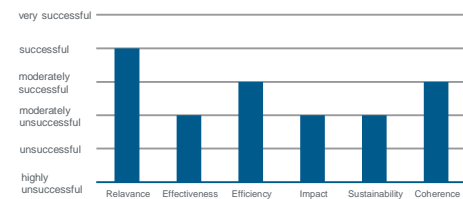


# Ex-post evaluation

## Irrigation perimeter Medjerda valley, Tunisia

|   |   |                              |      |
|---|---|------------------------------|------|
| <b>Title</b>                                    | Modernisation of irrigation perimeters in the Medjerda valley   |                              |      |
| <b>Sector and CRS code</b>                      | Agricultural water resources (CRS code: 31140)  |                              |      |
| <b>Project number</b>                           | Investment measure: 2003 66 336; Complementary measure (CM) 2004 70 021   |                              |      |
| <b>Commissioned by</b>                          | German Federal Ministry for Economic Cooperation and Development (BMZ)  |                              |      |
| <b>Recipient/Project-executing agency</b>       | Ministère de l'Agriculture/Direction Générale du Génie Rural et de l'Exploitation des Eaux (DGGREE) and Commissariat Régional au Développement Agricole (CRDA) de Manouba |                              |      |
| <b>Project volume/<br/>Financing instrument</b> | Investment measure: EUR 23.07 million/FC grant; basic and advanced training measure EUR 214,032/FC grant; CM EUR 2,021 million/FC grant                                   |                              |      |
| <b>Project duration</b>                         | 2006 (financing agreement) to 2014 (final inspection)   |                              |      |
| <b>Reporting year</b>                           | 2023  | <b>Year of random sample</b> | 2022 |

Overall rating:  
**moderately unsuccessful**



## Objectives and project outline

The objective of the project at outcome level was to make more efficient use of water resources and soil in the project area. At impact level, a sustainable contribution should be made to increasing the agricultural incomes of the established facilities in water user groups. As part of the project, the obsolete gravity irrigation system in the Lower Medjerda valley in Tunisia, covering an area of approx. 4,396 hectares, was replaced by a modern pressure irrigation system.

## Key findings

The project was able to provide the basis for more efficient and resource-conserving irrigation in the project area by modernising the irrigation perimeters. However, the impacts and sustainability of the project are significantly impaired by a drastic and ongoing deterioration in general water availability after the end of the implementation period.

- The core problem of high water losses and inefficient resource management was correctly identified and addressed appropriately. However, the risks of drought phases were not sufficiently taken into account in the design.
- The project fits in well with Tunisian sector policy and German-Tunisian cooperation. Potential synergies with TC projects remained untapped.
- The outcome targets were only partially achieved. The land use intensity, yield situation and collection rate of water charges were below target. However, the project contributed to reducing water losses.
- No significant income improvements were observed. However, significant infrastructure and administrative scope for times of better water availability was created.
- Water shortages and the consequences of climate change are having a negative impact on the sustainability of the project's results.

## Conclusions

- The decision to modernise existing irrigation perimeters rather than the reclamation of agricultural land should be highlighted positively.
- The integration of the complementary measure into the project can be evaluated as profitable for both the target group and the project-executing agency.
- Stronger integration of measures for adjustment to climate change could have increased or safeguarded the effects of the project.
- Participative approaches can promote the acceptance of measures in changing contexts and contribute to more ownership within the target group.

## Ex post evaluation – rating according to OECD-DAC criteria

### General conditions and classification of the project

Like most countries in the Middle East and North Africa (MENA) region, Tunisia has limited renewable water resources and is classified as a water stress country with a water availability of 470 cubic metres per capita.<sup>1</sup> The scarce water supply is unevenly distributed across the country and is used intensively. This has already led to an increasing scarcity of water resources, which is further exacerbated by the effects of climate change (e.g. frequent drought periods). The agricultural sector consumes most of the country's existing water resources at 80%.<sup>2</sup>

The water sector in Tunisia was facing considerable challenges as far back as the early 2000s. The country was suffering from water scarcity at the time due to limited natural resources and an arid climate.<sup>3</sup> From 1999 to 2002, Tunisia also experienced the worst drought in 50 years, affecting agricultural producers in particular.<sup>4</sup> The use of outdated irrigation methods led to inefficient water use, which in turn increased water scarcity and led to environmental problems such as land degradation. In both urban and rural areas, water waste was a problem exacerbated by outdated infrastructure and leaks. In addition, inadequate wastewater treatment in urban areas had a negative impact on water quality.<sup>5</sup> Against this background, the project evaluated here was designed in 2003 and implemented from February 2006 to autumn 2014. The local final inspection was carried out in October 2014.

With regard to the project-executing agency structure, the project had a number of special characteristics. It was coordinated by the specialist department DG/GREE (Direction Générale du Génie Rural et de l'Exploitation des Eaux) of the Ministry of Agriculture in Tunis. However, the project-executing agency was the regional agricultural authority (Commisariat Régional au Développement Agricole; CRDA) located in the governorate of Manouba. The implementation of the modernisation project was in turn delegated to an implementing organisation (Unité de Gestion du Projet; UGP) founded by the CRDA.

### Brief description of the project

As part of the project, the obsolete gravity irrigation system in the Lower Medjerda valley in Tunisia, covering an area of approx. 4,396 hectares, that can only be used in a few sub-areas, was replaced by a modern pressure irrigation system. The investment measures included the demolition of the existing irrigation infrastructure, the construction of new pumping station and equalisation basins in addition to the underground transport and distribution network, as well as the rehabilitation and expansion of the existing drainage facilities and the agricultural road network. The modernisation should enable both the use of water-saving irrigation methods and demand-oriented, permanent water supply. The project target group was the agricultural facilities in the project area organised in water user groups (Groupements de Développement Agricole; GDA), to which the operation and maintenance of the facilities were transferred after the project was completed. The modernised irrigation areas comprise five irrigation sectors (Mansoura, Sidi Néji, Habibia, Bir Aouini and Mehrine) with a total of six GDAs in the governorate of Manouba west of the capital city of Tunis. The GDAs and the project-executing agency were also supported as part of a complementary measure and a training measure (basic and advanced training measure) to ensure project success. The modernisation measures should ensure more efficient use of water resources and soil in the project area (outcome objective) and make a sustainable contribution to increasing agricultural incomes in the project area (impact level).

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1 World Bank (2007). Evaluation du Coût de la Dégradation de l'eau en Tunisie. Report n° 38856-TN, p. 68.

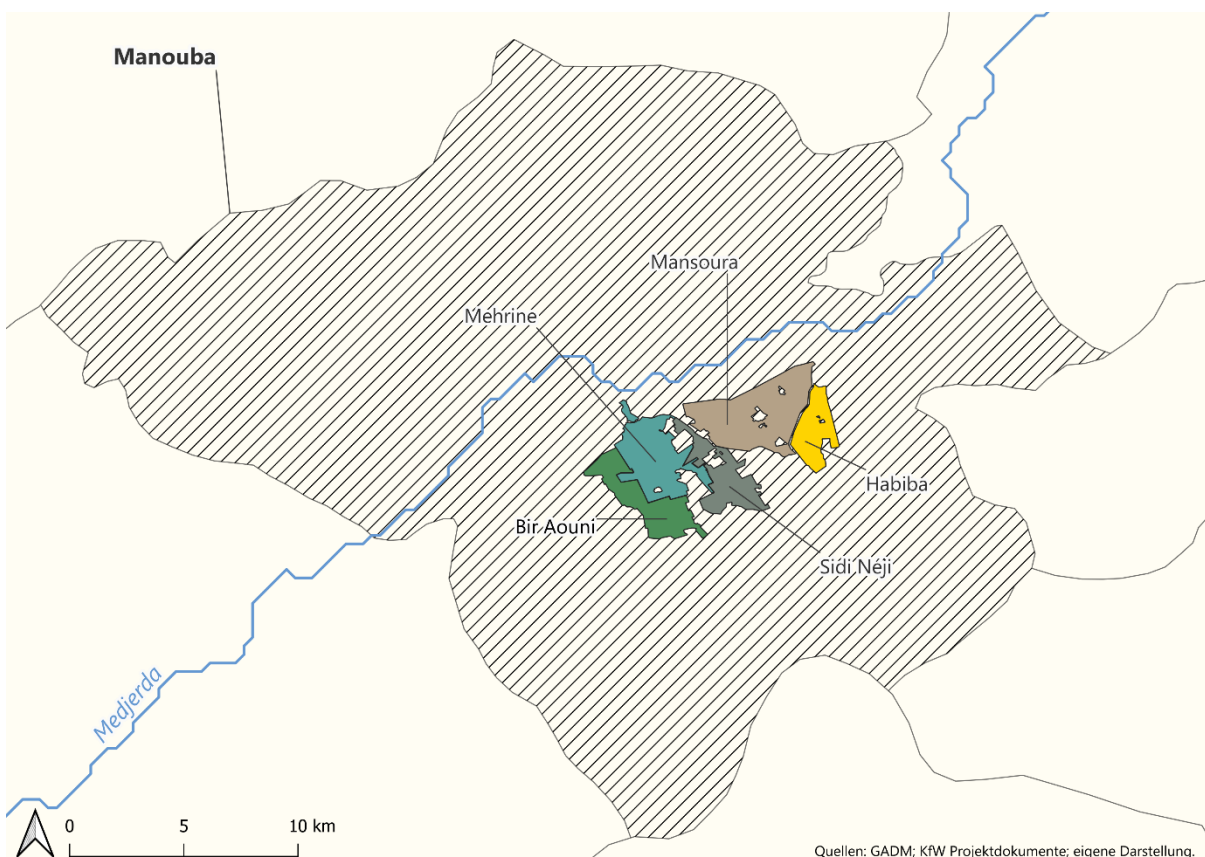
2 Souissi, A., Mtimet, N., McCann, L., Chebil, A., & Thabet, C. (2022). Determinants of Food Consumption Water Footprint in the MENA Region: The Case of Tunisia. *Sustainability*, 14(3), 1539.

3 Gaaloul, N. (2011). Water resources and management in Tunisia. *International Journal of Water*, 6(1-2), 92-116.

4 Ghoneim, E., Dorofeeva, A., Benedetti, M., Gamble, D., Leonard, L., & AbuBakr, M. (2017). Vegetation drought analysis in Tunisia: A geospatial investigation. *J. Atmos. Earth Sci*, 1, 1-9

5 Gaaloul, N. (2011). Water resources and management in Tunisia. *International Journal of Water*, 6(1-2), 92-116.

Map of the project country incl. project areas (governorate of Manouba)



## Breakdown of total costs

|                                 |                    | Inv.<br>(planned) | Inv.<br>(actual)   | Complementary<br>measure<br>(planned) | Complementary<br>measure<br>(actual) |
|---------------------------------|--------------------|-------------------|--------------------|---------------------------------------|--------------------------------------|
| <b>Investment costs (total)</b> | <b>EUR million</b> | <b>25.00</b>      | <b>23.07</b>       | <b>1.74</b>                           | <b>2.02</b>                          |
| Counterpart contribution        | EUR million        | 9.75              | 9.25               | 0                                     | 0                                    |
| Debt financing                  | EUR million        | 15.30             | 14.45 <sup>6</sup> | 1.74                                  | 2.02                                 |
| <i>Of which budget funds</i>    | EUR million        | 5.1               | 4.82               | 1.74                                  | 2.02                                 |

## Evaluation according to OECD-DAC criteria

### Relevance

#### *Policy and priority focus*

Water policy in Tunisia has changed and evolved significantly over the years. From the 1960s to the 1990s, the main focus area of policies was on supply shaping, particularly through the building of water facilities and centralised resource management. The country was involved in the identification of water potential, mobilisation of identified resources and hydraulic development. Tariff policy also played an important role, but tariff increases were no longer implemented after 2003, resulting in low covering of the costs.<sup>7</sup>

The years 1990-2010 saw increased mobilisation of supply (e.g. through the building of large dams, hill lakes, wells as well as collection and distribution facilities) and the start of the transition to demand management, with the aim of balancing demand and resource availability. The objectives of the reformed water policy also included the optimal use of available resources and were accompanied by significant institutional (promotion of user associations, decentralisation of water management), legal (internalisation of externalities according to the polluter-pays and user-pays principle) and economic reforms (objective of a “true price”, limitation of state interventions).<sup>8</sup>

Since the 2010s, Tunisia’s water policy has evolved towards a sustainable and efficient water supply. Greater emphasis was placed on the promotion of decentralised approaches with greater involvement of the different decision-making levels. The new constitutions of 2014 and 2022 place particular emphasis on the protection of water resources and the right to a clean environment. Demand-driven water management strategies were developed, including the modernisation of irrigation groups, climate change adjustment measures and the promotion of environmentally friendly agriculture techniques. The long-term water strategy project “EAU 2050” aims to provide a holistic, participative and innovative vision for water resource management to ensure a sustainable and efficient water supply for Tunisia by 2050.<sup>9</sup>

In terms of concept, the project evaluated here was therefore aligned with the partner’s policies and priorities at the time of the appraisal and during the implementation phase, and was suitable for making a contribution to the more sustainable use of existing water resources. The existing framework conditions in the water sector in Tunisia were taken into account. In the agricultural sector, too, the project’s conceptual objectives were in line with those of the 10th development plan (2002 – 2006) and subsequent plans drawn up by the Tunisian government.

The project also fits in with the long-standing German DC commitment to the use and protection of Tunisia’s water resources.<sup>10</sup> At the time of the MP 2003, there was no joint programme proposal for DC programmes in

<sup>6</sup> The debt financing consists of a budget loan of EUR 4.81 million and a KfW loan of EUR 9.63 million.

<sup>7</sup> MARHP (Ministère de l’agriculture, des ressources hydrauliques et de la pêche) (2016). Report national du secteur de l’eau. Année 2016.

<sup>8</sup> FAO (2023). Analyse de la gouvernance de l’eau dans la basse vallée de la Medjerda – Tunisie.

<sup>9</sup> Ibid.

<sup>10</sup> KfW (2003). MV – Modernisation of irrigation perimeters in the Medjerda valley.

Tunisia.<sup>11</sup> Instead, the then DC portfolio in the priority area “Environment and water” was based on a priority area strategy paper that was adopted with the Tunisian government in 2003 and set as the overall objective a contribution to the sustainable development of Tunisia. A modification of the priority area and its future design was recorded between the Federal Ministry for Economic Cooperation and Development (BMZ) and the Tunisian side in the minutes of the “Comité de Suivi” of December 2009, and included a focus on the areas of water and climate as well as the follow-up of a thematic-regional approach. Furthermore, “integrated water resource management” and “irrigation” were defined as part of the portfolio. As a result, the project evaluated here was additionally in line with the modified focus and the DC programme “Water” newly set up at the end of the implementation phase, which aims to “improve the living conditions of the population in disadvantaged urban and rural regions of Tunisia on the basis of a balanced water inventory and environmental sustainability”. From today’s perspective, the project also fits in seamlessly with the German focus on cooperation with Tunisia, which includes the core theme of “environment and natural resources”. As part of this focus and especially within the area of action water, Germany is orienting its efforts towards the sustainable use of limited water resources, for example through the rehabilitation of existing irrigation systems or the introduction of efficient irrigation techniques.<sup>12</sup>

### ***Focus on needs and capacities of participants and stakeholders***

Tunisia has a limited supply of water. The available water is estimated at around 4.9 billion cubic metres per year. This makes Tunisia what is known as a “severely water-stressed country”.<sup>13</sup> This has a major impact on agriculture, which is one of the country’s most important economic sectors. Irrigated agriculture accounts for about 35 to 40% of the value of agricultural production, 20% of agricultural employment and 20% of the value of agricultural exports.<sup>14</sup> Regular shortages of surface water, the expansion of irrigated areas and the legal and illegal building of deep wells lead to overutilisation of groundwater resources.<sup>15</sup> The project addressed this problem by aiming to achieve more efficient and resource-conserving water use. The present project envisaged the modernisation of five geographically related sectors (see map of project areas) of the Basse Vallée de la Medjerda (Lower Medjerda Valley). The sectors were selected as part of a feasibility study based on socio-economic and technical selection criteria.<sup>16</sup> It also proposed the conversion of existing supply-driven gravity irrigation into a demand-driven irrigation system that allows the application of modern, efficient technologies on the parcel of land.

The project’s target group was farms organised into six water user groups (Groupement de Développement Agricole; GDA) in the five sectors of Mansoura, Sidi Néji, Habibia, Bir Aouini and Mehrine of the Tunisian governorate of Manouba, west of the capital city of Tunis. Manouba emerged from the former governorate of Ariana in 2000 as a result of a regional reform and covers a total area of 105,150 hectares, of which 97.4% is classified as agricultural land and 87.6% as arable land. Within this land use, cereal crops dominate with around 47%, followed by fruit and other permanent crops, which account for around 26%, and feed crops, which occupy around 18.5% of the total usable area. Land use had a total intensity of only around 88% at the time of the appraisal.<sup>17</sup>

Of the total irrigation area of the governorate (25,516 ha), in 2003 approximately 20,940 ha (82%) were covered by public irrigation perimeters under CRDA Manouba administration. These were almost exclusively part of the gravity irrigation system of the Lower Medjerda valley, which was created in the early 1950s and comprises a continuous irrigation area of approximately 27,000 ha. However, due to the poor condition of the irrigation systems and the resulting restrictions for the irrigation economy, this area was not fully used. The irrigation sector plays a huge role in agricultural production, employment and income throughout the country and especially within the project area.

The project’s intended target group consisted predominantly of smallholders: approximately 40% of the target group had less than five hectares of land and approximately 82% had less than 10 hectares at the time of the appraisal. A total of 601 holdings with an average size of 6.8 ha were to be reached. For the vast majority of

<sup>11</sup> KfW/GIZ (2011): Joint reporting on the DC programme “Environment and Water”.

<sup>12</sup> KfW (2023). Tunisia Online: <https://www.kfw-entwicklungsbank.de/Internationale-Finanzierung/KfW-Entwicklungsbank/Weltweite-Pr%C3%A4senz/Nordafrika-und-Nahost/Tunesien/>.

<sup>13</sup> KfW (2023). Online: <https://www.kfw-entwicklungsbank.de/Internationale-Finanzierung/KfW-Entwicklungsbank/Weltweite-Pr%C3%A4senz/Nordafrika-und-Nahost/Tunesien/>; FAO (2023).

<sup>14</sup> STUDI (2019). Collecte et analyse préliminaire des données existantes et recadrage méthodologique. Report de démarrage, stage 1.

<sup>15</sup> FAO (2023). Analyse de la gouvernance de l’eau dans la basse vallée de la Medjerda – Tunisie.

<sup>16</sup> KfW (2003): MV – Modernisation of irrigation perimeters in the Medjerda valley.

<sup>17</sup> KfW (2003). MV – Modernisation of irrigation perimeters in the Medjerda valley. The selection criteria were: (1) Predominance of a small-scale farm structure, due to the generally associated, higher usage intensity; (2) low risk of future land loss due to expansion of urban agglomerations in the project area; (3) existence of a Groupement d’Intérêt Collectif (GIC); (4) minimal problems with regard to land law and current debt situation of the farms



beneficiaries (89%), rural and, in particular, agricultural activities were the main source of employment and income. Only 4% of the beneficiary holdings were operated by tenants.<sup>18</sup> At the time of the appraisal, there were frequently conflicts in the project region about water access between smallholders and large owners as well as overlying and underlying parts of the irrigation system. Lack of access to irrigation can lead to marginalisation of economically disadvantaged farmers.<sup>19</sup> To prevent or resolve such conflicts, sustainable and fair management of water resources is crucial. This requires the cooperation of all parties involved, clear regulations and institutions, as well as measures to increase water resource efficiency and quality.

With the aim of increasing water availability and efficiency of water use, and therefore contributing to higher crop yields with lower water consumption, the proposed modernisation measures addressed the challenges described above and the core problem. The project was geared to the needs of the target group. Conceptually, it had the potential to reduce the marginalisation of smallholders in the project area, where water is scarce, and strengthen their ability to sustainably manage water resources, thereby leading to an improvement in the target group's living conditions.

### ***Appropriateness of design***

At the time of the appraisal, the existing irrigation infrastructure was in a desolate state due to the advanced age and insufficient maintenance of the facilities. As a result, only supply-oriented irrigation was possible, which resulted in very high water losses and low irrigation efficiency in the five sectors. In addition to the inefficiency of the distribution system, the very poor maintenance and functional condition also led to increasingly serious problems between the upper and lower sections of the system, as regular and sufficient supply was no longer possible for large areas. The decision to modernise/rehabilitate existing irrigation perimeters instead of tapping into new perimeters amid the already very tense water situation would also seem judicious today. The development of new irrigation perimeters normally requires additional land use, which can intensify environmental impacts and lead to land conflicts if the areas are already populated. The modernisation of existing perimeters can therefore contribute to sustainability and the protection of the environment, as well as minimise social impacts. Modernisation is also in most cases more cost-effective and less time-consuming than new development, as the latter involves considerable planning costs as well as investments in infrastructure and land procurement. Nevertheless, from today's perspective, the time schedule underlying the project at the time of conception can be described as too optimistic. In addition, all relevant interview partners confirmed during the evaluation that the proposed solution or the conversion to a pressure irrigation system was the most technically feasible solution at the time.

The theory of change underlying the project links to the correctly identified core problem of lack of water availability and inefficient water use in that the obsolete gravity irrigation system, which can only be used in a few sub-areas, was to be replaced with a more modern pressure irrigation system. Specifically, the project envisaged the demolition of the existing irrigation infrastructure, the construction of new pump stations, equalisation basins and an underground transport and distribution network, as well as the rehabilitation and expansion of the existing drainage facilities and the agricultural road network. These investment measures and the supplementary introduction of water-saving techniques at parcel level (by the farms themselves) were intended to create the technical conditions for resource-saving and more efficient use of water and land (outcome objective). Based on this, an increase in the agricultural income of the target group in the project area was to be made possible via yield increases in agricultural production as an overarching objective (impact) as well as an associated improvement in the social living conditions of rural households. Training and education measures were also set to help smallholders learn and implement efficient agricultural practices in order to further reduce water consumption and later take over the operation of the modernised plants themselves. Furthermore, the project aimed to strengthen the social and political negotiating power of the water use groups newly established close to the start of the project by enabling them to participate more actively in water resource management and a fairer distribution of scarce water resources through the participatory approach.<sup>20</sup>

The theory of change is plausible and verifiable from both the perspective at the time and today, assuming constant water availability in the system. In addition to water availability – which is outside the project's sphere of influence but is essential for its success – other factors influence the plausibility and, in particular, the strength of the impact relationships. For example, the extent of more efficient use of resources (outcome) depends not only

<sup>18</sup> KfW (2003). MP – Modernisation of irrigation perimeters in the Medjerda valley; KfW (2014): final inspection report.

<sup>19</sup> FAO (2023). Analyse de la gouvernance de l'eau dans la basse vallée de la Medjerda – Tunisie.

<sup>20</sup> Overall, strengthening the social and political power of water use groups is an essential step in the promotion of sustainable development, social justice and environmental protection in connection with the sustainable and efficient use of scarce water resources.

on modernisation measures, but also whether (1) illegal (ground) water withdrawal is stopped/reduced, (2) the CRDA has sufficient human and financial resources to be able to carry out regular operating and maintenance measures, (3) the tariff system sets sufficient incentives for resource-conserving water withdrawal and generates sufficient income, and (4) the companies request and receive loans for the introduction of water-saving techniques. The postulated relationship between yield increases and an improvement in the living and income situation is plausible and empirically proven on many occasions. The strength of this correlation depends on other external factors: 1) Farmers have the necessary input factors that influence crop yields (sufficient labour, seeds, fertilisers and pesticides), as well as suitable distribution channels, 2) producer prices do not fall, 3) land law issues have been clarified and 4) there are no serious environmental or climate disasters.

To measure target achievement at outcome level (more efficient use of water resources), quantitative indicators were defined for a) average land use intensity, b) degrees of coverage of operating and maintenance costs, c) irrigation efficiency of the network and d) amount of water-saving technology at the time of the appraisal. The effectiveness of the project at impact level was to be measured by the change in per capita income. In principle, the target system formulated was coherent and the indicators formulated during the appraisal were suitable for measuring target achievement. However, due to lack of data availability, adjustments were necessary at the time of the evaluations (see Effectiveness). In addition, the ambition level was too high in terms of income development and usage intensity in retrospect. A conceptual weakness is that no baseline data collection was provided for the determination of income development.

In addition to the investment measure, the project-executing agency and the target group were to be supported in parallel by a complementary measure and be enabled to take over the operation and maintenance of the facilities after the end of the project. In order to further develop the competences of the national and regional executing agency staff, a basic and advanced training measure was also to be implemented as part of the project. From today's perspective, both measures also appear to be an expedient supplement to the project and essential for maintaining the objectives pursued within the framework of the project even after its end. Equally essential for the sustainable operation of the facility is the establishment of a tariff system from which operating and maintenance costs as well as part of the replacement investments can be financed from the yields.

In addition, the modernisation of irrigation perimeters were to be developed jointly with the involvement of users/water communities in a participatory approach, for example with regard to the course of secondary and tertiary infrastructure or the location of hydrants. As part of the technical proposal, farms could irrigate their parcels individually in all sectors despite the predominantly small-scale area structure. Since the water use groups already existed before the start of the project's planning and were to take over the operation and maintenance of the modernised plants after completion of the irrigation infrastructure, a participatory approach additionally seems expedient from today's perspective. Furthermore, the active involvement of future users offers the potential to better use and take into account local knowledge and needs, and to promote acceptance, participation and ownership of beneficiaries.<sup>21</sup> All of these aspects can contribute to conflict mitigation and sustainable use of resources.<sup>22</sup> Consequently, the decision to use a participatory approach can be assessed as particularly positive.

### ***Response to changes/adaptability***

The project was largely implemented in accordance with the design. However, a significant change concerned the technical design of the water supply for the irrigation areas. While a decentralised water supply and treatment was envisaged during the appraisal, whereby the irrigation areas were to be divided into two independent blocks, the separation into two independent irrigation systems in favour of a centralised water supply and treatment for the entire irrigation area was rejected on the recommendation of the consulting consortium commissioned with the technical design. Apart from necessary adjustments to local conditions and changes due to inaccurate land registry plans and unclear ownership, the other irrigation system facilities (especially those on the fields) remained largely unchanged.<sup>23</sup>

In particular, support for water user groups required a wider scope than planned in the design.<sup>24</sup> According to the project documents, this was mainly due to the fact that the user groups did not previously have extensive

<sup>21</sup> Carr, D. S., & Halvorsen, K. (2001). An evaluation of three democratic, community-based approaches to citizen participation: Surveys, conversations with community groups, and community dinners. *Society & Natural Resources*, 14(2), 107–126.

<sup>22</sup> Carr, D. S., & Halvorsen, K. (2001). An evaluation of three democratic, community-based approaches to citizen participation: Surveys, conversations with community groups, and community dinners. *Society & Natural Resources*, 14(2), 107–126.

<sup>23</sup> KfW (2014): final inspection report.

<sup>24</sup> KfW (2010): BE

experience with the management of large irrigation areas, which were previously centrally administered by the agricultural administration. The project was able to incorporate this finding into the implementation by extending and increasing the accompanying measure.

A drastic deterioration in water availability as occurred in the drought phase of 2016/2017 and again from September 2022, and which led to an irrigation ban, would have been foreseeable as the worst-case scenario at the time of the MP, although not necessarily expected. Although precipitation-related water bottlenecks would probably have had an even more negative effect on unmodernised perimeters, this deterioration impairs the plausibility of the theory of change from today's perspective, as it was based on the assumption of constant water availability without long-lasting drought phases. Alternative planning or design could not have prevented this scenario, as the water scarcity can also be attributed to several factors that cannot be influenced by the project or can only be influenced by it to a very limited extent, such as low precipitation volumes and climate change.

Between December 2010 and January 2011 the Jasmine Revolution took place in Tunisia, marking the beginning of the so-called Arab Spring, a wave of protests and political changes in several countries of the Middle East and North Africa. During and after the revolution, the project's target-group-oriented values such as participation, personal responsibility and democratisation were particularly important. These values made a significant contribution to the successful implementation of the project, even in turbulent times.<sup>25</sup>

### **Summary of the rating:**

The core problem of outdated and inefficient irrigation systems that existed at the time of design was correctly identified and was to be solved with the technically most expedient solution at the time, a switch to a pressure irrigation system and the introduction of water-saving technologies. As a result, the project was conceptually integrated into the goals and strategies of the partner country and German DC in Tunisia. The participatory approach was also set to contribute to higher acceptance among the target group using local capacities and competences. The project's theory of change appears plausible, even from today's perspective. However, the context of frequent droughts since 2016 in particular has shown that the land use intensity and yield improvement required to increase income also depend to a significant extent on external factors (water availability) that were not sufficiently taken into account in the design. Nevertheless, the overall relevance of the project can be assessed as high.

**Relevance: 2**

## **Coherence**

### **Internal coherence**

The project was part of the long-standing and still ongoing FC commitment in the area of agricultural irrigation in Tunisia, and was expediently embedded in the overarching DC programme "Environment and Water" (established during the implementation phase) and its successor programme "Water".<sup>26</sup> Due to the focus of the evaluated project on increasing irrigation efficiency, resource conservation and the participative approach with the involvement of user groups, the project rigorously continued the FC commitment in rural areas initiated in the "Small-scale Irrigation in Central Tunisia" programme.<sup>27</sup> This is the first FC project in Tunisia that aimed to rehabilitate irrigation perimeters over larger areas. Previously, smaller areas of around 100 hectares were rehabilitated as part of FC projects.<sup>28</sup> The second phase of the project evaluated here expanded the progress already made in the first phase, both in terms of space and content.

<sup>25</sup> KfW (2014). Final inspection report

<sup>26</sup> Examples include: "Irrigation of Badrouna", BMZ no. 1966 65 418; "Irrigation of Bou Heurtma", BMZ no. 1969 65 628; "Irrigation of Lower Medjerda valley and Ras Djebel", BMZ no. 1984 65 353; "Rehabilitation of the oases of Gafsa", BMZ no. 1985 65 087; "Small-scale irrigation of Central Tunisia", BMZ no. 1996 66 280 and the more recent projects "Improvement of water resource management (IWRM Mornag and modernisation of the Sidi Thabet irrigation area)", BMZ no. 2005 65 721 and Phase II of the project evaluated here, "Modernisation of the Medjerda valley irrigation perimeter II", BMZ no. 2011 66 784).

<sup>27</sup> KfW (2014). Final inspection report

<sup>28</sup> Anecdotal evidence from interviews with KfW stakeholders.



With regard to potential synergy effects and complementarity of the measures between TC and FC, there was untapped potential during the implementation phase of the evaluated programme according to the statements of relevant project participants. Therefore, structured coordination between TC and FC had hardly taken place at the time, as the TC was active in other areas of Tunisia. There would have been potential primarily in the area of expanding regional structures, further training with the target group with regard to the marketing of their products and an improvement in soil quality (e.g. with regard to the risk of salination). The fact that the potential remained untapped lies outside the project's sphere of influence and is therefore not directly attributable to the project. The unrealised synergy effects are therefore not assessed as material deficiencies in the valuation.

Overall, the project was consistent with international norms and standards, in particular with the basic principles of the International Development Agenda 2030. The project takes into account the six quality characteristics of German DC, whereby it is particularly relevant for the quality characteristics "human rights and inclusion" and "environmental and climate compatibility". Participatory rural development and decentralisation are promoted through the establishment of water user communities required for the project, their support as part of the complementary measure and their participation in the planning and implementation of the project measures. Due to the increase in efficiency of the irrigation systems and the reduction in water consumption, the project also contributes to achieving the climate protection obligations under the Paris Agreement.

### **External coherence**

In addition to Germany, a large number of other donors are and have been active in the water and wastewater sector in Tunisia. The EU, the World Bank, the Agence Française de Développement (AFD), the Japan International Cooperation Agency (JICA) and the Banque Africaine de Développement (BAD) are the main donors in the area of rural water supply, in particular drinking water supply and irrigation.<sup>29</sup> Over the past two decades, the focus area has been on improving demand management in the water sector, including measures such as increasing irrigation efficiency, introducing graduated tariffs and promoting water user groups. For example, the Tunisian government received support through two nationwide sector investment programmes "PISEAU I and II" (Projet d'Investissement dans le Secteur de l'Eau), which were co-financed by the World Bank and AFD, and through the EU-funded Programme d'Appui aux Politiques Publiques de Gestion des Ressources en Eau pour le Développement Rural et Agricole (PAPS-Eau).<sup>30</sup> The project evaluated here was an integral part of the PISEAU and its component of irrigation management/ expansion of the irrigation infrastructure.<sup>31</sup> As part of the PISEAU sector investment programmes, regular donor meetings also took place for the first time to coordinate relevant sub-sector framework conditions, including tariff systems and sector activity supervision. Discussions with project managers revealed that regular coordination meetings were only slowly institutionalised during the implementation phase and were initiated above all by the World Bank. In addition, donors were closely coordinated as part of the sustainability strategy for the rural water sector, which was developed with the aid of German DC and includes the promotion of water user groups.<sup>32</sup>

Not all donors shared the participatory and user group-oriented approach of the KfW project. Instead, the World Bank set up projects, for example, which initially aimed to create new, central irrigation management units in the Upper Medjerda valley. Contradictory approaches can jeopardise the continuity of existing participatory structures and successes, which in turn can have an adverse impact on coherence and effectiveness. In this specific case, however, the World Bank withdrew the requirement for central irrigation management units in 2023 in order to avoid any negative effects of a lack of donor harmonisation. Therefore, and since the approach chosen by the project to strengthen decentralised structures is in line with the then (and current) objective of German DC, this does not have a negative impact on the evaluation.

### **Summary of the rating:**

With regard to internal coherence, it can be concluded that the evaluated project was incorporated into the priorities and strategies of German DC in Tunisia and meaningfully complemented the efforts of the German Federal Government in the area of agricultural irrigation. However, synergy potential between TC and FC remained largely untapped. With regard to external coherence, the project supports the efforts of the partner and other

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<sup>29</sup> KfW/GIZ (2017). Joint reporting on the Water DC programme.

<sup>30</sup> KfW (2014). Final inspection report

<sup>31</sup> KfW (2003). MP – Modernisation of irrigation perimeters in the Medjerda valley.

<sup>32</sup> KfW/GIZ (2017). Joint reporting on the Water DC programme.

donors active in the water sector. However, donor voting procedures were only established late in the course of the project. Overall, the coherence can be assessed as moderately successful.

**Coherence: 3**

**Effectiveness**

**Achievement of (intended) targets**

The objective at outcome level, which was adjusted as part of the EPE, was: “Water resources and soils in the project area are used more efficiently”. The target achievement at outcome level can be summarised as follows.

| Indicator   | Status during PA   | Target value PA/EPE  | Actual value at final inspection (2014)      | Actual value at EPE (2023)                           |
|---|--|--|--|--|
| (1) Increase in average land use intensity to 117%, 6 years after completion of construction work   | 70% <sup>33</sup>  | 117%   | 70%  | Not achieved (65%)                                   |
| (2) Central local stakeholders confirm increased coverage of operating and maintenance costs as well as part of replacement investments through tariffs | According to PA: Specification of aspiration level in tariff study | The collection rate of the GDA and a qualitative evaluation of the cover are used for the EPE. | Coverage of operating costs not yet achieved | Not achieved   |
| (3) Irrigation efficiency of the network is more than 90%   | 30%  | >90%   | 90%  | Partially achieved (89% in 2022) <sup>34</sup>       |
| (4) 80% of the total area is equipped with water-saving technologies (irrigation and drip irrigation)   | 0  | 80%  | 72%  | Achieved according to qualitative data <sup>35</sup> |

**Note on indicator (1): “Increase in average land use intensity to 117% six years after completion of construction work”.** In the final inspection, the intensity of land use was calculated by comparing the crops cultivated within the irrigated areas with the entire irrigable area in the project area. The same procedure was therefore also carried out in the context of the EPE with the data received from the executing agency. However, this only goes up to 2021<sup>36</sup>. The analysis shows a usage intensity of only approximately 70% for 2021 and an average value of approximately 65% for the period 2019-2021 (corresponds to a period of six years after commissioning of the system). The target value for this indicator was therefore not reached. For the entire period from 2013 to 2021, the average usage intensity was only 59.5% and therefore also far below the target.

The analysis of the development of usage intensity since commissioning up to 2021 (Figure 1) also shows that this initially increased continuously in the first four years of operation up to 2016, but then fell to a level of only

<sup>33</sup> In the project documents, there is a discrepancy in the status value at the time of the appraisal, which was stated at 90% in the original module proposal and at 70% in the final inspection report.

<sup>34</sup> Data from CRDA, not verified.

<sup>35</sup> Unfortunately, the quantitative data was not submitted during the EPE.

<sup>36</sup> The data could not be verified at the time of the evaluation. As already mentioned in the final inspection, this does not always match other data.

approximately 41.5% in 2018 in the two subsequent years. The sharp downturn in intensity during this period coincides with the drought period in the project area and can plausibly be attributed to this and the associated water shortage. Conversely, the increase between 2013 and 2015 (subject to the reliability of the data provided) can be used as evidence that the modernised system has the potential to promote land use intensity under optimal water access conditions. The surveyed GDAs and implementation partners also confirm a positive development for the period 2013-2016, with an increase in irrigated areas and the number of water consumers as well as good water availability via the system. According to information provided, the latter has resulted in time savings for farmers and higher yields, in particular due to the introduction of drip irrigation systems.

Figure 1: Land use intensity since start of operation

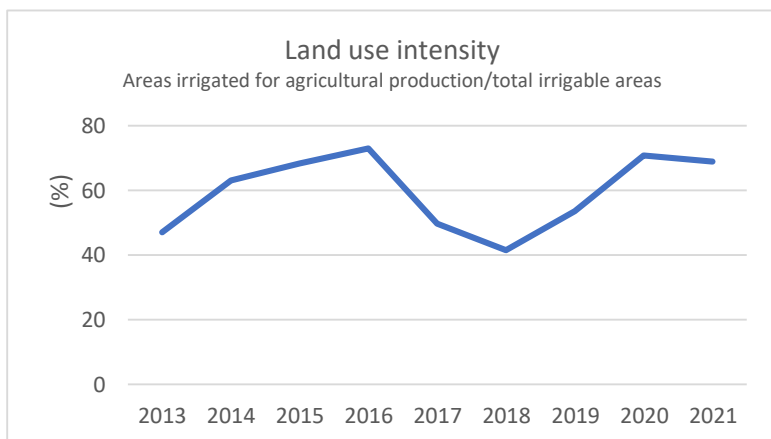
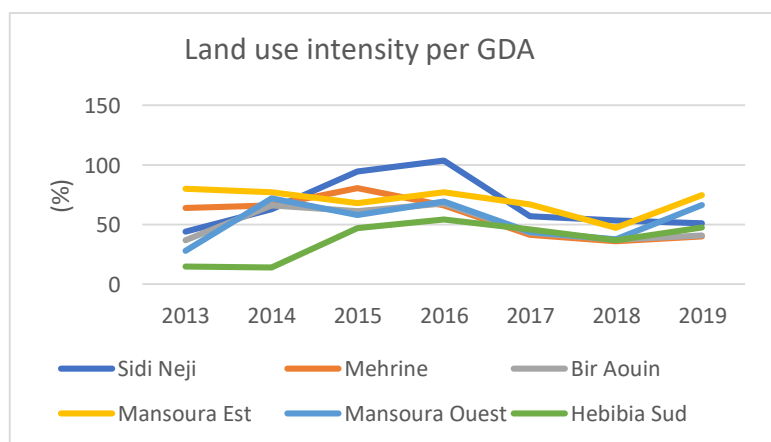


Figure 2: Land use intensity per GDA



Source: Data from CRDA, own presentation.

**Regarding (adapted) indicator (2): “Central local stakeholders confirm increased coverage of operating and maintenance costs as well as part of replacement investments through tariffs”.** Although various measures to secure the continuity of the irrigation complex and network were implemented through the development of a tariff system and its application process, this indicator could not be achieved.

This observation is supported by the data obtained from the evaluation on the collection rates of the GDAs in the sectors concerned between 2016 and 2022 and by the data from the qualitative interviews. During the interviews, key players and stakeholders also confirmed the debt of the GDAs in the project area and reported on acceptance and application difficulties since the start of the project. These were exacerbated by the shortage of water from 2016/2017.

However, the process of introducing and applying the tariff system has been and continues to be challenging. In the first year of operation, flat rates for water consumption based on the use of irrigation areas were initially

introduced due to difficulties in commissioning the modernised irrigation system.<sup>37</sup> After the replacement of the water meters in 2014, these flat rates were largely replaced by binomial rates. After discussions and negotiations with all parties involved (including representatives of the target group), a tariff was chosen that was to be gradually increased from a low initial level in the following years to the level required for proper operation and maintenance (including an inflation share).<sup>38</sup> However, following the intervention of the Tunisian Farmers' Association in 2013, this annual increase had been suspended until 2019.<sup>39</sup> Currently, the governorate of Manouba applies binomial tariff design to the modernised perimeters. The system consists of a first fixed component that depends on the area size of the farm (74 TND/ha) and a second variable component that depends on the amount of water consumed (0.062 TND/m<sup>3</sup>). The tariff is structured in such a way that the GDAs can cover the operating costs (even if the farmers do not irrigate or irrigate less). De facto, however, many companies refuse to pay the fixed share, as they are currently unable to draw any water, or are only able to draw very little water.

The evaluation data shows that the GDAs in the affected perimeters are indebted. Indeed, the low coverage rate (which was also<sup>40</sup> found in a FAO study for the Lower Medjerda valley area, including the governorate of Manouba) has led to an increasing level of debt and impairs the ability of the GDAs to ensure the maintenance of networks and the water supply of members. This makes government intervention indispensable and impairs the sustainability of the entire system (see Sustainability). Due to droughts and the associated water shortage since 2016/2017, the debt situation has been exacerbated by the introduction of quotas (which allocate certain quantities of water to the various sectors). According to the FAO study in the Medjerda valley, farmers are indebted to the GDAs, the CRDAs and the CRDAs to the agricultural water supplier.<sup>41</sup> After the drought in 2016, the collection rate meanwhile stood at just 15%. Despite a temporary increase, it was not able to reach a cost-covering level in the following years. In 2022, the collection rate was 30%.

According to the evaluation data, the collection rate is severely affected by drought, which leads to lower water availability and decreased willingness to pay, especially for the fixed tariff share (which depends on the size of the farm). According to the CRDA, farmers are continuing to call for abolition of the fixed rate. Since the outbreak of the current drought in 2022, this has no longer been charged. Some respondents believe that this will continue to be the case due to a lack of consensus and repeated periods of drought.

Table 1: Collection rate

| Year  | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|------|------|------|------|------|------|------|
| Collection rate CRDA-GDA in % <sup>42</sup> | 101% | 15%  | 43%  | 66%  | 63%  | 79%  | 30%  |

Source: CRDA, own presentation. Notes: The overrun of 100% in 2016 corresponds to the catchup of previous years.

**Note on indicator (3): "Irrigation efficiency of the network is more than 90%".<sup>43</sup>** The indicator is almost achieved with a value of 89% for 2022.<sup>44</sup> In the project area, increased irrigation efficiency has been recorded since the implementation of the modernised irrigation system. Prior to the modernisation measures, irrigation was carried out using gravity irrigation methods. This was a non-underground system, which led to losses of up to 60% according to the key players surveyed during the EPE. Since the completion of the modernisation measures and the installation of water-saving systems, the network has achieved an average irrigation efficiency of 88% in the period 2016-2022 according to the CRDA, and therefore significantly lower loss rates. The partners surveyed and members of the GDAs confirmed this positive development.

37 Failure of a large number of water meters in the hydrants (final inspection, KfW 2014).

38 KfW (2014). Final inspection report.

39 AHP (2015). Project de Modernisation des Périmètres Publics Irrigués de la Basse Vallée de la Medjerda Rapport Final d'Exécution. Version finale, Décembre 2015.

40 FAO (2023). Analyse de la gouvernance de l'eau dans la basse vallée de la Medjerda – Tunisie.

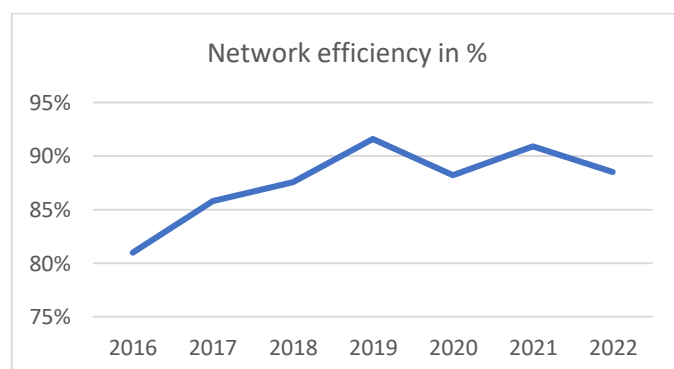
41 Ibid.

46 Data from CRDA Manouba.

43 Irrigation efficiency measures the percentage ratio between the amount of water pumped and the amount of water distributed.

44 According to CRDA data.

Figure 3: Network efficiency



Source: CRDA data, own presentation

**Note on indicator (4): “Equipping 80% of the total area with water-saving technologies (sprinkling and drip irrigation)”.** The qualitative data from the interviews with the GDAs and the CRDA confirmed the target achievement for this indicator. Quantitative data that could support the qualitative statements was not available at the evaluation date. The user groups also stated that, on the one hand, there was a significant reduction in water losses and, on the other hand, more targeted use was made of water. Nevertheless, a few farmers continue to waste water in the project area, even if the awareness-raising measures carried out as part of the project had had a largely positive impact.

As an interim conclusion, it can be stated that the positive developments as a result of water-saving devices and network efficiency are not sufficient to achieve the outcome goal of more efficient use of water resources. In fact, water consumption (under normal conditions of access to water resources) remains relatively high in relation to the intensity of agricultural use.<sup>45</sup> In the opinion of the interviewees and project managers, water waste, low fees and a low collection rate are key reasons for this.

#### **Contribution to achieving targets**

Some progress achieved with regard to the objective of more efficient use of water resources and soil can be directly and plausibly attributed to the project’s measures. The modernisation of the infrastructure as part of the project saw the replacement of the existing, outdated gravity irrigation system, which can only be used on a few sub areas, with a modern pressure irrigation system. The modernisation measures cover a total area of 4,396 ha (8% increase from the original target) and benefit 838 farms with an average size of 5.2 ha. They enable both the reduction of water losses as well as the use of water-saving irrigation methods and the need-based water supply for the selected crops (under normal conditions of access to the resource). In addition, the introduced irrigation technologies require less time for irrigation and therefore create more time for soil and plant cultivation measures. As a result, with its investment measures, the project has laid the foundation for more efficient use of water and soil resources.

The initial increase in land use intensity after the commissioning of the modernised perimeter (2013-2016) as well as after the drought period suggests that the facility is generally suitable for land use intensity promotion. According to information provided, the increase in water availability confirmed by the target group for this period has resulted in time savings for farmers and higher yields, which is due in particular to the introduction of drip irrigation systems by the respondents. The project plausibly contributed to an increase in water-saving material and knowledge on the affected perimeters through training as well as support for farmers provided by creating equipment plans for the parcels of land and in the application documents to the Ministry of Agriculture.

The project has also made efforts at several action levels to promote the introduction of a cost-covering tariff system. This includes, in particular, the following outputs as part of the complementary measure: a) conducting a tariff study and diagnosis with the involvement of the GDAs, b) compiling the cost elements based on the supply and service contracts, c) preparing the tariff components as well as drawing up several scenarios and tariff plans with alternatives, d) preparing and discussing the results with the GDAs and farmers, e) submitting the dossier to the DGGREE and f) strengthening the capacity of the GDAs in administrative and accounting to collect tariffs.<sup>46</sup>

<sup>45</sup> KfW (2014). Final inspection report; KfW/GIZ (2016). Joint reporting

<sup>46</sup> AHP (2015). Project de Modernisation des Périmètres Publics Irrigués de la Basse Vallée de la Medjerda Rapport Final d’Exécution. Version finale, Décembre 2015.



According to evaluation data for the period of good water availability (2013-2016), respondents confirm increased efficiency in collecting tariffs. This suggests that the measures were not ineffective despite the fact that indicator 2 failed to meet its target by a significant margin.

In addition, through a participatory approach and a multi-level user support measure (administration, finance, technology, materials and logistics), the project helped to lay the foundations for the administration of the system by the GDAs of the sectors concerned.

Overall, it can be stated that a link between the project activities and the progress in achieving the objectives is plausible. However, as can be seen from the degree of achievement of the various indicators, the project does not meet the expectations with regard to the achievement of the module objectives. The evaluation data emphasises that up to now, external factors, which could only be influenced to a limited extent or not at all by the project, had a negative impact on target achievement. These factors can be divided into (1) institutional and political, (2) socio-economic and (3) environmental factors.

The lack of water availability, partly due to drought, especially from 2016/2017 onwards, is a key influencing factor that significantly impairs distribution and irrigation options (and therefore agricultural uses). The water shortage also adversely impacts the maintenance, administration and operation of the system (since the GDAs depend on the water intakes, which are then also very low). Another environmental factor that has had a particularly adverse impact on the intensity of land use is plant diseases, which mainly affected tree crops in the period after commissioning. In 2015, for example, fire blight wiped out a large proportion of pear plants.

Among the institutional and political factors, the evaluation data from the interviews and external reports on the project area underline the relevance of water governance in Tunisia, in particular with regard to the legal and institutional framework. The interviews with project managers emphasise the difficulty that no updated legal basis was available within the framework of the project, as the Water Code (Code des Eaux) from 1975 has still been in the process of revision since 2008. As highlighted in the FAO study<sup>47</sup> and in the monitoring note for the follow-up project<sup>48</sup>, the legislative framework both from the time and currently does not allow effective enforcement of the law and the application of sanctions in the water sector in the affected areas. At the same time, it must be mentioned that the Jasmine Revolution took place during the implementation of the project and repeated attempts were made to undermine the legitimacy of the water use groups. In some interviews during the EPE, it was also emphasised that there was an increase in civil disobedience in the post-revolutionary period, which in some cases made it more difficult to implement the project and achieve its objectives.

Socio-economic factors were also mentioned as factors that limited the project's influence on the achievement of these indicators, in particular indicators 1 and 2. These include the proximity to Tunis. As a result of which there is far less interest in agricultural activities, especially among the younger generation, inheritance problems, which sometimes lead to the abandonment of land, and the absence of titles of ownership, which make it difficult to access state subsidies. Finally, controversial views on water access rights in the area concerned were repeatedly cited by those interviewed in the EPE as an additional factor affecting the introduction and application of the planned tariffs to cover the costs of maintaining and operating the system (indicator 2).

With regard to any impact of the project on disadvantaged population groups (e.g. poorer rural population, smaller farmers and women), the evaluation data indicates that the modernisation of the system has enabled more even access and distribution of water in the affected areas. However, according to the data from the interviews and the reviewed project documents, no particular attention was paid to the promotion of disadvantaged population groups. However, smaller farmers and those with fewer resources are more affected by the external factors mentioned above. Those who do not have a land title are, for example, less likely to receive government subsidies for the acquisition of water-saving technologies.<sup>49</sup> The water shortage also affects small businesses to a particularly high degree. Because in times of drought and water shortage, they have less access to alternative water sources (e.g. through (well) drilling), they mostly cultivate crops that are not irrigated during drought periods and generally have no alternative sources of income. According to an FAO study, the increase in water tariffs for irrigation also affects primarily the smallest producers and less the large, export-oriented companies.<sup>50</sup>

The project also does not focus on the promotion of women's rights. According to a 2014 survey on the working conditions of women in rural areas in Tunisia, women do 79% harvesting work, 70% of weeding and 65% of sowing.<sup>51</sup> There are no female members in the 33 existing GDAs.<sup>52</sup> On the other hand, of the 25 technical directors of

<sup>47</sup> FAO (2023). Analyse de la gouvernance de l'eau dans la basse vallée de la Medjerda – Tunisie.

<sup>48</sup> KfW (2013). Monitoring note.

<sup>49</sup> FAO (2023). Analyse de la gouvernance de l'eau dans la basse vallée de la Medjerda – Tunisie.

<sup>50</sup> Ibid.

<sup>51</sup> Ibid.

<sup>52</sup> Ibid.

the GDAs, 11 are women. Of these, nine are based in Manouba and two in Bizerte. In the six GDAs that were part of the project's target group, all technical directors (*directrices techniques*) are women. Therefore, women do participate in daily agricultural management, but not at the decision-making level.<sup>53</sup>

### **Quality of implementation**

With regard to the quality of implementation, the choice of a participative approach is positive, despite complex framework conditions. In interviews with KfW and CRDA employees, the approach was seen as a success factor of the project. The project's efforts to coordinate the various management levels were also highlighted in the interviews. The complementary measure also had positive effects. The GDAs and the project-executing agency were provided with both administrative and technical training and further education. It laid important foundations for a later takeover of the maintenance and operation of the modernised irrigation system (CRDA) as well as the underground secondary and tertiary pipelines and hydrants at the field boundaries (GDAs).

The data on the quality of cooperation between the implementation consultant, the CRDA, the DGGREE and the GDA are based mainly on the project documentation (in particular the final inspection) as well as on interviews with the implementation consultant and, to a lesser extent, with KfW employees. However, one limitation of this ex-post evaluation is that almost ten years after the completion of the work, there are hardly any more people available who have assisted with the implementation itself (the employees of KfW, GDA, CRDA and DGGREE are no longer in the same positions).

Overall, the cooperation was rated as positive and the quality of the implementation of the construction measures as adequate (final inspection). Nevertheless, there were deficits that led to significant delays and reductions in quality. For example, the high number of lots has led to increased administrative expenses (in a context characterised by bureaucratic award procedures), coordination problems between businesses and a lack of adequate control over implementation and related procedures. Furthermore, the final inspection and the consultant's final report highlighted the lack of experience of the CRDA and the shortage of staff as challenges.<sup>54</sup> In addition, the late mobilisation of construction supervision staff by the project-executing agency affected the supervision of the construction sites and the installation of the equipment. Start-up took place too soon, resulting in water quality problems (the site outlets were not adequately treated, resulting in clogging problems). As mentioned by several interviewees, this has adversely impacted farmers' confidence in the system. The commissioning eventually started in April 2013 and lasted for about four months.<sup>55</sup> The difficulties with delimiting parcels and titles of ownership were also not fully resolved, contrary to the design and specific agreements. This also caused delays.

### **Unintended consequences (positive or negative)**

During the evaluation, the interviewees did not identify any unintended effects. However, the analysis of secondary data indicates two possible unintended effects. As part of the evaluation mission in Tunisia, it emerged that a strikingly high proportion of women were represented in the role of technical managers in the GDAs, although women were not specifically addressed or promoted by the project. The promotion of women can therefore be assessed as an unintended positive side effect of the project. The FAO study<sup>56</sup> also points to the difficulties associated with the introduction of different tariff systems in the Medjerda valley region. According to the report, this situation could lead to a feeling of injustice among those farmers who face higher fees in downstream governorates. Whether this impairs the effectiveness of the project cannot be conclusively assessed at the time of the evaluation.

### **Summary of the rating:**

By modernising and introducing the need-based supply of irrigation water, the project enabled a reduction in water losses and the direct use of modern, water-saving irrigation technologies at all locations, therefore laying the foundation for achieving the outcome target. However, the positive developments in achieving indicators 3 and 4 with the increase in network efficiency and by providing water-saving devices are not sufficient to achieve the outcome objective of more efficient use of water resources. Despite the project's measure in the area of the development of a tariff system and its application process, it was not possible to cover the operating and maintenance costs as well as part of the replacement investments through the tariffs. Also, despite the initial positive

<sup>53</sup> Ibid.

<sup>54</sup> The CRDA department was not consolidated until 2009 and the procedures within the institution were not consolidated until 2011-2012, towards the end of the project (consultant's final report).

<sup>55</sup> KfW (2013) Monitoring comment.

<sup>56</sup> FAO (2023). Analyse de la gouvernance de l'eau dans la basse vallée de la Medjerda – Tunisie.

development after commissioning, land use intensity is still low and dependent on a number of other factors, including water shortage. The evaluation data underlines the role of external factors that impaired target achievement.

**Effectiveness: 4**

## Efficiency

### *Production efficiency*

The originally planned project duration of six years was significantly exceeded. The actual start of the implementation period with contract signing for the services of the planning phase in February 2006 until the commissioning of the entire modernised irrigation system in autumn 2014 was eight years. The final work on the rural roads was still being carried out in mid-2015.<sup>57</sup> Starting in February 2006 and finishing in spring 2015, the complementary measure also lasted a total of around nine years. Several reasons led to the delays. On the one hand, the time allowed for the planning and implementation phase of the project at the time of the appraisal can be described as too optimistic in retrospect. The time and effort required for the administrative processes in connection with the tendering and award of contracts for construction work was also significantly underestimated. Furthermore, this was made more difficult by the fact that the project-executing agency awarded a total of ten lots, which were selected via public competition procedures and which were not supported by KfW, during the tendering process for the services. It was not possible to select the most competent companies from KfW's and the consulting consortium's perspective in all cases, as the proposed criteria for the project-executing agency's preselection of companies were defined at a lower threshold in order to enable as many companies as possible to participate in the competition.<sup>58</sup> The division into ten lots resulted in greater administrative expenses for the project-executing agency and significant delays in the award of contracts and implementation.

Delays also resulted from an alteration in the originally planned technical design. Instead of a decentralised water supply and treatment in the individual sectors, which provided for separation of the supply of the entire irrigation area into two independent blocks, a central water supply and treatment for the entire irrigation area was implemented on the proposal of the consulting consortium entrusted with the technical design. Furthermore, the Jasmine Revolution took place in Tunisia during the implementation period in 2010/2011. Associated staff changes and other delays also affected the course of activities.<sup>59</sup>

The total costs of the project amounted to approximately TND 46.322 million (approx. EUR 23.703 million at an average exchange rate of TND 1.954/EUR) and therefore around 32% (in local currency) above the actual planned costs of TND 35.027 million. (EUR 25.009 million based on the MP exchange rate of TND 1.401/EUR). In addition to the time delays listed above (which also meant that the term of the consulting services had to be extended several times), the increased scope of the project's services (8% greater irrigation area and higher number of agricultural holdings) also led to additional costs. However, the increase in costs is mainly due to the high inflation in Tunisia and the associated significant price increase for building materials during the implementation period, and is therefore outside the project's sphere of influence. Since the exchange rate in favour of the euro (real devaluation of the TND) developed simultaneously during the project term, the project's total costs in euros could be kept within the framework despite a significant increase in costs in local currency.<sup>60</sup>

The main costs of the modernisation measure were attributed to the purely supply contracts, which accounted for around 88% of the total costs. Other budget lines, such as land consolidation, expropriation compensation,<sup>61</sup> administration and engineering services, accounted for only around 12% of the costs, with the cost of engineering services being unusually low at 7% and due to the project-executing agency's restrictive policy towards such services. However, this led to reduced quality over the course of the supervision of works and also contributed to some of the difficulties in commissioning the modernised irrigation system. The specific investment costs were

<sup>57</sup> KfW (2014). Final inspection report.

<sup>58</sup> KfW (2014). Final inspection report.

<sup>59</sup> AHT (2015). *Projet de Modernisation des Périmètres Publics Irrigués de la Basse Vallée de la Medjerda Rapport Final d'Exécution. Version finale, Décembre 2015.*

<sup>60</sup> KfW (2014). Final inspection report; AHP (2015). *Projet de Modernisation des Périmètres Publics Irrigués de la Basse Vallée de la Medjerda Rapport Final d'Exécution. Version finale, Décembre 2015.*

<sup>61</sup> According to the appraisal of the follow-up project, the new construction measures (e.g. in the vicinity of the pump station) resulted in land expropriation to a small extent, but this was carried out in accordance with the relevant Tunisian laws and compensated for fairly. Relocations were not necessary under any circumstances.

around TND 10,550 per hectare, which can be regarded as high compared to similar projects.<sup>62</sup> In addition, there are high operating and maintenance costs. According to the final inspection, higher-quality crops and increased intensity of use would have been necessary to ensure profitability at both economic and business level.

A total of 39% of the financing for the modernisation measure was originally to be provided by Tunisia and 61% by FC. The FC share was financed via a loan, from which 94% of the planned funds were to be disbursed. The residual funds of the FC share amounted to EUR 0.892 million and were reduced in accounting terms. The share financed by the Tunisian budget was around 40.1%, which is 1.01 percentage points higher than planned.

The complementary measure was financed wholly from FC grant funds; the costs ultimately amounted to EUR 2.021 million (instead of the originally planned EUR 1.735 million).<sup>63</sup> The additional costs in the complementary measure were caused by the extension of the project duration by two years, which led to higher staff and operating costs. The FC share of the basic and advanced training measure amounted to EUR 214,032 and was also financed from grant funds. The share financed by the national Tunisian budget is not known or could no longer be adequately reconstructed at the time of the final inspection.<sup>64</sup>

### **Allocation efficiency**

At the time of the appraisal, an overall economic profitability of 5% and a doubling of the average value added per m<sup>3</sup> of water were forecast, under the assumption of full target achievement and a 20-year useful life after completion of the construction work. Due to the low usage intensity and earnings situation at the time, the allocation efficiency in this regard is lower than expected, but cannot be precisely quantified due to a lack of data. However, when assessing this circumstance, it must be taken into account that the modernisation measures and high adoption rates of water-saving technologies result in significantly more efficient water use than before the start of the programme. If gravity irrigation has continued to have been used, the drought-related water bottlenecks would probably have caused much greater damage.

According to the assessment of interviewed representatives of the executing agency and KfW, the intended impacts could not have been achieved by an alternative approach. In the interviews with various stakeholders, it was repeatedly confirmed that the solution implemented was the most technically feasible with regard to the modernisation of the existing irrigation system. According to the TE, the half-shell technology originally used was not particularly water-efficient and was also being used less and less at the time. This type of surface irrigation would also result in significant water consumption, as this could only be used in a less targeted manner. There have additionally been increasing difficulties in repairing the half shells because spare parts were increasingly hard to come by and there would hardly have been any companies specialising in this technology. In addition, reconstruction would have caused significant additional planning, land development and investment expenses compared with modernisation works. Reconstruction would not have resulted in any efficiency gains in contrast to the solution implemented as part of this project.

Although the deviation from the technical design to a central water supply system described above resulted in a larger supply complex than originally planned, it enables potentially more cost-effective, more efficient operation and has a positive effect on allocation efficiency. In addition to an expansion of the agricultural area by around 8% compared to the original design, there was also a higher number of beneficiary farms (601 at the time of the appraisal, 838 actual beneficiary farms) in the project area. In addition, the sectors benefiting from this project were previously selected in the course of a feasibility study in which, in addition to the state of the irrigation and drainage infrastructure at the time, the 1) predominance of a small-scale farm structure, due to the generally associated, higher usage intensity; 2) a low risk of future land loss due to the expansion of urban agglomerations in the project area; 3) the existence of water use groups and 4) minor problems with regard to land law and the current debt situation of the establishments were included in the selection criteria.<sup>65</sup> Accordingly, the project favoured the most suitable sectors with the most technically expedient, efficient and water-saving solution at the time, which has a positive effect on allocation efficiency.

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<sup>62</sup> Ibid. In a small irrigation project in central Tunisia, the costs were 4,200 TND/ha. However, due to the simpler systems, this is only partially comparable.

<sup>63</sup> KfW (2014). Final inspection report.

<sup>64</sup> KfW (2014). Final inspection report.

<sup>65</sup> KfW (2003). MP – Modernisation of irrigation perimeters in the Medjerda valley.

### Summary of the rating:

During the implementation period, there were significant delays that reduced production efficiency. In some cases, the reasons for exceeding the planned time frame were outside the project's sphere of influence. Overall, however, costs were kept within limits, mainly due to a shift in the exchange rate in favour of the euro. Allocation efficiency is slightly below expectations. However, since the operationalisation selected as part of the project was the most technically expedient at the time, no profits could have been achieved with regard to allocation efficiency through alternative approaches. In summary, the efficiency can be assessed as moderately successful.

**Efficiency: 3**

### Impact

The overarching development policy objective of the project adjusted as part of the EPE is: To make a sustainable contribution to increasing agricultural incomes in the project area.<sup>66</sup> Target achievement at the impact level can be summarised as follows:

| Indicator   | Status PA   | Target value at PA  | Actual value at final inspection  | Actual value at EPE  |
|---|---|---|---|--|
| (1) Key local stakeholders confirm an increase in the agricultural per capita income of an average farm six years after completion of the construction work | Average operation of 6.8 ha on average at approx. 3,600 TND/a (but with a relatively large range of variation in the sectors (from 2,690 ha in Habibia to 6,760 ha in Mehrine) measured by feasibility study) | 100% increase<br><br>For the EPE: qualitative evaluation of the level of agricultural per capita income | Not specified (measurement only possible six years after completion of construction work) | Quantitative measurement not possible due to lack of suitable data.<br><br>Value estimated as not achieved |

#### Note on indicator (1): Central local stakeholders confirm an increase in the agricultural per capita income of an average farm six years after completion of the construction work.

At the time of the evaluation, no monitoring data on the development of the per capita income (differentiated by type of farm) in the irrigation perimeters is available. However, the quantitative data on the agricultural use of the irrigated land in the six GDAs concerned and the qualitative data from the interviews indicate that the income target was not reached.

Various interviewees (from the CRDA and the GDAs) reported selective improvements in farm incomes between 2013 and 2016. According to the interviewees, these coincided with times of good water availability in the system and fluctuated depending on the (drought-related) water availability and other factors. This evidence obtained from the qualitative interviews tallies with the quantitative data received from the CRDA on the development of agricultural crops in the project area, which is used as an approximation for the development of the yield situation in the absence of alternative data. The data on the development of land use intensity (and therefore hypothetically also the yields of agricultural production and therefore the per capita income) can be divided into two main phases for analysis. The first phase ranges from commissioning (approx. 2013) to the drought years 2016/2017. The second phase starts afterwards and ends with this ex post evaluation (2023). However, the available quantitative data only covers up to 2021.

During the first phase, respondents reported improved water availability through the system and higher yields due to good conditions for access and distribution of water through the modernised system and the application of water-saving techniques using suitable equipment. The data available from the CRDA on water consumption, network efficiency and land use intensity are used here as an approximation for the development of crop yields.

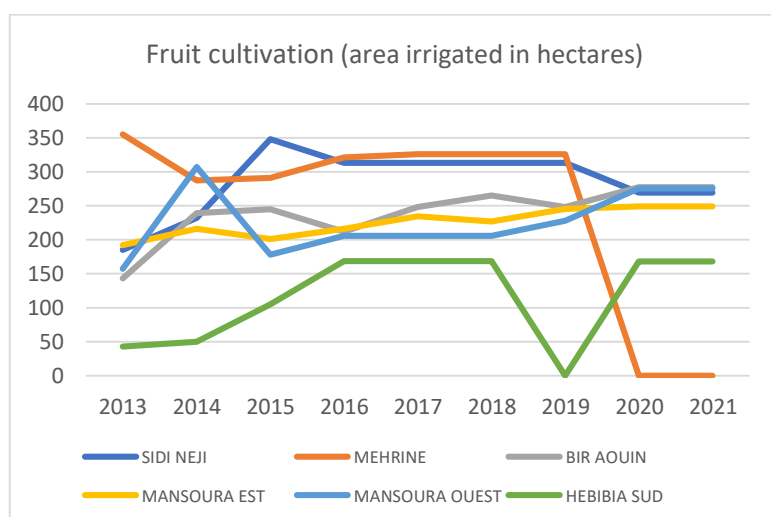
<sup>66</sup> The objective defined at the time of the appraisal was to double income. Since no quantitative data on income development is available, the indicator was adjusted.



Based on this data, an increase in the cultivation of agricultural crops in the project area can be observed between 2013 and 2016, but this declines in the following two years.

In the second phase (2018-2022), a certain recovery in water availability can initially be observed from 2018 onwards, as well as a continuous increase in land use intensity until 2020. Overall, the water availability was usually lower than necessary for optimal operation of the facility. Low rain falls since 2020 and the outbreak of another drought in 2022, which persisted until the time of the evaluation, led to the introduction of water quotas (which in some cases only cover 30% of what the plants, mainly tree crops, needed in order to survive). Since September 2022 it has no longer been possible to distribute irrigation water via the system due to drought.<sup>67</sup> According to the interviewees, this has led to cultivation restrictions being placed on certain crops, or the suspension of growing certain crops altogether (including vegetables and fodder crops). Fire blight, a plant disease, has also led to the clearing of 3,000 ha of pear trees in the affected area over the last three years. The situation was aggravated by persistently high temperatures, which led to the loss of large areas of tree crops (especially peach). According to the interviewees, reconstruction is not yet to be concluded and is difficult to implement, especially against the background of regular problems with water availability. The effects of these phenomena on fruit cultivation can be seen in particular in the downturn in fruit tree crops in some GDAs from 2018/2019:

Figure 4: Irrigated areas of the various sectors



Source: CRDA data, own presentation

Despite the lack of quantitative data on the development of income and yields from agricultural production in the area affected (which is a differentiated analysis according to the type of holding, small vs. large holdings), the qualitative data in conjunction with the analysis of secondary data suggests that the smallest holdings were and are most affected by the negative consequences of drought and disease infestation of plants. These have 1) no financial funds for alternative water sources (boreholes), 2) mostly grow vegetables and 3) are less likely to have an alternative source of income. Consequently, it can be plausibly concluded that the lack of income increase for women will also have negative effects, as they represent a large proportion of the labour force in the agricultural sector in the region.

**Contribution to overarching developmental changes (intended)**

Due to limited data availability, the effects of the project can only be evaluated on the basis of plausibility considerations. These are based on qualitative interviews and quantitative secondary data, which are used as proxy indicators. A counterfactual analysis is not possible on the basis of the available data. In order to classify the evaluation, it should also be taken into account that any increase in income from agricultural production depends not only on improved access to water and more efficient irrigation, but also on other important factors. In particular, climatic conditions, water and soil quality, techniques to increase yields through e.g. water savings and rotation cultivation, the conversion to crops with higher value added (and lower water consumption) and the use of effective fertilisers in particular should be mentioned here. Agricultural yields also depend on the prices of inputs

(e.g. seeds) and equipment available to farmers, their access to funding and government support, and the sales prices of agricultural products, which in turn are subject to external economic and geopolitical conditions. The overlap between the water and agriculture sectors as well as the importance of climatic and economic factors are therefore crucial for achieving the impact objectives.

The available data does not indicate a significant contribution of the project to income increases and consequently improved living conditions for the target group to date. However, the evaluation data allows for the reasonable assumption that the project improves or can improve the conditions for increasing yield and income in times of good or sufficient water availability. Firstly, the qualitative data collected confirmed that improving access to water and irrigation efficiency had led to time savings for farmers and greater flexibility in cultivation and irrigation times. These factors form the basis for higher production efficiency and better care of soils and plants, and therefore for more intensive and efficient cultivation conditions. Secondly, the introduction of water-saving equipment throughout the area supported by the project (through support in the preparation of funding applications and technical support through training) has also led to an improvement in land use intensity, according to the GDAs surveyed. These two factors therefore appear to indicate a positive development in the relationship between improved irrigation efficiency, working time and agricultural yields.

### ***Contribution to (unintended) overarching developmental changes***

In the context of the ex post evaluation, no contribution of the project to unintended development policy changes could be identified. Neither the project managers nor the user communities gave indications of unintentional changes.

### ***Summary of the rating:***

Data on income development is not available. However, data on the target group and data on the development of agricultural use does not indicate an improvement in the target group's income situation. Based on empirical values from the first years of the operating phase, it can be plausibly concluded that the project contributed to improving the income of the beneficiary farmers when water availability was good or sufficient. However, due to drought-related water shortages, this potential has not yet been exploited. The project's results are significantly below expectations with regard to its overarching developmental impact.

**Impact: 4**

## **Sustainability**

### ***Capacities of participants and stakeholders***

While the project-executing agency (CRDA) ensures the operation of the systems for water supply, water distribution and transport to the various sectors, responsibility for the operation and maintenance of the systems in the sectors (underground secondary and tertiary lines as well as hydrants at the field boundaries) lies with the user communities (GDAs). The actual irrigation of the fields is the responsibility of the farmers.

Beyond the operation and maintenance of the water supply as well as distribution and transportation facilities in the various sectors, the CRDA's role is to ensure coordination with the GDAs as well as their support and supervision. The CRDA coordinates with the GDAs, in particular regarding pricing and quotas. As described in the consultant's final report, Manouba's CRDA was insufficiently staffed and financially equipped at the start of the project. Since Manouba's CRDA was created in 2002 by the division of the CRDA area of Ariana into two geographical areas, the associated services were still spread over several premises across Manouba and Tunis. The internal procedures for the functioning of the CRDA were not fully institutionalised. It was only gradually that management and departments were restructured from 2009 and consolidated from 2010-2011 (and therefore towards the end of the project).

In the final inspection report, the capacities at CRDA level were considered sufficient for long-term maintenance of the system. The evaluation discussions with several departments of the CRDA and the GDAs concerned confirmed that the CRDA is able to perform its function and intervene in the areas of responsibility of the GDAs as needed. With regard to maintenance and repair, the information provided by CRDA and KfW employees during the visit to the plants as part of the evaluation mission (central pumping station, recovery station and open basins – which were not in operation since September 2022 due to the cessation of the water supply due to the drought)

indicates that the system is generally functioning well and that maintenance was deemed sufficient. However, some deficiencies were also pointed out, such as: the need for more frequent systematic cleaning, in particular at the main pumping station and sewers, as well as water quality supervision. The currently low revenues from water usage fees and the debt situation pose a threat to the long-term operation and maintenance of the infrastructure created.

The financial and human resources of the CRDA are not sufficient to implement an integrated approach to coordination at several levels (maintenance, support to the GDAs, support to farmers, etc.). Therefore, the need for greater support for farmers was highlighted, in particular with regard to pre-production aspects. Based on the predominantly anecdotal evidence gathered in the context of on-site surveys and documentary research, it can be concluded that CRDA cannot currently meet the demand for holistic support for farmers along the production chain up to marketing (including reevaluation of the production chain, soil analysis, agricultural land use education measures) due to a lack of resources.

Since the commissioning of the modernised system and the end of the project, the GDAs have been formally registered and have assumed liability for operations in the affected sectors. While all GDAs were still operational at the time of the evaluation, their ability to act is sometimes significantly affected by numerous factors. It also shows that there are different views within the Tunisian administration on the capabilities of the GDAs. While some have doubts about the legal status and organisational form of the GDAs within the water management system at local level, others consider the system to be fundamentally functional, but underline the need to further strengthen management capacities.

The surveyed GDAs themselves considered their technical and management capabilities to be sufficient, with a further need for technical support to maintain the system. Currently, all affected GDAs have their own buildings with furniture, computer equipment and accounting systems (financed from project funds). In addition, at least one technical manager (directrice technique) and one technician per GDA are employed there as paid personnel. In particular, the presence of paid staff has been mentioned on several occasions as an essential element of the current functioning of GDAs, whose chairs and board members are volunteers.

However, according to the affected GDAs and the CRDA, the progress made in capacity building was significantly affected by the successive drought periods from 2016-2017. The increasing water scarcity is limiting the ability of the GDAs to distribute enough water to farmers and therefore to obtain the necessary water revenues for maintenance. Furthermore, water scarcity undermines farmers' confidence in the system. This highlights the vulnerability of the GDAs. In fact, the drought problems and the associated water shortage (especially 2016/2017 and then again from September 2022) have led to work being abandoned on some parcels of land as they could no longer be irrigated. This, in turn, has contributed to a loss of confidence in the system and an increase in vandalism, as well as illegal drilling and water extraction (FAO). Some GDAs mentioned that in recent years they have sometimes stopped organising the General Assembly (*Assemblée Générale*). The current situation significantly impairs the GDAs' ability to act as real coordinators of water management at local level.

This risk, which had already been classified as high in the final inspection, has therefore been confirmed. As highlighted in the interviews with the GDAs of the affected sectors, the CRDA and KfW employees, and in the documents and data available, the GDAs are currently indebted and rely on government intervention to continue their activities and maintain the system appropriately. According to the stakeholders surveyed, there is a risk that the technical directors will no longer be able to remain in their posts if their salaries cannot be paid.

In addition, it should be noted that the scope of intervention of the GDAs remains limited. The GDAs act as mediators in water distribution between the CRDA and the affiliated farmers. GDAs can shut off water for users in the event of payment defaults. However, they have no mandate to resolve conflicts. At the time of the final inspection, reference was already made to the need to reform the GDA statutes and the corresponding legal framework conditions. Since then, however, no significant progress has been made in this regard.

### ***Contribution to supporting sustainable capacities***

Already during the design phase, it was recognised that the capacity strengthening of the various actors is crucial for the sustainable anchoring of the results and the long-term operation of the systems. Capacity was built mainly through the complementary measure and the basic and advanced training measure, and was aimed at the employees of the CRDA, the GDAs and to a lesser extent at certain groups of farmers. The promotion of capacity took place at the technical, administrative and financial level (multi-level approach) and also covered areas beyond the pure administration and maintenance of infrastructure, such as monitoring and evaluation as well as agricultural use training.

The results of the on-the-spot surveys carried out as part of the evaluation showed that the measures taken have strengthened the institutional and personnel capacities of the CRDA. For example, five CRDA departments<sup>68</sup> were provided with equipment and various training courses were provided (administration, accounting, acquisition and use of irrigation systems, use of GIS and GPS systems, technical training on the maintenance of networks and their equipment, reclamation of agricultural land, rules and procedures for the award of contracts, etc.). The project also strengthened the CRDA's capacity as a supporter of the GDAs by providing equipment and training the *Cellule d'Appui aux GDAs*. Support for capacity building was positively rated by respondents during the evaluation journey and, in their opinion, took place at an important point in the structuring and introduction of the CRDA processes. However, the high staff turnover at the CRDA during the implementation phase of the project limited the CRDA's ability to benefit from the newly acquired skills over a longer period of time and therefore adversely impacts the sustainability of capacity building.

The project also strengthened the capacities of the GDAs at institutional, material, administrative and technical level. In the on-site meetings, the representatives of the GDAs confirmed that the project's measures (e.g. equipment and training for computerised invoicing and accounting) enabled institutionalisation of processes and better organisation of the administration and fee system.

The sustainability of the system should also be ensured by the introduction of a viable tariff system. This should be implemented through a participatory approach that allows for a long-term financing solution negotiated between all parties. In theory, this approach represented a comprehensible sustainability strategy. The current research literature confirms the importance of implementing a participative approach and the main role of the GDAs in Integrated Water Resource Management (IWRM).<sup>69</sup> Ideally, this approach would also allow for stronger coordination between all actors and a stronger link between the GDAs and their members at local level. During the evaluation, the participatory approach was assessed as an essential component in the project's intervention context and as a driver of positive effects in the water governance system at local level. However (and as mentioned in the Effectiveness section), there have been and are many difficulties in implementing the tariff system, so that it is currently not or not fully functional. The initially encouraging results achieved in some post-commissioning GDAs (see Effectiveness section) are now being challenged in the context of water scarcity.

### ***Durability of impacts over time***

Water scarcity and the impact of climate change are significant issues that affect the ability of actors to continue to operate and maintain the system sustainably. Reports on climate developments in Tunisia indicate an increase in extreme weather events, particularly droughts, and a less favourable water inventory throughout the country. An increase in winter temperatures is also expected, which can have a negative impact on crop development and yields. The more modern irrigation system was set up to improve the use of water resources in times of water scarcity. Compared to the existing situation before the modernisation, the project has improved resilience to water scarcity. Nevertheless, the system and its administrative, financial and technical functioning are largely affected by the increasing water scarcity in the project area.

Cultivation of land and crops is discontinued as there is insufficient water to irrigate them. This reduces the intensity of land use, yields and, ultimately, farmers' income. At the same time, the shortage of water leads to a drop in revenue from water fees and therefore to financial bottlenecks for maintenance and operation. It has also led to an increase in well drilling, some of which is illegal. As mentioned by the CRDA services, applications for drilling are steadily increasing and only a few can be officially approved. There is a risk that illegal drilling and vandalism will increase in the affected area, as little control is exercised and sanction possibilities are low (according to the CRDA, the still applicable water law (Code des Eaux) only provides for fines). Finally, water scarcity and the frequent failures and interruptions of the water supply in the system also affect the infrastructure itself. As confirmed by KfW's technical staff, the GDAs and the CRDA, the system must be emptied and refilled in the event of discontinuations. This process, which must be carried out carefully and step by step, sometimes leads to burst lines, which then need to be replaced. In addition, algae formation increases in the system when it is idle for longer periods, which may require manual cleaning and therefore means additional maintenance work.

### ***Summary of the rating:***

Through a multi-stage and participatory approach, the project strengthened the institutional and technical capacities of the CRDA and the GDAs for the administration, operation and maintenance of the system. However, there are many factors adversely impacting the sustainability of the effects of the measures taken. A key challenge for sustainable operation and preservation of the perimeter is drought-related water shortages. This was already

<sup>68</sup> UGP, Cellule d'Appui aux GDAs, Cellule d'Appui à l'Economie d'Eau, Arrondissement Etude et Statistiques Agricoles, Arrondissement Exploitation des Périmètres Irrigués. (Consultant report).

<sup>69</sup> FAO (2023). Analyse de la gouvernance de l'eau dans la basse vallée de la Medjerda – Tunisie.

identified as a high risk to the sustainability of the project at the time of the final inspection, in particular in connection with the possible effects of climate change and increasing demand in other sectors with overall limited resources. This risk materialised between 2016/2017 and today. The agricultural utilisation possibilities, as well as the yield and income situation, are significantly affected by water scarcity. The low revenues from water usage fees, also resulting from water scarcity, as well as the debt situation, also pose a threat to the long-term operation and maintenance of the infrastructure created. Due to the inadequate duration of the impacts, sustainability is no longer assessed as successful despite the project's visible contribution to the capacity building of the project-executing agency and the water user groups.

**Sustainability: 4**

## **Overall rating: 4**

The FC project “Modernisation of the irrigation perimeter in the Medjerda Valley” is highly relevant from the perspective at the time and of today. Tunisia suffers from water shortages combined with inefficient and, in many cases, unsustainable water use. This central problem was correctly identified and was to be addressed by implementing the most technically suitable solution at the time, namely the modernisation of the existing gravity irrigation system to a pressure irrigation system. The project was aligned with the objectives and strategies of the partner country and German development cooperation in Tunisia, and was aligned with the needs of the target group. The project also demonstrates a satisfactory level of internal and external coherence.

The project was only able to achieve some of its objectives at outcome level. The land use intensity, which has so far been significantly below expectations, is having a negative impact on the yield and income situation and therefore also on the overarching objective. There is currently no improvement in the income situation. Although important and necessary conditions for more intensive land use and higher yields were created through better distribution and use of water resources through the implementation of the project, the impact objective was not met.

The multi-level capacity building approach pursued by the project helped to strengthen the technical and administrative capacities of the actors responsible for the management and operation of the irrigation system, and to institutionalise the internal management and coordination processes. However, the evaluation shows that a stronger focus on the accompanying measures at a technical level on the one hand and on support for the farmers on the other hand would have enabled a closer link between the various technical, socio-economic and environmental dimensions of the efficient use of water resources for agricultural production. The evaluation also shows that the limited financial and human resources of the CRDAs and GDAs, as well as the current debt situation, pose a threat to the sustainability of investments and capacity building.

The drought-related water shortage significantly influences the evaluation of the project, as effectiveness, impact and sustainability have all been negatively affected by it. As the project addresses the problems of scarcer water resources, has generally improved water use efficiency and the precipitation-related water availability is outside the project's sphere of influence, this project is still rated as adequate overall.

## **Contributions to the 2030 Agenda**

By helping to create the conditions for more efficient use of water and soil resources, the project has taken a number of steps towards achieving the goals of the UN 2030 Agenda. SDG 6, which aims, among other things, to improve water management and integrated management of water resources, must be mentioned first. In particular, the measures to modernise the irrigation systems successfully implemented as part of the project contributed to achieving this objective. Although the evaluation data does not reveal any significant positive changes within the scope of the project under SDG 1 “No Poverty” and SDG 2 “Zero Hunger”, it is possible to link the measures to a contribution to these SDGs, as the conditions for more intensive and efficient water use have been created in order to achieve higher yields from agricultural production. This can also contribute to food security in the medium to long term. In addition, the various measures of the project promoted more economical and efficient use of water resources and therefore contributed to achieving SDG 13 “Climate Action”.



Shared responsibility: The project fits in well with Tunisia's sectoral policy and German-Tunisian cooperation in the water sector. It was part of the sector investment programme "PISEAU", which was financed by several donors. An exchange between the donors took place. There was no joint follow-up or reporting.

Interaction of ecological, economic and social development: The project aims to combine the ecological, social and economic development dimensions, with the focus on the ecological (water and soil protection) and economic dimensions (intended income increase).

Inclusiveness/leave no one behind: The project enabled the target group to participate in important decision-making processes and promoted own responsibility for the use of water resources. The project did not provide for targeted promotion of disadvantaged persons or groups. There are no signs of negative effects on specific (vulnerable) groups. The project will comply with the principle of Agenda 2030 "No one left behind".

## **Project-specific strengths and weaknesses as well as cross-project conclusions and lessons learned**

The project had the following strengths and weaknesses in particular:

- One of the project's strengths is its high relevance for more efficient use of water resources in the context of water scarcity in Tunisia.
- The application of a participatory and multi-stage approach, which allows for the consideration of the particulars of the context of water governance at local level and capacity building, and also integrates various aspects of the management of water resources for agricultural production, is also a strength of the project.
- In addition, the project was able to adapt to changes in its external environment, in particular by strengthening and extending the complementary measure, which has proven to be essential for enabling suitable management and administration of the system.
- Good support from the consulting consortium, which was selected via an international public competition process and was able to provide crucial support in all aspects of the implementation phase as well as the realisation of the demand-oriented concept in a sometimes difficult environment.
- One of the weaknesses of the project results from some conceptual deficiencies, including technical details. With regard to the theories of change between the outcome and impact levels, the target system could have taken greater account of the interdependencies between the water and agriculture sectors, which could have made it possible to achieve the impact objectives of the project better.
- In addition, significant delays and difficulties in commissioning (e.g. premature commissioning of the irrigation system without prior thorough flushing of the pipes, which led to more extensive cleaning work being necessary) are among the weaknesses of the project implementation.
- The drought-related water shortage led to the effectiveness and sustainability of the project being significantly impaired. This water shortage has so far severely limited the intensity of use and opportunities to generate income.

Conclusions and lessons learned:

- In order to be better prepared for extreme weather events such as prolonged drought periods, irrigation projects should already in the design phase have a stronger integration of measures for adjustment to climate change (e.g. through training on system maintenance under drought conditions, as well as more measures to switch to lower-irrigation crops with higher value added and agricultural techniques in connection with climate change adjustment) for the sustainability of the overall system.
- Questions concerning the border lines and ownership rights of agricultural parcels should be clarified in advance of construction-intensive irrigation projects, in order to avoid losing time during the implementation phase.

- In the case of tenders for rehabilitation, construction and equipment measures, an excessive number of lots can significantly increase the coordination and time required, compromising efficiency and effectiveness.
- In times of political upheaval and unrest, the principles of participation, ownership and democratisation anchored in projects prove to be particularly relevant and can make a significant contribution to the successful implementation of projects despite volatile framework conditions. This reaffirms the benefits of participatory approaches in development cooperation, as they can promote the acceptance and stability of measures in changing political contexts.
- Measures specifically aimed at women and disadvantaged target groups should be included in the project measures at the time of conception.
- Projects of this size should be implemented (to the extent legally possible) on a turnkey basis in order to guarantee the obligations of involved and commissioned service providers over the entire implementation period and to contractually regulate clear remuneration conditions as well as the delivery of a fully functional system from the start. This avoids unnecessary time wasted on commissioning of already completed infrastructure.

## Evaluation approach and methods

### Methodology of the ex post evaluation

The ex post evaluation follows the methodology of a rapid appraisal, which is a data-supported qualitative contribution analysis and constitutes an expert judgement. This approach ascribes impacts to the project through plausibility considerations which are based on a careful analysis of documents, data, facts and impressions. This also includes – when possible – the use of digital data sources and the use of modern technologies (e.g. satellite data, online surveys, geocoding). The reasons for any contradicting information are investigated and attempts are made to clarify such issues and base the evaluation on statements that can be confirmed by several sources of information wherever possible (triangulation).

#### Documents:

Internal project documents, secondary specialist literature, strategy papers, context, country and sector analyses, final report by the consultant.

#### Data sources and analysis tools:

Monitoring data of the partner, GPS data from project documents, satellite images, data from specialist literature, qualitative interviews

#### Interview partners:

Project-executing agency, user groups, consulting firm, KfW stakeholders, TEs, GIZ stakeholders

The analysis of impacts is based on assumed causal relationships, documented in the results matrix developed during the project appraisal and, if necessary, updated during the ex post evaluation. The evaluation report sets out arguments as to why the influencing factors in question were identified for the experienced effects and why the project under investigation was likely to make the contribution that it did (contribution analysis). The context of the development measure and its influence on results is taken into account. The conclusions are reported in relation to the availability and quality of the data. An evaluation concept is the frame of reference for the evaluation.

On average, the methods offer a balanced cost-benefit ratio for project evaluations that maintains a balance between the knowledge gained and the evaluation costs, and allows an assessment of the effectiveness of FC projects across all project evaluations. The individual ex post evaluation therefore does not meet the requirements of a scientific assessment in line with a clear causal analysis.

The following aspects limit the evaluation:

- Insufficient data (requested data was not provided in full by the project-executing agency during the evaluation)
- Since the appraisal and implementation of the project had already taken place some time ago, relevant project managers were sometimes no longer contactable, statements were sometimes no longer verifiable

### Methods used to evaluate project success

A six-point scale is used to evaluate the project according to OECD DAC criteria. The scale is as follows:

- Level 1** very successful: result that clearly exceeds expectations
- Level 2** successful: fully in line with expectations and without any significant shortcomings
- Level 3** moderately successful: project falls short of expectations but the positive results dominate
- Level 4** moderately unsuccessful: significantly below expectations, with negative results dominating despite discernible positive results
- Level 5** unsuccessful: despite some positive partial results, the negative results clearly dominate
- Level 6** highly unsuccessful: the project has no impact or the situation has actually deteriorated

The overall rating on the six-point scale is compiled from a weighting of all six individual criteria as appropriate to the project in question. Rating levels 1-3 of the overall rating denote a “successful” project while rating levels 4-6 denote an “unsuccessful” project. It should be noted that a project can generally be considered developmentally “successful” only if the achievement of the project objective (“effectiveness”), the impact on the overall objective (“impact”) and the sustainability are rated at least “moderately successful” (level 3).

### List of abbreviations:

|          |   |
|----------|---|
|          | Final inspection  |
| AFD      | Agence Française de Développement,  |
| BAD      | Banque Africaine de Développement   |
| GDP      | Gross domestic product  |
| BMZ      | German Federal Ministry for Economic Cooperation and Development  |
| CRDA     | Commissariat Régional au Développement Agricole (CRDA) de Manouba   |
| DAC      | Development Assistance Committee  |
| DGGREE   | Direction Générale du Génie Rural et de l'Exploitation des Eaux   |
| EU       | European Union  |
| EUR      | Euro  |
| FAO      | Food and Agriculture Organization of the United Nations   |
| FC       | Financial cooperation   |
| FC E     | FC evaluation   |
| GDA      | Groupements de Développement Agricole   |
| GEF      | Global Environmental Fund   |
| HDI      | Human Development Index   |
| JICA     | Japan International Cooperation Agency  |
| MARHP    | Ministère de l'agriculture, des ressources hydrauliques et de la pêche  |
| NGO      | Non-governmental organisation   |
| PAPS-Eau | Programme d'Appui aux Politiques Publiques de Gestion des Ressources en Eau pour le Développement Rural et Agricole |
| PISEAU   | Projet d'Investissement dans le Secteur de l'Eau  |
| PP       | Project proposal  |
| TND      | Tunisian Dinar  |
| TC       | Technical cooperation   |

### Publication details

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**List of annexes:**

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## Target system and indicators annex

| Project objective at outcome level   |  | Rating of appropriateness (former and current view)   |                     |                                      |                         |
|--|--|---|---------------------|--------------------------------------|-------------------------|
| During project appraisal: Efficient use of water resources and soil  |  | <p>The project purpose has been derived from the problem analysis, is appropriate in terms of content and is defined at the right level.</p> <p>However, it has not been formulated as a clear objective. For this reason, the project purpose was adapted in the design of this EPE.</p> |                     |                                      |                         |
| During EPE (if target modified): Water resources and soil in the project area are used more efficiently        |  |   |                     |                                      |                         |
| Indicator  | Evaluation of appropriateness<br>(for example, regarding impact level, accuracy of fit, target level, smart criteria)  | PA target level<br><br>Optional:<br>EPE target level  | PA status<br>(2003) | Status at final inspection<br>(2014) | Status at EPE<br>(2023) |
| Indicator 1 (PA): Increase in average land use intensity to 117% six years after completion of the civil works | <p><b>Is the indicator defined as specific, measurable, attainable, realistic and time-bound (SMART)?</b> - Yes, the indicator is specific, measurable (if data on the irrigation campaigns are available as in the final inspection report) and scheduled. According to observations from the final inspection in 2015, the agricultural use of the irrigated areas is still low. From this point of view, the target level set seems too ambitious.</p> <p><b>Does the indicator capture a significant aspect of the target system?</b> - Yes</p> <p><b>Is the indicator defined at the correct target level (output, outcome or impact)?</b> - Yes</p> <p><b>Is the indicator characteristic measurable in the EPE?</b><br/>Yes, data on agricultural use of the irrigation area is available up to 2021 and was used to check the indicator.</p> <p><b>Can existing data be used as a comparative measurement?</b> - Unclear: Based on the documents currently</p> | 117%  | 70%                 | 70%                                  | Not achieved.           |

|   |  |  |  |  |   |
|---|--|--|--|--|---|
|   | available, this would not be possible, as the campaign data only covers the period 2013 to 2015.   |  |  |  |   |
| <p>Indicator 2 (PA): Coverage of operating and maintenance costs as well as part of replacement investments by the tariffs</p> <p>Alternative proposal: Central local stakeholders confirm increased coverage of operating and maintenance costs as well as a part of replacement investments through tariffs</p> | <p><b>Is the indicator defined as specific, measurable, attainable, realistic and time-bound (SMART)?</b> - No, the indicator is neither specific (are they 100% of the coverage? “part of the replacement investments”) nor time-bound. Therefore, it is not clear how it should be measured and whether it is realistic.</p> <p><b>Does the indicator cover a significant aspect of the target system?</b> -Yes</p> <p><b>Is the indicator defined at the correct target level (output, outcome or impact)?</b> - Yes</p> <p><b>Is the indicator characteristic measurable in the EPE?</b><br/>Unclear – if specified and if data on irrigation campaigns for recent years are available, the indicator could be audited. An alternative proposal was submitted for in the event that the indicator was not measurable during the EPE.</p> <p><b>Can existing data be used as a comparative measurement?</b> Unclear – because there is no information yet on how it should be measured.</p> | According to PA: Specification of aspiration level in tariff study | The collection rate of the GDA and a qualitative evaluation of the cover are used for the EPE. | Coverage of operating costs not yet achieved | Not achieved                                  |
| <p>Indicator 3 (PA): Irrigation efficiency of the network is more than 90%</p> <p>Alternative proposal: Central local stakeholders confirm an increased irrigation efficiency of the network.</p>   | <p><b>Is the indicator defined as specific, measurable, attainable, realistic and time-bound (SMART)?</b> - Partly, the percentage is specified, but the indicator is not time-bound.</p> <p><b>Does the indicator capture a significant aspect of the target system?</b> - Yes</p> <p><b>Is the indicator defined at the correct target level (output, outcome or impact)?</b> - Yes</p> <p><b>Is the indicator characteristic measurable in the EPE?</b><br/>- Unclear whether up-to-date data is available to check</p>   | 30%  | >90%   | 90%  | Partially achieved (89% in 2022) <sup>1</sup> |

<sup>1</sup> Data from CRDA, not verified.

|  |  |   |     |     |   |
|--|--|---|-----|-----|---|
|  | <p>the indicator. An alternative proposal was submitted for in the event that the indicator was not measurable during the EPE.</p> <p><b>Can existing data be used as a comparative measurement?</b> - Unclear whether relevant data is provided.</p>  |   |     |     |   |
| <p>Indicator 4 (PA): 80% of the total area is equipped with water-saving technologies (irrigation and drip irrigation)</p> | <p><b>Is the indicator defined as specific, measurable, attainable, realistic and time-bound (SMART)?</b> - Partly. The indicator is specific and measurable (if data on the equipment of the areas from the irrigation campaigns is available, as in final inspection). Since a basic value is missing, it is not possible to assess how realistic the objective is.</p> <p><b>Does the indicator capture a significant aspect of the target system?</b> - Yes</p> <p><b>Is the indicator defined at the correct target level (output, outcome or impact)?</b> - Yes</p> <p><b>Is the indicator characteristic measurable in the EPE?</b> Unclear – if relevant data on the irrigation campaigns of recent years is available, the indicator could be audited.</p> <p><b>Can existing data be used as a comparative measurement?</b> Unclear – because no relevant data is available yet.</p> | – | 80% | 72% | Achieved according to qualitative data <sup>2</sup> |

| Project objective at impact level   | Rating of appropriateness (former and current view)  |
|---|--|
| <p>During project appraisal: Sustainable increase in agricultural income in the project area.</p> | <p>The overall objective is derived from the problem analysis, is appropriate in terms of content and is defined at the right level. Due to the multitude of different factors that influence the income situation, it is more appropriate to assume a contribution to the change in income.</p> <p>However, like the project purpose, this is not formulated as a clear objective. It has been adapted in this respect.</p> |

<sup>2</sup> Unfortunately, the quantitative data was not submitted during the EPE.

| During EPE (if target modified): The project contributes to increasing agricultural incomes in the project area.   |  |   |   |  |  |
|--|--|---|---|--|--|
| Indicator  | Evaluation of appropriateness<br>(for example, regarding impact level, accuracy of fit, target level, smart criteria)  | PA target level<br><br>Optional:<br>EPE target level  | PA status (2003)  | Status at final inspection (2014)  | Status at EPE (2023)                   |
| <p>Indicator 1 (PA): The agricultural per capita income of an average farm increases by around 100% (six years after completion of construction work)</p> <p>Alternative proposal: Key local stakeholders confirm an increase in the agricultural per capita income of an average farm six years after completion of construction work</p> | <p><b>Is the indicator defined as specific, measurable, attainable, realistic and time-bound (SMART)?</b> Yes, the indicator is specific, measurable and time-bound.</p> <p><b>Does the indicator cover a significant aspect of the target system?</b> - Yes</p> <p><b>Is the indicator defined at the correct target level (output, outcome or impact)?</b> - Yes</p> <p><b>Is the indicator characteristic measurable in the EPE?</b><br/>Unclear whether the relevant data for measuring the indicator is provided.<br/>In the event that the indicator was not measurable during the EPE, an alternative proposal was submitted.</p> <p><b>Can existing data be used as a comparative measurement?</b> Unclear – as no relevant data is available yet.</p> | <p>Average farm of 6.8 ha on average at approx. 3,600 TND/a (but with a relatively large range of variation in the sectors (from 2,690 ha in Habibia to 6,760 ha in Mehrine) measured by feasibility study)</p> | <p>100%</p> <p>For the EPE: qualitative evaluation of the level of agricultural per capita income</p> | <p>Not specified (measurement only possible six years after completion of construction work)</p> | <p>Value estimated as not achieved</p> |



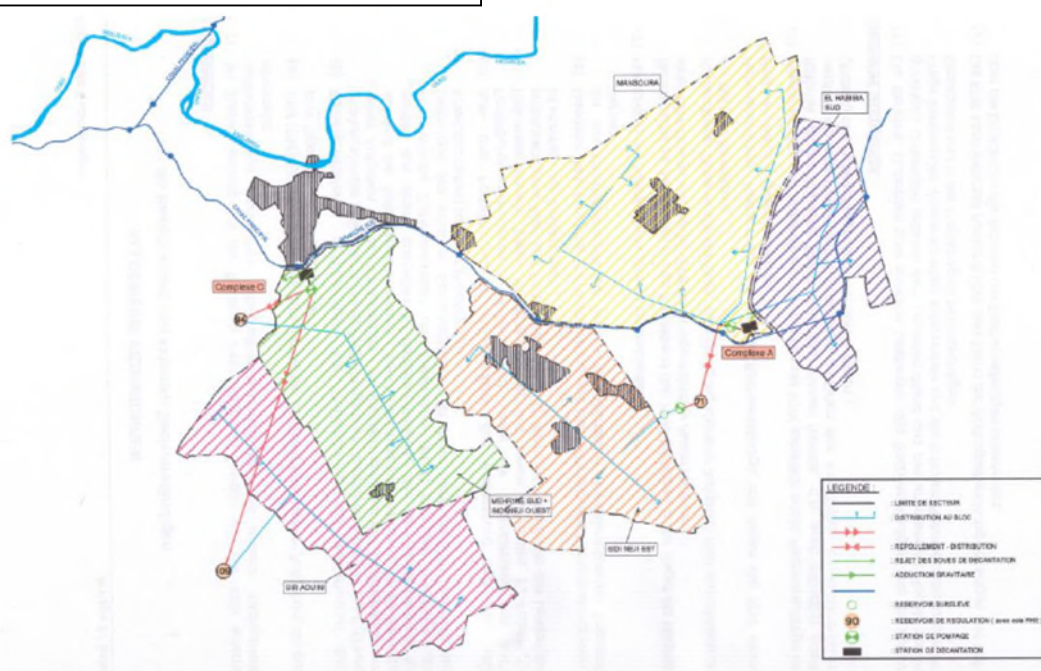
## Risk analysis annex

| Risk   | Relevant OECD-DAC criterion                                     |
|--|---|
| <p>The risks for time delays and cost increases already mentioned at MP (<i>based on Tunisian currency</i>) have occurred. Due to the associated high specific costs, there was still a medium risk at the time of the final inspection that the modernised facilities could not be operated economically or could only be operated less profitably. Ex post, it appears that this consequential risk has also occurred. At present, the facility is not profitable due to drought-related low utilisation.</p>  | <p><b>Effectiveness, efficiency, impact, sustainability</b></p> |
| <p>At both the time of the final inspection and the EPE, there is still a risk that the agricultural advisory service will only work to a limited extent and therefore the water user associations will not receive sufficient support.</p>  | <p><b>Effectiveness, impact, sustainability</b></p>             |
| <p>In some sectors, alternative water sources (<i>sometimes illegal</i>) continue to be used in an uncontrolled manner and the CRDA appears to be only partially able to enforce stricter compliance with current legislation and prevent illegal water extraction (including from the irrigation system). The risk identified in the PA therefore continues to exist, but in our estimation also at a higher, medium level due to the seemingly illegal water extraction from the modernised system. Against the background of the problems of water scarcity and access to water, the sometimes illegal extraction of water continues to be a problem in the project area.</p> | <p><b>Effectiveness, sustainability</b></p>                     |
| <p>As part of the project, the project-executing agency was equipped with sufficient transport capacities and operating resources to ensure the regular implementation of impact monitoring. At the time of the final inspection, the risk of inappropriate data collection was assessed as low, while the risk of a lack of quality controls and data analysis was assessed as high. Some of the requested data (current instalment of equipment with water-saving devices, information on the development of agricultural yields) was not provided despite multiple requests at the time of the EPE.</p>   | <p><b>Impact, sustainability</b></p>                            |
| <p>The enforcement of a reform of the statutes of the user communities and the associated legal environment had not been significantly advanced at the time of the final inspection, with the effect that the communities were only partially able to secure the operation and maintenance of the plants. The risk to the financially sustainable operation of the physical infrastructure in the sectors was assessed as high at that time. The findings from the EPE show that this risk continues to exist. Currently, the user communities are not able to cover the operating costs from the tariff income.</p>   | <p><b>Sustainability</b></p>                                    |
| <p>An already materialised and still high risk for the profitability and use of the facilities in the future is insufficient water availability. This applies in particular in the context of the potential impact of climate change and the increase in demand in other sectors with overall limited resources (e.g. drinking water supply with higher priority), which may be associated with a significant reduction in resources in the region and requires a reduction in the previously allocated sufficient quota. Although the introduced technologies allow optimised irrigation with low water requirements, it is not possible to further influence these risks.</p>  | <p><b>Effectiveness, impact, sustainability</b></p>             |
| <p>The risks related to agricultural production including their environmental impact resulting from the inappropriate use of fertilisers and pesticides were pointed out in the PA. This also applies in principle to risks of soil salinity in the semi-arid area. The risks have not yet occurred, but remain in principle, especially when considering that with modern, efficient irrigation methods in conjunction with a possible reduction in rainfall due to climate change, risks arising from increased soil salt content may possibly increase.</p>   | <p><b>Effectiveness, impact, sustainability</b></p>             |

## Project measures and their results annex

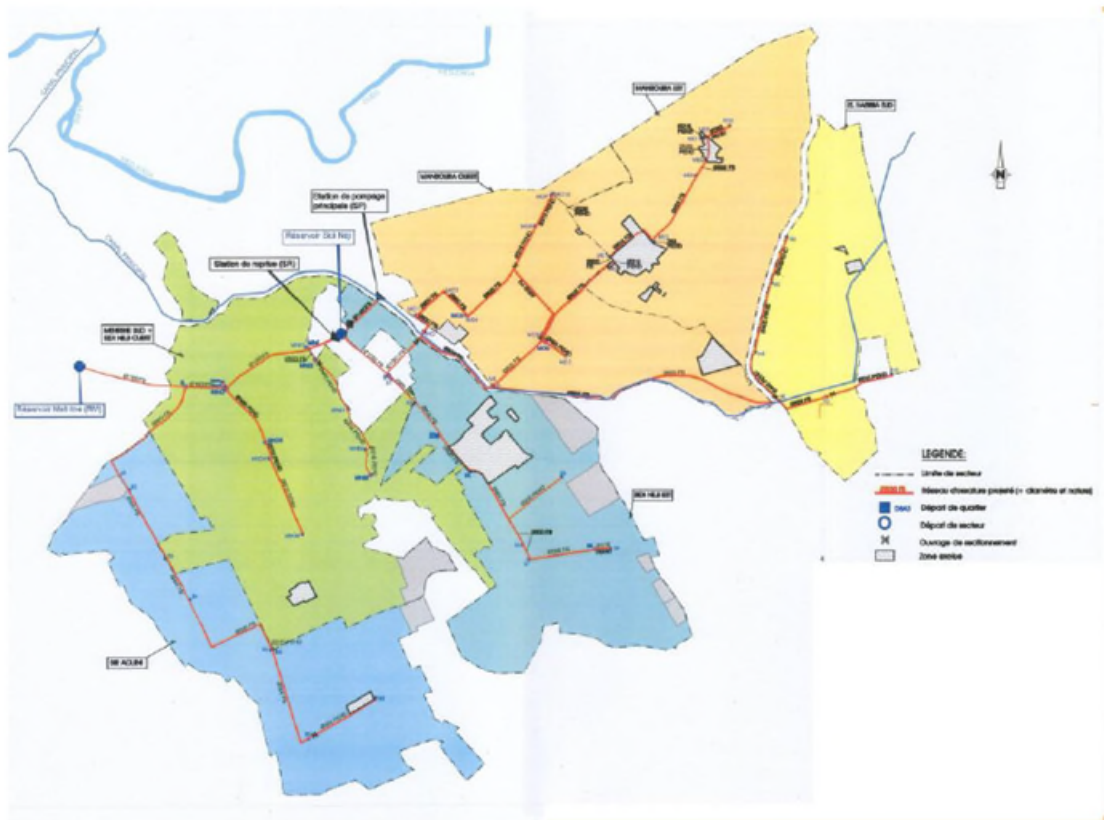
| Output (target at MP)  | Actual status at EPE   |
|--|--|
| Modernisation of the irrigation perimeter in the Mejdjerda valley to 4,071 ha by demolition of the existing irrigation infrastructure, the construction of new pumping stations, equalisation basins and the underground transport and distribution network. | The irrigation infrastructure has been modernised in all planned sectors. The actual modernised area is 4,396 ha, which is around 8% above the target value.   |
| The organisations take over the administration and maintenance of the modernised network at their level  | At the time of the final inspection, all irrigation sectors implemented as part of the project were managed and operated by officially registered water user communities during the EPE.                               |
| Solutions to problems (merger, access to credit, pricing, etc.) are identified and implemented   | The problems of unclear ownership relationships and unknown cadastral boundaries were largely solved during the course of the project.   |
| Systems for monitoring and evaluation are set up and are functional  | A system for follow-up and evaluation of all relevant developments in the modernised irrigation sectors has been installed at the responsible regional agricultural authority and staff have been trained accordingly. |

### (a) Planned solution



(b)

Realised solution



## Recommendations for operation annex

**The following recommendations were made in the final inspection for work still outstanding, the improvement of sustainability and the operational management of the implemented facilities:**

- Upon completion of all work, the surroundings of all construction sites shall be restored to their original condition and waste from the works shall be disposed of at controlled landfill sites. This also applies to waste from the old facility, including the tertiary channels. In addition, the smaller outstanding works, which are financed from the national budget, must be ordered and completed as soon as possible.
- Technical quality defects and deficits still present in the perimeters are to be identified by means of a detailed inspection jointly by the project-executing agency and user communities, and the corresponding work to rectify defects/improve the systems is to be carried out before the next irrigation season. This also applies in particular to any leaks in the pipelines laid underground. In this context, the project-executing agency was recommended to actively promote further equipment with water-saving irrigation technologies through suitable interventions also in the parcels in which furrow irrigation is still being practised, in order to increase the irrigation efficiency and therefore further optimise the use of water resources.
- Remaining problems in the ownership and cadastral limits of some parcels are to be resolved immediately in order to avoid land speculation and to allow the farms concerned access to credit.
- Any future problems in the operation of the irrigation infrastructure should generally be resolved as quickly as possible in order not to further feed the loss of trust of farmers/user communities caused by the difficulties in the commissioning of the irrigation system. This also applies to the apparently too low pressure ratios in some parts of the system reported by farmers during our field visits.
- Overall, we consider the ability of the user communities to operate the irrigation systems sustainably to be limited. This is due to both the technical and agricultural aspects as well as the financial and organisational aspects. The project-executing agency was therefore asked to ensure ongoing and regular support for the communities in all of the aforementioned aspects and to improve their situation through adequate training measures.
- In order to increase the number of contracts between user communities and farmers for the use of the irrigation infrastructure, we support strict compliance with and enforcement of the existing rules. The same applies to the introduction and implementation of a sufficiently cost-covering binomial tariff, the fixed share of which shall cover the total area of the establishment, not just the irrigated area. In this context, it is also worth mentioning that defective water meters must be replaced immediately in order to avoid the consumption-independent flat rates still applied in some parts of the sectors, which are diametrically opposed to efficient water use.
- The illegal water withdrawals observed in the Habibia sector in particular should be prevented in accordance with the existing rules in order to be able to guarantee the sustainability of the irrigation infrastructure in this sector and to ensure the efficient use of water resources.
- Specific rules for the operation and maintenance of the facilities were developed through the accompanying measure. In addition, none of the systems in the sectors are very complex and they are all well adapted to the rural environment and the knowledge of the users, yet we strongly recommend that users offer their full support in the application of such rules, including preventive maintenance plans.

- In this context, we also recommend exploring the possibilities of establishing an association of the six user communities and promoting its establishment to support individual communities when they encounter problems that would otherwise overwhelm them.
- Despite the fact that, according to our observations, (in the meantime) competent personnel are responsible for the operation/maintenance of the complex communal systems of the irrigation system (*pumping stations, water treatment and storage, primary piping system*), we continue to recommend investigating the possibilities of the competent state company SEC-ADENORD taking over the operation/maintenance of these systems, as provided for in the Special Agreements.
- With regard to the development of water and soil quality in the sectors, we recommended that the surveys and analyses started during the course of the project be continued regularly, as only these surveys or analyses can identify adverse developments in good time and adequately tackle them with corresponding countermeasures.



Evaluation questions in line with OECD-DAC criteria/ex post evaluation matrix annex

**Relevance**

| Evaluation question  | Specification of the question for the present project  | Data source (or rationale if the question is not relevant/applicable)   | Rating | Weighting ( - / o / + ) | Rationale for weighting |  |
|--|--|---|--------|-------------------------|-------------------------|--|
| Evaluation dimension: Policy and priority focus  |  |   |        | 2                       | o                       |  |
| <p>Are the objectives of the programme aligned with the (global, regional and country-specific) policies and priorities, in particular those of the (development policy) partners involved and affected and the BMZ?</p> | <ul style="list-style-type: none"> <li>• Is the project concept aligned with the most important framework specifications of the BMZ and the partner country?</li> </ul> <p>Relevant quality characteristics:<br/>           Environmental protection and resource conservation (UR:1)<br/>           Participatory development / good governance (PD/GG:1)<br/>           Rural development (LE:2)<br/>           Adaptation to climate change (KLA:1)</p> | <p>1. Document analysis:<br/>           Primary strategic frameworks:<br/>           • Agenda 2030<br/>           • BMZ concept “Promotion of sustainable agriculture” from 2013<br/>           • BMZ Water strategy from 2017</p> <p>Additional strategic frameworks:<br/>           • BMZ Reform concept 2030<br/>           • UN Conference on Environment and Development (Rio Conventions) (1992)</p> <p>Relevant political and institutional framework conditions of the partner<br/>           • Stratégie EAU 2050 pour la Tunisie<br/>           • Strategy Secteur de l'Eau Tunisie 2030 (Ministère de l'Agriculture)<br/>           • La stratégie d'adaptation au changement climatique pour le secteur agricole et les ressources naturelles (2006)<br/>           • La stratégie de pérennisation des systèmes hydrauliques (2014)<br/>           • La troisième stratégie de l'ACTA (2017)<br/>           10th Development Plan (2003-2006) of the Tunisian government in the agricultural sector</p> <p>2. Semi-structured interviews with project-executing agency and partner</p> |        |                         |                         |  |

|  |   |   |   |   |  |
|--|---|---|---|---|--|
| <p>Do the objectives of the programme take into account the relevant political and institutional framework conditions (e.g. legislation, administrative capacity, actual power structures (including those related to ethnicity, gender, etc.))?</p> | <ul style="list-style-type: none"> <li>• Which Tunisian/administrative structures, capacities, etc. should be used?</li> <li>• To what extent did these offer sufficient absorption potential for the implementation of the programme?</li> </ul>   | <ol style="list-style-type: none"> <li>1. National strategy of partner country <ul style="list-style-type: none"> <li>• Stratégie EAU 2050 pour la Tunisie</li> <li>• Strategy Secteur de l'Eau Tunisie 2030 (Ministère de l'Agriculture)</li> <li>• La stratégie d'adaptation au changement climatique pour le secteur agricole et les ressources naturelles (2006)</li> <li>• La stratégie de pérennisation des systèmes hydrauliques (2014)</li> <li>• La troisième stratégie de l'ACTA (2017)</li> </ul> </li> <li>2. Semi-structured interviews with project-executing agency and partner</li> </ol> | 2 | o |  |
| <p>Evaluation dimension: Focus on needs and capacities of participants and stakeholders</p>  |   |   |   |   |  |
| <p>Are the programme objectives focused on the developmental needs and capacities of the target group? Was the core problem identified correctly?</p>  | <ul style="list-style-type: none"> <li>• Is the project design aligned with the needs (income increases and more efficient use of resources) of the target groups?</li> <li>• Are a lack of water supply and high losses in water use core problems for the population living there?</li> <li>• Did the strategy envisage the involvement of the target group in relevant implementation steps?</li> <li>• Was and is the selection criteria (1. <i>Mainly smallholdings</i>, 2. <i>Low risk of future loss of land by cities. Agglomeration</i>, 3. <i>Existence of a GIC</i> and 4. <i>Few problems concerning land</i>) realistic and reasonable for the project location from the perspective at the time and today?</li> </ul> | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection and strategic reference documents</li> <li>2. Semi-structured interviews with project-executing agency and partner as well as the target group</li> <li>3. Needs analysis (interviews, document analysis)</li> </ol>   |   |   |  |
| <p>Were the needs and capacities of particularly disadvantaged or vulnerable parts of the target group taken into account (possible differentiation according to age, income,</p>  | <ul style="list-style-type: none"> <li>• Was an appropriate analysis of the impact of the measures on particularly disadvantaged population groups carried out during the design of the project?</li> </ul>   | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection and strategic reference documents</li> </ol>   |   |   |  |

|  |   |   |   |   |  |
|--|---|---|---|---|--|
| <p>gender, ethnicity, etc.)? How was the target group selected?</p>  | <ul style="list-style-type: none"> <li>• Were some aspects of the plan designed for these groups?</li> <li>• What role did the company size structure and socio-economic factors play in the selection of the project locations as well as the programme's design?</li> </ul>   | <p>2. Semi-structured interviews with implementation consultant, executing agency and partner as well as the target group</p>   |   |   |  |
| <p>Would the programme (from an ex post perspective) have had other significant gender impact potentials if the concept had been designed differently? (FC-E specific question)</p>      | <ul style="list-style-type: none"> <li>• To what extent was there a minimum quota for women-led businesses to benefit from the measures?</li> <li>• To what extent were the project's measures strategically aligned with the potential gender impacts?</li> </ul>  | <p>1. Project appraisal report, progress reports, final inspection, consultant report<br/>2. Semi-structured interviews with project managers, implementation consultant and the target group</p> |   |   |  |
| <p>Evaluation dimension: Appropriateness of design</p>   |   |   | 3 | 0 |  |
| <p>Was the design of the programme appropriate and realistic (technically, organisationally and financially) and in principle suitable for contributing to solving the core problem?</p> | <ul style="list-style-type: none"> <li>• How realistic are the module objective and the implementation concept from a past and current perspective as well as in view of the available resources (in terms of time, finances, partner's capacities, implementation modality)?</li> <li>• To what extent can possible changes to the framework conditions be taken into account when designing the intervention?</li> </ul> <p>To what extent were external influences taken into account in the intervention?</p> | <p>1. Project appraisal report, progress reports, final inspection,<br/>2. Semi-structured interviews with project managers, implementation consultant</p>  |   |   |  |
| <p>Is the programme design sufficiently precise and plausible (transparency and verifiability of the target system and the underlying impact assumptions)?</p>                           | <ul style="list-style-type: none"> <li>• How plausible are the module and the overall goal? Are they precisely formulated?</li> <li>• How plausible are the target system and the underlying impact hypotheses?</li> </ul>  | <p>1. Project appraisal report, progress reports, final inspection</p>  |   |   |  |

|  |   |   |  |   |   |  |
|--|---|---|--|---|---|--|
| <p>Please describe the theory of change, incl. complementary measures, if necessary in the form of a graphical representation. Is this plausible? As well as specifying the original and, if necessary, adjusted target system, taking into account the impact levels (outcome and impact). The (adjusted) target system can also be displayed graphically. (FC-E specific question)</p> | <p>The project's theory of change depicted graphically serves to analyse the following aspects:</p> <ul style="list-style-type: none"> <li>• How are the project's measures linked to the intended impact?</li> <li>• How plausible is the theory of change?</li> </ul>   | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with implementation consultant</li> </ol>                                   |  |   |   |  |
| <p>To what extent is the design of the programme based on a holistic approach to sustainable development (interplay of the social, environmental and economic dimensions of sustainability)?</p>   | <ul style="list-style-type: none"> <li>• To what extent did the project address social, environmental and economic aspects holistically?</li> <li>• To what extent was the project aimed at promoting the autonomy and independence of farmers?</li> </ul>  | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers, implementation consultant</li> </ol>                 |  |   |   |  |
| <p>Evaluation dimension: Response to changes/adaptability</p>  |   |   |  | 2 | o |  |
| <p>Has the programme been adapted in the course of its implementation due to changed framework conditions (risks and potential)?</p>   | <ul style="list-style-type: none"> <li>• The technical design of the water supply has been changed from a decentralised to a centralised approach: to what extent were the changes justified? What were the pros and cons of the changes compared to the original design?</li> <li>• To what extent have the changes affected the implementation of the project?</li> </ul> | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers (especially TE), implementation consultant</li> </ol> |  |   |   |  |

## Coherence

| Evaluation question   | Specification of the question for the present project  | Data source (or rationale if the question is not relevant/applicable)   | Rating | Weighting (- / 0 / +) | Rationale for weighting |
|---|--|---|--------|-----------------------|-------------------------|
| Evaluation dimension: Internal coherence (division of tasks and synergies within German development cooperation):   |  |   | 3      | 0                     |                         |
| To what extent is the programme designed in a complementary and collaborative manner within the German development cooperation (e.g. integration into DC programme, country/sector strategy)? | <ul style="list-style-type: none"> <li>• What operational environment/player landscape was relevant for the project?</li> <li>• To what extent did the project's design and implementation approaches complement other projects in the sector?</li> </ul>                                  | 1. Semi-structured interviews with project managers<br>1. Ongoing programme reporting<br>2. Documents and objectives of other German development projects |        |                       |                         |
| Do the instruments of the German development cooperation dovetail in a conceptually meaningful way, and are synergies put to use?   | <ul style="list-style-type: none"> <li>• To what extent did the implementation as a cooperation project with GIZ affect internal coherence?</li> </ul> To what extent was the implementation in this framework coherent and complementary between the development cooperation instruments? | 1. Semi-structured interviews with project managers, implementation consultant, GIZ<br>2. Documents and objectives of other German development projects   |        |                       |                         |
| Is the programme consistent with international norms and standards to which the German development cooperation is committed (e.g. human rights, Paris Climate Agreement, etc.)?               | To what extent are the project design and measures aligned with the identified norms and standards? (e.g. the Paris Declaration or the principle "Leave no one behind")  | 1. Project appraisal report, progress reports, final inspection<br>2. Semi-structured interviews with project managers, implementation consultant         |        |                       |                         |
| Evaluation dimension: External coherence (complementarity and coordination with actors external to German DC):  |  |   |        |                       |                         |



|  |   |   |
|--|---|---|
| To what extent does the programme complement and support the partner's own efforts (subsidiarity principle)?   | <ul style="list-style-type: none"> <li>To what extent does the project complement the partner's measures?</li> </ul>  | <ol style="list-style-type: none"> <li>Partner's strategy documents</li> <li>Semi-structured interviews with project managers, implementation consultant, project-executing agency and partners</li> </ol>      |
| Is the design of the programme and its implementation coordinated with the activities of other donors?   | <ul style="list-style-type: none"> <li>How exactly did the project fit into the <i>Programme d'Investissement du Secteur de l'Eau</i> (PISEAU) supported jointly with the World Bank and AFD?</li> <li>To what extent does the project complement other projects of other donors in the area of application?</li> </ul> | <ol style="list-style-type: none"> <li>Objectives of external IZ actors:</li> <li>Semi-structured interviews with project managers, implementation consultant, project-executing agency and partners</li> </ol> |
| Was the programme designed to use the existing systems and structures (of partners/other donors/international organisations) for the implementation of its activities and to what extent are these used? | <ul style="list-style-type: none"> <li>To what extent were there potential synergy effects with regard to existing systems and structures?</li> <li>To what extent did the project activities correspond to the identified potential synergies?</li> </ul>  | <ol style="list-style-type: none"> <li>Objectives of external IZ actors</li> <li>Semi-structured interviews with project managers, implementation consultant, project-executing agency and partners</li> </ol>  |
| Are common systems (of partners/other donors/international organisations) used for monitoring/evaluation, learning and accountability?   | <ul style="list-style-type: none"> <li>To what extent are there common monitoring, evaluation and learning systems?</li> <li>To what extent have they been used?</li> </ul>   | <ol style="list-style-type: none"> <li>Semi-structured interviews with project managers, implementation consultant, project-executing agency and partners</li> </ol>  |

## Effectiveness

| Evaluation question  | Specification of the question for the present project | Data source (or rationale if the question is not relevant/applicable) | Rating | Weighting (- / 0 / +) | Rationale for weighting |
|--|---|---|--------|-----------------------|-------------------------|
| Evaluation dimension: Achievement of (intended) targets              |   |   | 4      | 0                     |                         |
| Were the (if necessary, adjusted) objectives of the programme (incl. | <b>Indicator 1:</b>                                   | 1. Project appraisal report, progress reports, final inspection       |        |                       |                         |

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| <p>capacity development measures) achieved?<br/>Table of indicators: Comparison of actual/target</p>   | <ul style="list-style-type: none"> <li>• What is the current average land use intensity?<br/><u>If no data is available:</u></li> <li>• Is an average increase in land use intensity confirmed by the key local stakeholders?</li> </ul> <p><b>Indicator 2:</b></p> <ul style="list-style-type: none"> <li>• To what extent are the costs for operation and maintenance as well as for part of the replacement investments covered by the fees?</li> </ul> <p><b>Indicator 3:</b></p> <ul style="list-style-type: none"> <li>• How efficient is irrigation via the network currently?</li> <li>• <u>If there is no data:</u> Is increased irrigation efficiency due to the improved infrastructure confirmed by key local stakeholders?</li> </ul> <p><b>Indicator 4:</b></p> <ul style="list-style-type: none"> <li>• What proportion of the total area is equipped with water-saving technologies (spray and drip irrigation)?</li> </ul> <p>For all indicators: Are there significant differences in terms of target achievement between the five perimeters? If so, what are the reasons for this?</p> | <ol style="list-style-type: none"> <li>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner</li> <li>3. Target/actual comparison based on the indicators</li> <li>4. Data for the past years on the irrigation campaigns in the project area (if made available): Data on land use intensity, covering of the costs and collection rate, overview of maintenance and expenditure on operation and maintenance, water consumption</li> </ol> | 4 | o |  |
| <p>Evaluation dimension: Contribution to achieving targets:</p>  |  |   |   |   |  |
| <p>To what extent were the outputs of the programme delivered as planned (or adapted to new developments)? (<i>Learning/help question</i>)</p> | <ul style="list-style-type: none"> <li>• To what extent were the outputs of the project activities and measures achieved (qualitative evaluation)?</li> <li>• Output 1: Has the irrigation infrastructure been modernised in all planned sectors? Did this lead to a time saving in irrigation for the farms?</li> </ul>   | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol>   |   |   |  |

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|   | <ul style="list-style-type: none"> <li>• Output 2: Are the irrigation sectors managed by registered user groups?</li> <li>• Output 3: Were the issues of unclear ownership resolved?</li> <li>• Output 4: Has a system for follow-up and evaluation of all relevant developments in the modernised irrigation sectors been installed at the competent regional agricultural authority and has staff been trained accordingly?</li> <li>• To what extent have the deficiencies in facility operation identified during the final inspection been rectified in the meantime (overflow of distribution structures during full operation of the pump station, emptying of storage tanks in the evening hours)?</li> <li>• What is the usable total area?</li> <li>• Was the pathway system rehabilitated as planned?</li> </ul> |   |
| <p>Are the outputs provided and the capacities created used?</p>  | <ul style="list-style-type: none"> <li>• To what extent did the project improve or create capacities (qualitative evaluation)?</li> <li>• To what extent are the irrigated areas used as originally planned?</li> <li>• Are the water supply, treatment and transport systems adequately operated?</li> <li>• Are the deficits identified at the final inspection still present under rare operating conditions (overflow of distribution structures at full pump station output, emptying of storage tanks in the evening hours)?</li> </ul>   | <p>1. Semi-structured interviews with project-executing agency and partner as well as the target group</p>  |
| <p>To what extent is equal access to the outputs provided and the capacities created guaranteed (e.g. non-discriminatory, physically)</p> | <ul style="list-style-type: none"> <li>• To what extent did the project pay attention to the inclusiveness of its measures (e.g. do the local families benefit equally from the improved</li> </ul>   | <p>1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</p> |

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| <p>accessible, financially affordable, qualitatively, socially and culturally acceptable)?</p>  | <p>irrigation system)? (qualitative evaluation)</p> <ul style="list-style-type: none"> <li>• Are smallholdings disadvantaged by the measures compared to larger farms? Are there differences in the application and approval rate for subsidies for investments in water-saving technologies depending on the size of the facility?</li> </ul> |   |
| <p>To what extent did the programme contribute to achieving the objectives?</p>   | <p>To what extent have the project measures contributed to achieving the objectives? (qualitative evaluation)</p>  | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol> |
| <p>To what extent did the programme contribute to achieving the objectives at the level of the intended beneficiaries?</p>  | <ul style="list-style-type: none"> <li>• To what extent have the project measures affected the target group? (qualitative evaluation)</li> </ul>   | <ol style="list-style-type: none"> <li>1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol>  |
| <p>Did the programme contribute to the achievement of objectives at the level of the particularly disadvantaged or vulnerable groups involved and affected (potential differentiation according to age, income, gender, ethnicity, etc.)?</p> | <p>To what extent did the project measures affect disadvantaged and vulnerable groups (e.g. poorer rural population and women)? (qualitative evaluation)</p>   | <ol style="list-style-type: none"> <li>1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol>  |
| <p>Were there measures that specifically addressed gender impact potential (e.g. through the involvement of women in project committees, water committees, use of social workers for women, etc.)? (FC-E specific question)</p>               | <ul style="list-style-type: none"> <li>• To what extent have actions focused on potential gender impacts been implemented?</li> <li>• To what extent have the measures affected gender-specific issues?</li> </ul>   | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol> |

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| <p>Which project-internal factors (technical, organisational or financial) were decisive for the achievement or non-achievement of the intended objectives of the programme?<br/><i>(Learning/help question)</i></p>        | <ul style="list-style-type: none"> <li>• To what extent were internal project factors considered decisive for achieving the objectives?<br/>Specifically at the level of:             <ul style="list-style-type: none"> <li>- Financing modality (What role did the project-executing agency's own contribution play in achieving the objectives?)</li> <li>- Technical support from the implementation consultant.</li> <li>- Organisational and administrative capacities of the project-executing agency.</li> <li>- Decisions by the executing agency that deviate from the planning (decision for a larger number of lots for construction measures)</li> <li>- Involvement of user groups (GDA) in construction design</li> <li>- Tariff structure and collection rate</li> <li>- Training of user groups: Are the GDA functional?</li> </ul> </li> </ul> | <p>1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner</p> |  |   |   |  |
| <p>Which external factors were decisive for the achievement or non-achievement of the intended objectives of the programme (also taking into account the risks anticipated beforehand)? <i>(Learning/help question)</i></p> | <ul style="list-style-type: none"> <li>• To what extent were external factors considered decisive for achieving the objectives?<br/>Specifically, this concerns the following:             <ul style="list-style-type: none"> <li>- Possible scarcity of water resources due to climate change?</li> <li>- Possible lack of access to operating resources (e.g. fertiliser) due to the COVID-19 pandemic or war between Ukraine and Russia?</li> </ul> </li> </ul>   | <p>1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner</p> |  |   |   |  |
| <p>Evaluation dimension: Quality of implementation</p>  |  |   |  | 4 | o |  |
| <p>How is the quality of the management and implementation of the programme (e.g. project-executing agency, consultant, taking into</p>   | <ul style="list-style-type: none"> <li>• To what extent did the use of the project planning and monitoring system by the project-executing agency and</li> </ul>   | <p>1. Project appraisal report, progress reports, final inspection</p>  |  |   |   |  |

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| <p>account ethnicity and gender in decision-making committees) evaluated with regard to the achievement of objectives?</p>  | <p>the implementation consultant correspond to the project design?</p> <ul style="list-style-type: none"> <li>• To what extent was the decision-making timely and evidence-based?</li> <li>• To what extent was the project able to document the change processes during implementation?</li> <li>• To what extent did the project-executing agency's capacities (approach/qualification of staff, process flow, etc.) contribute to achieving the objectives?</li> </ul>  | <p>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner</p>  |
| <p>How is the quality of the management, implementation and participation in the programme by the partners/sponsors evaluated?</p>  | <ul style="list-style-type: none"> <li>• Which partners and executing agencies were involved in the project?</li> <li>• To what extent was cooperation with the partners involved in the project conducive to achieving the objectives?</li> <li>• Was the project management unit (Unité de Gestion du Projet; UGP) sufficiently staffed?</li> <li>• How well did the interaction between UGP, the user groups and the implementation consultant AHT work?</li> <li>• How should the coordination, supervision and quality assurance of the construction work by UGP be evaluated?</li> </ul> | <p>1. Project appraisal report, progress reports, final inspection</p> <p>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner</p> |
| <p>Were gender results and relevant risks in/through the project (gender-based violence, e.g. in the context of infrastructure or empowerment projects) regularly monitored or otherwise taken into account during implementation? Have corresponding measures (e.g. as part of a CM) been implemented in a timely manner? (FC-E specific question)</p> | <p>To what extent were gender dimensions included in the monitoring system, including the relevant risks?</p>  | <p>1. Project appraisal report, progress reports, final inspection</p> <p>2. Semi-structured interviews with project managers, implementation consultant</p>                                       |



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| <p>Evaluation dimension: Unintended consequences (positive or negative)</p>   |  |   | 4 | 0 |  |
| <p>Can unintended positive/negative direct impacts (social, economic, ecological and, where applicable, those affecting vulnerable groups) be seen (or are they foreseeable)?</p> | <ul style="list-style-type: none"> <li>• Were negative (unintended) or positive (not formally agreed) impacts observed by respondents?               <ol style="list-style-type: none"> <li>a) At economic level</li> <li>b) At a social level</li> <li>c) At an ecological level</li> </ol> </li> </ul>   | <ol style="list-style-type: none"> <li>1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol>  |   |   |  |
| <p>What potential/risks arise from the positive/negative unintended effects and how should they be evaluated?</p>   | <p>Qualitative evaluation of benefits/risks</p>  | <ol style="list-style-type: none"> <li>1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol>  |   |   |  |
| <p>How did the programme respond to the potential/risks of the positive/negative unintended effects?</p>  | <ul style="list-style-type: none"> <li>• To what extent can unintended effects be attributed to the project (contribution analysis)?</li> <li>• To what extent has the project taken appropriate adjustment measures?</li> </ul>   | <ol style="list-style-type: none"> <li>1. Semi-structured interviews with project managers, implementation consultant</li> </ol>  |   |   |  |
| <p><b>Additional evaluation question:</b><br/>To what extent were the recommendations made during the audit actually implemented?</p>   | <ul style="list-style-type: none"> <li>• In particular, evaluations are made as to whether               <ol style="list-style-type: none"> <li>a) The user communities are regularly and continuously supported by the project-executing agency and the recommendations on pricing and compliance with rules are implemented.</li> <li>b) Data on the development of water and soil quality is regularly collected and evaluated.</li> <li>c) Existing technical defects in the perimeters identified in the final inspection were rectified (repair of possible leaks on routed lines).</li> <li>d) Existing problems with ownership rights and cadastral boundaries at final inspection were solved.</li> </ol> </li> </ul> | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol> |   |   |  |

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|  | e) Illegal water extraction in the Habiba sector has now been curtailed. |  |
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## Efficiency

| Evaluation question   | Specification of the question for the present project   | Data source (or rationale if the question is not relevant/applicable)   | Rating | Weighting ( - / o / + ) | Rationale for weighting |
|---|---|---|--------|-------------------------|-------------------------|
| Evaluation dimension: Production efficiency   |   |   | 3      | o                       |                         |
| How are the inputs (financial and material resources) of the programme distributed (e.g. by instruments, sectors, sub-measures, also taking into account the cost contributions of the partners/executing agency/other participants and affected parties, etc.)? (Learning and help question) | <ul style="list-style-type: none"> <li>• How are the costs divided according to output?</li> <li>• What are the costs (costs per component)?</li> <li>• What contributions have been agreed and made by the partners?</li> <li>• To what extent are there any differences between the originally planned and actual costs (with rationale)?</li> </ul>  | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with implementation consultant</li> </ol> |        |                         |                         |
| To what extent were the inputs of the programme used sparingly in relation to the outputs produced (products, capital goods and services) (if possible in a comparison with data from other evaluations of a region, sector, etc.)? For example, comparison of specific costs.                | <ul style="list-style-type: none"> <li>• To what extent were internal/external benchmarks used to maximise effectiveness?</li> <li>• What was the impact of the decision to increase the number of lots in the tender for the construction phases on the input to output ratio? What impact did this decision have on cost efficiency? [see also additional evaluation question 1]</li> <li>• How often was the use of resources reflected by the project?</li> <li>• What are the annual operating costs per hectare? [if such data exists]</li> <li>• According to the final inspection, engineering services accounted for only 7% of the total costs, which is</li> </ul> | <ol style="list-style-type: none"> <li>1. Semi-structured interviews with implementation consultant and executing agency</li> </ol>   |        |                         |                         |

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|   | comparatively low: does this affect the quality and supervision of work?  |  |   |   |
| If necessary, as a complementary perspective: To what extent could the outputs of the programme have been increased by an alternative use of inputs (if possible in a comparison with data from other evaluations of a region, sector, etc.)? | <ul style="list-style-type: none"> <li>To what extent and how often did the project conduct an internal project reflection on maximising output?</li> <li>To what extent were potential alternatives to output maximisation discussed, considered and/or implemented?</li> </ul>                              | 1. Semi-structured interviews with project managers, implementation consultant   |   |   |
| Were the outputs produced on time and within the planned period?  | <ul style="list-style-type: none"> <li>To what extent were the results of the project achieved within the planned time frame?</li> <li>Was the original implementation deadline met?</li> </ul> [see also Additional evaluation question 1)   | 1. Project appraisal report, progress reports, final inspection<br>2. Semi-structured interviews with implementation consultant  |   |   |
| Were the coordination and management costs reasonable (e.g. implementation consultant's cost component)? (FC-E specific question)   | <ul style="list-style-type: none"> <li>To what extent were the total costs for coordination and management reasonable?</li> <li>To what extent were the costs for the implementation consultant reasonable in relation to the relevance and provision of services within the scope of the project?</li> </ul> | 1. Project appraisal report, progress reports, final inspection<br>2. Semi-structured interviews with project managers, implementation consultant and executing agency |   |   |
| <b>Evaluation dimension: Allocation efficiency</b>  |   |  | 3 | o |
| In what other ways and at what costs could the effects achieved (outcome/impact) have been attained? ( <i>Learning/help question</i> )  | To what extent can other ways be found to achieve the expected results of the project?  | 1. Semi-structured interviews with project managers, implementation consultant and project-executing agency  |   |   |
| To what extent could the effects achieved have been attained in a more cost-effective manner,   | To what extent were the partners' contributions appropriate in relation to the results achieved?  | 1. Project appraisal report, progress reports, final inspection<br>2. Semi-structured interviews with project managers, implementation consultant                      |   |   |

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| <p>compared with an alternatively designed programme?</p>   |   |  |
| <p>If necessary, as a complementary perspective: To what extent could the positive effects have been increased with the resources available, compared to an alternatively designed programme?</p>   | <ul style="list-style-type: none"> <li>• To what extent were potential synergies with the cooperation partners exploited?</li> <li>To what extent has the project realised cooperation potential within the German development cooperation?</li> </ul>  | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers, implementation consultant and project-executing agency</li> </ol>   |
| <p><b>Additional evaluation question 1:</b><br/>What are the causes of the time delays and cost increases? To what extent does this adversely impact the overall economic profitability of the measures?</p>  | <ul style="list-style-type: none"> <li>• What were the causes of the delays and cost increases identified during the final inspection?</li> <li>• To what extent did they affect the economic viability of the measures overall? [Do the executing agencies share KfW's assessment of the negative consequences of the changed tender conditions for the construction measures?]</li> </ul> | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers, implementation consultant and project-executing agency</li> </ol>   |
| <p><b>Additional evaluation question 2:</b><br/>The final inspection measured an exceptionally high water consumption, which far exceeds the planned consumption. In the EPE, it should be checked whether the consumption figures are still excessive and possible reasons should be investigated.</p> | <ul style="list-style-type: none"> <li>• What is the current water consumption in the project area?</li> <li>• If consumption is too high, what are the possible reasons for this?</li> </ul>   | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection, final report of the consultant</li> <li>2. Semi-structured interviews with project managers, implementation consultant and project-executing agency</li> <li>4. Data for recent years on the irrigation campaigns in the project area (if made available)</li> </ol> |
| <p><b>Additional evaluation question 3:</b><br/>At the final inspection, it was noted that a commercially profitable operation can only be achieved by planting higher-quality crops and a high intensity of use. The EPE is intended to investigate whether a change to planting higher-quality</p>    | <ul style="list-style-type: none"> <li>• Can an increase in the planting of higher-quality crops be observed over the farming phase?</li> </ul>   | <ol style="list-style-type: none"> <li>2. Semi-structured interviews with project managers, implementation consultant and project-executing agency</li> <li>4. Data for recent years on the irrigation campaigns in the project area (if made available)</li> </ol>  |

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| crops can be observed during the operating phase. |  |  |
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## Impact

| Evaluation question   | Specification of the question for the present project   | Data source (or rationale if the question is not relevant/applicable)   | Rating | Weighting ( - / o / + ) | Rationale for weighting |
|---|---|---|--------|-------------------------|-------------------------|
| <b>Evaluation dimension: Overarching developmental changes (intended)</b>   |   |   | 4      | o                       |                         |
| Is it possible to identify overarching developmental changes to which the programme should contribute? (Or if foreseeable, please be as specific as possible in terms of time.)   | <p>The focus area here is on the impact level (overall objective): Sustainable increase in agricultural income in the project area.</p> <ul style="list-style-type: none"> <li>To what extent has the agricultural per-capita income of an average farm increased? (Indicator 1)</li> </ul> | <ol style="list-style-type: none"> <li>Project appraisal report, progress reports, final inspection</li> <li>Semi-structured interviews with project-executing agency and partner as well as the target group</li> <li>Target/actual comparison based on the indicators</li> <li>Data for recent years on the irrigation campaigns in the project area (if made available)</li> </ol> |        |                         |                         |
| Is it possible to identify overarching developmental changes (social, economic, environmental and their interactions) at the level of the intended beneficiaries? (Or if foreseeable, please be as specific as possible in terms of time) | <ul style="list-style-type: none"> <li>To what extent can potential changes in development policy be observed at target group level?               <ol style="list-style-type: none"> <li>Social nature</li> <li>Economical nature</li> <li>Ecological nature</li> </ol> </li> </ul>        | <ol style="list-style-type: none"> <li>Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol>   |        |                         |                         |
| To what extent can overarching developmental changes be identified at the level of particularly disadvantaged or vulnerable parts of the target group to which the programme should contribute? (Or, if                                   | To what extent can general changes in development policy be observed at the level of disadvantaged and vulnerable groups?   | <ol style="list-style-type: none"> <li>Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol>   |        |                         |                         |

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| foreseeable, please be as specific as possible in terms of time)  |   |  |   |   |
| Evaluation dimension: Contribution to overarching developmental changes (intended)  |   |  | 4 | o |
| To what extent did the programme actually contribute to the identified or foreseeable overarching developmental changes (also taking into account the political stability) to which the programme should contribute?  | To what extent did the project influence the achievement of the impact indicators (qualitative evaluation)? Can this contribution be determined directly or through plausibility considerations?  | 1. Semi-structured interviews with project-executing agency and partner as well as the target group  |   |   |
| To what extent did the programme achieve its intended (possibly adjusted) developmental objectives? In other words, are the project impacts sufficiently tangible not only at outcome level, but at impact level? (e.g. drinking water supply/health effects) | <ul style="list-style-type: none"> <li>To what extent has the project affected broader potential changes in development policy (qualitative evaluation)?</li> </ul>   | 1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group |   |   |
| Did the programme contribute to achieving its (possibly adjusted) developmental objectives at the level of the intended beneficiaries?  | <ul style="list-style-type: none"> <li>To what extent has the project contributed to any changes in the income situation of the target group? (qualitative evaluation) [see also first question of this evaluation dimension, as the impact objective aims at changing the income situation of the intended beneficiaries]</li> <li>Does the programme lead to an improved water supply (outcome), which in turn leads to an intensification and adjustment of the cultivation programme towards higher-quality crops?</li> </ul> | 1. Semi-structured interviews with project-executing agency and partner as well as the target group  |   |   |
| Has the programme contributed to overarching developmental changes or changes in life   | To what extent has the project affected potential changes in development policy for   | 1. Semi-structured interviews with project managers, implementation  |   |   |

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| <p>situations at the level of particularly disadvantaged or vulnerable parts of the target group (potential differentiation according to age, income, gender, ethnicity, etc.) which the programme was intended to help?</p>   | <p>disadvantaged and vulnerable groups? (qualitative evaluation)</p>   | <p>consultant, project-executing agency and partner as well as the target group</p>   |
| <p>Which project-internal factors (technical, organisational or financial) were decisive for the achievement or non-achievement of the intended developmental objectives of the programme? (<i>Learning/help question</i>)</p>   | <ul style="list-style-type: none"> <li>• To what extent can internal project factors be regarded as decisive for achieving the intended development policy objectives? (qualitative evaluation)</li> </ul> <p>Are farms receiving ongoing support from the regional agricultural authority, particularly in the agricultural advisory department?</p>  | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers, implementation consultant, executing agency, target group</li> </ol> |
| <p>Which external factors were decisive for the achievement or non-achievement of the intended developmental objectives of the programme? (<i>Learning/help question</i>)</p>  | <p>To what extent can external factors be considered decisive for achieving the intended development policy objectives? (qualitative evaluation)</p>   | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers, implementation consultant</li> </ol>                                 |
| <p>Does the project have a broad-based impact?</p> <ul style="list-style-type: none"> <li>- To what extent has the programme led to structural or institutional changes (e.g. in organisations, systems and regulations)? (Structure formation)</li> <li>- Was the programme exemplary and/or broadly effective and is it reproducible? (Model character)</li> </ul> | <ul style="list-style-type: none"> <li>• What structural or institutional changes that the project-executing agency and the partners have made can be observed?</li> <li>• To what extent did the project influence these structural or institutional changes (qualitative evaluation) - e.g. with regard to strengthening own responsibility and participation of agricultural holdings</li> <li>• To what extent has the project influenced other measures? To what extent were the project's approaches replicated, e.g. as part of follow-up projects (example)? (qualitative evaluation)</li> </ul> | <ol style="list-style-type: none"> <li>1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol>  |
| <p>How would the development have gone without the programme? (<i>Learning and help question</i>)</p>  | <p>To what extent can alternative scenarios that represent the development of the project context without the project be identified? (qualitative evaluation)</p>  | <ol style="list-style-type: none"> <li>1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol>  |



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| <p>Evaluation dimension: Contribution to (unintended) overarching developmental changes</p>   |   |   | 3 | 0 |  |
| <p>To what extent can unintended overarching developmental changes (also taking into account political stability) be identified (or, if foreseeable, please be as specific as possible in terms of time)?</p>   | <ul style="list-style-type: none"> <li>To what extent can context factors of development policy be observed in this sector? (qualitative evaluation)</li> </ul> <p>To what extent were they foreseeable? (qualitative evaluation)</p>   | <ol style="list-style-type: none"> <li>Project appraisal report, progress reports, final inspection</li> <li>Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol> |   |   |  |
| <p>Did the programme noticeably or foreseeably contribute to unintended (positive and/or negative) overarching developmental impact?</p>  | <ul style="list-style-type: none"> <li>To what extent were unintended (positive and/or negative) development effects foreseen in the design phase of the project (qualitative evaluation)?</li> <li>To what extent were measures taken in connection with unintended (positive and/or negative) effects on development (qualitative evaluation)?</li> <li>To what extent did the project take measures to address conflicts of objectives between the economic, social and environmental dimensions of development? (Qualitative evaluation)</li> <li>Has any adjustment of the crop programme to higher quality crops resulted in increased dependence on prevailing market conditions or decreased self-sufficiency?</li> </ul> | <ol style="list-style-type: none"> <li>Project appraisal report, progress reports, final inspection</li> <li>Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol> |   |   |  |
| <p>Did the programme noticeably (or foreseeably) contribute to unintended (positive or negative) overarching developmental changes at the level of particularly disadvantaged or vulnerable groups (within or outside the target group) (do no harm, e.g. no strengthening of inequality (gender/ethnicity))?</p> | <p>To what extent do unintended (positive and/or negative) impacts of development policy adversely impact disadvantaged and vulnerable groups (e.g. poor rural population and women) affected?</p>  | <ol style="list-style-type: none"> <li>Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol>   |   |   |  |

## Sustainability

| Evaluation question   | Specification of the question for the present project  | Data source (or rationale if the question is not relevant/applicable)   | Rating | Weighting ( - / 0 / + ) | Rationale for weighting |
|---|--|---|--------|-------------------------|-------------------------|
| Evaluation dimension: Capacities of participants and stakeholders   |  |   | 3      | 0                       |                         |
| Are the target group, executing agencies and partners able and willing (ownership) to maintain the positive effects of the programme over time (after the end of the promotion) on an institutional, personnel and financial level? | <ul style="list-style-type: none"> <li>To what extent are the general resources adequate for maintaining the results?               <ul style="list-style-type: none"> <li>a. Organisational</li> <li>b. At staff level</li> <li>c. Financial</li> </ul> </li> <li>To what extent are external risk factors (uncontrolled use (partially illegal) of alternative water sources, insufficient water availability in conjunction with the potential effects of climate change and increased demand, environmental impacts, political instability) observable with regard to the anchored results (qualitative evaluation)?</li> <li>Are farmers willing and financially able to pay the water fees?</li> </ul> | <ol style="list-style-type: none"> <li>Project appraisal report, progress reports, final inspection</li> <li>Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol> |        |                         |                         |
| To what extent do the target group, executing agencies and partners demonstrate resilience to future risks that could jeopardise the impact of the programme?   | To what extent can a strengthening of resilience be observed with regard to the framework conditions/risk factors identified during the evaluation? (qualitative evaluation)   | <ol style="list-style-type: none"> <li>Project appraisal report, progress reports, final inspection</li> <li>Semi-structured interviews with implementation consultant, project-executing agency and partner as well as the target group</li> </ol>                   |        |                         |                         |
| Evaluation dimension: Contribution to supporting sustainable capacities:  |  |   | 3      | 0                       |                         |
| Did the programme contribute to the target group, executing agencies and partners being   | <ul style="list-style-type: none"> <li>To what extent has the project contributed to strengthening resources (organisational, personnel and</li> </ul>   | <ol style="list-style-type: none"> <li>Project appraisal report, progress reports, final inspection</li> </ol>  |        |                         |                         |

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| <p>institutionally, personally and financially able and willing (ownership) to maintain the positive effects of the programme over time and, where necessary, to curb negative effects?</p> | <p>financial)? (Target group, executing agency and partner; qualitative evaluation)</p> <ul style="list-style-type: none"> <li>• To what extent was the exit strategy appropriate in relation to the resources of the target group, the project-executing agency and the partner (qualitative evaluation)?</li> <li>• To what extent has the project promoted the development of sufficient local capacities for the maintenance of irrigation systems (in the form of training for GDAs and local agricultural authorities)?</li> <li>• To what extent are the operators still active at the time of the evaluation, is their financing for the permanent operation of the facilities still secured and has the project-executing agency so far taken on technical monitoring of the facilities? (in particular: to what extent do the GDAs have the technical and administrative know-how to assume responsibility for the operation and maintenance of the irrigation systems?)</li> </ul> | <p>2. Semi-structured interviews with implementation consultant, project-executing agency and partner as well as the target group</p> |
| <p>Did the programme contribute to strengthening the resilience of the target group, executing agencies and partners to risks that could jeopardise the effects of the programme?</p>       | <p>To what extent did the project contribute to resilience (target group, project-executing agency and partner)? (qualitative evaluation)</p>   | <p>1. Semi-structured interviews with implementation consultant, project-executing agency and partner as well as the target group</p> |
| <p>Did the programme contribute to strengthening the resilience of particularly disadvantaged groups to risks that could jeopardise the effects of the programme?</p>                       | <p>To what extent did the project contribute to resilience (target group, project-executing agency and partner)? (qualitative evaluation)</p>   | <p>1. Semi-structured interviews with implementation consultant, project-executing agency and partner as well as the target group</p> |

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| <p>Evaluation dimension: Durability of impacts over time</p>   |  |  | 4 | o |  |
| <p>How stable is the context of the programme (e.g. social justice, economic performance, political stability, environmental balance)?<br/><i>(Learning/help question)</i></p> | <p>1. Qualitative evaluation of context factors (e.g. socio-ecological and political changes, geopolitical changes (e.g. supply), climate change, water scarcity, drought)</p>   | <p>1. Project appraisal report, progress reports, final inspection<br/>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</p>  |   |   |  |
| <p>To what extent is the durability of the positive effects of the programme influenced by the context?<br/><i>(Learning/help question)</i></p>                                | <p>• To what extent can risks and potential for securing long-term effects be identified (qualitative evaluation)?<br/>To what extent has the project responded to potential risks and potential for sustainability?</p>   | <p>1. Project appraisal report, progress reports, final inspection<br/>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</p>  |   |   |  |
| <p>To what extent are the positive and, where applicable, the negative effects of the programme likely to be long-lasting?</p>   | <p>To what extent is the sustainability of the analysed results and effects plausible?</p>   | <p>1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</p>  |   |   |  |
| <p>To what extent are the gender results of the measure to be considered permanent (ownership, capacities, etc.)? (FC-E specific question)</p>                                 | <p>To what extent is the sustainability of the analysed gender-relevant results plausible?</p>   | <p>1. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</p>  |   |   |  |
| <p><b>Additional evaluation question:</b><br/>How does the current fee system work?</p>  | <ul style="list-style-type: none"> <li>• How effective is the collection or willingness of users to pay?</li> <li>• What sanctions are imposed on users who do not pay their fees?</li> <li>• How functional is it?</li> <li>• To what extent is it perceived as fair by users?</li> </ul> | <p>1. Project appraisal report, progress reports, final inspection<br/>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group<br/>3. Data for recent years on the irrigation campaigns in the project area (if made available)</p> |   |   |  |

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| <p><b>Additional evaluation question:</b><br/>How does the cooperation between the institutions involved in the establishment work?</p> | <ul style="list-style-type: none"> <li>• How does cooperation between the GDAs and the regional agricultural authority work?</li> <li>• How were the GDAs included in the modernisation of the irrigation perimeters?</li> </ul>   | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol> |
| <p><b>Additional evaluation question:</b><br/>To what extent have the risks assessed in the final inspection occurred?</p>              | <ul style="list-style-type: none"> <li>• To what extent do they adversely impact the sustainability and effectiveness of the project?               <ol style="list-style-type: none"> <li>a) Illegal extraction of water from alternative water sources</li> <li>b) Insufficient availability of water resources</li> <li>c) Unsustainable management of agricultural land due to improper use of fertilisers and pesticides.</li> </ol> </li> </ul> <p>What measures does the Ministry of Agriculture take to prevent illegal water withdrawals? [Focus on Habibia, where according to final inspection, illegal water extraction was particularly frequent]</p> | <ol style="list-style-type: none"> <li>1. Project appraisal report, progress reports, final inspection</li> <li>2. Semi-structured interviews with project managers, implementation consultant, project-executing agency and partner as well as the target group</li> </ol> |