water resources planning at the national level. It manages the entire water cycle, from mobilization (dams, boreholes) to agricultural irrigation.

- **Ministry of the Environment:** The role of the Ministry of Environment in Tunisia in the water sector is complementary to that of the Ministry of Agriculture, Water Resources and Fisheries. While the MARHP manages freshwater resources, the Ministry of Environment focuses on **water pollution control** and **wastewater management**. It is responsible for developing the strategy and policies for the protection of the environment, which includes water resources. It oversees the prevention and control of all forms of pollution affecting water resources, whether rivers, lakes or groundwater.

In collaboration with the Ministry of Agriculture, the Ministry of Environment promotes the reuse of treated wastewater for agricultural irrigation and other non-potable uses, with the aim of preserving freshwater resources.

Other ministries and institutions are involved in the water sector; their roles will be developed in the "stakeholder mapping" section. Their intervention is often done in consultation with the Ministry of Agriculture.

Figure 1: Key Missions and Bodies in the Management of the Water Sector in Tunisia

1.1.2.2. Legal framework

The legal framework is mainly defined by the **Water Code** and other regulatory texts:

- **Law No. 75-16 of 31 March 1975** : This is the current Water Code; it has been amended several times since its promulgation. This code establishes the fundamental principles of water management in Tunisia. In particular, it stipulates that the **public hydraulic domain is inalienable and imprescriptible**. It defines the rights of use and the conditions for the exploitation of water, in particular for wells and boreholes.

  A **draft of a new Water Code** is being discussed to modernize legislation in the face of current challenges such as climate change, water scarcity and overexploitation. This new code aims to strengthen governance, better protect the public water domain, regulate uses and take into account the notion of water footprint.

- **Additional texts** : Numerous decrees and orders have been added to the Water Code to regulate specific aspects such as the distribution of drinking water, sanitation, or the use of treated wastewater:

- **2014 Constitution** : Article 44 of the Tunisian Constitution guarantees the **right to water** for all and makes the preservation of water and its rational use a duty of the State and society.

1.1.3. Major challenges and strategic risks

Tunisia's water crisis is deeply rooted in governance structural constraints. There are institutional alignment gaps and a largely outdated regulatory framework. Water management is inherently political and social, not purely technical. Political interference and social pressure for immediate solutions can often arbitration challenges with long-term sectoral goals. The 1975 Water Code is considered outdated, and the process of revising a new code, which began in 2019 and was submitted to Parliament in 2020, has been suspended, creating a regulatory transition period that hinders the application of modern management principles.

The overexploitation of groundwater is a major challenge, with exploitation rates reaching 118.7% for groundwater, 134.3% for deep aquifers and 130.2% for non-renewable fossil aquifers. This overexploitation is aggravated by the existence of some 21,290 unlisted or unauthorized boreholes nationwide. The average drop in the level of the water tables has been 2 meters per year for the past 20 years. This situation is all the more critical as national water demand is expected to increase by 38% by 2050, while conventional water resources are expected to decrease by 28%. This growing structural imbalance between supply and demand threatens the country's water security.

Water management in Tunisia is centered on the complex Water-Energy-Food Nexus. While Agriculture currently accounts for over 80% of water withdrawals, the "Water 2050" strategy targets a rebalancing of demand, aiming to optimize this share to 70%. Concurrently, the industrial and tourism sectors, particularly along the coastline, exert increasing competitive pressure on resources. The growing reliance on non-conventional water sources, while essential for security, entails a substantial increase in energy intensity. Furthermore, the integrity of available resources is challenged by industrial effluents and untreated urban wastewater, necessitating enhanced protection and treatment measures."

The implications of these challenges are directly felt in the daily lives of citizens. **Service interruptions** occur in various regions, including those traditionally characterized by higher supply levels. These **operational** disruptions have heightened social sensitivity, underscoring that water security is a fundamental pillar of **national resilience** and the effective realization of the right **to water**, as enshrined in the Constitution of 2014.

1.2. Current Situation of water resources in the Gabès region

1.2.1. General data about the Gabes region

The governorate of Gabes, located in the south-east of Tunisia, has an **arid to semi-arid climate**. The region is mainly known for its **natural resources**, including phosphate and oil, which are at the heart of its economy. The coastal area of Gabès is home to an important chemical industry, particularly for the production of phosphoric acid. In terms of agriculture, despite the dry climate, the region stands out for its **unique oasis**, the only coastal olive grove in the world, where olive, date and pomegranate crops coexist. However, this oasis is threatened by industrial Environmental footprints. Demographically, the population of Gabes is relatively young, with high density in urban areas. The city of Gabes is an economic, educational and transport hub for the region. Fishing activity is also notable along the coast, contributing to the local economy.

The governorate of Gabes, with an area of **7,175 km²**, has a population of about **410,847 inhabitants** in 2024, or a density of **57 inhabitants/km²**. The region's economy, although dominated by industry, has a high unemployment rate, especially among graduates.

The governorate of Gabès has **13 delegations**. The government decree n° 2020-367 du 16 juin 2020 added two new delegations to the list, namely **Ouedhref**[1] and **El-Hamma-West**, bringing the total from 11 to 13 delegations.

1. **Gabès South** : 83,013 inhabitants
2. **El Hamma** : 57,856 inhabitants
3. **Mareth** : 57,358 inhabitants
4. **Gabès Medina** : 46,380 inhabitants
5. **Gabès West** : 37,420 inhabitants
6. **Ghannouch** : 35,329 inhabitants
7. **Oudhref** : 17,931 inhabitants
8. **New Matmata** : 16,779 inhabitants
9. **Metouia** : 13,613 inhabitants
10. **Menzel El Habib** : 10,200 inhabitants
11. **Toujane** : 9,690 inhabitants
12. **El Hamma West** : 21,352 inhabitants
13. **Matmata** : 3,926 inhabitants

Figure 2: Delegations and distribution of the population in Gabès

[1] El Hicha was a locality/imada of Metouia, after promulgation of governemental decree of June 2020, by Order (arrêté) of the Minister of the Interior dated December 30, 2020, El Hicha became a locality of Ouedhref (The gouvernorate of Gabes count 13 delegations and 73 imadas)

Economic and social data

- **Population and employment**: The population of the governorate is estimated at **410,847 inhabitants** in 2024. The unemployment rate is significantly higher than the national average, especially for higher education graduates, with **43.35%** of them unemployed in the city of Gabes, compared to **20.06%** at the national level according to 2014 data.

- **Sectors of activity**: The main employers in the region are public administration (**34.55%** of jobs), followed by industry (**17.78%)** and trade (**15.47%).**

Environment and climate

- **Rainfall** : The climate is arid to semi-arid, with an average annual rainfall of only **230 mm**. The rainiest months are September and October.

- **Temperature** : The average annual temperature is around **20.45°C**.

- **Sunshine** : The region enjoys about **2,900 hours of sunshine** per year.

Agriculture

- The Gabès region has **599,262 ha of useful agricultural land** , of which **169,600 ha** is arable land. The rest of the land is made up of forests (**13,062 ha**) and rangelands (**416,600 ha**).

- **Irrigated areas** : The agricultural sector of Gabès has **25,747 hectares** of irrigated land, divided between public perimeters (**11,102 ha**), oases (**7,374 ha**) and private perimeters (**7,121 ha**).

- **Productions** : The region is a major producer of pomegranates, with an estimated production of **25,000 tons** in 2018-2019. Olive production has also seen strong growth, from **15,000 tons** in 2016-2017 to **70,000 tons** for the 2022-2023 and 2023-2024 seasons.

- **The tomato sector in Gabès** relies almost entirely on geothermal energy and is heavily dominated by a few large export companies. Production in Gabès' geothermal greenhouses (mainly in the El Hamma and Ouedhref regions) is largely destined for European and Gulf markets. A total of 11companies and around 40 small farmers are involved in this activity. Exports of vine tomatoes were estimated at around **10,000 tons** for the 2023 season, while the total early produce production in the area is estimated at 38,000 tonnes for the 2024-2025 season. This growth is based in particular on the Desert Joy project, which aims for an annual production capacity of 35,000 to 40,000 tons of tomatoes in the long term.

Water resources and consumption

- **Groundwater resources**: The primary water supply relies on deep aquifers. Currently, these resources face **intensive exploitation**: annual withdrawal volumes are estimated to exceed **180 million m³ per year**, representing an exploitation rate of **140% relative to renewable resources;**

- **Consumption Dynamics:** Water demand is on a steady upward trend. Drinking water consumption for the city of Gabès has reached 7.65 million m³/year, while the industrial zone accounts for over 18 million m³/year (including pumping). Irrigated agriculture remains the **most water-intensive sector**.

- **Supply-Demand Balance:** Several localities face **persistent supply gaps**, notably the New Matmata delegation, with an estimated daily peak shortage of 2,000 m³, and Mareth, with 120 m³/day. The newly commissioned **Zarat desalination plant** is a strategic response designed to **mitigate these imbalances**.

Water quality and Environmental Integrity

- **Salinity Dynamics**: Water quality is a priority, with salinity levels reaching high thresholds, especially in coastal aquifers. The National Water Exploitation and Distribution Company (SONEDE) aims to stabilize salinity levels in southern Tunisia at or below **1.5 g/l** to ensure potable water standards.

- **Industrial impact**: The environmental integrity of the region, particularly the Gabès oasis, faces significant challenges from **industrial discharges**. Managing the impact of the chemical industry is essential to protecting water resources and the local ecosystem.

- **Alternative Water solutions**: To address these challenges, the region prioritizing **non-conventional water resources** such as brackish water and seawater desalination. A major project is underway to double the capacity of the Zarrat desalination plant in the governorate of Gabes to **100,000 m³/day**. Furthermore, the integration of **treated wastewater reuse** and rainwater harvesting is being actively developed to enhance regional water security

1.2.2. Regional governance

- **The Regional Commissariat for Agricultural Development (CRDA)** is a key player in the agricultural sector of the governorate of Gabes. Its main mission encompasses the development and preservation of natural resources. It is responsible for extension, monitoring agricultural seasons, promoting local production and encouraging agricultural investment. The CRDA also manages projects to improve irrigation efficiency and combat problems such as soil salinization, thus playing a key role in the sustainability and competitiveness of regional agriculture

The Ministry of Agriculture is represented by 24 Regional Agricultural Development Commissariat (CRDAs) in each governorate.

- **Agricultural Development Groups (GDA):** In rural areas, the management of drinking water supply systems (DWS) is often delegated to these organizations, with **associative status** and recognized as being of public utility. They voluntarily bring together farmers and users in order to ensure the collective management of natural resources (in particular irrigation water and irrigated public perimeters), the equipment, the maintenance of infrastructure and the promotion of agricultural techniques for the benefit of its members. The institutional and regulatory supervision of the GDAs is carried out at the central level by the **Directorate General of Financing, Investment and Professional Organizations (DGFIOP)** within the Ministry of Agriculture, thus guaranteeing the supervision, support and control of their administrative and financial management. They work in close collaboration with the Regional Commission for Agricultural Development (CRDA), thus positioning themselves as important relays in the organization and economic development of the rural world.

Other regional departments and institutions are involved in the water sector; their roles will be developed in the "**stakeholder mapping" part**. Their intervention is often carried out in consultation with the CRDA.

1.2.3. Local issues and challenges of water management

Competition of use

In the Gabès region, there is significant competition between the supply of drinking water to urban centers (7.65 million m³ per year for the city of Gabès), water for the industrial-chemical zone (over 18 million m³ per year), and water for irrigated agriculture (estimated at over 150 million m³ per year for irrigation and oases) or **80%** of the total water withdrawn from the deep aquifers of the governorate. This increased competition for a limited resource intensifies competition of use and makes the planning and regulation of demand by sector all the more crucial.

This resource competition is exacerbated by the presence of a heavy industrial cluster (GCT) within an oasis ecosystem. Competition is mainly based on **deep fossil aquifers**, which are heavily solicited. It is estimated that total consumption is unevenly distributed: **irrigation** absorbs about **43%** of the resources exploited, while **industry** captures nearly **31%,** leaving the **(domestic) drinking water** sector with about **26%**. This pressure challenges the long-term viability of traditional oasis agriculture, which is continuous industrial requirements, leading to the decline in piezometric levels and the reduction in the cultivation of certain plots.

Water quality in industrial areas

Water quality is under significant pressure due to discharges from chemical industries, particularly those from the Ghannouch complex. Industrial effluents discharged into the receiving environment (often at sea or sometimes poorly managed) contain **heavy metals** and pollutants that exceed the treatment capacities of conventional wastewater treatment plants, contaminating surface water and threatening the integrity of coastal aquifers. In addition, the overexploitation of groundwater leads to **marine intrusion**, increasing the **salinity** of groundwater which, in some coastal aquifers, reaches levels between **1.5 and 3.5 g/litre**, making it less suitable for irrigation and requiring expensive treatment (desalination) for industrial and domestic uses.

*The **Ghannouch complex** is the **state-owned industrial zone** in the Gabès governorate, housing the major chemical plants of the **Tunisian** **Chemical Group (GCT)**, which are the source of complex industrial effluents requiring advanced management.*

Wastewater and stormwater management

Wastewater management requires a significant infrastructure effort. The existing wastewater treatment plant (WWTP) in Gabès is being rehabilitated and modernized, with projects scheduled to increase its treatment capacity to approximately **21,500 m³/day** (Hydro Head) to better manage the organic load (estimated at **11,500 kg BOD5/day**) and move the facilities away from the urban area. Concerning **rainwater**, projects aim to recover it rather than letting it drain. This includes the construction of retention basins and recovery reservoirs (such as at the El Glem wadi in South Gabes) to minimize the risk of flooding and offer a new water resource for irrigation, contributing to the diversification of unconventional resources.

Fragility of oasis ecosystems

The oasis ecosystem of Gabès is characterized by the unique but very highly sensitive maritime oasis. This system faces significant pressure from the **intensive use** of water resources and **industrial externalities**. The operating principle, based on deep groundwater, is **challenged** by high extraction rates for agriculture and industry (which accounts for about 31% of the exploited water), leading to lower piezometric levels and soil salinization. This environmental pressure is exacerbated by **industrial effluents** and **unplanned** urbanization that impacts the **protective** 'oasis effect' and its microclimate. Consequently, the productivity of emblematic crops, such as pomegranate and henna, is **impacted**, contributing to a reduction in cultivated surface area and a loss of biodiversity

El Hamma Oasis: Threat to Artesianism

The oasis of El Hamma is particularly sensitive because it historically depends on artesian springs from the deep faults of the Jeffara aquifer[2]. Socio-economic development and the multiplication of unsanctioned boreholes have led to the gradual drying up of these vital sources. Currently, the pressure on the water table is reflected in a constant drop in its level, jeopardizing access to water for farmers. Although projects for the artificial recharge of aquifers by treated wastewater have been studied on an experimental basis, the priority remains the preservation of the fragile hydrogeological balance linked to the El Hamma fault to guarantee the sustainability of this traditional agriculture.

Oasis of Métouia: Salinization and Encrustments

The oasis of Métouia is facing a critical salinization crisis of its lands and waters. The combination of the depletion of the aquifers and poor drainage has favoured the appearance of gypsum crusts and saline efflorescence. Analyses show that the salt load in the irrigation water of Métouia reaches high values, varying between 4 and 5 mS/cm, which is detrimental to the crops. This poor water quality and the dysfunction of the drainage network hinder soil leaching, threatening date palm and arboriculture (fruit trees). Efforts are required to optimize drainage systems and consider the reuse of drainage water to preserve the region's highly sensitive oasis system.

formation containing groundwater), called the Jeffara de Gabès aquifer, which is an important source of water for agriculture in the region.

CHAPTER II

DESK RESEARCH

CHAPTER II: DESK RESEARCH

2.1. Review of Policies, Strategies, Plans and Programs at the National Level

2.1.1. Water policies

Water policy in Tunisia has evolved since independence and has gone through different phases:

- **1956** (after independence): This was the beginning of a policy called **"large-scale hydraulics"** focused on the mobilization of resources, through the construction of large infrastructures such as dams and hill lakes, as well as the drilling of deep wells to capture groundwater
- **1974:** Creation of the National Office for Sanitation (ONAS) to manage the sanitation sector.
- **1975:** Promulgation of the Water Code, which reaffirms the status of water as a public good, The 1975 Water Code repealed several previous provisions, including: The Decree of **24 May 1920**, which created a special water service and a Water Committee and The Decree of **5 August 1933**, which established a regulation on the conservation and use of water in the public domain.
- **1990s** : Gradual shift from a supply-side policy to a demand-side management policy, with the implementation of the ten-year strategy for resource mobilization.
- **2003:** The Ministry of Agriculture, Water Resources and Fisheries publishes the Water Master Plan, reaffirming long-term mobilization and management strategies.
- **2023:** Faced with the increasing scarcity of the resource, the policy is moving towards a **more integrated and sustainable management**. Efforts are now focused on **controlling demand**, particularly in the agricultural sector, which consumes most of the available water. This involves encouraging more efficient irrigation techniques and making use of **non-conventional water**, such as seawater desalination and the reuse of treated wastewater. The country is recognized for having achieved one of the highest rates of access to safe drinking water and sanitation in the region, but the challenges of climate change and overconsumption require constant adaptation and strengthening of water governance. It was then that the **Action Plan for Integrated Water Resources Management (PAGIRE)** was developed for the period 2023-2028, with a focus on resilience to climate change and governance.
- **August 2024: Declaration of a water emergency.** The Tunisian Water Observatory (OTE)[3] issued an urgent appeal to declare a national water emergency. This alert, which gained significant attention, highlighted the alarming decline in dam filling rates to approximately 23.2%. This situation underscores the **operational limits of conventional supply models** when faced with unprecedented, prolonged drought conditions

2.1.2. National Water Strategies

[3] The Tunisian Water Observatory (OTE), a project of the Tunisian Forum for Economic and Social Rights (FTDES), is a civil society organization recognized for its role in independent monitoring (watchdog) of water resources and water-related social competition. Its opinion is crucial in assessing the social acceptance and governance of the sector.

A. The "WATER 2050" strategy

The "Water 2050" strategy is a long-term project aimed at ensuring the country's water security, led by the Ministry of Agriculture, with the Technical and Financial support of the AfDB, KFW and GIZ.

The development of this strategy lasted 07 years, from 2017 to 2024. It was carried out in **5 stages**, according to a consultation process, with a broad participation of all stakeholders, during national, regional and local workshops.

The strategy paper consists of 10 volumes, which addressed:

- Diagnosis of the water situation in Tunisia
- The prospective analysis that made it possible to define the most likely scenario
- Defining the vision and strategic objectives
- Developing a budgeted action plan

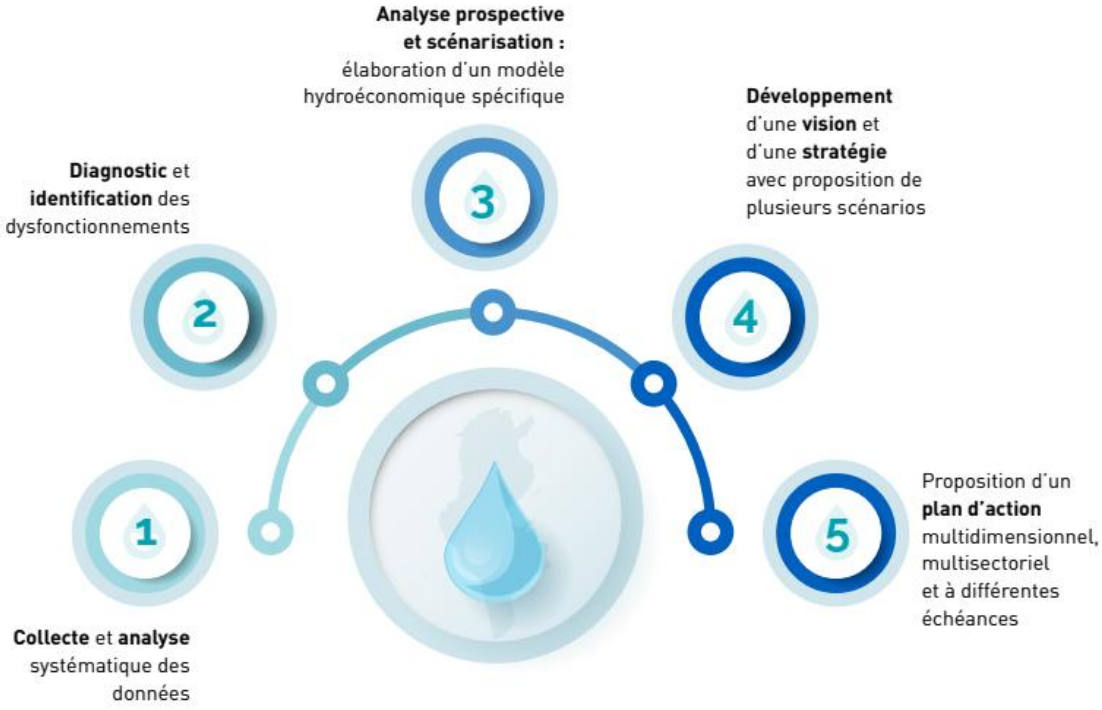

Figure 3: Stages of the strategic study of the water sector by 2050
Source: Tunisia Water 2050, Vision and Strategy, GIZ, November 2023

The prospective analysis concluded that, according to the Intergovernmental Panel on Climate Change (IPCC) forecasts [4]and considering the moderate scenario RCP 4.5:

- The Mediterranean region will experience significant increases in temperature, at the same time as reductions in rainfall.
- **Droughts** will become **more intense** and **more frequent**,

[4] The **IPCC** stands **for Intergovernmental Panel on Climate Change**; the intergovernmental body created in 1988 by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO).

- Flood risks will **increase**

The **highest-scoring scenario** was called "**Water and Sustainable Development**". It will make it possible to achieve the objectives of sustainable development in a combined logic of **optimal water and land management**. It corresponds to a match between supply and demand, **broken down according to several time steps**: 2023-2025, 2026-2035 and 2036-2050 by adopting the **assumption of RCP 4.5** from 2040 onwards, which assumes that the average annual temperature of the Earth's surface is expected to increase by the end of the century (2071-2100) by 1.0 to 4.5°C compared to the period 1971-2000.

The vision that has been defined is **"New Inclusive and Sustainable Water System"**

For the planning of the **2050 water strategy**, **3 scenarios** will be successively implemented:

- The trend scenario (2023-2025), which consists of completing existing or planned projects
- The improved trend scenario (2026-2035);
- The Water and Sustainable Development scenario to be launched from 2036.

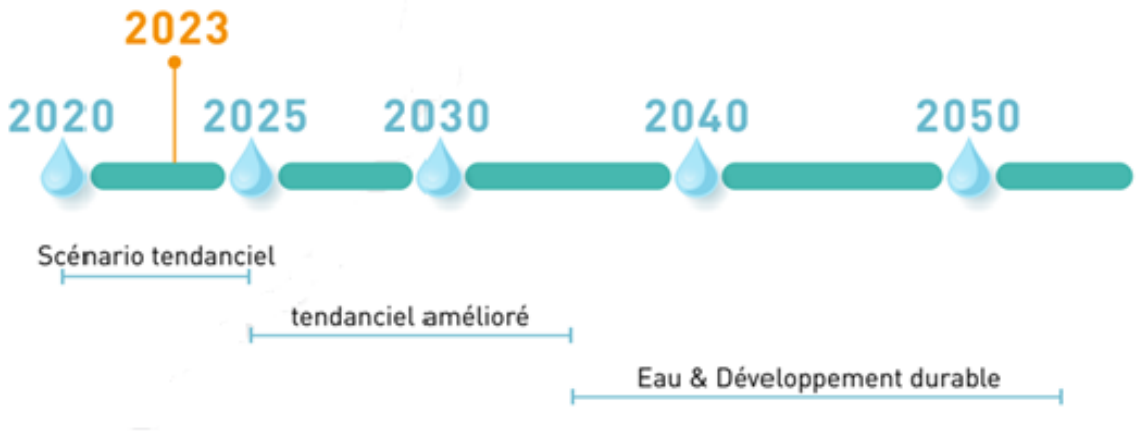

Figure 4: Water 2050 Strategy Implementation Scenarios
Source: Tunisia Water 2050, Vision and Strategy, GIZ, November 2023

The main strategic axes are:

1. To realize the right of all to safe drinking water and quality of the resources of the Far North-West and by thoroughly modernizing infrastructure and equipment
2. Using Desalination and REUSE as complementary strategic choices for mobilizing unconventional resources
3. Transform the "Water Quality and Ecosystem Protection" objective into a Strategic Axis for the Structuring of the Water System
4. Ensuring the Articulation between Water 2050 and the Food Sovereignty Strategy
5. Optimize the Information System and Strengthen the Modeling Capacities for Water Management 2050
6. Implement the Innovative Option of Systematic Use of Assisted Groundwater Recharging
7. Ensuring Coherence Between Public Policies for the Rationalization of the Water System and Territorial Development
8. Design and Implementation of a Renewed Governance Compatible with the New Water Strategy 2050
9. Implementation of a Strategy to Reduce the Effect of Climate Change on the Balances and Dynamics of the Water System

10. Use the Water Allocation by Use and Region from 2020 to 2050 Simulated by the Hydro-Economic Model as the basis for the implementation of Water 2050

This strategy is broken down into an Action Plan with **6** blocks, which would require an investment of 70 billion dinars (23 billion Euro) to finance about **43 projects** and **1200 actions** divided into several components by 2050:

Block 1 "Institutional and Organizational Governance"
Block 2 "Drinking Water, Conventional Resources, Transfer and Desalination";
Block 3 "IWRM and Food Security"; (estimated cost of 59.3 billion dinars, or 80.6%)
Block 4 "Public Policy, Water Quality and Safeguarding Ecosystems";
Block 5 "Water & Territories and Inclusive and Sustainable Development";
Block 6 "Objectification, Regulation and Rationalization of Decision-Making Processes"

Table 1: Block 3 : Integrated Water resources management and Food Security, Summary of actions

	2020 Status	2050 Target
Plans for 31 new Dams		+240 Mm^3
Projects to raise 8 Dams (Additional Volume)		+255 Mm^3
Underground Dam Projects (Numbers)	1	106
Construction of 560 Wastwater Treatment Plants	296 Mm /Year	681 Mm /Year
Extension and Rehabilitation of Wastewater Network (Linear)	18000 Km	31000 Km
Widespread Use of Tertiary Treatment	10%	100%
Promotion of REUSE : irrigated perimeters, Groundwater Recharge, Industry	296 Mm /Year	681 Mm /Year
Improving agricultural intensification in perimeters	80%	130%
Improving the valuation of green water in rainfed agriculture Olive Trees Cerals		 +95000qx/Year +14500 T/Year
Renewable energy Production	484 MW	11240 MW

Source : Synthesis Report : Water 2050 - Vision and Strategy

In conclusion, the "Water 2050" Strategy is positioned as **an essential and ambitious roadmap** to ensure the country's water security in the face of the pressing challenges of climate change, confirmed by the IPCC's forecasts.

Deployed over a period of more than two decades and requiring a major investment of 70 billion dinars, it is based on a clear vision of the **"New Inclusive and Sustainable Water System"** and a gradual implementation.

The adoption of the **"Water and Sustainable Development"** scenario and the commitment to the ten strategic axes, in particular the use of non-conventional resources (desalination, REUSE) and renewed governance, demonstrate a desire to profoundly transform the national water system to ensure the adequacy between supply and demand until 2050 and beyond, with a view to sustainable development and food sovereignty.

B. The REUSE 2050 strategy

The document called "REUT 2050 Strategy" is a National Master Plan "Water Reuse 2050" that will propose a strategy for the development of Treated Wastewater Reuse (REUT) in Tunisia by 2050. The

"Water Reuse 2050" Master Plan will be integrated into the Master Plan for Tunisia's Water Resources for 2050 called the "EAU 2050" Strategy.

The study is funded by the French Development Agency (AFD) as part of the Adapt'Action Facility, which is itself part of the Paris Climate Agreement.

The study development process is divided into three main phases:

- Phase n°1: Diagnosis of the sector,
- Phase 2: Evaluation of the future of the REUT and definition of a strategy for the sector,
- Phase 3: Drafting of the "Water REUSE 2050" Master Plan

The state of play in 2020 established that despite the state of severe water stress and the major challenges of the water sector in Tunisia, the reuse rate of treated wastewater (TWW) remains low, **less than 10%** of the total volume treated.

The main obstacles to this reuse are:

1. **Quality and Technical Challenges:** The quality of the treated water (by ONAS) is often insufficient for reuse (lack of tertiary treatment), and the **transport infrastructure** (irrigation and distribution networks) between wastewater treatment plants (WWTPs) and areas of use is often non-existent or deficient.
2. **Governance and Institutional:** The management of REUT is mainly **driven by supply** (what ONAS produces) rather than by user demand. There is a **lack of coordination** between ONAS, the Ministries of Agriculture and Health, as well as a **confusion of roles and responsibilities**.
3. **Acceptability:** Low **acceptance** by users (especially farmers) due to the perception of health risks and poor water quality.

The master plan for 2050 transforms the TWW from a waste to a **strategic resource** for Tunisia's water future, based on the potential of TWWs, which can be summarized in 3 essential elements:

- **Doubling of the Deposit:** The volume of TWWs produced in Tunisia is projected to **double** by 2050, from about **300 million cubic meters (Mm³)** to about **650 Mm³** per year.
- **Water Security:** In 2050, TWWs could represent between **14% and 26%** of the national water mix, depending on the hydrological scenarios (average year vs. dry year).
- **Deficit Reduction:** The reuse of this volume could potentially reduce the national water deficit by **20% to 33%.**

The key strategic directions are:

- **Priority to Substitution:** Objective n°1 is for TWWs **to replace conventional resources** (dam water, groundwater) in non-potable uses (mainly irrigation). This makes fresh water safe for drinking water.
- **Geographical Concentration:** Prioritize the development of large-scale REUT projects around the **six major wastewater treatment centres** (Greater Tunis, Greater Sousse/Monastir, Greater Sfax, Nabeul/Hammamet, Grand Gabès and Djerba/Zarzis), which will concentrate the majority of the EUT volumes.
- **Technological Upgrade:** To guarantee substitution and acceptability, a massive investment in **tertiary treatment technologies** is essential to ensure that the quality of the TWWs meets the most demanding standards.

The success of this plan depends on the elimination of the identified obstacles, namely:

- **Sustainable Financing:** Implement a **pricing system** for TWWs or use a dedicated tax to cover the investment and operating costs of REUT's networks. The Cost-Benefit Analysis shows that REUT is cost-effective, especially when it **avoids or postpones costly desalination investments**.
- **Regulatory Framework:** Adapt and anticipate **regulations** (Tunisian and European) for the uses of TWWs and ensure transparency on water quality data.
- **Coordinated Governance:** Strengthen **inter-institutional coordination** and ensure that REUT projects meet user **demand** (demand-driven approach).

In conclusion, the **WATER REUSE 2050** plan is the roadmap to move Tunisia from water-stressed management to resilient management, making treated wastewater the country's main **new resource** by 2050.

C. The National Strategy for Ecological Transition (SNTE)

The SNTE is developed by the Ministry of Environment, with the support of UNDP, launched in 2022 and published in 2023. It is based on a participatory approach involving all actors and sectors, with a view to addressing anthropogenic and natural pressures threatening the living conditions and well-being of populations and ecosystems, which have become increasingly vulnerable. It is considered a policy orientation of the Government, it aims to anchor the concepts of environmental protection, sustainable development, adaptation and resilience to the effects of climate change in all sectors of economic and social development.

The SNTE aims to ensure the sustainability of natural capital, while improving the efficiency of resources in development activities, as presented in **its five axes broken down into 53 measures**, in interaction with each other and with existing or developing national strategies, plans and action programmes in all other sectors, as well as with the international instruments signed and ratified by Tunisia in the field of the environment, sustainable development and the fight against climate change, all of which are intended to be the subject of intervention programmes to be launched immediately, in harmony with the 2023-2025 Development Plan, the Tunisia 2035 Vision, the structural reform programme undertaken by the Government and all other sectoral strategies (energy, industry, transport, tourism, health, education, etc.).

THE SNTE'S VISION FOR 2023-2035-2050

The material and intangible well-being of current and future generations is ensured, within the framework of a just and inclusive economic and social development model, low in natural resources and energy, environmentally neutral, adapted to climate change and resilient to crises and disasters.

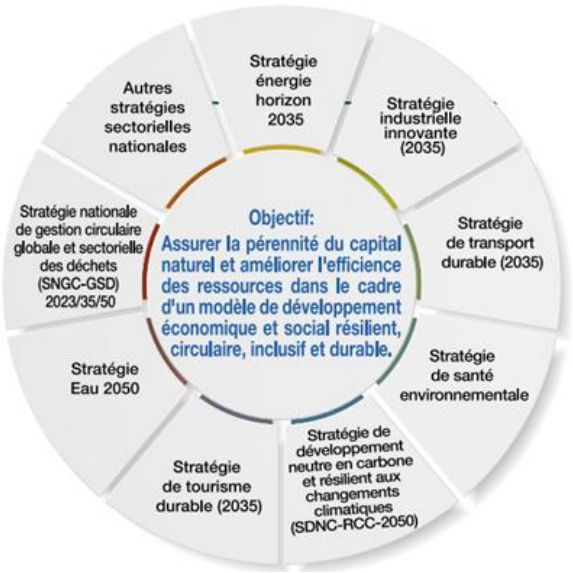

Figure 5: Interaction of the SNTE with other strategies
Source: SNTE summary document, Ministry of the Environment, 2023

The five axes of the SNTE are as follows:

- **Axis 1**. **Governance and Financing:** Establish systemic, intersectoral and territorial institutional governance and provide adapted and accessible financing systems.
- **Axis 2**. **Climate Change:** Strengthen the adaptive and resilience capacities of sectors, environments and populations to climate change and its effects and reduce carbon intensity to achieve neutrality by 2050, while minimizing disaster risks.
- **Axis 3. Sustainable Management of Resources and Ecosystems:** Ensuring the rational management of natural resources, preserving and restoring ecosystems (terrestrial and marine). In concrete terms, the implementation of this axis includes ten (10) measures, including:
    - **Action 20:** Initiate a water saving and loss reduction program, including but not limited to: optimization of irrigation systems, domestic and institutional storage of rainwater, reuse of treated wastewater
    - **Measure 21:** Development of non-conventional water resources, in particular treated wastewater for agricultural irrigation or in the industrial sector and development of related standards
    - **Measure 29:** Develop and implement an action plan for the sustainable development of traditional oases, inspired by the pilot project carried out in 2018/19 in six (6) oases, with the support of the World Bank (1 in Kebili, 1 in Gabes, 3 in Tozeur and 1 in Gafsa)
- **Axis 4 Sustainable Production and Consumption and Pollution Control:** Laying the foundations of the green, blue and circular economy within the framework of sustainable consumption and production patterns and eventually eradicating pollution hotspots, decontaminating and rehabilitating polluted sites.
- **Axis 5 Science, Knowledge and Culture at the service of the ecological transition:** Develop environmental culture, science, knowledge and the qualification of human resources in the fields of environmental protection, sustainable development and the fight against the effects of climate

change and disseminate these values to the various stakeholders.

A selection of measures was proposed for consideration by the working groups at the National Conference on Ecological Transition (NCET) on 26 June 2023, in order to prioritise actions and define a calendar of activities, except that this work plan has not been budgeted or at least, the budget has not been made public.

2.1.3. Development Plans, Action Plans

A. Action Plan for Integrated Water Resources Management (PAGIRE) (2023-2028)

PAGIRE TUNISIA 2023-2028 is a strategic document developed by the Ministry of Agriculture, Water Resources and Fisheries (MARHP) to strengthen the application of the Integrated Water Resources Management (IWRM) approach in Tunisia, led by the DGGREE.

Despite the adoption of IWRM, Tunisia reported in 2020 a score of **60%** for indicator 6.5.1 (relating to the degree of implementation of IWRM), marking a very slight improvement compared to 2017 (55%). Faced with these persistent limitations, the PAGIRE was developed through an inclusive consultative process (from June 2022 to March 2023) in order to frame and accelerate a more effective application of IWRM.

The plan aims to provide a framework to **advance coherence and synergy** in government action while reducing redundancy and dispersion of human and financial investments in the water sector.

The consultation process identified urgent challenges and formulated **13 priority actions (A1 to A13),** structured around the four pillars of IWRM: (i) Enabling environment; (ii) Institutions and participation; (iii) Management instruments; and (vi) Funding.

The 13 priority actions are:

- **Action 1:** Develop a monitoring and evaluation system with **gender-specific indicators** of water policies.
- **Action2:** Activate **proactive drought management** under various climate scenarios.
- **Action 3:** Operationalize the IWRM Technical Committee (CTGIRE).
- **Action 4: Analyze the social dynamics around water**.
- **Action 5:** Conduct a regular structured dialogue with users and citizens.
- **Action 6:** Strengthening the capacities of IWRM stakeholders
- **Action 7:** Establish a **coordination platform with Algeria** on shared water (groundwater and surface water).
- **Action 8:** Choose the aquifers most in demand for the **reinforcement and modernisation of the network for monitoring** the state of aquifers (piezometry and quality).
- **Action 9: Strengthen hydrogeological knowledge** of groundwater and groundwater monitoring and preservation methods.
- **Action 10:** Promote the implementation of **nature-based solutions** for water security.
- **Action 11: Create a fund** funded from pollution fines for actions to rehabilitate and decontaminate water bodies.
- **Action 12:** Develop an **Investment Programme for the Water Sector**.
- **Action 13:** Define the appropriate scale (centralised *versus* decentralised) and the (basin-

based) approach to water management (this action is proposed to be deferred until after the completion of actions A4, A5 and A6).

The total cost of PAGIRE is estimated at **31.8 million Tunisian Dinars (TND).**

Funding is mainly based on **international aid**, with a national contribution considered crucial to catalyze the search for funding.

The **IWRM Technical Committee (CTGIRE)** (whose operationalization is the subject of action A3) is designated to ensure the monitoring and evaluation of the implementation of the PAGIRE through annual meetings.

The main risk identified is **political instability** and frequent changes at the government level, which may delay the implementation of activities, particularly institutional ones.

B. National Development Plan (PDN)

Tunisia's National Development Plan (NDP) is led by the **Ministry of Economy and Planning (MEP),** which coordinates the development and monitoring of national strategies and major economic and social guidelines. This process, which traditionally takes place every five years, is based on **consultation** involving all government actors, the social partners (trade unions, employers) and civil society. The NDP is based on a **bottom-up approach** based on **the Regional Development Plans (RDP)** and **Local Development Plans (LDP),** with a view to further integrating territories and correcting disparities. The management of this regional version is often the responsibility of the **General Commission for Regional Development (CGDR),** under the aegis of the MEP, in collaboration with the governorates and municipalities. These territorial frameworks, which can take the form of **Master Plans for the Development of Economic Regions (MPDER),** are strongly supported by the requirement for **decentralization** enshrined in the current constitutional framework, in order to promote a participatory and balanced implementation of development. Currently, the **2026-2030 NDP** is being developed by the MEP and is expected to be published in **December 2025.**

The **NDP** currently underway is the **Three-Year Development Plan (2023-2025)** designed to respond to difficult economic challenges (global crises, macroeconomic balances) and accelerate the economic transition.

It was officially adopted at a Ministerial Council at the end of December 2022 and is presented as a **reference framework for government action** in the medium term, in line with **Tunisia's strategic vision for 2035** and the **National Structural Reform Program**.

The 2023-2025 Development Plan is based on several major axes, aimed at laying the foundations of a new development model:

- **Structural reforms:** It incorporates all the reforms planned by the government, in particular those aimed at **economic and financial stabilization** and the reduction of the budget deficit.
- **Regional Development:** One of the key objectives is to correct regional disparities with a new approach to the distribution of the regional development budget, often summed up by the slogan **"Make every region an economic capital".**

- **Investment and Business Climate:** The plan places a strong emphasis on improving the business climate and encouraging entrepreneurship and private investment, in particular through the liberalization of private initiative (revision of authorizations).

- **Sustainable Development:** It plans to accelerate the energy transition (renewable energies, green economy), secure **water resources** (through desalination and REUT), and accelerate the knowledge economy.

- **Social:** The plan aims to consolidate the social role of the state and to combat poverty (which affected about 20% of the population at the time of its preparation).

2.1.4. Legislative and regulatory framework

- **The Water Code (Law No. 75-16 of 31 March 1975**): **The preparation of** the draft new code was the subject of a participatory process over several years. It has been presented at several small ministerial councils. It was presented to the government at the beginning of 2023, with a revision of the text by the government's legal adviser before it was submitted to Parliament.

  The primary objective is to modernize the 1975 Water Code, which is currently reaching its regulatory limits and is no longer aligned with the country's evolving context, specifically the structural water stress and the intensifying impacts of climate change.

  The main reforms and innovations proposed by the bill are as follows:

  - **Governance reform** : The new code aims to streamline and strengthen water resources management by creating sectoral, national and regional structures dedicated to water management. One proposal mentions the creation of a "Supreme Water Council" attached to the presidency of the government, as well as an "Agency for the Protection of Public Water".
  - **Protection of the public water domain** : The text provides for reinforced measures to protect public water assets, including a significant increase in fines for violations.
  - **Integrated and sustainable management** : The project aims to establish mechanisms for a more integrated and sustainable management of water resources, integrating modern concepts such as the water footprint and long-term planning (e.g. a water management plan for 2050 is mentioned).
  - **Water consumption and saving** : The project promotes the rationalization of water consumption in all sectors and the recovery of treated water. It emphasizes the need to reduce waste.
  - **Right to water** : It guarantees the right to drinking water, in accordance with the Constitution, while establishing social pricing for water.
  - **Climate change adaptation** : The bill aims to better manage extreme events such as droughts and floods.

Figure 6: Main reforms of the new Water Code

The **Water Code** is the fundamental text. Numerous laws, decrees, and orders complement it to cover the operational, institutional, and financial aspects of the water sector in Tunisia. In addition to the texts for the creation and organization of public institutions, 03 decrees are important to know:

- **Decree No. 79-768** of 13 September 1979, laying down the conditions and procedures for the discharge of waste water into the receiving environment:

  It specifies the specific technical conditions and procedures that entities must comply with before proceeding with the discharge of effluent.

- **Decree No. 89-1047** of 25 July 1989, laying down the conditions for the use of treated wastewater in the agricultural sector:

  This text regulates the use of water that has undergone a purification treatment with a view to its reuse in agriculture.
  It sets out the quality criteria that this water must achieve and the conditions under which it can be safely applied to agricultural crops.

- **Government Decree No. 2017-157** of 25 January 2017, setting the quality standards for water intended for human consumption, the conditions and procedures for their control.

  This decree defines all the quality standards that water must meet in order to be considered fit for human consumption.
  It also details the framework (conditions and modalities) by which this drinking water must be regularly monitored and controlled in order to guarantee its sanitary compliance.

2.2. Review of Policies, Strategies, Plans and Programmes at the Regional Level (Governorate of Gabes)

Action at the level of the governorate of Gabès is framed by the **Regional Development Plan (RDP) 2023-2025,** which aims to transform the region into a **competitive economic hub**. This RDP focuses on economic diversification to reduce historical dependence on the polluting chemical industrial complex, while capitalizing on its unique strengths.

2.2.1. Sectoral policies

Regional sectoral policies in Gabès are mainly aimed at making a **transition from a heavy industrial model to a sustainable and diversified model**.

The regional orientations and policies of the key sectors in Gabès can be summarized as follows:

- **Sustainable Industry and Green Chemistry: De-pollution and Modernization:** Responding to environmental and social concerns related to the existing chemical complex (Ghannouch). The policy is to promote **sustainable industry** and **green chemistry** (in line with the National Green Hydrogen Strategy), while modernizing industrial zones and creating new areas with low environmental impact in inland delegations (e.g. New Matmata, El-Fjij).

- **Agriculture and Oasis: Enhancement of the oasis and food security:** Implementing the **Integrated Agricultural Development Plan (PDAI) of Gabes**. The emphasis is on the region's unique three-storey agriculture (palm grove/arboriculture/vegetable crops), the saving of irrigation water, and the protection of the oasis system against the advance of urbanization and pollution.

- **Tourism and Ecotourism: Ecological Diversification:** Developing new niches to move away from classic seaside tourism. The policy is focused on **ecotourism** (enhancement of the oasis, sebkhas and desert landscapes) and **agri-tourism**. Initiatives such as the "Marina Gabès" project aim to transform the coastal area into a nautical and seaside destination (if validated).

- **Infrastructure and Connectivity: Service Hub for the South:** Strengthening Gabès as a **pivotal link** in the Southern region. This involves the development and rehabilitation of transport infrastructure (land, rail, sea and air), and the development of logistics zones (such as in Bouchama and Métouia) and a strategic **economic corridor** to southern Algeria.

- **Research and Innovation: Support for the Technological Cluster:** Strengthen the role of the **Gabès Industrial and Technological Cluster** in scientific research, technological innovation and support for the creation of companies (SMEs, start-ups).

2.2.2. Specific programs and local projects

Specific programs and projects are the concrete implementation of sectoral policies, often financed by the envelope allocated to the public sector in the RDP (the 2023-2025 RDP allocated more than 2.2 billion dinars to the public sector).

Examples of projects by program category:

- **Major Infrastructure Projects:**

  - **University Hospital** and **Faculty of Medicine** project to strengthen the social offer and R&D.
  - Construction of **modern fishing ports** (e.g. in Zarat and Ghannouch) to stimulate maritime activity.
  - Rehabilitation and development of the **Commercial Port of Gabès** (in connection with the southern logistics exchanges).

- **Social and Local Development:**

  - **Economic Integration Programs:** Specific programs aimed at the financial inclusion of women promoters and vulnerable families (e.g. national **"Ra'idet"** programs and family integration programs).
  - **Micro-projects and handicrafts:** Support for small trades and local crafts, often within the framework of the National Fund for the Promotion of Handicrafts (FONAPRAM).

- **Sectoral projects (agriculture & environment):**

  - **Integrated Agricultural Development Projects (IADPs):** Programs financed by donors (e.g. AfDB) for improved irrigation, watershed management and farm modernization.
  - **Water Management (REUT):** Local projects for water saving, irrigation and reuse of treated wastewater (REUT) are essential in Gabès for the sustainability of its oasis agriculture.

- **Industrial/Urban Development:**

  - **Development of new industrial zones:** In particular the industrial zone programmed in **El-Fjij** (delegation of El Hamma) and the industrial zone of **New Matmata** to attract processing and low-impact industries.
  - **Eco-tourism projects:** Development of an ecotourism zone in **Gabes-south** and rehabilitation projects for natural sites (El Khbeyet spa resort in Hamma-west).

All of these policies and programs reflect the regional desire (supervised by the CGDR and the MEP) for a **structural transformation** of Gabès towards **a more diversified, resilient and socially inclusive region.**

The overall implementation rate of an RDP is almost always **lower than the initial forecast**, due to public debt constraints, administrative delays and financing difficulties.

Competitiveness and regional development analyses (such as those of the Tunisian Institute of Competitiveness and Quantitative Studies (ITCEQ)) often indicate a **deterioration in the score** (the Regional Development Index (RDI)) for the governorate of Gabes or a recent near stagnation (in 2024, compared to 2021).

This deterioration is sometimes attributed to the difficulty of improving the overall socio-economic environment and to the increasing pressure on employment.

The implementation is very **heterogeneous** depending on the type of project:

Table 2: Progress status of RDP projects for 2023–2025

Sector / Program	Estimated Completion Status (Examples)	Comment / Constraint
Major social infrastructure projects (education/health)	**Progress noted.** * **University Hospital:** Rehabilitation work has often been delayed (launched in 2013, suspended in 2019, restarted). Recent figures show progress ranging from **20% to 85%** depending on the lot and the sources, which indicates an active but very long project. * **University Institutes:** Various rates of advancement (e.g.: Institut Supérieur d'Informatique at **80%,** Institut des Eaux at **22%).**	These projects are essential and progressing, but historic lead times are indicative of administrative complexity and budgetary allocation constraints."
Industrial development projects	**Launch/Development Phase.** * **Industrial Zones:** The development of new zones (e.g. Nouvelle-Matmata) is generally adopted (by agreement with the Gabès Technology Cluster), but the development works are often in the initial phase or face land delays.	The need for specialized industrial zones is essential to support the diversification of the private sector and move towards high-value-added industries
Agricultural Projects (PDAI / Water)	**Sectoral achievement pursued.** * Specific programmes (such as PDAI **- Phase II)** are continuing to be implemented, often with the support of international donors (AfDB, AFD). * Water policy (saving irrigation water, REUT) is a **priority** but its implementation is gradual.	These projects are technically demanding and heavily dependent on external funding. Final evaluation studies are launched, indicating the end of a phase of programmes.
Business & Social Climate	**Difficulty of Measurement.** * Social programmes (such as "Ra'idet" or family integration) have implementation rates in terms of the **number of credits allocated** (often good), the socio-economic impact on structural indicators (poverty, unemployment) requires a longer observation period to reach full maturity."	The IDR scores show that the impact on employment and the average size of companies remains low.
NAWARA Gas Project (Completed but with impact)	**Operational.** The final gas processing part at Ghannouch-Gabès is operational and plays a role in the gas supply.	Although it is a major completed project, it is an indicator of the heavy industrial activity maintained in the region.

The Gabes Regional Development Plan 2023-2025 is a **framework of intentions** strongly focused on diversification and sustainability. **Concrete progress** on social (hospitals, universities) and agricultural structuring projects is being made, but often with delays inherited from previous plans. **Challenges persist** in the implementation of the industrial diversification policy in the hinterland and the rapid improvement of the business climate.

The level of implementation is **moderate and accelerating**, but national budgetary constraints and administrative burdens continue to slow down the implementation of the plan.

2.3. Summary of Environmental and Social Impact Assessments (ESIA)

2.3.1. Environmental Assessment Regulatory Framework

In Tunisia, the Environmental and Social Impact Assessment (ESIA) is governed mainly by Decree No. 2005-1991 of 11 July 2005, relating to the environmental impact assessment and setting the categories of units subject to the environmental impact assessment and the categories of units subject to specifications. This procedure aims to identify, assess and mitigate the potential negative consequences of a development project (industrial, agricultural, infrastructural) on the physical, biological and social environment.

The National Agency for Environmental Protection (ANPE) is the authority responsible for reviewing and approving these studies.

2.3.2. Environmental and Social Impacts of Industrial Activity in Gabes

The industrial activity of the Tunisian Chemical Group (TCG), concentrated in the Ghannouch area of Gabes, represent a significant point of environmental and social focus in the region, Gabès is identified as a critical environmental monitoring area, requiring targeted mitigation strategies.

Successive ESIAs have identified the major impact as the discharge of phosphogypsum (the by-product of phosphoric acid production) directly into the Gulf of Gabes. This has led to the near-total destruction of marine ecosystems, the disappearance of Posidonia meadows and contamination of sediments.

On the social level, the impact is associated with public health concerns, odor nuisance, and pressure on water resources. This creates persistent social sensitivities among local communities (such as fishermen and farmers), leading to increased advocacy for stricter environmental regulations or the modernization and strategic relocation of specific industrial units

The interaction between industrial activity and the water sector is characterized by significant environmental pressures:

- **Marine Ecosystem Alteration**: The continuous discharge of phosphogypsum (hydrated calcium sulphate) has been extensively documented in ESIAs. These studies highlight the physico-chemical modification of the water column and marine sediments. This process impacts critical coastal habitats, such as Posidonia meadows and spawning grounds, while contributing to the concentration of trace elements (heavy metals, fluorides, and radionuclides) within the Gulf's ecosystem.
- **Aquifer Quality Sensitivity**: ESIAs have also identified challenges related to the leaching of storage sites and non-compliant solid by-products. Rainwater interaction with these materials can lead to the percolation of acidic mineralized solutions into the superficial and deeper aquifers of Gabès. This phenomenon affects the chemical profile of groundwater used for oasis agriculture and local water supply, necessitating rigorous monitoring and protective measures.

The Gulf of Gabes Depollution Program (GGDP) is the major reference. This program is the culmination of comprehensive and detailed ESIAs, often carried out with the support of the European Union (EU) (in particular via FEMIP/EIB studies) and financial institutions such as the World Bank or the AfDB. These

assessments provide the technical and financial framework for the flagship initiative aimed at **ending marine discharges** and implementing the **segregation of industrial effluents** from the GCT. The GGDP sets the standards for future solid waste management and industrial wastewater treatment.

2.3.3. Environmental and Social Impacts of Water Infrastructure in Gabes

Hydraulic infrastructures are particularly concerned and classified according to their scale of impact:

- **Annex I (Category A and B):** Large-scale projects, such as large dams, seawater desalination plants and large areas irrigated by non-conventional water, require a comprehensive ESIA, incorporating a detailed Environmental and Social Management Plan (ESMP).
- **Appendix II**: Projects with a more moderate impact, often linked to network extension works or small hill lakes, are subject to a simple Environmental Specification.

The Major Water Infrastructure Projects in Gabes are:

1. **Zarrat Desalination Plant**: The ESIA is specifically assessing the consequences of brine discharge into the marine environment. It requires technical solutions to dilute and disperse brine (e.g. via offshore diffusers) in order to protect sensitive coastal ecosystems, such as Posidonia meadows.
2. **Modernization of the Gabès wastewater treatment plant (A-WWTP):** The project to set up an Advanced Wastewater Treatment Plant (A-WWTP) at the local wastewater treatment plant is part of the municipal wastewater management of the Gabes Region, including the cities of Gabes, Ghannouche and Chenini-Nahal. It aims to modernize and optimize the wastewater treatment system and raise the quality of the discharged water, thereby reducing pressure on the water table and the oasis by integrating advanced treatment technologies. The ESIA, in this particularly sensitive context due to the historical industrial environmental footprints of the region, evaluated the effectiveness of the new treatment in removing emerging pollutants and ensuring safety for agricultural reuse, while taking into account social acceptance.
3. **Rehabilitation of the El Hamma WWTP**: The rehabilitation works consist of the replacement or rehabilitation of electromechanical and hydromechanical equipment and civil engineering works to ensure the fixing of the equipment as well as the development of a pit equipped for faecal materials. The wastewater drained by the sewerage network of the city of El Hamma is conveyed to the existing wastewater treatment plant located in the northwest of the city by a transfer collector with a total length of 2,400 linear meters (ml).

In addition to the concessionaire's contractual mitigation measures, the ESMP provides for the implementation of additional mitigation measures to eliminate, reduce and offset adverse impacts to acceptable levels. This covers raw wastewater and waste water management, waste management, safety and health protection measures as well as social pressure mitigation measures.

Integrated Agricultural Development Projects (PDAI I and II):

Implemented by the CRDA, with technical and financial support from the AfDB, these projects have also developed ESIAs that often focus on the impact of irrigation techniques on the state of aquifers (overexploitation) and the management of saline soils, ensuring the sustainability of water resource use in a context of aridity.

2.3.4. Donor guarantee

For major projects financed by international institutions (World Bank, AfDB, JICA, etc.), the compliance of the ESIA with the Environmental and Social Safeguard Standards of these donors (often more demanding than the national framework) is a *sine qua non* condition for the granting of funds.

In conclusion, ESIA in Tunisia is regulated, has a control, approval and monitoring body (ANPE). All industrial, water or other projects are required to submit and obtain approval for ESIA and ESMP, and to ensure that mitigation measures are in place throughout the project.

CHAPTER III

STAKEHOLDER MAPPING

CHAPTER III: STAKEHOLDER MAPPING

3.1. National institutional actors

At the national level, 05 ministries are involved in the water sector:

- Ministry of Agriculture, Water Resources and Fisheries (MARHP)
- Ministry of the Environment (MOE)
- Ministry of Economy and Planning (MEP)
- Ministry of Equipment and Housing (MEHAT)
- Ministry of Health (MOH)

At the level of these ministries, directorates (departments) intervene in the sector, with regional representation in the 24 governorates depending on the structures

3.1.1. Ministry of Agriculture, Water Resources and Fisheries (MARHP)

Management – Mobilization – Distribution

The MARHP is the key institution and central authority of the water sector, whose attributions, governed by Decree 2001-420, focus on quantitative management and resource mobilization. Its essential missions can be summarized in three major areas:

- **Strategic Planning and Regulation:** The Department is responsible for developing development plans for the control, optimal use and conservation of water resources. It also defines the regulatory framework necessary for the promotion of the agricultural sector and the management of water resources, including the development of non-conventional waters.
- **Mobilization and Infrastructure:** The MARHP ensures the realization of major hydraulic works and infrastructure related to agricultural water (dams, conveyances, irrigation networks). He is in charge of monitoring, maintaining and modernizing this equipment to guarantee distribution and meet the country's needs.
- **Management of the Public Hydraulic Domain:** It is the guardian of the State's Public Hydraulic Domain (DPH), ensuring its preservation, the development of natural watersheds and the conservation of water and soil (CES), essential functions to maintain the sustainability of upstream resources.

The Ministry of Agriculture is organized into Directorates-General at the central (national) level. In addition to the administrative directorates, technical directorates are responsible for sectors related to agriculture. In addition to the Ministry's central directorates, other institutions are subject to its supervision, including agencies, offices and public enterprises.

Within the Ministry of Agriculture, 03 Technical Directorates are dedicated to the water sector, in addition to an office within the Cabinet of the Minister in charge of coordination and the Key Public Company in charge of water distribution (SONEDE).

❖ **The Office of Planning and Hydraulic Balances (BPEH):**

is a directorate at the level of the Cabinet of the Minister of Agriculture. In coordination with stakeholders in the hydraulic sector, whose missions are to:

The BPEH is responsible for coordinating with stakeholders in the water sector, regularly organizes consultation and planning meetings, and publishes the National Water Report annually.

- Plan the mobilization of conventional water resources and the development of non-conventional water resources with a view to satisfying, in the medium and long term, the growing needs of the various water-consuming sectors.
- To plan the annual allocation of water resources to the various users in order to develop these resources.
- Ensure permanent monitoring of the deployment of the hydraulic sector, particularly in exceptional situations, which essentially consist of periods of flooding or drought or during potential operational disruptions in water production and distribution facilities.
- To ensure coordination between the establishments producing and distributing water resources in the hydraulic field.

❖ **The Directorate General of Water Resources (DGRE):** is a central technical department of the Ministry of Agriculture, in charge of the strategic management, planning and water balance of the country. Its missions are to:

- To set up and manage measurement and observation networks concerning the various components of the country's water resources,
- To develop basic and applied studies aimed at the evaluation and establishment of general balances of water resources,
- To develop principles and methodologies for the management and use of water resources in accordance with supply and demand;
- To promote research and experimentation activities concerning conventional and non-conventional water resources with a view to ensuring their development,
- To develop the basis for plans for the mobilization of water resources and their exploitation.

❖ **The General Directorate of Rural Engineering and Water Exploitation (DGGREE):** is a central technical department of the Ministry of Agriculture, whose missions are to:

- To carry out strategic studies, formulate policies and develop plans relating to the agricultural agricultural agricultural engineering and water sector;
- Monitor and evaluate projects for the development of irrigated perimeters and agricultural sanitation, and water exploitation and irrigation programs and maintenance of hydraulic structures and equipment and design the most appropriate technical and economic methods in these areas,
- Rationalize the use of water, enhance non-conventional water in agriculture, monitor institutional aspects for the promotion of collective interest groups and study and implement water demand management instruments in the agricultural sector,
- Coordinate drinking water programmes in urban and rural areas, develop programmes for the supply of drinking water to rural areas, monitor and evaluate related projects,
- To coordinate rural infrastructure programmes and to study the technological and economic aspects of agricultural machinery with a view to encouraging mechanization in the agricultural sector.

❖ **The General Directorate of Dams and Major Hydraulic Works (DG/BGTH):**[5] is a central technical department of the Ministry of Agriculture, whose missions are to:

- Draw up hydraulic studies,
- To develop surface water control studies,
- Developing water mobilization studies
- To develop studies for large hydraulic structures for the mobilization of surface water (large dams, water transfer structures, hill dams),

[5] DG/BGTH was not one of the national institutions interviewed during the survey on this inventory, as Tunisia's large dams are mainly located in the **north** (more than 90% of water supplies)

- To draw up studies for major hydraulic developments,
- To build large dams, hill dams and large hydraulic developments,
- Control and ensure the maintenance of large dams,
- Carry out works to protect rural and agricultural areas from wadi floods.

At the regional level, the Technical Directorates of the Ministry of Agriculture are represented by Districts within the CRDAs.

In addition to the technical departments dedicated to the water sector, other departments have an important role, including:

- **The National Observatory of Agriculture (ONAGRI):** is a central administration within the Ministry of Agriculture, Created by Decree No. 99-309 of 1 February 1999,
  - Establish a reliable information system to analyse the situation of the agriculture and fisheries sector at the national and international levels through relevant, reliable and periodic indicators.
  - Collect, analyze, and process national and international information and data related to the agriculture and fisheries sector.
  - Disseminate the information and data collected and make them available to the various stakeholders such as decision-makers, planners, researchers, producers, exporters and others...

ONAGRI collaborate with the Central Technical Directorates and the CRDAs to collect and disseminate information related to the agriculture sector

- **The National Company for the Exploitation and Distribution of Water (SONEDE):** is a public institution created by Law 68-22 of 2 July 1968 and considered as a public company according to Decree 2004-2265 of 27 September 2004. SONEDE is under the supervision of the Ministry of Agriculture, Water Resources and Fisheries, which ensures the production and distribution of drinking water in urban and semi-urban areas. It is the country **'s leading provider of water services**. Its missions are to:
  - Study and construction of catchment facilities
  - Technical network management
  - Drinking water treatment and production
  - Commercial management of subscribers (Distributing water at the urban level)
  - Managing major rehabilitation and desalination projects

SONEDE has 40 districts that cover the entire Tunisian territory.

SONEDE buys water from SECADENORD to distribute it to Greater Tunis, Cap Bon, the Sahel and Sfax North. The south is fed by brackish water and boreholes.

- **The Northern Water Exploitation Canals and Conduits Company (SECADENORD):**[6] was created by Law No. 26 of 11 May 1984. It is a public company also under the supervision of the Ministry of Agriculture. Its mission is to manage, operate, undertake and maintain the canal and the pipes intended to transport water from the Sidi Salem and Ashkel dams and the Far North dams to the places of their intended use, according to the developments under its control.

- **Educational and research institutions:** Agricultural educational institutions are placed under the supervision of 02 Ministries: Agriculture and Higher Education. Higher education and scientific research in Tunisia is structured and coordinated by the Institution of Agricultural Research and Higher Education (IRESA), an umbrella entity that oversees the main educational

[6] SECADENORD was not one of the national institutions surveyed during the preparation of this report, as it does not intervene directly in southern Tunisia.

institutions and specialized research centers. Among these, the National Agronomic Institute of Tunisia (INAT) is the flagship institution for the training of agricultural engineers and experts in resource management, while the National Institute for Research in Rural Engineering, Water and Forests (INRGREF) is positioned as the center of excellence in applied research, directly intervening in water management, irrigation techniques, and adaptation to climate challenges ensuring the essential connection between academic knowledge and the **resolution of hydraulic** and water management challenges in Tunisia.

- **National Agronomic Institute of Tunisia (INAT):**

INAT is the oldest engineering school in Tunisia and Africa, created on October 17, 1898, its current name dates back to 1970 following its detachment from the University of Carthage.

- The "Rural Engineering, Water and Forests" (GREF) department, also called "La maison de l'Eau" is dedicated to the training of INAT agricultural engineers in the specialties of Hydraulics and Rural Development (HAR), Sanitary Engineering (GS), Drilling (FO) and Forests and Land Management (FAT).
- The main specialties covered by the GREF department are Hydraulics, irrigation, drinking water, calculation of hydraulic networks and structures, hydrology, hydrogeology, geology, agricultural machinery, water quality, sanitation, dam calculation, soil mechanics, Life Cycle Assessment (LCA), water quality, drilling, forestry, remote sensing, GIS, spatial analysis and modelling, integrated water resources management modelling and multi-objective optimisation. All these specialties make it possible to develop tools to help manage and develop resources and watersheds and a solid basis for the governance of water resources and forest management.
- The theoretical and practical training infrastructure consists of classrooms, hydraulics and analysis laboratories, computer rooms, mechanical workshops and an educational farm.

- **National Institute for Research in Rural Engineering, Water and Forests (INRGREF):**

The INRGEF is a public research institution created in 1996 (resulting from the merger of two research establishments, including the National Institute of Forestry Research created in 1957).

- It contributes to the national research policy in the field of forests, water and land management.
- It is also responsible for the organization and implementation of research activities in these fields and contributes to the supervision of master's and doctoral students in research programs.
- Its missions are carried out in research projects covering several fields, including forest ecology, forest genetics, forest physiology and biotechnology, forest and pasture management, forest economics and forest fires etc.
- It also participates in the protection, conservation and rationalization of the exploitation of natural resources and the sustainable management of rural areas.
- The research themes concern in particular the control, saving and development of the use of water for crop irrigation, the problems of soil salinity, wastewater, agricultural machinery, Water and Soil Conservation, reforestation, the improvement of wood and pastoral production, the conservation of natural resources, the exploitation and management of forests and rangelands, and new and renewable energies.
- The missions of the research laboratory "Marginal water use, management of irrigation systems and hydro-agricultural developments" are the rational use of irrigation water, the development of water of different qualities and the study of hydro-agricultural developments.
- In terms of the use of treated wastewater and waste sludge, the research work of this laboratory is based on the following axes:
    - To study the possibilities of improving the quality of treated wastewater.
    - Optimize the use of treated wastewater and waste sludge in agriculture.

- To study the environmental and health impacts of water and sludge use on the water-soil-plant system.

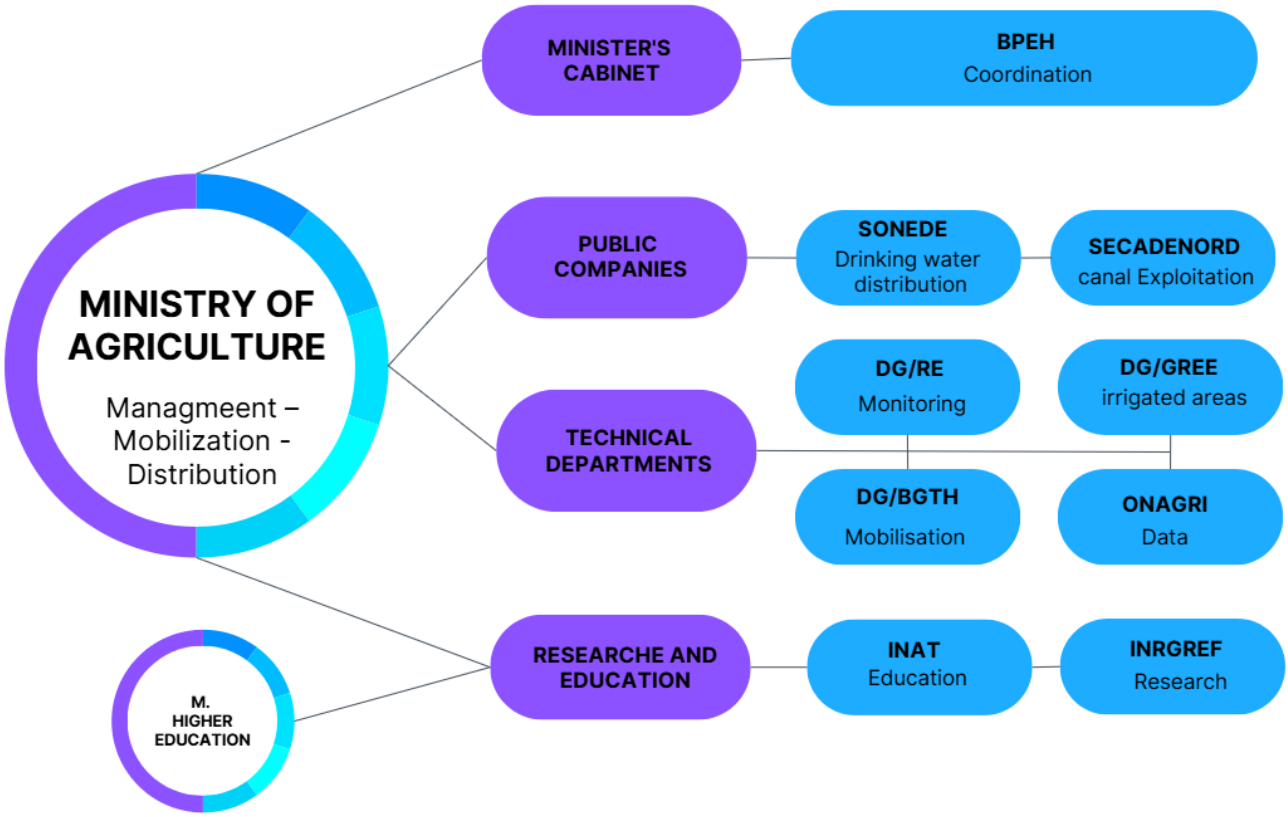

Figure 7: Agricultural Institutions Involved in the Water Sector in Tunisia

3.1.2. Ministry of the Environment (MOE)

Water quality - pollution prevention - waste water management - ESIA.

The Ministry of Environment plays an essential monitoring and regulatory role to ensure the sustainability and quality of water resources in Tunisia. Its action complements that of the Ministry of Water Resources by focusing on the protection of aquatic environments, pollution prevention and ecological management. These missions of global protection and sustainable management of the natural environment are carried out by a set of specialized organizations:

❖ The **National Office of Sanitation (ONAS)**

ONAS is a public company, created under Law No. 73-74 of 03/08/1974. It is the main operator in charge of the collection, treatment of wastewater and rainwater evacuation in urban areas. It is responsible for **sanitation and the fight against water pollution**. Its missions are:

- Combating sources of water pollution;
- The management, operation, maintenance, renewal and construction of any work intended for the sanitation of cities;
- The promotion of the distribution sector and the sale of treated water and sludge from wastewater treatment plants;
- The planning and implementation of sanitation projects;

- The development and implementation of integrated wastewater treatment and stormwater disposal projects

ONAS also has a major role in the valorization and reuse of purified water, for use in irrigation, particularly in arid or semi-arid regions.

❖ The National Agency for Environmental Protection (ANPE)

The ANPE was created by virtue of Law No. 88-91 of 2 August 1988, and is the central authority responsible for the examination and approval of Environmental and Social Impact Assessments (ESIAs). It ensures that environmental and social concerns are integrated from the design phase of a programme.

Its main mission in the water sector is to prevent the pollution of water resources (surface water, groundwater and maritime water) by monitoring the environmental compliance of industrial and non-industrial establishments.

The ANPE is responsible for issuing environmental operating permits, carrying out inspections and taking enforcement measures to ensure that liquid discharges comply with national and international standards, thus directly contributing to the preservation of water quality.

At the regional level, the ANPE is organized around eight (8) regional directorates that cover several governorates. Gabès is attached to the South-East Regional Directorate, whose headquarters are in Sfax.

❖ The International Center for Environmental Technologies in Tunis (CITET)

CITET is a non-administrative public institution (EPNA), under the supervision of the Ministry of the Environment. Created in 1996, under Law No. 96-25 of 25/03/1996, in response to the international recommendations of the RIO Summit (1992) for capacity building in developing countries and support for the transfer of environmentally sound technologies, CITET is thus committed to developing Tunisian skills to ensure an environmentally sound technology transfer that is well adapted to the local context. national and international. Its missions are:

- Acquire, adapt and develop new techniques;
- Promoting environmental technologies and their production;
- Strengthen national capacities and develop environmental scientific and technical knowledge appropriate to specific national and regional needs.

For the water sector, CITET focuses on technological innovation, particularly in the areas of water treatment, purification, pollutant analysis and waste recovery. It plays a key role in transferring know-how, providing specialized training and technical assistance to companies and public bodies for the adoption of greener and more efficient solutions for sustainable water management.

❖ The Agency for the Protection and Development of the Coastline (APAL)

APAL manages and protects the Tunisian coastal and maritime space. Although its main field of action is the littoral zone, its role is intrinsically linked to water quality, since the marine environment and coastal wetlands are often the final receptacles of runoff and effluents. APAL works on sustainable coastal development, erosion control and marine pollution monitoring, which is crucial to maintaining the integrity of adjacent water ecosystems and the quality of coastal waters.

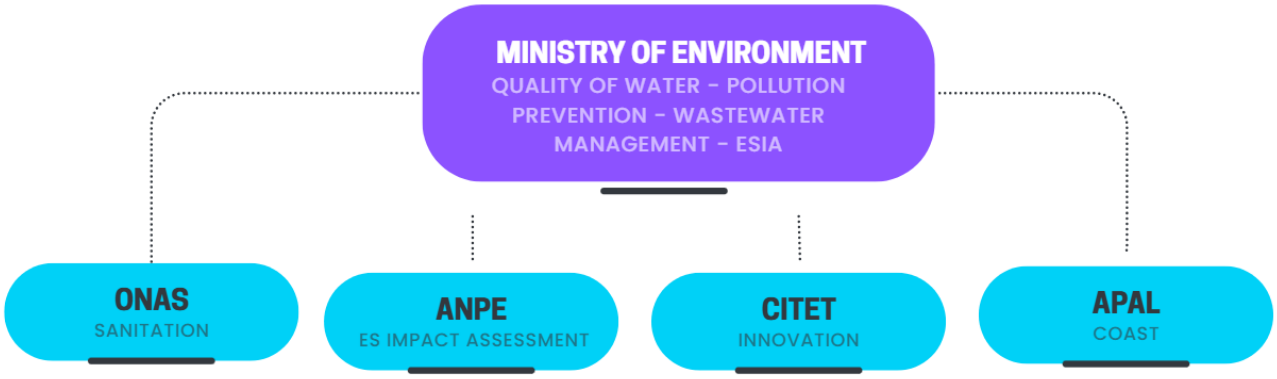

Figure 8: Environmental Institutions Involved in the Water Sector in Tunisia

3.1.3. Ministry of Economy and Planning (MEP)

Planning – Financing – Partnerships

The Ministry of Economy and Planning is the central body responsible for macroeconomic planning and financing of major infrastructure projects in Tunisia. Its name has often evolved over the course of government reorganizations (previously MDICI, MDCI, etc.), but its functions remain essential: it is the strategic link between the needs of the water sector and national and international sources of financing.

Historically, development and planning functions have been framed since the creation of the first development plans. The role of the MEP is to complement the technical expertise of the Ministry of Agriculture (MARHP) by ensuring the financial envelope and strategic coherence.

❖ **Organization of the Department**

Government Decree **No. 2016-1164 of August 10, 2016**, on the organization of the Ministry of Development, Investment and International Cooperation, as amended and supplemented by Decree **No. 2019-938 of October 16, 2019,** is **the reference text** for the current organization of the Ministry of Economy and Planning, which repealed all previous texts, in particular Decree No. 96-271 of February 14, 1996, on the organization of the Ministry of Economic Development and Decree No. 97-388 of 14 February 1997 on the organization of the Ministry of International Cooperation and Foreign Investment. Presidential **Decree No. 2021-249 of December 23, 2021** restored the current name of the MEP.

The MEP is organized into General Committees, which are organized into General Directorates and Offices. It includes 04 General Committees:

- The General Committee for Global Balances and Statistics,
- The General Committee for Sectoral and Regional Development,
- The General Committee for International Cooperation,
- The General Investment Supervision Committee

This particular organization of the Ministry is linked to its sovereign character and the high decision-making level, in order to guarantee transversality, arbitration and prioritization of investments according

to the national economic strategy. Its key missions indirectly but crucially concerning the water sector are:

- **Planning and Strategy:** Preparation of comprehensive development strategies (such as Five-Year Plans) that include priority programs, including major water projects (dams, desalination plants, water transfers).
- **Project Financing:** Monitoring, evaluation and validation of major investment projects. The Department participates in budget processes to ensure that the necessary funds are allocated for water infrastructure.
- **International Cooperation:** Negotiation and management of international cooperation agreements and loans to multilateral financial institutions (World Bank, AfDB, etc.), which are the main donors for the modernization and extension of water sector infrastructure.

❖ **The Directorate General of Infrastructure (DGI)**

The DGI is the key structure of the Ministry of Economy and Planning for the development of infrastructure development prospects and the evaluation of major projects. It reports to the General Committee for Sectoral and Regional Development. His main role is:

- **Technical and Economic Assessment:** The DGI conducts the in-depth technical and economic review and evaluation of major infrastructure projects proposed by sectoral ministries (such as water, transport, energy).
- **Validation and Arbitration:** It evaluates the feasibility, social and economic profitability of investments (including large dams, desalination plants or transfer networks) and arbitrates their inclusion in the State budget and the Development Plan.
- **Coordination:** It ensures interministerial coordination to ensure the proper execution and financial monitoring of these strategic investments.

❖ **Regional representation:**

The MEP is represented at the regional level by two structures whose mission is to supervise and support:

- The General Commissions for Regional Development (CGDR), also known as Regional Development Commissions (CRDs) at the level of 11 coastal governorates,
- There are 03 Development Offices: the South (ODS), the North-West (ODNO), and the Centre-West (ODCO).

3.1.4. Ministry of Equipment and Housing (MEHAT)

Spatial planning - Urban hydraulics

The current organization of the Ministry is defined by **Decree No. 1413 of 22/07/1988** on the organization of the Ministry of Equipment and Housing. It is responsible for national policy in the areas of:

- **Equipment:** road infrastructure, ports, airports (in part), civil buildings, etc.
- **Housing:** promotion of social housing, building regulations.
- **Land use planning and urban planning:** Defining national and regional master plans and establishing land occupation regulations.

- **Public works :** physical, large-scale construction
- **Urban hydraulics** : in particular flood protection.

❖ **Urban Hydraulics Department (DHU):**

The DHU's main role is to **protect cities against flooding**. It is responsible for:

- Medium- and short-term planning of studies and **implementation of flood protection works for cities**.
- The **control and follow-up of studies** (diagnostics, master plans) for the protection of cities against flooding.
- The **control and monitoring of** works to protect cities against flooding.
- The **maintenance of urban flood protection structures** (canals, dikes, retention basins, etc.).
- The issuance of **technical opinions** concerning development and urban development plans in the flood prevention sector.

The DHU is the key technical structure within the MEHAT to **anticipate, design, implement and maintain** the necessary measures to secure Tunisian urban areas in the face of flood risks.

3.1.5. Ministry of Health (MOH)

Water Health Monitoring

The organization of the Ministry of Health is mainly governed by **Decree No. 81-793 of 9 June 1981** and its subsequent amendments. The central role of the Ministry in the water sector is to ensure **public health**. This translates into the mission of **sanitary surveillance** of all water intended for human consumption and water used in sensitive environments. It is the competent authority to define **drinking water standards** and ensure that they are respected, in particular through regular monitoring of the quality of the water supplied by the national operator, SONEDE.

❖ **The Directorate of Environmental Health and Environmental Protection (DHMPE)**

The **DHMPE** is the key operational structure for hygiene and environmental risk prevention. Its water-related missions are:

- Sanitary control and **regular monitoring of the drinking water** distributed throughout the territory (tap water).
- Management of public hygiene problems and **vector control** (related to stagnant water and waterborne diseases).
- Monitoring of the quality of bathing water and health authorisations.

Although some of its responsibilities have been divided, the DHMPE retains the fundamental mission of controlling water in the public network and general environmental health.

❖ **The National Authority for Food Safety (INSSPA)**

INSSPA is a public institution with financial and moral autonomy created by **Law No. 2019-25 of February 26, 2019**, whose main mission is to ensure the **safety of foodstuffs and animal feed**.

INSSPA has taken over the control of water quality when it is considered a food product or is a risk factor in the food chain:

- **Control of Packaged Water:** It is the authority responsible for the health safety, transport and storage of **bottled water** (mineral water, spring water), considered as food products.
- **Reused water (REUT):** The INSSPA is also involved in the quality control of **treated wastewater (REUT)** when it is intended for **agricultural use**, in order to prevent the contamination of crops and, by extension, the contamination of the food chain.

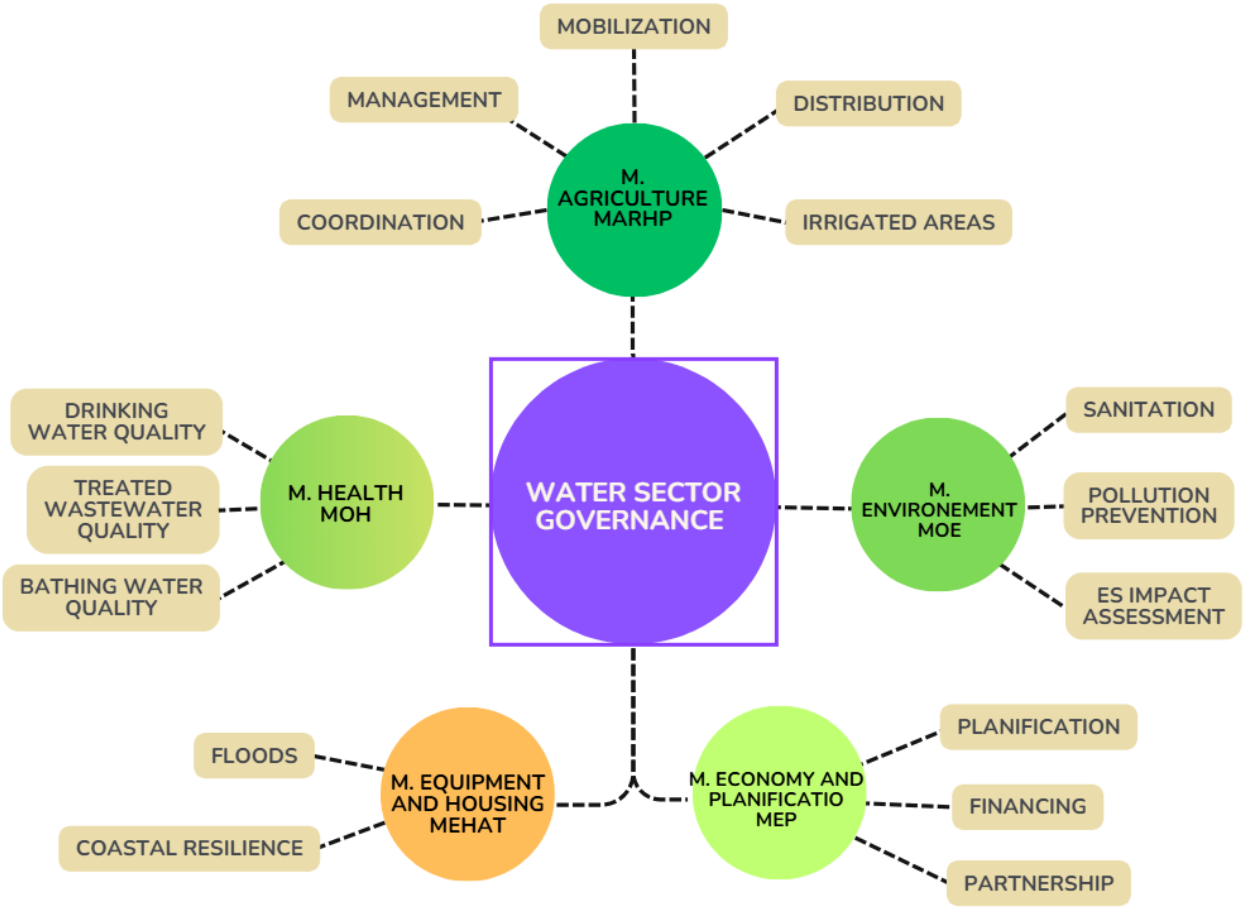

Figure 9: Synthesis of the Roles of National Institutions in the Water Sector

3.2. Regional and local actors (Governorate of Gabès)

National institutional actors have regional representations. It is essential to note that governance at the regional level differs subtly from that at the national level, a crucial specificity to be taken into account when developing a project, especially in terms of implementation and coordination.

For the current inventory phase, the regional and local actors of the Governorate of Gabès contacted were selected in consultation with the client. As the list of regional speakers is very extensive, we have focused on the major players for this stage. A project design phase, on the other hand, would require a broader and more comprehensive approach to stakeholder contact

❖ The Governorate of Gabes

The Governorate of Gabès is the administrative authority of the State at the regional level, responsible for coordinating government action and implementing public policies in all sectors. It is the administrative pivot for the supervision of local crises related to water or the environment.

The governor is the depositary of the State's authority in the region**:**

- It is responsible for the implementation of the national development policy at the regional level and proposes means for the economic and social promotion of the governorate.
- It coordinates and controls the regional services of the civil administrations of the State and exercises administrative supervision over local public authorities.
- It watches over the interests of the State with regard to companies and companies benefiting from financial assistance from the State.

○ The delegation of El Hamma

The Delegation of El Hamma represents the intermediary administrative level between the Governorate and the municipalities of its jurisdiction, ensuring proximity to citizens in the application of local regulations.

Since June 2020, El Hamma has been divided into 02 delegations: that of El Hamma and that of El Hamma West

○ The Delegation of Oudhref

The provincial capital of Oudhref was established as a full-fledged **Oudhref Delegation** from June 2020. **El Hicha** was a **Sector (Imada)** attached to the Delegation of Metouia which has been transferred to a **Sector of the new Delegation of Oudhref**.

❖ The Regional Agricultural Development Authority (CRDA)

The CRDA of Gabès is the regional representation of the Ministry of Agriculture. The CRDAs were created by Decree 89-44, their operation is set by Decree 89 – 832 of 29/06/1989.

At the regional level, CRDA is in charge of coordination with stakeholders in the water sector.

The CRDA is the main technical actor for the agricultural sector responsible for formulating proposals for the development of the agricultural sector at the level of the Governorate. It is responsible for:

- To examine the provisional annual programme to be implemented as well as the reports on the implementation of the Commissioner's activities and to make the related recommendations that it deems useful
- Studying the provisional operating and equipment budgets monitors their implementation on a periodic basis
- To ensure the smooth running of agricultural campaigns and actions to safeguard harvests and proposes measures that it deems useful for the best progress of these campaigns in terms of supply, processing and sale of products
- Ensuring the smooth running of actions to defend and protect plants and animals
- Assist in the establishment of appropriate structures to help organize the agricultural sector

In addition, the CRDA is responsible for supervising farmers in the adoption of efficient practices as well as the management of irrigation systems at the level of collective perimeters.

The CRDA is represented at the local level by Territorial Extension Districts **(CTVs).** They are the essential link for direct contact with farmers in the field.

❖ **The Southern Development Office (ODS)**

The ODS is the regional representation of the Ministry of Economy and Planning (MEP), created by Law No. 94-83 of 18 July 1994. The O.D.S. is a public institution of a non-administrative nature whose headquarters are located in Medenine, covering the 6 governorates of the south: Medenine, Gabes, Tataouine, Gafsa, Kebili and Tozeur. The ODS has 6 Regional Development Directorates (DDR) in the 6 governorates mentioned above. Its missions focus on the **analysis, planning, coordination and evaluation of development at the** regional level. In essence, the ODS is responsible for:

- **Collect information, study and propose** general development and investment policies (public and private) in its area of intervention, then monitor **and evaluate them**.
- **Assist the regional authorities** (Governorates) in the design, elaboration and execution of their development plans, including the **coordination** of the various stakeholders.
- **Harmonize** plans and programs between the different areas under its jurisdiction.
- **To draw up complementary action programmes** in collaboration with specialised structures to develop areas in difficulty.
- **Participate in the promotion of private investment** in collaboration with technical services and local authorities, and monitor their implementation.
- **Support regional and local structures** in their efforts to promote private investment.

❖ **The Technical Centre for Protected Crops and Geothermal Energy (CTCPG)**

The CTCPG was created in 2010, under Law No. 4 of 19 January 1996 on the creation of technical centers in the field of agriculture, and the Ministerial Decision of 28 April 2010, its missions are:

- Undertaking experiments to select varieties and rootstocks and adapt them to the conditions of the production regions;
- Develop technical documents for the judicious choice of greenhouse equipment, particularly in terms of the quality of metal structures, protective plastic sheeting, and heating, ventilation, fertigation and above-ground production systems;

- The undertaking of experiments for the management of irrigation and climate for a better development of plants;
- Development of production and integrated pest management to improve the quality of exported productions;
- To give advice on studies and new and old creations of greenhouse projects, with a view to rationalizing the exploitation of geothermal water resources and limiting minimizing return water discharge;
- Study of the possibilities of extension in traditional and non-traditional areas that heat the greenhouses by exploiting geothermal water or other alternative sources of energy;
- Provision of technical services directly to producers upon their requests;
- To make available to farmers the latest means of communication and to publish the necessary technical references, including audio-visual references to introduce them to all the production techniques adopted inside and outside the country;
- Organize training and initiation sessions for producers and technicians in the geogreenhouse sector.

The headquarters of the Center in Gabes, it has an experimental station in Chenchou and Monastir. It has secondary schools in Tozeur and Kebili

❖ **The Gabès Technology Hub (Politech Gabès)**

The competitiveness clusters in Tunisia were created in 2005 to support innovative projects by promoting synergies between various industrial and research partners. Competitiveness clusters bring together research and training centres and companies around local innovation projects with a regional, national and/or international vocation. These clusters are always presented as a new form of industrial organisation focused on improving the attractiveness of the territory to which they are attached. The competitiveness clusters are the subject of significant support from the Tunisian State both in terms of their development and financially.

Politech-Gabès, aims to strengthen the national economy through an innovative, environmentally friendly and energy-efficient technological content and to provide services for the benefit of companies within a framework of Public-Private Partnership (PPP) with a view to consolidating the strategic sectors of the territory and this with a double perspective:

- In terms of the development of technological and competitiveness clusters: Create a real dynamic of innovation, in particular through the consolidation of the competitiveness of the Eco-industries sector.

- In terms of the development of economic activity areas: Develop a new generation of industrial parks that respect international standards and offer services of excellence.

Politech-Gabès ensures:

- The operation, animation and maintenance of the Pole. It is the single point of contact for operators within the cluster.
- Promoting the Hub nationally and internationally and attracting investment.
- Establishment of cooperation and partnership links with similar clusters, research centres and academic institutions at the national and international levels.

❖ **The Institute of Arid Regions (IRA Gabès)**

The IRA Gabès is the branch of the IRA Medenine, which was created by virtue of Law No. 76-6 of 7 January 1976, its main missions are to carry out the research necessary for the development of the agricultural sector, the protection and conservation of natural resources and the fight against desertification in arid and desert regions.

It has 04 branches in the regions of Gabes, Kebili, Tataouine and Ben Guerdane with the following missions:

- **Valorisation of research achievements:** in partnership with development actors and socio-professional organisations, which is carried out within the framework of a contractual approach with economic actors, through an integrated system involving awareness-raising and popularisation of research results. The business incubator is the space for promoting the IRA's research results and it is also a structure for supporting business creation projects.**Training:** through advanced training courses for trainees, supervision of student trainees (post-graduate academic cycles), national and international tailor-made courses.
- **Information and documentation:** with a documentary collection composed of nearly 14000 titles (books, theses, dissertations, journals, reports, etc.), accessible on the intranet site and the publication of technical bulletins and popular brochures

Since 1990, **the Review of Arid Regions** has become the regular publication of the IRA.

The IRA of Gabès is a pillar of scientific research applied to the problems of semi-arid. Its role is essential to: (i) Research on soils and their management in the face of desertification and (ii) The study of the sustainable management of non-conventional water resources and the adaptation of agronomy to extreme water constraints in the South.

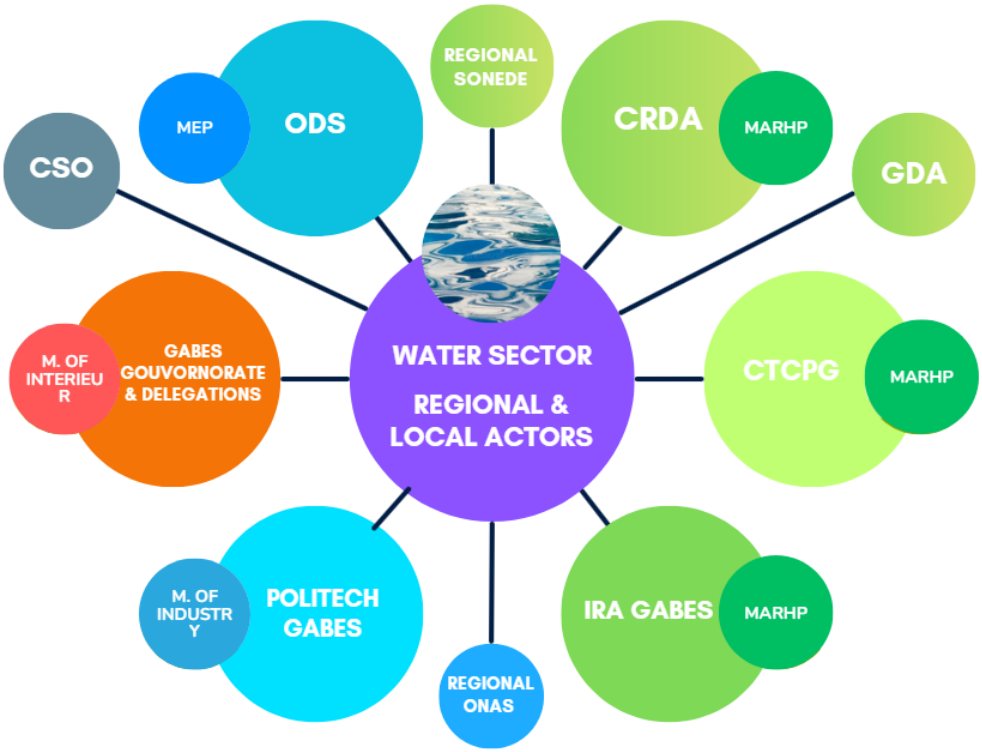

Figure 10: Regional and local actors involved in the water sector in Gabès

3.3. Civil Society Organizations

The region of Gabès has a particularly dynamic and diversified network of associations. These civil society organizations play a critical role, ranging from passionate environmental advocacy to the promotion of socio-economic development and the day-to-day management of agricultural resources, establishing themselves as key players in the local governance of water, land and production. Their constant mobilization highlights the tensions between industrial development and the preservation of the local ecosystem.

In the context of this report, the selection focused on the GDAs, the main actors in water management in rural areas, the FIDEL association, active in the environmental field, in particular in the Metouia delegation, and the Cluster des Primeurs du Sud, which is distinguished by the grouping of companies active in the early produce sector in the Gabès region.

- **Agricultural Development Group**

Agricultural Development Groups (GDAs) are non-profit structures of public utility, governed by Decree No. 99-1819 of 23 August 1999 *approving the standard statutes of development groups in the agriculture and fisheries sector*.

In 2010, as part of the National Strategy for the Sustainability of Drinking Water Supply Systems (DWS) in rural areas and irrigation systems, the Ministry of Agriculture entrusted the responsibility for the management and operation of the hydraulic infrastructures of the Public Irrigated Perimeters (PPI) to the GDAs, which are local associations of water users.

The objectives of this program are:

1. Improvement of Sustainability and Efficiency: The main goal is to ensure a more rational, efficient and sustainable management of water resources, through the empowerment of users to optimize the use of each cubic meter of water (maximum value of water).
2. Gradual disengagement of the State: The process aims to lighten the burden of the public administration (CRDA) in terms of daily management, maintenance and collection of fees, to entrust it to the irrigators themselves.

Strengthening of the GDAs: The Agricultural Development Groups (GDAs) are becoming the key players in this management. They are responsible for the maintenance of the networks, the distribution of water towers, the collection of contributions and the application of regulations within the perimeter. Membership of the GDA is often compulsory for farmers using state-funded hydraulic structures.The process of transferring this responsibility is an attempt to decentralize water management to the grassroots, transforming the GDAs from purely advisory bodies into real local irrigation water contractors.

The irrigation water supply to farmers is overseen by the Ministry of Agriculture and managed locally by the GDA. The CRDA manages local resources (boreholes, dams) and sets raw water quotas for irrigation. The local GDA purchases the water in bulk, receives it at a delivery point designated by the CRDA (often a main meter), establishes the irrigation schedule, distributes the water to its members according to the quotas and schedules set for farmers, and bills them accordingly. The GDA is also responsible for maintaining the secondary and tertiary network (pipes and valves leading to the fields).

The GDA is created for the collective management of a given hydraulic infrastructure. Its area therefore coincides with the network it is responsible for operating and maintaining. The GDA's intervention depends directly on the technical delimitation of the area it is supposed to serve, whether it is a modern irrigated area or a traditional oasis

The Governorate of Gabès has 88 irrigation GDAs, some of which are not very active.

A **very significant proportion** of these GDAs are in the El Hamma area, which is the largest area of oases and geothermally irrigated crops. The irrigation GDAs in El Hamma are key players in the management of the irrigation system fed by **deep water (Continental Intercalary aquifer),** which salinity is a major constraint.

- **FIDEL Association: Forum for initiative and local development in Métouia**

FIDEL is an association in Gabes, founded in 2013, Its main mission is to contribute to the promotion of local development and the integration of young people from the governorate of Gabès into professional life. It is also active in the fields of the environment and sustainable development, in particular with actions to:

- Raising awareness of the green and circular economy among children and students
- Recycling plastics
- Composting green waste and installing composters in schools

It has developed the experience of recovering bath water for the irrigation of the Metouia park, the objective being the fight against desertification and the replanting of the Metouia forest with forest trees adapted to the region (carob tree, Aleppo pine, hazelnuts).

She has developed several partnerships with international organizations and funds in the framework of cooperation projects (German Embassy, Oxfam, Expertise France, UNDP, Embassy of Finland and others).

- **Cluster of Southern Early Produce**

The southern early produce cluster (Cluster des Primeurs du Sud) was created in 2015, at the initiative of 13 founding members including: 6 members from companies namely: ZinaFresh, Cinquième Saison, DesertJoy, Server, GAPRIM and Géoproduction, 2 members mandated by the farmers of El hamma, 2 independent farmers operating in early geothermal crops and 3 members from support structures namely: Politech Gabès, Regional Union of Agriculture and Fisheries (URAP) and Technical Center for Protected and Geothermal Crops (CTCPG).

The objective is to strengthen competitiveness and innovation in the early crops sector (early and off-season crops), in particular those exploiting the region's geothermal hot water resources for greenhouse cultivation (tomatoes, etc.). Its mission is to:

- Jointly develop new markets, particularly for exports.
- To strengthen the capacities of member farmers (small and large producers).
- Improve productivity, quality and competitiveness of products.
- To set up platforms for collaboration between companies, research and support structures.

The geothermal early fruit and vegetable sector is one of the most dynamic in the governorate. The Cluster contributes directly to the significant growth of exports of these products (for example, an increase of 51% was recorded in the 2024-2025 campaign compared to the previous season).

It has benefited from a collaborative project with French clusters, such as Vegepolys Valley and Bio-AURA, to strengthen its capacities and promote technical exchanges.

The Southern Early Produce Cluster is a driver of economic development that makes intensive and organized use of Gabès' geothermal water for export agriculture. It is a perfect example of how local actors organize themselves to develop a specific and rare resource.

3.4. International Partners: Financial Institutions and Technical Organizations

3.4.1. Financial Institutions

❖ **German Development Bank (KFW):**
A strategic response to water stress

KfW's commitment in Tunisia is positioned as a major pillar of integrated water resources management (IWRM), aimed at ensuring sustainable and quality access to water in the face of the challenges of climate change and water stress. The action is structured around **three main components** and particularly targets the centre and south of the country.

KfW's 3 Pillars of Intervention:

- ❖ **Drinking Water Supply (DWS):** Improvement of water quality (desalination) and reduction of system inefficiencies in the distribution network (partner: SONEDE)
- ❖ **Sanitation**: Extension and rehabilitation of wastewater treatment plants (WWTP) and recovery of treated wastewater for agriculture (partner: ONAS)
- ❖ **Integrated Water Resource Management (IWRM) & Irrigation:** Modernisation of infrastructure (canals, dams) and flood protection (partner: MARHP,

Focus on the intervention in southern Tunisia and in Gabès

Southern Tunisia is a priority area for KfW, where the emphasis is on mobilizing non-conventional resources to compensate for the salinity of the aquifers and water shortages. 3 major actions can be cited:

- **Securing by Seawater Desalination:**

The governorate of Gabès is hosting a flagship project co-financed by KfW: the construction of the Zarat Seawater Desalination Plant. This strategic project aims to provide drinking water to more than one million people in the Southeast, covering the governorates of Gabes, Medenine and Tataouine, and thus helping to mitigate the overexploitation of underground aquifers.

- **Improvement of Quality by Desalination of Brackish Water:**

As part of the National Programme for the Improvement of the Quality of Drinking Water (**PNAQ),** KfW is supporting the construction of brackish water desalination plants in several other localities in the South and Centre-South, including Gafsa, Kébili, Sidi Bouzid and Ben Guerdane. The objective is to reduce the salinity rate of the water distributed to make it comply with standards.

- **Network Performance:**

Gabès and other southern governorates are part of SONEDE's network performance improvement programme, co-financed by KfW, with the aim of reducing the leakage rate and optimising distribution efficiency.

In summary, KfW's action is characterised by massive investments in infrastructure (desalination plants) and in the efficiency of services (distribution networks and sewerage).

❖ African Development Bank (AfDB): Priority to Sanitation and Reuse

The AfDB is also a major player and its priorities are complementary to those of KfW, with a strong focus on the development of **non-conventional water**.

The AfDB's approach in Tunisia has a strong focus on strengthening climate resilience and water security, with a particular focus on the sanitation sector and water efficiency in agriculture.

The AfDB's 3 Major Pillars and Partnerships

- ❖ **Sanitation and Reuse (TWW):** Improvement of the quality of treated wastewater (**TWW**) for agricultural reuse, rehabilitation and extension of wastewater treatment plants (WWTP) (**ONAS)**
- ❖ **Rural Drinking Water (RDW):** Extension of access to drinking water in rural areas (Rural Drinking Water Supply Programme - PAEPR) and capacity building (**SONEDE)**
- ❖ **Integrated Agricultural Development (Irrigation):** Financing of integrated agriculture projects including the mobilization and improved use of water resources for irrigation (**MARHP)**

Focus on Sanitation and Regional Impact (including Gabes)

Unlike KfW, which often focuses on desalination for water supply, the AfDB focuses mainly on **sanitation** (treatment) and **reuse** (recovery).

- **Reuse of Treated Wastewater (TWW):**

The AfDB finances projects that are crucial to improve the quality of treated wastewater and increase its reuse in agriculture. A recent and significant loan has been granted to ONAS to strengthen climate resilience through better wastewater management. This program includes the rehabilitation and extension of numerous wastewater treatment plants and potentially concerns **17 governorates**, including **Gabès** and other regions in the south. The aim is to make around 100 million m³ of purified water available to irrigate agricultural land.

- **Integrated Agricultural Development Projects (IADPs) in Gabes:**

The AfDB has had a direct and targeted intervention in Gabès as part of the Integrated Agricultural Development Project (PDAI) whose objective is to reduce poverty and increase farmers' incomes in the governorate. The project includes a water component, including the improvement of surface **water use** through various developments, the development of irrigated areas, and the implementation of water and soil conservation (ESC) works over large areas.

- **Rural Drinking Water (PAEPR):**

The AfDB has also been a major player in financing the Rural Drinking Water Supply Program (PAEPR), which improves access to drinking water for hundreds of thousands of inhabitants in inland and rural areas.

❖ World Bank (WB): Governance and Public-Private Partnerships (PPPs)

The World Bank's approach is distinguished by its support for institutional reforms and financing aimed at improving integrated water resources management and introducing new financing methods, including Public-Private Partnerships (PPPs).

The WB's Strategic Lines of Intervention

1. Sanitation & PPP: Major support for the development of sanitation and financing of PPP pilot projects for wastewater management. (ONAS)

2. Drinking Water Supply (DWS) & Management: Financing of drinking water supply projects in urban centers (extension, rehabilitation of production complexes) and technical assistance. (SONEDE)

3. Natural Resource Management (NRM): Projects aimed at improving living conditions in rural areas and supporting the sustainable management of land and water resources, in particular the PIAIT project (DGGREE/MARHP)

Focus on Sanitation, Reforms and Regional Impact

The World Bank is a historical partner of Tunisia in the water sector; its action covers the entire territory with structuring interventions:

- **Support for ONAS and PPPs:**

The WB has recently allocated significant funding (€113.6 million) specifically to improve wastewater management services through PPP projects. The aim is to strengthen ONAS's capacity to manage this type of contract for the provision of sanitation services, particularly for treated wastewater.

  - **Sanitation of the North of Tunis Project:** An emblematic project aimed to reduce the environmental impact of discharges into the Gulf of Tunis and to support the reuse of treated wastewater for agriculture, particularly in the irrigated perimeter of **Borj Touil**.

- **Improvement of Drinking Water Services:**

The WB has financially supported SONEDE for the supply of drinking water to urban centers. These projects included the extension of treatment plants (such as the ST4 plant in Greater Tunis) and the rehabilitation of water production complexes. The WB is also financing the acquisition of equipment (meters) to improve SONEDE's operational efficiency.

- **Regional Interventions (including the South):**

Although the WB intervenes in large cities (Tunis, Sfax), it also finances projects affecting more Inland areas with high development potential. For example, the Second Natural Resource Management Project targeted to improve the living conditions of rural communities in several governorates, including Medenine (South). In addition, sanitation projects have been financed in cities such as Kebili.

In conclusion, the World Bank is positioning itself as the partner in **governance reforms** and **large-scale financing** of water and sanitation infrastructure. It is working closely with ONAS and SONEDE to modernize the management of the sector and is introducing innovative mechanisms such as PPPs to ensure the sustainability of services.

❖ European Recovery and Development Bank (EBRD): Service Efficiency and Resilience

The EBRD's approach in Tunisia focuses on strengthening the resilience of the water sector to climate change and improving the operational and financial efficiency of state-owned enterprises (SONEDE and ONAS). It focuses on the modernisation and good governance of services.

The EBRD's 3 Pillars of Intervention:

- ❖ **Network Efficiency (AEP):** Reduction of Non-Revenue Water (NRW), improvement of the performance and energy efficiency of the drinking water distribution network (SONEDE)
- ❖ **Sanitation and Resilience**: Financing of the rehabilitation of sewerage networks and treatment plants (WWTP); sludge recovery and energy efficiency (ONAS)
- ❖ **Rural Development and Irrigation**: Modernization of rural water infrastructure and support for local water management for better efficiency. (CRDA du Sud/ MARHP)

Focus on Infrastructure Projects and Regional Impact (including the South)

The EBRD stands out for its targeted investments that directly improve the performance of water operators.

- **1. PIHOS project: Support for the Southern Oases**

The **Southern Oasis Water Infrastructure Project (PIHOS)** is a structuring intervention that targets the Gabès region and other southern governorates. It aims to rehabilitate and modernize traditional irrigation systems (reduction of waste, security of resources), while strengthening the capacity of Agricultural Development Groups (GDAs) to manage water in a sustainable manner.

- **2. Network Performance Improvement (SONEDE)**

The EBRD has granted significant financing to SONEDE to improve the performance of its distribution network, in particular through the installation of new equipment and the implementation of leak detection and repair systems. These projects aim to reduce the rate of "Non-Revenue Water", which is crucial in a context of national water stress.

- **3. Energy Efficiency and Sanitation (ONAS)**

The EBRD finances projects for ONAS aimed at integrating energy efficiency into wastewater treatment plants (WWTPs), and sometimes the **recovery of sludge** from wastewater treatment (e.g. biogas production). This reduces ONAS's operational costs and strengthens the environmental sustainability of the sector. The funding targets wastewater treatment plants in several cities, especially in large urban areas.

In conclusion, the EBRD is positioned as the ideal partner for projects that link infrastructure investment to improving the **management, efficiency and financial sustainability** of water and sanitation services.

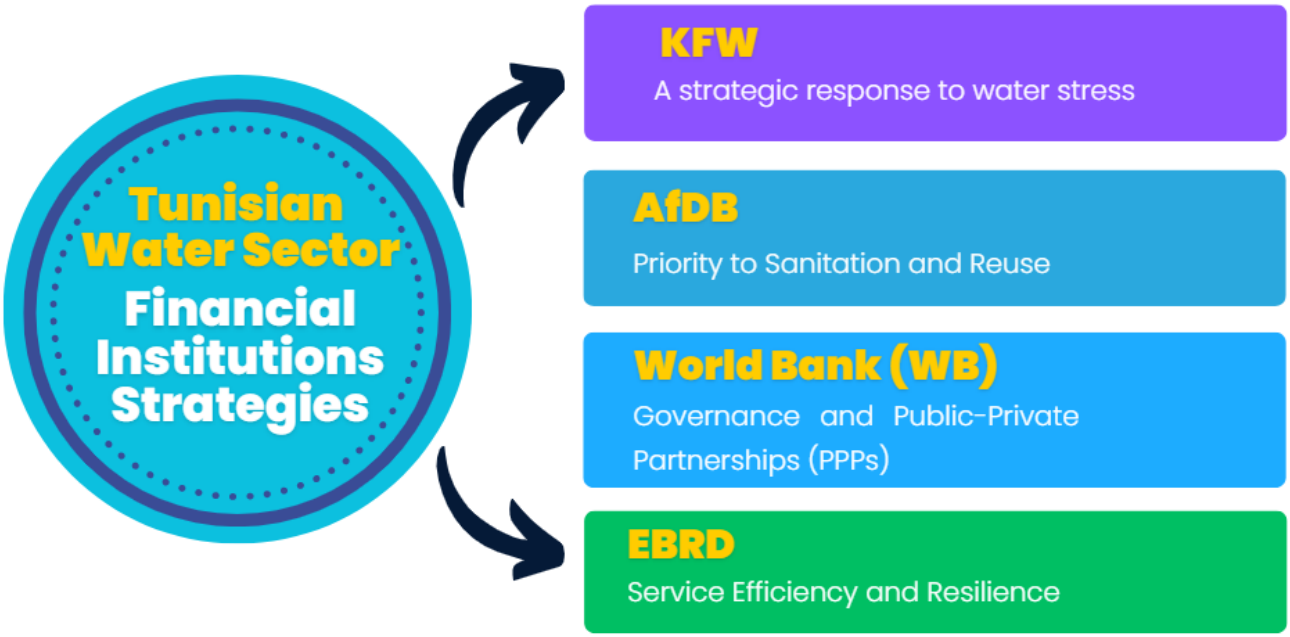

Figure 11: Strategies of IFI for Tunisian Water Sector

3.4.2. Technical Organizations

❖ **Sahara and Sahel Observatory (OSS)**

Founded in 1992 and based in Tunis since 2000, the Sahara and Sahel Observatory (OSS) is an international organization with an African vocation. Its main role is to create and support partnerships to address challenges related to **water resources management** and the implementation of Multilateral Environmental Agreements in Africa, particularly land degradation, biodiversity and climate change.

The OSS currently has 48 members, including 28 African countries and 7 non-African countries. In addition to these States, there are 13 entities representing Africa, the United Nations and non-governmental organizations. Collaborations between the OSS and its members aim, first and foremost, to strengthen joint efforts for a sustainable future in Africa.

The OSS's mission is to help its African member countries sustainably manage their natural resources in the face of the most challenging climate change. Its action is mainly focused on arid, semi-arid and dry sub-humid areas.

To carry out its mission, the OSS is continuously developing expertise that allows it to shed light on current environmental issues and to contribute to strategic reflections on the sustainable management of land and water resources.

Its actions are divided into three main areas:

- Implementation of multilateral environmental agreements: implement agreements on land degradation, biodiversity and climate change;
- Promotion of initiatives: support regional and international initiatives that respond to environmental challenges by promoting synergy between States and sub-regional organizations in order to consolidate a true partnership space

- Harmonization of approaches: Define concepts and unify methodologies related to sustainable land and water resource management.

It is also committed to protecting biological heritage through the development of concepts and methodologies dedicated to environmental monitoring, natural resource management and adaptation to climate change. This commitment is based on scientific and technical programs structuring its strategy, namely: "Land", "Water", "Climate" and "Biodiversity".

These axes aim to promote integrated and collaborative management of natural resources in Africa. Through its accreditations with the Green Climate Fund (GCF) and the Adaptation Fund (AF), the OSS supports countries in the implementation of projects that mitigate the impacts of climate change on people and ecosystems.

To achieve its mission, the Observatory relies on knowledge transfer, capacity building and awareness-raising among all stakeholders.

The OSS is a platform for North/South/South cooperation. It is also an agency for the implementation of cooperation projects.

❖ Italian Agency for Development Cooperation (AICS) Integrated Development and Climate Resilience

AICS in Tunisia gives priority to an approach of **decentralised cooperation and integrated rural development**, placing adaptation to climate change and sustainable local resource management at the heart of its action. Its projects often target land, water and agricultural management, particularly in the central and southern regions.

AICS' Major Areas of Intervention

1. **Water Management and Irrigation (IWRM):** Promotion of efficient irrigation techniques, management of non-conventional water resources (TWWs) and rehabilitation of rural infrastructure (CRDA/MARHP, ONAS)
2. **Food Security and Adaptation**: Support for Agricultural Sectors to Increase Productivity, Resilience to Climate Shocks and Soil Protection (CES) (MARHP)
3. **Debt Conversion:** Financing of large-scale infrastructure projects through bilateral debt swap mechanisms (ONAS and various ministries)

Focus on Agricultural and Resilience Projects

AICS operates through a series of complementary projects, showing a diversified intervention on the water cycle in agriculture.

- **TANIT Project (Climate Change Adaptation and Innovative Management Techniques**for **Irrigation and Water Resources in Tunisia):** This is the flagship project of AICS, aimed at the introduction of new irrigation and water management practices that are more resilient in the face of resource scarcity.
- **PRESTO Project (PR**Systemic **Efficiency and Operational Transfer Project):** Focuses on improving the use of **treated wastewater (TWW)** and protecting fragile ecosystems such as oases, a crucial issue in southern Tunisia.

- **IRDP Project (Integrated Rural Development Projects): Finances rural development programs that integrate a strong Water and Soil Conservation (ESC) component** and the improvement of water efficiency in irrigated areas.
- **RINOVA Project:** A project focused on the innovative management of natural resources and soils, often linked to the themes of water and fertility in a context of land degradation.
- **ADAPT Cereals project:** More specifically targeted at food security, it aims to make the cereal sector more resilient to climate change, in particular through water-saving agronomic techniques.
- **PRASOC project:** Line of Credit at Subsidized Rate for the Private Sector, in particular Agriculture and Fisheries. It facilitates access to finance for SMEs wishing to invest in sustainable and green production equipment and systems, including water-saving technologies.
- **Rejim Maatoug Project:** This emblematic project specifically supports agricultural development in the southwest area, involving the mobilization of water and the settlement of populations in desert areas.
- **Debt conversion in support of ONAS:** Italy is a major player in debt conversion. The funds released have enabled **massive and direct investments in the sanitation sector managed by ONAS**, in particular for the rehabilitation of wastewater treatment plants.

In conclusion, AICS stands out for its in-depth action on the **link between water and agriculture**, targeting the resilience of rural populations to climate change and desertification.

❖ Other Technical Partners and Organizations

- **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ):** As the technical implementing agency of the German government, GIZ does not directly fund massive infrastructure (KfW's role), but it is essential for technical assistance, capacity building and governance consulting.
    - **Contribution to the Water 2050 strategy:** Support to Tunisian ministries (MARHP in particular) in the development of long-term policies for water security.
    - **IWRM project (GIRE):** Technical support for the implementation of Integrated Water Resources Management (IWRM), often through pilot projects on TWW reuse, aquifer management and efficiency in agriculture.
- **European Union (EU):** The EU is a leading partner, often through grants or co-financing of multi-donor programmes (WB, AfDB, KfW).
    - **ValEUr-Gabès project:** A targeted example of European engagement in the region. The objective is to support the recovery of Treated Wastewater (TWW) and the improvement of environmental management in the governorate of Gabès, in connection with ONAS's sanitation efforts.
- **Japan International Cooperation Agency (JICA):** JICA is recognized for its technological expertise. It finances the construction of key infrastructure, in particular for the recycling of industrial or urban wastewater for the Grand Complexe Chimique de Gabès (GCT), in order to reduce pressure on groundwater for industrial needs.

3.4.3. Focus on the Technical and Financial Platform (TFP Water)

The **Water TFP is** an **institutional framework for coordination and dialogue** bringing together all the actors involved in the water sector in Tunisia.

Purpose and Role of the Water TFP

The Water Technical and Financial Platform ensures strategic **coordination** between the Tunisian government and its **Technical and Financial Partners (TFPs)** in the field of water (resources, sanitation, irrigation, etc.).

Its main role is to:

1. **Align interventions:** Ensure that external projects and financing (loans, grants) are consistent with national priorities, including the **National Water Strategy 2050** (Water 2050).
2. **Harmonize procedures:** Improve aid effectiveness by simplifying and harmonizing procedures for granting financing and implementing projects.
3. **Facilitate dialogue:** Serve as a forum for exchange and review of progress between the **Ministry of Agriculture, Water Resources and Fisheries (MARHP)** and donors (AFD, KFW, World Bank, AfDB, European Union, AICS, etc.).
4. **Follow up:** Discuss challenges, bottlenecks and performance indicators of major programs in the sector (resource mobilization, water saving, reuse of treated wastewater, etc.).

Structure and Operation

The Water TFP functions as an **extended steering committee** for the water sector in Tunisia.

- **National steering:** The secretariat is generally provided by the **Ministry of Agriculture (MARHP)** and the associated technical structures (SONEDE, ONAS, DGGREE, etc.).
- **Partners (TFPs):** These include the main bilateral and multilateral development agencies present in Tunisia:
    - Kreditanstalt für Wiederaufbau (KfW - Germany): Coordinator
    - African Development Bank (AfDB): Co-Coordinator
    - World Bank
    - French Development Agency (AFD)
    - European Union (EU)
    - Italian Agency for Development Cooperation (AICS), etc.

In addition, the Water TFP provides coordination and technical support to the Ministry of Agriculture in the development of the National Water Report (last version: NWR (fr.RNE) 2024), a key document for the monitoring of the sector strategy.

Table 3: Summary of International Projects in the Water Sector

Project / Program	Main Objective of the Project	Lead Funder (TFP)	Tunisian Beneficiary / Partner
Zarat Desalination Plant (Gabes)	Securing drinking water in the South-East (Gabès, Medenine, Tataouine) and reducing the overexploitation of groundwater.	**KfW**	**SONEDE**
Brackish Water Desalination (PNAQ)	Improvement of the quality of drinking water in the localities of the South and Centre-South (Gafsa, Kébili, Sidi Bouzid, Ben Guerdane).	**KfW**	**SONEDE**
Network Performance Improvement (PAP)	Reduction of non-revenue water and optimization of distribution efficiency.	**KfW**, **EBRD**	**SONEDE**
TWW Remediation / Reuse Program	Rehabilitation and extension of WWTPs, improvement of the quality of TWWs for agricultural reuse.	**AfDB** **Debt Conversion (AICS)**	**ONAS**
Sanitation financing via PPP	Strengthening ONAS's capacity to manage Public-Private Partnership contracts for wastewater services.	**WB**	**ONAS**
Southern Oasis Water Infrastructure Project (PIHOS)	Rehabilitation and modernization of irrigation systems and strengthening of local management of GDAs in the South (including Gabès).	**EBRD**	**Southern CRDA** / MARHP
Integrated Agricultural Development Project (IADP) in Gabes	Poverty reduction and increase in farmers' incomes through better use of water (irrigation, ESC).	**AfDB**	CRDA / MARHP
TANIT project	Introduction of irrigation and water management practices that are more resilient to resource scarcity.	**AICS**	**MARHP**

Project / Program	Main Objective of the Project	Lead Funder (TFP)	Tunisian Beneficiary / Partner
ValEUr-Gabès project	Treated Wastewater Recovery (TWW) and Environmental Management in the Governorate of Gabes.	**EU**	**ONAS**
Industrial Wastewater Recycling (GCT)	Use of recycled water for industrial needs to reduce pressure on aquifers.	**JICA**	**GCT** (Grand Complexe Chimique de Gabès)
PIAIT Project (Project for the Intensification of Irrigated Agriculture in Tunisia)	Improvement of living conditions in rural areas and sustainable management of land and water resources.	**WB**	**DGGREE**
REJIM MAATOUG project	Agricultural development in the South-West, mobilization of water and settlement of populations in desert areas.	**AICS**	**ODRM** (Office de Développement de Rejim Maatoug) / MARHP

CHAPTER IV

RESULTS OF THE STAKEHOLDER SURVEY

CHAPTER IV: RESULTS OF THE STAKEHOLDER SURVEY

4.1. Methodology of the Study and Stakeholder Analysis

4.1.1. Identification and Selection of Key Stakeholders

The selection of the actors interviewed was carried out according to rigorous criteria aimed at ensuring comprehensive and strategic coverage of water issues in the region, in particular the Water-Agriculture Nexus.

Table 4: Selection criteria and strategic objectives

Selection Criteria (Justification)	Strategic Objective
Mandate and Alignment (Ownership)	Integrate the client's proposals and suggestions while ensuring alignment with the assignments' objectives.
Representativeness and Sweep of Actors	Cover the most important actors (authorities, civil society, International Institutions) in order to capture all types of interventions and challenges related to the sector.
Future Partnership Potential	Identify key actors (TFPs, public, CSO) with high potential for further collaboration and implementation of recommendations.
Geographical and Thematic Relevance	Specifically target institutions directly related to agriculture (Water-Agriculture Nexus) and the environment in the governorate of Gabes.

4.1.2. Maintenance Protocol and Data Collection

The semi-structured questionnaire model was established and validated in consultation with the sponsors. It served as a guiding grid for the interviews to ensure the comparability of the data and the richness of the information.

The questionnaire was structured around the following headings:

1. **Formal Identification:** Collection of data relating to the Institution (Status, Missions and Attributions) and the Interlocutor, in order to circumscribe their exact role in the sector.
2. **Mapping of the Existing:** Inventory of activities, ongoing projects and direct interventions carried out by the institution in the field of water.
3. **Diagnosis and Foresight:** Identification of the expectations, difficulties, problems and challenges perceived by the actor regarding water management.
4. **Contribution to Solutions:** Collection of **recommendations** and **ideas for concrete projects** that can be developed to address the identified challenges.

Contact methods: The interlocutors were officially designated by their respective institutions following the sending of an email, the content of which had been previously validated with the sponsors.

4.1.3. Quality Control and Data Validation

The credibility of the conclusion's rests on the verification and cross-checking of the information collected. This validation phase was conducted according to the following principles:

- **Verification of Regulatory Compliance:** The information collected was compared with the **regulatory texts** (decrees, laws) that govern the public institutions surveyed to ensure the accuracy of the missions and attributions declared.
- **Internal cross-checking:** Technical and operational data have been **cross-checked** between the different interlocutors or departments (if applicable) to ensure factual consistency.
- **Structuring for Consistency:** The raw data was restructured, analyzed, and synthesized to ensure the **overall consistency** of the report and clarity of conclusions.

4.2. Summary of Expectations and Recommendations

4.2.1. Thematic analysis of results

For a better analysis of the results, the expectations and recommendations are classified by group:

- Public institutions: which bring together national and regional services
- Civil Society Organizations
- International financial organizations and institutions

Out of a total of 31 actors identified at the beginning of the survey, 28 national and regional actors agreed to the interview, i.e. a completion rate of 90%.

Table 5 : List of actors interviewed during the survey

Organ	Level	N#	Department
Ministry of Agriculture, Water Resources and Maritime Fisheries (MARHP)	National	1	Secretariat of State
	National	2	BPEH
	National	3	SONEDE
	National	4	DGRE
	National	5	DGGREE
	National	6	ONAGRI
	Regional	7	CRDA
	Regional	8	CTCPG
Ministry of Agriculture/Ministry of Higher Education	National	9	INAT
	National	10	INRGREF
	Regional	11	IRA
Ministry of Economy and Planning (MEP)	National	12	DGI
	Regional	13	ODS
Ministry of Industry (MOI)	Regional	14	Politech Gabès
Governorate of Gabes	Regional	15	Governorate of Gabes
	Local	16	Delegation of El Hamma
Ministry of the Environment (MOE)	National	17	ONAS
	National	18	CITET
Ministry of Equipment and Housingt (MEHAT)	National	19	DHU
Civil Society Organization (CSO)	Regional	20	GDA Chenchou 4
	Regional	21	FIDEL
	Regional	22	Southern early produce cluster
International Financial Organizations and Institutions	International	23	OSS
	International	24	KFW
	International	25	WB
	International	26	BAD
	International	27	EBRD
	International	28	AICS

The expectations and recommendations of the various Stakeholders are collected in the following tables:

Table 6 : Stakeholder Expectations

Organ	Level	Department	Issues and Expectations
Ministry of Agriculture	National	Secretariat of State	- **Drinking water** is a priority for the Ministry. Currently, connections in the **urban area** stand at **100%**, and the **rural area** at **95.7%**. - The management of **GDAs** and water distribution remains a major challenge for the Ministry. A review is currently underway to transfer this management to **SONEDE**. - The Ministry intends to strengthen **SONEDE**. - **Evapotranspiration** is also a challenge (the transformation of "blue water" into "green water"). - For **Gabès**, the objective is to use treated wastewater in industry and tourism. - For **mountainous areas** such as **Matmata**: there is a need for drilling/boreholes to reduce water scarcity. - For **oases**, the problem lies in irrigation and the management of drainage water.
	National	BPEH	- Financing of projects programmed in the "Water 2050" action plan - Adequate coordination of actions
	National	SONEDE	- Securing Strategic Assets: Enhanced monitoring of unauthorized pipe tapping and the protection of drilling infrastructure is essential. Priority should be given to highly vulnerable areas, such as the Gafsa region, where the highest rates of infrastructure interference have been recorded - Seeking additional funding for the PAP project (Grand Sfax) - The rehabilitation of the Gabès plant which will allow a gain of the equivalent of 02 boreholes
	National	DGRE	- One of the reasons for water stress is the drop in rainfall of 30 to 40%, as a result, the sector requires a paradigm shift that aims to manage demand according to the evolution of climate change - The water sector suffers from a structural problem due to the poor management of REs, based on mobilization - The Water 2050 strategy defines the vision and orientations, is the benchmark for the water sector - Wastewater has been considered as an alternative resource until now
	National	DGGREE	- Find resources for project implementation, knowing that requests for funding are available - Strengthening the impact of projects - Institutional reform - Reduced water loss

Organ	Level	Department	Issues and Expectations
	National	ONAGRI	- Develop a document platform management software: grouping of documents with indexing (e.g. gabès water) - Strengthen communication on the ONAGRI website and agridata, - Agridata, a mine of information poorly exploited, need technical support to simplify external use and strengthen access to this platform - Digitalization of the water sector (as part of a major project for the digitalization of the agricultural sector)
	Regional	CRDA	- Ageing of the network of oases: a study on the rehabilitation of the Irrigated Perimeter of El hamma is available, the CRDA is looking for funding from (13 million TND), - Creation of IP in Chenchou - For Desert Joy, the discharge of water after heating is not recycled, on the other hand, it attracts wild boars to the region - The problem of managing the Water GDAs lies in the land tenure aspect of the oases - In West Gabes, the OTD is developing a test on the REUT on 300 ha for the irrigation of fodder, an experience to be exploited and considered
	Regional	CTCPG	- The lack of formal organization of the GDA is a bottleneck to water management in rural areas - In Gabès: 2 wastewater perimeters are underutilized - Limited adoption of wastewater reuse practices - Geothermal projects present technical complexities, with drilling managed by the CRDA. - Deep drilling involves high capital costs - Electricity Cost Burden - Project for the extension of the Technical Centre: Chenchou station, with consideration of an extension to Zerkine and Kebili - The oases of Gabes are the largest producers of the "Kenta" variety of dates, however, irrigation using thermal station waters is currently restricted due to sanitary standards and the need for water quality stabilization - Direct water to high-potential areas rather than non-irrigated zones
Ministry of Agriculture/Ministry of Higher Education	National	INAT	- Traditional agriculture needs modernization, digitalization and control of each production - The intervention will have to be on the value chains (from the resource to the market) - The current problem is the promotion of production at the expense of water (waste) - Lack of collaboration: the farmer remains the weakest link in the chain - Lack of trust in AVFA extension workers

Organ	Level	Department	Issues and Expectations
			- The unavailability of means (especially rolling means) to state extension workers blocked their interventions for 15 days - Dilution and major confusion of technical information, e.g. on facebook, 10 answers provided, none of them are good - Lack of standardization (e.g. for the fertilization of cereals and the optimal dose to be used) - The problem: "crucial" information is missing Case of Gabès: - The hot water pipe comes from El Hamma - The efficiency of the network: 30 million m3, the volume sold represents 55% of the volume distributed, with a loss of 45%, due to leaks, fraud, meter shutdown and others
	National	INRGREF	- Improved water availability through brackish water and desalination - Review the way water is managed and the allocation of quotas to agriculture and industry, including models that allow for the sustainable use of resources
	Regional	IRA Gabès	- Maintenance problem of the geothermal water network coming from Khebaiat, source of water cut-off - Overexploitation of aquifers in Chenchou due to uncontrolled drilling - Positive use potential except for overexploitation and water loss - Wastewater treatment plant in Metouia: sludge furnishing of wastewater treatment plants - Sector Governance: Water Sector Stakeholders: • For Groundwater: it is the Mr. Agriculture, clear governance • For Wastewater: several speakers: Mr. Health, Mr. Environment, ONAS, M. Agriculture (various departments) - If the parties involved are organised: possibility of recovering drainage water: treatment, recycling, return to the networks - In Bechima, a perimeter irrigated by wastewater for the production of fodder and arboriculture, the only user is the GDA Oued Cherka - The Bechima wastewater treatment plant (Gabes) is recognized as a pilot model for the tertiary treatment of wastewater (EU)
Ministry of Economy and Planning	National	DGI	- Seeking funding for the Jerba desalination plant and the extension of the Zarrat plant - Rehabilitation and renewal of networks for all governorates, including Gabès

Organ	Level	Department	Issues and Expectations
	Regional	ODS	- Valorisation of geothermal water - Recycling of bath water (loss is estimated at 140 l/s) - The wastewater treatment plant discharges 4000m3/day which is discharged into the sebkha (Flat and salty bottom of a closed depression, without vegetation, characterized by saline efflorescence)
Department of Industry	Regional	Gabès Technology Park	• Project 1: Creation of a "Water" space as part of the Gabès Science City project • Project 2: Establishment of a collaborative platform for scientific, technological and economic monitoring of the South-East in Gabès. Areas of interest: chemistry, water, renewable energies, environment and sustainable development, greenhouse agriculture, useful substances. • Project 3: Organization of three master classes: o Green hydrogen: a new opportunity to decarbonize economic activities (Gabès, November 2025), in partnership with the CCI Sud-Est and the French Institute of Tunisia; o Recovery of low-temperature thermal waste (Gabès, February 2026), in collaboration with the Technical Center for Protected and Geothermal Crops of Gabès; o Water audit in industry and agriculture (Gabès, March 2026), in partnership with ISSTEG and SONEDE. • Project 4: Construction of a 1 MWp photovoltaic power plant in the Matmata Nouvelle Industrial Zone, thus contributing to the regional energy transition.
Governorate of Gabes	Regional	Governorate of Gabes	- Rainfall in Gabès is 120 mm, to be considered when developing projects related to water resources - The major problem is the availability of drinking water due to the imbalance between needs and resources, which are insufficient - Agricultural development needs considering the impact of climate change and the specificity of the region
	Local	Delegation of El Hamma	- The thermal water from El Hamma is directed to the Bouchemma station (Dissa) for distribution to West Gabes, Ouedhref, and Ghannouch. This spatial distribution creates regional supply imbalances, leading to social sensitivities within the local population regarding water access. This operational gap is primarily attributed to: • Infrastructure Obsolescence: The aging of thermal cooling systems, which process water at 60-80°C, presents significant operational safety risks for

Organ	Level	Department	Issues and Expectations
			technicians and end-users. A modernization program is estimated at 1.6 MTND, with a long-term implementation horizon. • System Reliability: Frequent service interruptions occur due to the current condition of the conveyance network. The rehabilitation of these pipelines represents a strategic investment requirement of approximately 8 MTND. - The high quantity of bath water discharges **(700 l/s)** which is not recovered - Delay in the execution of projects due to the spirit of the tribes and clans
• **Ministry of the Environment**	National	ONAS	- Ageing of wastewater treatment plants, need for rehabilitation and extension and tertiary treatment - Revision of the REUSE Standard (NT 106.03) - Seeking funding for Master Plan projects (2026-2030): Sludge drying unit, Studies
	National	CITET	- Develop more partnership in projects - Spreading the experience of water filtration by plants
Ministry of Public Works	National	DHU	- Rainwater recovery - There are nature-based solutions, except that there are no detailed studies or tests carried out yet - Need for Technical Assistance (Studies/Research Work) for Research and Innovation in Flood Protection - The master plan for the development forecasts flooding and shows that no place is spared because of climate change - Need for coordination with other institutions to share information and anticipate risk instead of managing it
Regional Civil Society Organizations	Regional	GDA Chenchou 4	The common problems of GDAs lie in: - Energy consumption and the possibilities of replacing it with renewable energies (photovoltaic panels), - Maintenance and renewal of pumps: lack of know-how and adequate distribution to all members - The state of agricultural roads: which directly hinders productivity and rural development. - Agricultural Distribution Channels: Structural Inefficiency and Lack of Transparency - The weakness of the management of the GDAs

Organ	Level	Department	Issues and Expectations
	Regional	FIDEL	- The problem of irrigation in agriculture in El Hicha: olive groves are in a rainfed mode that is a rarity - If some of the desalination water from the El Hicha Joy unit is distributed to farmers, it will reduce tensions with the local population - Duplicate the pilot irrigation of the forest and the park with the grey water of Bains Maures, on other forests
	Regional	Southern Fruit and Vegetable Cluster	- If a program is designed for the recovery of bath water, companies are ready to buy the water - Be a partner in the implementation of cooperation projects
International Financial Organizations and Institutions	International	OSS	- Lack of regional resources to support farmers - Strengthen collaboration - In Gabès: problem of marine intrusion causing the degradation of water quality which degrades the quality of the soil - Low rainfall that does not allow sufficient leaching - The institutional challenges regarding the separation of water resource management from agricultural oversight, aiming to ensure independent regulation and avoid conflicting mandates - The Netherlands' membership of the OSS (as a member) is welcome
	International	KFW	- Become a member of the Water TFP - Collaborate on the financing of existing projects - Develop partnerships
	International	WB	- Contributing to multi-donor projects - Intervene at the national level and not only the Gabès region - The project implementation approach offers considerable value-of-money opportunities (which allows the Bank's management costs to be covered and interest is reinjected into the project, allowing for budgetless expansions).
	International	AfDB	- Contribution of Dutch design offices in the studies to be launched (Benchmarking - To study the interest of the Netherlands in becoming a member of the Board of Directors of the "African Water Facility" which will soon organize a round table to present the projects to donors

Organ	Level	Department	Issues and Expectations
	International	BERD	- Partnership for Technical Assistance Components - Partnership for the financing of activities
	International	AICS	- Lack of data on the impact of REUSE, need for studies - Need for studies on the impact of wastewater chlorination on soil and plants - Little monitoring of emerging pollutants (microplastics, permanent organic pollutants, antibiotics) and their consequences on health and agriculture

Table 7 : Stakeholder Recommandations

	Organ	Level	Department	Recommendations
1	**Ministry of Agriculture**	National	Secretariat of State	- The Ministry proposes a **Water-Energy-Food Security Nexus** program for supplying drinking water to dispersed rural populations in **mountainous, forested, and border areas**. - This program uses **individual solutions**, including non-collective sanitation equipment and photovoltaic solar energy production, and targets **25,000 vulnerable families**. - The program duration is **10 years (2026–2036)**, with an estimated budget of **750 million TND** (or **$250 million**).
2		National	BPEH	- Refer to the "Water 2050" strategy - Aligning with the objectives of the Tunisian State - Share Inventory Report - Coordinate interventions, in particular through the Water TFP
3		National	SONEDE	- Go through the diplomatic circuit, through the MEP, specifying that the partnership or the person concerned is SONEDE - Strengthening communication by considering the social side, especially in the Gafsa region
4		National	DGRE	- Management of what exists and avoiding new mobilizations - Water Saving Technology - REUT - Submit a copy of the report to the DGRE library - Action on the desalination of borehole water
5		National	DGGREE	- Planning major works and a schedule for the rehabilitation of the networks is better than thinking about new creations - Optimal use of irrigated areas (100%) - The problem of infrastructure is a social problem and a lack of cooperation between GDAs and farmers - Crops in 3 floors still exist in Gabès, which is no longer the case for the other regions (Gafsa, Tozeur and Kébili) and this is due to the infrastructure and the fact that the climate of Gabès is better than Gafsa and Tozeur - Need for timely water to ensure cultivation
6		National	ONAGRI	- Water quality and resource durability, to be prioritized with optimized allocation among users - E.g., SECADENORD manages both input and output—a model that could be adapted for other regions.

	Organ	Level	Department	Recommendations
				- Implementation of a digital platform for water demand management, tracking real-time consumption. - Integration of Photovoltaic (PV) energy with desalination (salinity reduction); noting that reverse osmosis is capital-intensive without solar energy support. - Collaborative management of transboundary aquifers (shared among 3 countries) - Reinforcement of the participatory approach - Development of well batteries fed with advanced treated wastewater to act as a barrier against seawater intrusion (lessons learned from the Ben Arous pilot project to be applied in Gabès with enhanced treatment standards). - Protection of the unique coastal oasis; consider crop diversification strategies beyond dates in the Gabès area - Careful management of industrial by-products (phosphogypsum). - Addressing the technical challenges of farming with high salinity levels (reaching 7g/l). - Preventing marine salt-water intrusion into the groundwater.
7		Regional	CRDA	- Economic water management, reuse of Desert Joy water discharges in the Irrigated Schemes - Availability of the 2 studies on the reuse of rejects - Rehabilitation of the network of the PI des oases with enhancement of oasis products - Economic Water Management - Proposal for a programme on the reuse of Moorish bath water (carry out a feasibility study) - The feasibility study of the Irrigated Perimeters is available
8		Regional	CTCPG	- Small farmers: creating the balance of the local market - Promotion of geothermal products - Create a platform for collecting products from the GDAs (Society), to better organize them and market the products - Large companies can be incubators for small farmers - Photovoltaic solution to reduce energy consumption - Consult existing studies: Rehabilitation of oases (by CNEA), Use of bath water (by Bureau 3S) - Additional studies distinguishing between conventional waters and bath waters - Creation of geothermal projects

	Organ	Level	Department	Recommendations
9	**Ministry of Agriculture/Ministry of Higher Education**	National	INAT	- IT system/platform that covers the entire value chain, even the state had access to monitor diseases, prevent and fight diseases, with a dashboard for each partner - Developing an AI/Chat bot with access for each stakeholder to answer technical questions, makes it possible to offer a permanent service in real time - Develop controlled greenhouses that save up to 80% - The science exists and is available, but the farmer's know-how is lacking - Acting on the recovery of lost water - Improving the network to recover lost water "Non revenue Water" - Reducing energy consumption in agriculture through digitalization, as well as that of desalination plants (25 Kw/m3) - Work on the "Water" and "Carbon" footprint of all agricultural products - Consider that water scarcity is not new, it already depends on the region (low rainfall, skeletal soil) but rather on waste which is much more due to ignorance "information is not available"
10		National	INRGREF	- Define priorities with the local population, who are actively involved and contributing to the project - Asset status update - Consider agro-forestry, which is becoming very important, in particular the diversification of crops in tiers - Living Lab: Living Lab, transferring knowledge to farmers - Watershed management: local solution adapted by community, autonomy of the regions - Moving towards environmental solutions, promoting the "Water, Energy, Food Security" Nexus
11		Regional	IRA	- Actions according to the category of water (geothermal, grey (Moorish baths), black) - Drainage water recovery - Soil study of land irrigated by wastewater - Avoid the multiplicity of stakeholders: source of blockage, difficulty in knowing who does what
12	**Ministry of Economy and Planning**	National	DGI	- Develop a REUSE pilot city over an entire governorate or small town - Development of thermal tourism in El Hamma targeting NL tourists - Smart irrigation - See the experience of the production fodder office on pilot areas with REUSE

	Organ	Level	Department	Recommendations
				- Contact the Landscaping Society of Gabès - See the pilot sludge recovery experiment in Manouba - Plant remediation in unserviced areas - Strengthening territories
13		Regional	ODS	- Intervention on the collection of geothermal water, knowing that a study is underway for the reuse of bath water (estimated loss of 50l/s) - Connecting oases to bathwater - Establishment of a technical centre for water research, management and governance - Create a laboratory with the Water Institute for professionals and students - El Hamma: Acquisition of tertiary water treatment equipment (WG+ONAS) for use in agriculture (Hamma) - El Hicha: Installation of a desalination plant
14	**Department of Industry**	Regional	Gabès Technology Park	- Contact the ACDD: Citizenship and Sustainable Development Association - Contact the ORDG: The Regional Development Observatory of Gabès - Promoting the Water-Energy-Agriculture Nexus
15	**Governorate of Gabes**	Regional	Governorate of Gabes	- Decide what the Dutch side wants to do, on which axis can act, and then return to the Governorate - Listen to everyone - Consider water quality management - The Moorish baths sector is not organized, to be considered for a potential intervention - Developing REUSE, particularly in Toujène and Matmata - Possibility of organizing a consultation meeting within the Governorate, with all stakeholders, for the prioritization of actions that can be developed
16		Local	Delegation of El Hamma	- Opt for projects that have an impact on the local population and can be carried out in a short period of time - Develop a bath water recovery plant from El Hamma: 60% will be used by farmers (especially in the oases) and 40% by NL companies, the owner can be a Community company[7] - When deciding to launch a project in El Hamma, the delegation will be able to facilitate participation and organize a consultation meeting with ONAS, SONEDE, CRDA and the Municipality

[7] Community company: legal entity created by **Decree-Law No. 2022-15 of March 20, 2022** in Tunisia. a form of business that differs from traditional commercial companies (SARL, SA) and even associations, by its **social and territorial purpose**.

	Organ	Level	Department	Recommendations
17	**Ministry of the Environment**	National	ONAS	- Contribute to the realization of studies - Develop pilot projects, including a sludge drying plant - Developing a pilot agricultural site to improve the quality of the sludge and use it as composting - If a request for project proposal is made: define the date, duration and estimated budget, knowing that the ONAS can submit applications that are ready - Involve the regional ONAS and the concessionaires in the preparation workshops - Consider renewable energies that are interesting for REUSE and other energy-intensive activities
18		National	CITET	- Don't exclude an actor, which is not easy - Develop a charter with the majority of stakeholders (private, municipalities) - Integrate training - Integrate young people who have innovative ideas, through a call for applications and challenges to provide solutions for SMEs with water resources problems - CSOs can be ambassadors to advocate and support the project
19	**Ministry of Equipment and Housing**	National	DHU	- Creation of an operating room at the level of the Ministry of Equipment which will be connected to the National Security to monitor data on wadis, with the purchase of equipment (rain gauge, cameras for wadi levels) - Thinking about the sustainability of projects and actions implemented - Develop a pilot site for testing nature-based solutions, with Technical Assistance to carry out studies and works: The Gabès wadi can be used as a pilot site (Rain garden, housing estate in the polluting industrial zone, water tarpaulin under the sidewalks, sensors at the wadis level for flooding) The transfer will be to the priority areas defined in the strategy - Provide technical assistance by local experts
20	**Regional Civil Society Organizations**	Regional	GDA Chenchou 4	- Management of water leaks due to poor distribution design (excessive pumping during peaks that exceeds needs and subsequent discharge into nature), which requires a change in mindset, particularly through communication and awareness raising among farmers - Rehabilitation of networks to reduce leaks as well - Strengthening of the system for granting permits for wells (better organization and management by the State services)

	Organ	Level	Department	Recommendations
				- Support for capacity building in the management of water SLMs
21		Regional	FIDEL	- See the model developed by Desert Joy for the transformation of substrate waste into compost - Consider the involvement of the local population to prevent social tensions
22		Regional	Southern Fruit and Vegetable Cluster	- Valorisation of bath water, exporting companies are in favour of partnerships and the purchase of treated water
23	**International Financial Organizations and Institutions**	International	OSS	- Partnership opportunities for project implementation - See the initiative of the Green Corridor of Tunisia, built on the REUSE, developed in partnership with the Minister of the Environment - The solar plan for the use of renewable energies is available in southern Tunisia - Aligning with the State's priorities (see PAGIRE, Water Strategy 2050)
24		International	KFW	- Consumption management - Generating the resource - Transfer of know-how, particularly for ONAS - The WWTP installation faces the problem of land tenure status - Consider the needs of public companies that are suffering from the lack of qualified personnel following the mass retirement - Once the amount allocated, the idea and the duration of the project is defined, come back to the TFPs for consultation and more recommendations
25		International	WB	- Avoiding investment in infrastructure without considering the institutional aspect - Learn from lessons learned from previous investments - The aspect of governance must play an important role in any project, bearing in mind that the evaluation of progress has not taken place, the question that is still unanswered: who is the manager of the irrigated perimeters - For REUSE: several discussions have taken place, the institutional framework remains the big question (several stakeholders: Agriculture, Health, Environment, etc.) - Consider the Water 2050 strategy to be the reference document for the projects to be developed - The vision in relation to the water code is not yet clear

	Organ	Level	Department	Recommendations
				- Support the performance of operators (SONEDE, ONAS, Others) for better technical, commercial and financial management - The World Bank is in favor of collaboration in the design and implementation of projects on the Dutch side, the advantage it offers is the "investment income" which covers the management fees (in the order of 10% and more if the amount is large and paid in one go)
26		International	BAD	- Mobilization of a donation for underground dams to prevent evaporation (project in progress) - See the interest of the Netherlands in the management and recovery of solid waste at the level of the Municipality of Tunis, knowing that the study is finalized
27		International	BERD	- Support for funding, not donations - Avoid diluted one-off support - Post-creation support for SMEs/GDAs/Agripreneurs is very useful and currently notes a remarkable lack in the vast majority of projects - High demand in El Hamma for support for the creation of projects by young people, knowing that the potential is very high - Focus on changing business plans that must take into account climate change, niche markets - Introduction of new water management technologies (see the example of the establishment of a new palm variety with a better success rate) - Think about smart irrigation, which is in notable need
28		International	AICS	- Taking a phased and cautious approach - Environmental and health control is essential to create trust among the population - Supporting start-ups that will work on smart irrigation - Develop REUSE projects locally and use locally

4.2.2. Identification of convergences and divergences

The expectations of the actors are very numerous and varied, but are mainly focused on issues and avenues for improvement for water management, especially in the regional context of Gabès, with an emphasis on geothermal water, wastewater reuse (REUT) and modernization.

The consultations revealed a strong convergence of expectations regarding the identification of challenges (climate, network performance) and the prioritization of solutions (REUT, Desalination). The main divergence, although minimal in substance, lies in the prioritisation of specific actions and projects. This thematic grouping by strategic axes thus reflects this strong convergence of stakeholders around the following areas of intervention:

Chapter I: Diagnosis of the Sector: Structural Challenges, Climate and Degradation of Uses

This axis highlights the key constraints identified by stakeholders that impact water management in the South-East, focusing on climate challenges, the operational limitations of existing infrastructure, and usage-related bottlenecks.

I.1. Climate Constraints and the Emergency of Water Stress

The sector is facing a climate emergency, characterised by a drastic drop in rainfall (30 to 40%) which weakens all water ecosystems. Local rainfall, particularly in Gabès (120 mm), is insufficient to ensure natural leaching of the soil. This situation has created a major imbalance between growing needs and available resources, directly impacting the availability of drinking water.

The quality of the resource is compromised by the overexploitation of groundwater (particularly in Chenchou, due to uncontrolled drilling) and, on the coast of Gabès, by marine intrusion which degrades the quality of the water and, in turn, that of the soil. The sector suffers from a historical structural problem of resource management, which is too focused on mobilization (capture) rather than on conservation and efficiency. Furthermore, Evapotranspiration is also a significant challenge, notably the transformation of "blue water" into "green water", complicating water balance management.

I.2. Infrastructure Integrity and Operational Efficiency

The Ministry's priority remains drinking water supply (AEP). Currently, connections in the urban area stand at 100%, and the rural area at 95.7%. Despite this success, the existing infrastructure is characterized by low efficiency and a critical need for maintenance:

- **Significant System Inefficiencies:** The operational performance of certain networks requires urgent attention. For instance, Non-Revenue Water (NRW) levels can reach 45% in specific southern districts, such as the Gabès region. This is primarily due to physical leaks, commercial inaccuracies, and unauthorized withdrawals. Furthermore, the sustainability of resources is challenged by unregulated connections and the physical sensitivity of hydraulic infrastructure (including drilling equipment), particularly noted in areas like Gafsa, requiring targeted reinforcement and protection
- **Infrastructure Obsolescence:** Geothermal hot water systems suffer from widespread ageing. This deterioration poses significant operational safety challenges and thermal regulation risks for end-users. The financial burden of maintenance is substantial (8 MTND for piping), and the

complete system modernization is a long-term strategic project, requiring an estimated 1.6 MTND over a 10-year period for chiller upgrades.

- **Economic and Operational Viability:** The sustainability of water exploitation is challenged by the high capital expenditure (CAPEX) of **deep drilling** and the increasing **energy burden** related to pumping and distribution costs

I.3. Waste and Bottlenecks in Agricultural Use

The agricultural sector, the largest consumer of water, is identified as a major source of waste and inefficiency:

- Uncontrolled Waste: There is a preference for production at the expense of water (waste). Traditional agriculture urgently requires modernization, digitalization and better control of production, as well as targeted intervention on value chains (from the resource to the market).
- Lack of Standardization: The industry lacks clear guidelines, as illustrated by the example of the lack of standardization for the optimal dose of fertilization of crops (e.g. cereals).
- Dysfunctions of the GDAs: The Agricultural Development Groups (GDAs) are confronted with structural problems, in particular the weakness of their management, the absence of an organization that hinders access to water in rural areas, and problems related to the land aspect of the oases. For the oases, the problem lies specifically in irrigation management and the management of drainage water.
- Regional needs : For mountainous areas such as Matmata, there is a recognized need for drilling/boreholes to reduce the current water scarcity.

Chapter II: Development and Diversification of Alternative Resources

To address the growing water deficit, stakeholders spoke of the need to move towards alternative resources in order to increase water supply through the exploitation and securing of non-conventional resources, such as REUT, desalination and geothermal energy.

II.1. Wastewater Reuse (REUT)

REUT is seen as an under-exploited alternative resource, but essential for the future:

- Unfinished potential: There is a lack of tradition of wastewater use, which translates into poor exploitation of existing perimeters (2 perimeters in Gabès). For example, to date, 4000 m3/day are discharged into the Sebkha River by the wastewater treatment plant. For Gabès, the Ministry's objective is to use treated wastewater in industry and tourism, extending the scope beyond agriculture.
- Infrastructure and Regulatory Challenges: The sector is suffering from the ageing of wastewater treatment plants (WWTPs), which require rehabilitation, extension and integration of tertiary treatment. A revision of the REUSE standard (NT 106.03) is essential to unlock the potential.
- Experiments to be promoted: Conclusive tests are underway, such as the one at the OTD in Gabès West on 300 ha for the irrigation of fodder

II.2. Valorisation of Geothermal Waters and Bath Water

The South-East has a unique wealth that is not valued: geothermal energy and bath water.

- Thermal discharges: The high quantity of bath water discharges (700 l/s, estimated loss of 140 l/s) is not recovered. For Desert Joy, the discharge of water after heating is both an environmental challenge and a potential to be exploited.
- Economic Opportunities: There is a clear potential for economic recovery: if a program is designed for the recovery of bath water, companies are willing to buy the water.
- Obstacles: Irrigation of the oases of Gabès with bathwater is currently impossible due to the use of chemicals. Geothermal projects are difficult and complex (bearing in mind that the drilling is carried out by the CRDA).
- Experiences to be promoted: the pilot of irrigation of the forest and the park with the grey water of the Moorish Baths of Métouia developed by FIDEL, which could be duplicated.
- Training: The organization of a Master Class on the Recovery of Waste Heat at Low Temperatures is a key initiative.

II.3. Alternatives and Resilience through Desalination

Desalination and brackish water exploitation are pillars of future resilience.

- Improving water availability through brackish water and desalination is a major strategic direction.
- The potential to reduce social tensions is high: the distribution of part of the desalination water from the El Hicha Joy unit to local farmers is a concrete avenue.

Chapter III: Governance, Institutional and Framework for Action

The sustainable transformation of the water sector requires a profound revision of the policy framework. This axis brings together the institutional and organizational disfuntions mentioned by the stakeholders as well as the proposals for reform for a more coordinated and effective governance.

III.1. Governance Complexity and Reform Needs

The current institutional framework lacks clarity and hinders action:

- Fragmented Governance: The management of groundwater is clear (Ministry of Agriculture), but that of wastewater suffers from complexity due to the multiplicity of stakeholders (Ministries of Health, Environment, ONAS, Agriculture).
- Institutional Reform: A strategic restructuring is required to address overlapping mandates between water resource regulation and agricultural production, ensuring impartial governance. Regarding the management of Agricultural Development Groupings (GDA), a transition is underway to integrate rural water distribution into SONEDE’s jurisdiction. This move aligns with the Ministry's objective to standardize service quality and strengthen SONEDE’s operational capacity nationwide.

- Coordination: It is imperative to strengthen coordination with other institutions for information sharing, allowing risks to be anticipated rather than managed. A better organization of the stakeholders could allow the recovery of drainage water (treatment, recycling) and rainwater.

III.2. Socio-Organizational Challenges and Local Efficiency

Effectiveness at the local level is hampered by social and organizational factors:

- The execution of projects is delayed due to the spirit of the tribes and clans.
- The water situation is a source of tension, illustrated by the paradox of El Hamma: being the source of hot water, it does not benefit from the water, causing frustration among the local population.
- Intervention must be thought of in a holistic way on value chains (from the resource to the market) for maximum impact.

Chapter IV: Information, Digitalization and Knowledge Transfer

The modernization and resilience of the sector rely on knowledge management. This axis brings together the critical challenges and needs in digitalization, applied research and skills building for informed decision-making.

IV.1. Digitization and Improvement of Access to Data

The current situation is marked by the dilution and major confusion of technical information (e.g. on Facebook), and the absence of "capital" information.

Modernization requires more structured knowledge management:

- The sector needs Digitalization (as part of the major agricultural project), in particular to develop a document platform management software and improve indexing.
- Agridata, despite its potential as a "mine of information", is poorly exploited and requires technical support to simplify external use.
- ONAGRI, in its capacity as an "Agricultural Observatory" lacks visibility and needs to strengthen communication on the ONAGRI website and the Agridata platform, which is classified as the best Opendata.

IV.2. Research, Innovation and Expertise

Research must be oriented towards anticipating and securing uses:

- Urgency of Impact Assessments: There is a lack of data on the impact of REUSE, and the need for studies on the impact of wastewater chlorination on soil and plants.
- Emerging Risks: There is little monitoring of emerging pollutants (microplastics, antibiotics) and their consequences on health and agriculture.
- Innovative Solutions: Nature-based solutions exist, but still require detailed studies and tests (e.g. filtration of water by plants, recovery of rainwater).

- Risk Prevention: Despite the existence of a master plan for floods (no place is spared), there is a need for technical assistance (studies/research work) for innovation in flood protection.

IV.3. Training and Capacity Building

- Weakened popularization: The lack of confidence in AVFA's extension workers is an obstacle, accentuated by their unavailability (lack of rolling resources). The farmer remains the weakest link due to a lack of collaboration and support.
- Initiatives: The sector highlights specialised training actions, such as the organisation of a Master Class on Water Audit in Industry and Agriculture (Gabès, March 2026).

Chapter V: Funding, Partnerships and Priority Projects

This final axis consolidates financing expectations, strategic cooperation opportunities and the portfolio of priority investment projects, constituting the roadmap for the mobilization of external resources.

V.1. Financing Expectations and Economic Constraints

Funding is the most critical enabling factor:

- Immediate Needs: Resources need to be found for the implementation of projects, especially since requests for funding are already available. There is an active search for additional funding for the PAP project (Grand Sfax) and for the Master Plan projects (2026-2030) (e.g. Sludge Drying Unit).
- Financial Mechanisms: The project implementation approach can be optimized (The World Bank has optimized its project management model to offer *Value of Money* opportunities : coverage of management costs by the Bank and reinjection of interest).
- Costs: Operational costs are a constraint (deep boreholes, cost of electricity) hence the need to move towards the Water-Energy-Agriculture Nexus.

V.2. Portfolio of Key Infrastructure Projects

Several major investment projects have been identified:

- Drinking Water/Desalination: Seeking funding for the Jerba desalination plant and the extension of the Zarrat plant.
- Oasis and Irrigation: Seeking funding for the rehabilitation of the Irrigated Perimeter of El Hamma (13 million TND).
- Energy and Resilience: Construction of a 1 MWp photovoltaic power plant in the Matmata Nouvelle Industrial Zone (contributing to the energy transition).

V.3. International Cooperation and Strategic Partnerships

Cooperation is sought for financing and technical assistance:

- Partnerships: A strong willingness to develop more partnership in projects, strengthen collaboration and contribute to multi-donor projects. The objective is to be a partner in the implementation of cooperation projects and to strengthen the impact of projects.
- Focusing: Cooperation should be oriented towards the technical assistance components and the financing of activities. The contribution of the Dutch design offices is desired for the *Benchmarking*.
- Institutions: There is interest in becoming a member of the Water TFP and assessing the opportunity for the Netherlands to become a member of the OSS or the Board of Directors of the African Water Facility. The intervention must be oriented at the national level, and not only at the Gabès level.

Synthetic conclusion

The analysis of the data collected highlights a **challenging regional water situation**, characterized by climatic pressure, **infrastructure performance gaps**, and **substantial resource optimization needs** (notably a **45% Non-Revenue Water rate** and significant **irrigation inefficiencies**)

The diagnosis, summarized in **Axis I**, confirms that the current management, historically focused on mobilization, is no longer viable in the face of climate change.

Nevertheless, this reading of the constraints reveals a **strong convergence of expectations** between local actors, institutions and potential partners on areas for improvement:

1. **Secure and Diversify the Supply** through the immediate development of **alternative resources** (REUT, geothermal waters) (**Axis II**).
2. **Modernise Practices** and strengthen supervision through **institutional reforms, the strengthening of key operators (SONEDE)** and better coordination (**Axis III**).
3. **Invest in Knowledge and Technology** to master data and expertise (**Axis IV**).
4. **Mobilize resources** through strategic partnerships and a portfolio of priority infrastructure projects (**Axis V**).

The challenge is no longer just to manage the shortage, but to make a **complete transition to a sustainable management model**. The roadmap, materialized by the financing needs and priority projects presented in **Axis V**, now requires a firm commitment to transform these convergences of ideas into concrete actions.

4.2.3. Formulation of key recommendations

- **Prioritization of recommendations:**

All recommendations were compiled to identify those that were mentioned by several stakeholders. This will enable them to be prioritized and provide an initial outline of appropriate actions to be taken.

Table 8: Prioritization of recommandations

Recommendation Theme (Standardised)	Frequency (Nouvelle)	Priority (Frequency-based)
REUSE (Wastewater Reuse) / Sludge	9	Priority N°1
Governance, Coordination & Strategic Alignment	7	Priority N°2
Recovery/Reuse of Bath/Geothermal Water	6	Priority N°3
Network Rehabilitation/Management & NRW	5	Priority N°4
Local Approach / Involvement of the Population	5	Priority N°4
Smart Irrigation / Water-Saving Technologies	5	Priority N°4
Research & Studies (R&D)	5	Priority N°4
Digitalization / Platform / AI	4	Priority N°5
Energy-Water-Agriculture/PV Nexus	4	Priority N°5
Operator Reform/Improvement	4	Priority N°5
Support for GDAs / SMEs / Agris	4	Priority N°5
Partnership, Cooperation & Mobilization of Expertise	3	Priority N°6
Education, Know-how & Youth	3	Priority N°6
General framework / Quality	3	Priority N°6

This table highlights an unambiguous mandate structured around two absolute priorities: **REUSE (Wastewater Reuse)**, confirmed as the most awaited technical solution (9 mentions), and **Governance/Coordination**, which constitutes the essential institutional lever to unblock action (7 mentions). This core strategy is strongly complemented by the need to invest in **Applied Research** and **Water Efficiency** technologies.

- **Summary of Strategic Recommendations**

The grouping of stakeholders' proposals, based on the frequency of mentions, highlights priorities for action. These are based on a coherent set of institutional reforms, strategic orientations and capacity-building actions, which are considered essential to ensure the sustainability and structural transformation of the sector.

1. Governance, Strategic Alignment and Coordination

The strongest recommendation concerns the need to stabilize the framework for action to unlock technical initiatives (6 mentions).

- **Strategic Alignment:** Ensure that any intervention is strictly **aligned with the objectives of the Tunisian State** and uses the **National Strategy "Water 2050"** as a central reference document.
- **Reform and Clarification:** Require that the **governance aspect be an important part** of project design. It is imperative to **avoid investment in infrastructure without first clarifying the institutional framework** (role of the manager of irrigated areas, land tenure status of wastewater treatment plants, etc.).
- **Coordination: Coordinate interventions** formally, in particular through the **Water TFP**, and **avoid the multiplicity of stakeholders** for REUSE, which is a major source of blockage.
- **Local Decision:** Organize **consultation meetings within the Governorate** with all stakeholders for the **prioritization of actions** to be developed.

2. Systems Rehabilitation and Operational Efficiency

Action on existing infrastructure is considered to be a higher priority than the creation of new resources (5 mentions).

- **Optimizing System Efficiency:** Prioritize the **rehabilitation of distribution networks** (SONEDE, CRDA) and establish a **strategic maintenance schedule** to significantly reduce **Non-Revenue Water (NRW)**. These interventions should take precedence over the development of new water supply infrastructures
- **Pressure Management:** Implement better leak management by addressing **poor distribution design** (peak management and over-pumping).
- **Regulation:** Strengthen the system for granting **authorizations for wells** for better organization and management by State services.

3. Strengthening of Operators, GDAs and the Agricultural Model

Strengthening operational capacity and supporting local actors is essential (7 mentions combined).

- **Support for Operators: Support the performance of public operators** (SONEDE, ONAS) for better technical, commercial and financial management, in particular by considering the urgent need for **the renewal of qualified staff** following retirements. A targeted **transfer of know-how** is requested (in particular for ONAS).

- **Support for Local Actors: Support capacity building for the management of water SLMs** (lack of post-creation support).
- **Agricultural Valorization:** Create a **platform for collecting GDA products** to better organize and market them. Encourage **large companies to be incubators** for small farmers.

4. Partnerships, Financing and Social Acceptability

Success depends on a change of approach in the way projects are set up (5 mentions for the social approach and 3 for cooperation).

- **Social Acceptability:** Adopt a **participatory approach** as a basis. **Define priorities with the local population** and favor **watershed management** to ensure buy-in.
- **Trust:** Environmental **and health control is essential** to create confidence among the population regarding REUSE and new practices.
- **Financing Modalities:** Partners are encouraged to support **funding** (and not just grants) by favouring mechanisms that guarantee the **sustainability of projects** (avoid diluted one-off support).
- **Cooperation:** Develop a **partnership charter** with the majority of actors and focus cooperation on **Technical Assistance** by relying heavily on **local expertise**.

5. Innovation, R&D and Knowledge Transfer

The integration of technologies and the development of know-how are major levers (4 mentions for R&D and 3 for Training).

- **Technology Adoption:** Foster the **Water-Energy-Food Security Nexus** and integrate **renewable energy (PV)** to reduce costs. This is materialized by the Ministry's 10-year program (2026-2036) aimed at connecting **25,000 vulnerable families** in dispersed rural areas using individual, non-collective sanitation and photovoltaic solutions.
- **Training:** Implement know-how **transfer** mechanisms to fill the expertise gap among farmers.
- **Applied R&D:** Contribute to the **realization of studies** on environmental and health impacts (e.g. REUSE) and develop test sites for **Nature-Based Solutions (SbN).**
- **Youth and Innovation: Integrating young people** who have innovative ideas (start-ups) to provide solutions to water resources problems.

6. Projects and Pilot Initiatives: Roadmap and Modelling

This final axis presents the tangible realization of the priorities defined in the previous axes. It includes the portfolio of **major strategic programs (such as the national Nexus program)**, pilot initiatives, and feasibility studies. These actions require short or medium-term implementation and aim to model water efficiency, integrate technologies, and ensure the social acceptability of alternative resource management.

6.1. Strategic Program: Water-Energy-Food Security Nexus

Domain	Specific initiative	Objective
National Supply / Social Impact	**Implementation of the 10-year (2026–2036) Water-Energy-Food Security Nexus program.**	Supplying drinking water to 25,000 vulnerable families in mountainous, forested, and border areas using individual solutions (non-collective sanitation and PV solar energy production).

6.2. Pilot Projects for Valorization and REUSE

Domain	Specific initiative	Objective
REUSE/Cities	Develop a **REUSE Pilot City** over an entire governorate (or small locality)	To serve as a model for the full integration of REUSE at the territorial level.
REUSE/Agriculture	**Acquisition of tertiary water treatment equipment** for use in agriculture (El Hamma).	Ensuring safe and compliant use of treated wastewater.
Sludge/Composting	Develop a **Pilot Project for a Sludge Drying Station** and an agricultural site to use sludge as composting.	Recover the by-products of wastewater treatment plants, reduce waste and enrich the soil (circular economy).
REUSE/Security	Install a **battery of wells powered by tertiary treated wastewater** to create a barrier against the infiltration of the water table by seawater (Gabès).	Securing the coastal water table.
Geothermal recovery	Develop an **El Hamma Bath Water Recovery Station** (target: 60% for agriculture, 40% for companies).	Implement an economic model for the recovery of geothermal waste.
Agricultural Innovation	Developing **Controlled Greenhouses** and Pilot Sites for **Smart Irrigation**.	Reducing water consumption in agriculture by up to 80% and testing new varieties.

6.3. Feasibility Studies and Test Sites

Domain	Specific initiative	Objective
Bath Water	Carry out a **detailed Feasibility Study** for a Moorish **bathwater reuse programme**.	To determine the technical and economic feasibility and acceptability of REUSE of bath waters.
Nature-Based Solutions (SbN)	Develop a **Pilot Site for the Testing of Nature-Based Solutions** (e.g. Wadi of Gabès for rainwater and flood management).	Test innovative environmental solutions (rain garden, plant filtration) before their deployment.
Resources/Geothermal	Create **Geothermal Projects** (based on existing studies).	Exploiting the energy and water potential of deep aquifers.
Environmental Aspect	Conduct **Studies on the Impact of Wastewater Chlorination on Soil and Plants** (REUSE).	Complete the trust framework (health and environmental) for REUSE.

6.4. Enabling and Partnership Initiatives

Domain	Specific initiative	Objective
Digitizing	Develop an **IT System/Platform** covering the entire value chain (including disease surveillance and a Dashboard).	Improve monitoring of water exploitation, traceability and decision-making support.
Training/Innovation	Setting up **Living Labs** and mechanisms for the integration of **young innovators** (call for applications).	Transferring know-how from science to the farmer and stimulating local innovation.
Operations/Security	Creation of an **Operating Room** (Ministry of Equipment) connected to National Security.	Monitor data on wadis (rain gauges, cameras) to anticipate and prevent flooding.

Conclusion of the Recommendations Part

The in-depth analysis of the stakeholders' proposals leads to a strong **strategic convergence**: the water challenge of south-eastern Tunisia cannot be solved by isolated actions. The solutions are intrinsically linked and require a paradigm shift.

The recommendations are based on a twofold requirement:

1. **The Technical Imperative:** Priority must be given to securing and **scaling up alternative resources,** placing the Reuse of Treated Wastewater (REUT) and geothermal water recovery at the forefront of the national strategy. This effort must be complemented by immediate, structured action **to rehabilitate networks and significantly mitigate Non-Revenue Water (NRW).**

2. **The Sustainability Imperative:** Any technical initiative must be anchored in renewed **governance**. It is essential to ensure **institutional clarity** and the **strengthening of key operators (SONEDE, ONAS),** as well as the adoption of a **local and transparent** participatory approach.

By integrating **Water-Energy-Food Security Nexus solutions**, **water-saving technologies** and **Nature-based Solutions (SbN),** the proposed action plan offers a comprehensive investment platform. It makes it possible to transform climate risk into an opportunity for regional modelling, provided that the financing is directed towards **sustainable, technologically integrated and socially acceptable projects**, acting on both infrastructure and know-how.

Conclusion

Tunisia is facing a situation of structural water stress (<400 m³/capita/year), exacerbated by climate change and persistent drought. The challenges are amplified by **structural governance constraints** (institutional fragmentation, 1975 legal framework **requiring modernization**) and the intensive overexploitation of groundwater, with extraction rates far exceeding natural renewal capacities

The Gabes region, which is essential to Tunisia's economy and characterized by a unique coastal oasis, is a focal point for these tensions. The diagnosis reveals:

1. **Exacerbated competition of use:** Intense competition for resources between irrigated agriculture (about 43% of regional consumption), industry (31%) and drinking water, threatening the socio-economic balance and sustainability of traditional oasis agriculture.
2. **Environmental Challenges:** The integrity of water resources is affected by marine salt-water intrusion resulting from the intensive exploitation of coastal aquifers. Additionally, industrial environmental footprints necessitate careful management to preserve the delicate balance of the oasis ecosystem.

The in-depth analysis of the expectations of stakeholders, whether national, regional or international, revealed a strong strategic convergence. The water challenge of the South-East cannot be solved by isolated actions, but requires a paradigm shift based on a double imperative of intervention:

1. The Technical Imperative: Securing Alternative Resources

The absolute priority is to secure and massify unconventional resources to relieve the pressure on conventional aquifers.

- **Reuse of Treated Wastewater (REUT): This is the most anticipated technical solution** and a major lever for future water security, with the potential to reduce the national water deficit by 20% to 33% by 2050.
- **Valorization of Geothermal Water and Desalination:** The rational exploitation of geothermal water and the acceleration of desalination projects (such as the one in Zarat) are essential to diversify the water supply.

- **Network Rehabilitation:** Immediate and structured action is required to address **Non-Revenue Water (NRW)**, which reaches up to **30% in specific regions**. Reducing these **operational inefficiencies** is critical to preserving Tunisia's limited water resources

2. The Sustainability Imperative: Renovating Governance

Any technical initiative must be anchored in a renewed and effective governance to guarantee the sustainability of investments.

- **Coordination and Strategic Alignment:** Strengthening inter-institutional coordination, in particular through the Water TFP, is the essential lever to unblock action.

- **Capacity Building:** It is crucial to strengthen the capacities of national operators (SONEDE, ONAS) and regional and local structures (CRDA, GDA), notably through the planned transfer of GDA management to SONEDE. This must be promoted via a local and transparent participatory approach.
- **Emphasis on Innovation:** The convergence also highlights the need to invest in **Applied Research (R&D)** and **Smart Irrigation** technologies to optimize water consumption at the farm level.

In conclusion, this report provides a detailed roadmap for the future engagement of the Netherlands in Tunisia. The opportunities for cooperation lie at the crossroads of the Water-Energy-Food Security Nexus. By moving towards sustainable and socially acceptable projects that integrate digitalization, water-saving technologies, PV energy production and know-how transfer, foreign investment can transform climate risk into an opportunity for sustainable and inclusive regional development in southeastern Tunisia.

APPENDICES

Appendix I : List of interviewed stakeholders

1. National Stakeholders

	Department	Institution
1.	Water Resources Secretariat of State	M. Agriculture
2.	BPEH	M. Agriculture
3.	ONAGRI	M. Agriculture
4.	SONEDE	M. Agriculture
5.	DGRE	M. Agriculture
6.	DGGREE	M. Agriculture
7.	CITET	M. Environnement
8.	ONAS	M. Environnement
9.	DHU	M. Equipement
10.	DGI	M. Economy
11.	INRGREF	Research Institute
12.	INAT	Education Institute

2. Regional Stakeholders

	Department	Institution
1.	Gabès Government/SG	Regional authority
2.	El Hamma Delegate	Local Authority
3.	ODS	M. Economy
4.	CRDA Gabès	M. Agriculture
5.	CTCPG	M. Agriculture
6.	IRA Gabès	Research Institute
7.	Technopôle de Gabès	M. Industry
8.	Cluster des primeurs du sud	NGO
9.	GDA Chenchou 4	NGO
10.	FIDEL	NGO

3. PTF

	Organization	Type
1.	KFW	IFI
2.	WB	IFI
3.	EBRD	IFI
4.	AfDB	IFI
5.	AICS	Technical Partner
6.	OSS	Technical Partner

Appendix II: List of documents

1. Plans

- Action Plan for Integrated Water Resources Management in Tunisia-PAGIRE-Summary.pdf
- PAGIRE_Tunisie_2023

2. Strategies

- Strategy “Water 2050”
- SNTE
- Stratégie Dvp Gabès_2030.pdf
- Stratégie DD des Oasis-TN-2015.pdf
- Code_des_eaux_2010_tunisie.pdf

3. Projects

- fiche-thematique-Eau_2025-AICS.pdf
- GIRE_GIZ_Project fact sheet.docx
- Info_Projet PISEAU.docx
- Liste des projets_matrice 2024_AKBD.docx
- nexus_brochure_version_web.pdf
- Nexus-OSS_Project fact sheet.docx
- PDR SUD_JICA_Project fact sheet.docx
- PGE Gabès_Infos.docx
- Projet JICA fr.pdf
- PROJETS IRA.docx
- ValEUr Gabès.docx

4. Reports

- ATLAS_Eng.pdf
- AtlasGabesFr-2011-MEHAT.pdf
- BPEH_MARHP_Rapport annuel eau-2023.pdf
- CHIFFRES GABES-2023.pdf
- Dév régional_Etudes stratégiques et sectorielles_2011-2022_Mai 2025_MDICI.pdf
- Impact_du_CC_sur_la_s_curit_alimentaire_1752137870.pdf

- inventaire_de_lagrobiodiversit_oasienne_Kbilli_gafsa_gabes.pdf
- MODALITÉS DE GESTION DES AQUIFÈRES DE LA JEFFARA DE GABÈS EN LIEN AVEC LES ÉCOSYSTÈMES OASIENS-2017.pdf
- OSS-SASS-CS1_fr.pdf
- PGES-TIRE-STEP-EL-HAMMA_NO.pdf
- Rapport Activité-INRGREF_2020.pdf
- Rapport National Eau-2024.pdf
- rapport_synthese2023-SONEDE.pdf
- Rapport-MED-2050.pdf
- Rapport-PGIP-12112024.pdf
- RNE2021_VersionFianle_MarsF2023_ONAGRI.pdf
- Tunisia Update NDC-french-2021.pdf

5. Environment and Social Impact Assessment (ESIA)

- Rapport Environnement et DD_OTEDD_gabes_2015.pdf
- PGES-TIRE-STEP-EL-HAMMA_NO.pdf
- FODEP.pdf
- EIES-AWWTP-STEP Gabès.pdf
- Cahier des Charges_ANPE_Transfert d'eaux.pdf
- 61-02-EIES-desert Joy El Hicha-mission 1-def-3.pdf

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