



STUDY ON SERVICES TO IRRIGATORS

SYNTHESIS AND CROSS-CUTTING RECOMMENDATIONS

Writers:

Jean-Marie Brun, Abdesslem Fezzani
& Christophe Rigourd

Contributors:

Mongi Mejri & Sophoan Min

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COSTEA
ENSEMBLE POUR RELEVER LES DÉFIS
DE L'AGRICULTURE IRRIGUÉE




Iram Paris (head office)
49, rue de la Glacière 75013 Paris France
Tél. : 33 (0)1 44 08 67 67 - Fax : 33 (0)1 43 31 66 31
iram@iram-fr.org
www.iram-fr.org

Iram Montpellier
Parc scientifique Agropolis Bâtiment 3
34980 Montferrier sur Lez France
Tél. : 33 (0)4 99 23 24 67 - Fax : 33 (0)4 99 23 24 68



ARTE-FACT Development & Agri-Food Consulting Co., Ltd.,
#405B Street 61 BT, Boeng Tompon, Phnom Penh – Cambodge
Tél: +855 (0)12 807 817
jm.brun.kh@gmail.com
www.artefactdev.com



BICHE SARL., Bureau d'Ingénieurs
Conseils en Hydraulique et Environnement,
9 rue Ahmed Rami 1002 Tunis, Belvédère, Tunisie
Tél: +216 71285946
biche@gnet.tn

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LIST OF ACRONYMS

FOR THE STUNG CHINIT SITE

AFD	Agence Française de Développement (French Development Agency)
CASC	Conservation Agriculture Service Centre
COSTEA	Comité Scientifique et Technique de l'Eau Agricole (Scientific and Technical Committee for Agricultural Water)
CRIC	Chinit Reservoir Irrigation Committee
FWN	Farmer and Water Network
FWUC	Farmer Water User Community
IRAM	Institut de Recherche et d'Application des Méthodes de Développement (Institute for Research and the Application of Development Methods)
ISC	Irrigation Service Centre
ISF	Irrigation Service Fee
MAFF	Ministry of Agriculture, Forestry and Fisheries
MoWRaM	Ministry of Water Resources and Meteorology
O&M	Operation and Maintenance (of irrigation schemes)
PDA(FF)	Provincial Department of Agriculture (Forestry and Fisheries)
PDoWRaM	Provincial Department of Water Resources and Meteorology
PSG	Paddy Selling Group

FOR THE HEZOUA 1 SITE

ADG	Agricultural Development Group
APIA	Agence de promotion des investissements agricoles (Agency for the Promotion of Agricultural Investments)
AVFA	Agence de la vulgarisation et de la formation agricoles (Agency for Agricultural Extension and Training)
CRDA	Commissariat Régional de Développement Agricole (Regional Agricultural Development Commission)
CRRAO	Centre régional de recherches en agriculture oasienne (Regional Centre for Research in Oasis Agriculture)
CTV	Centre technique de vulgarisation (Technical Extension Centre)
DGGREE	Direction Générale du Génie Rural et Exploitation des Eaux (Directorate-General for Rural Engineering and Water Usage)
GDA-BD	Groupe de Développement Agricole (Organic Agriculture Development Group)
GID	Groupe interprofessionnel de la datte (Interprofessional Organisation for Dates)
MFI	Microfinance Institution
PO	Producers' Organisation
SMSA	Société Mutuelle de Services Agricoles (Mutual Agricultural Service Agency)
UTAP	Union tunisienne de l'agriculture et de la pêche (Tunisian Union of Agriculture and Fishery)

EXECUTIVE SUMMARY

OBJECTIVES AND METHODOLOGY

This study aimed to propose an overall plan for the formulation and organisation of services to irrigating farmers in two different contexts: oasis agriculture in Tunisia and irrigated rice cultivation in Cambodia.

Supported by COSTEA, it was conducted in collaboration with the Directorate-General for Rural Engineering and Water Usage (DGGREE) in Tunisia, and the Ministry of Agriculture, Forestry and Fisheries (MAFF) and the Ministry of Water Resources and Meteorology (MoWRAM) in Cambodia.

The methodology implemented crossed three main areas of analysis and the following activities for each of the two sites:

- **Sector-territory:** a territorial diagnosis was carried out based on a bibliographical analysis and a number of interviews. In Tunisia, a rapid diagnosis of the date sector was also carried out given the extent of the issues at stake in this sector.
- **Service needs:** surveys of farms were carried out which enabled the production of a typology of farms and an analysis of service needs. These surveys also made it possible to assess the farmers' current level of satisfaction with the various services.
- **Service offer:** a mapping of the service offer was carried out. Interviews were conducted with private and public service providers and the agricultural profession. Key services (prioritised) were evaluated and the adequacy of the service offer compared to the needs was assessed. A SWOT analysis of services was also conducted. In Cambodia, these analyses were completed by a historical analysis of the roll-out of services in Stung Chinit.

The approach thus combined the use of existing literature, surveys and individual interviews, focus groups, feedback and consultation workshops (start-up workshop, workshop to draw up the operational plan and final feedback meeting). Clear diagrams and summary tables are proposed. For each of the sites, the field diagnosis justifies a theory of change, which in turn is broken down into operational modalities (sharing of roles and main financial mechanisms). Two roadmaps are also proposed.

For each site, the following reports have been produced: an inception report, a diagnostic report and an operational plan report. These reports are available on COSTEA's website: <https://www.comite-costea.fr/actions/services-aux-irrigants/>

The study was conducted between September 2020 and June 2022, i.e. during the COVID pandemic, which had an impact on the implementation schedule and on some activities.

MAIN RESULTS FOR THE HEZOUA 1 SITE IN TUNISIA

The Hezoua 1 site is a modern 72 ha collective oasis dominated by Deglet Nour date production. It was created in 1962 and rehabilitated in 2018.

The diagnosis revealed farms in serious difficulty, and in particular, some that are in the process of being abandoned (type 3). There are many reasons for this: excessively small farm structures (fragmentation due to inheritance), a lack of labour (linked to cross-border trade), a tendency to specialise in dates, a date sector dominated by a handful of downstream actors (unregulated, with weak farmers' organisations), and an insufficient service offer which is not always in the irrigators' interests (the services being mainly focused on date production). Moreover, the new context of overproduction in the sector for the past two years, which is the 'new normal' in this sector, has aggravated the situation. Finally, the very sustainability of the oases is threatened by the drop in the water table (due to extensions), the specialisation in Deglet Nour (loss of biodiversity and of the functioning of the oases in tiers) and the new trend towards 'deconversion'. Apart from the water service, which is currently still satisfactory in Hezoua 1 but under threat, this oasis is representative of the situation of modern collective oases in the south. This flagship sector of Tunisia (the world's leading exporter) is thus based on non-viable family farms and a threatened agroecosystem.

The operational plan recommends 'a structuring of services based on a new balance between the State, the agricultural profession and the private sector - and in particular, an increase in the power of professional agricultural organisations, responding to the specific interests and needs of irrigators in oasis agroecosystems'. The proposed pathway has two stages: (i) firstly, to lift the priority constraint of marketing; (ii) then secondly, to set up - or revitalise - 'the ecosystem of services' to deal with the problems in a more systemic manner and thus initiate a virtuous circle of services. An innovative solution - inventory credit, or credit secured on stock - is proposed to enable a fairer integration of farmers in the sector. However, this solution is not sufficient and other proposals are made at the micro, meso and macro levels.

Finally, the study underlines the urgency of the situation. The farmers have just faced two very difficult years and social tensions are rising. In the current context, many farmers will be unable to cope with another similar season. The risk of a socio-economic crisis in the oasis areas is very real and requires emergency measures to be taken now pending more structural measures (such as the implementation of the operational service plan).

MAIN RESULTS FOR THE STUNG CHINIT SITE IN CAMBODIA

The Stung Chinit site is a rice-growing scheme of approximately 2800 ha. It was created in 1977 and rehabilitated between 2002 and 2006.

The diagnosis reveals a situation where the gradual implementation of a comprehensive range of services between 2006 and 2020 significantly increased the development of the scheme: transition from single cropping to double cropping, then to triple cropping for some farmers. While the irrigation service has been in place since 2007-2008, it is only between 2015 and 2020 that rice cultivation truly developed, supported in particular by a structured upstream and downstream sector from 2015, and

then by the development of mechanisation services in the years that followed. A complete range of services is now therefore in place, essentially based on private service providers.

However, the technical model of agricultural intensification is already showing its limits in terms of environmental (and therefore also economic, in the medium and long term) viability: soil degradation, pesticide contamination and impacts on fisheries, etc. Moreover, the water service is also under threat. The evaluation of services and of the adequacy between the offer and needs therefore shows current satisfaction, but also significant future risks that are not always perceived by the stakeholders.

The operational plan thus recommends: '(i) restoring an efficient and economically viable O&M system, and (ii) adopting more sustainable and profitable cropping practices on the Stung Chinit irrigation scheme.' To promote environmentally sustainable cropping systems, it proposes to set up technical-economic research-action groups to test and evaluate other production models (diversification, cover crops) and to support the emergence of an advice and service offer allowing sustainable production models to be scaled up. To consolidate the viability of the management of the irrigation service, the service plan proposes to: (i) reactivate the alliance between the irrigators' organisation and the territorial authorities; (ii) restore the principle of calculating users' contributions based on the budget for operation and maintenance services to be paid by the users, and; (iii) put the emphasis back on communication with users.

MAIN CROSS-CUTTING CONCLUSIONS

The choice of these two sites clearly illustrates the need for a complete range of services for irrigators, much broader than water service alone: we speak of a complete 'ecosystem of services' and we underline its systemic dimension.

The study also shows the link between services, performance and the sustainability of the schemes.

It shows that the water service must first be secured and that the other services must then be rolled out according to a (chrono) logical sequence specific to each scheme and responding first to priority constraints, then to secondary constraints. In both cases, marketing services appeared to be particularly important levers (second priority after securing the water service). It is also shown that once a complete service offer is in place, the services must continue to adapt according to a 'service cycle'.

On both sites, the service offer is dominated by private actors. The study shows that according to the local context (and particularly according to the power relations present), 'services to irrigators' is not always synonymous with services in the interest of irrigators. The study thus shows the necessity of public interventions: (i) on the one hand, to provide services that the private sector does not provide or to subsidise them; (ii) and on the other hand, to regulate these services (or regulate the sector) in order to arbitrate between the sometimes divergent interests of the actors, between short-, medium- and long-term interests, and finally, between economic, social and environmental interests.

The study shows the need for services at the micro, meso and macro levels. The notion of 'services' is more relevant at the micro and meso levels, but public policies at the meso and macro levels must support these services.

Two methodological lessons can also be drawn. Firstly, the study shows that analysing services to irrigators makes it possible to place irrigators at the centre of concerns by examining their interests and resources. The focus is not on the scheme, the territory or the sector, but instead on the irrigating farmers. The two diagrams used for the mapping of services and for the operational plan illustrate this well by placing the irrigating farmer at the centre of the diagram. The study then shows that the operational plans for strengthening services must be developed on a case-by-case basis and be based on field diagnoses: sector-territory diagnosis, mapping, history and evaluation of the service offer, typology of farms, evaluation and prioritisation of the farms' service needs, evaluation of the balance between service offer and needs. They seem particularly useful for planning public action and thus complementing private sector interventions.

1. INTRODUCTION

1.1 Reminder of the objectives of the study

This study aims to propose an overall plan for the formulation and organisation of services to irrigating farmers in several contexts of intervention of AFD (or of other development partners) on irrigation policies and on modalities to support the development of irrigation, so as to maximise their impact.

By focusing on two different contexts (oasis schemes in Tunisia and rice schemes in Cambodia) using a similar methodology, the structuring action seeks to contribute to the reflection on the feasibility of developing a stabilised methodology to define service programmes for irrigators. The action also aims to provide feedback on different programmes of this type in each of the two contexts studied, particularly by mobilising information from other sites not included in the study. This is to highlight decisive factors of the successes and difficulties encountered in terms of the choice of action, targeting of actors and the operational plans selected. Finally, it aims to encourage the emergence of a common reflection among researchers, decision-makers and operators on service systems for irrigating farmers and on the place they should be given in the formulation and implementation of the different components of support programmes and development policies for irrigated agriculture (development of agricultural production, service improvement, sustainable management of resources, territorial economic development, development of agricultural and agri-food sectors, etc.).

This action is financed by AFD through COSTEA from its budget line dedicated to supporting irrigation policy operations and actors.

In each of the two countries, COSTEA has given institutional anchorage to this work by formally involving the national authorities: in Tunisia, with the Directorate-General for Rural Engineering and Water Usage (DGGREE) of the Ministry of

Agriculture and Water Resources, which is the focal point for this action, and in Cambodia, with the Ministry of Water Resources and Meteorology (MoWRaM) and the Ministry of Agriculture, Forestry and Fisheries (MAFF).

In line with the ToR, the study is structured in four stages with the following specific objectives:

1. A territorial diagnosis of the irrigated agricultural system studied in order to characterise the current and potentially available service offer to irrigators.
2. The development of a succinct typology of the farms of the irrigated agricultural system in order to characterise their respective needs.
3. Prioritisation of the needs identified for each category of farm defined based on the typology produced and the results obtained from the diagnosis.
4. The formulation of a consolidated operational plan specifying the types of activities to be sustained, developed or created, as well as possible project management and supervision methods to optimise the sustainability of the inputs. The methods implemented for each activity will be described, as well as their interconnections and their potential adjustment, depending on the category of farms concerned (some actions may be implemented for all farms while others may target only a part of them).

1.2 Content of this report

This document is the last deliverable of COSTEA's structuring action on 'services to irrigators'. The six other deliverables are available on the website: www.comite-costea.fr/actions/services-aux-irrigants. This report includes:

- a presentation of the methodology followed, the project's achievements and a critical analysis of the methodology. In accordance with the ToR, this will 'contribute to the reflection on the feasibility of developing a stabilised methodology for defining service programmes for irrigators' (one of the objectives of the structuring action)¹.
- a presentation of the main conclusions² drawn from the Hezoua 1 site in Tunisia and the Stung Chinit site in Cambodia and a comparative analysis.
- findings on the possible extrapolation of the results and conclusions to other sites, on the relevance of the notion of services to irrigators, and on the notion of the operational plan for the reinforcement of services to irrigators.
- annexes presenting more detailed results for each of the two sites: synoptic record of the scheme, current mapping of the service offer, evaluation and prioritisation of the services, diagram of the issues of the sustainable development of

irrigation and services, diagram of the possible stages of the operational plan of services, diagram of services to the irrigators, and sharing of responsibilities in the service plan.

2. METHODOLOGY AND ACHIEVEMENTS

2.1 Methodology followed and main achievements

The methodology followed was generally in line with the ToR. It was validated in each country during the start-up workshops (December 2020-January 2021).

The study was conducted on two sites selected during the start-up workshops:

- **in Tunisia, the Hezoua 1 site** in the Governorate of Tozeur: this is a modern 72 ha oasis mainly producing dates;
- **in Cambodia, the Stung Chinit site** in the province of Kampong Thom: this is a 2800 ha rice-growing scheme.

As illustrated in the diagram on the following page, the approach on each of the sites involved three main areas of analysis:

- **Sector-territory:** a territorial diagnosis was carried out based on a bibliographical analysis and a number of interviews. In Tunisia, a rapid diagnosis of the date sector was also carried out in order to better understand the marketing issues which appeared to be particularly crucial.
- **Service needs:** surveys of farms were carried out which enabled the production of a typology of farms and a needs analysis. These surveys also made it possible to assess the farmers' current level of satisfaction with the various services.
- **Service offer:** a mapping of the service offer was first carried out. The key services (prioritised) were evaluated and the balance between the service offer compared to the needs was assessed. In Cambodia, these analyses were completed by a historical analysis of the roll-out of services in Stung Chinit.

This diagnostic elements were collected through **two field missions** on each of the sites (mission 1 between April and June 2021 and mission 2 between September and November 2021).

They were presented, discussed and validated during a **consultation workshop** at each site (January and March 2022). They were then combined to formulate an **operational service plan**. The broad outlines of each operational plan were discussed at the consultation workshop and in focus groups. The two operational plans each present a **theory of change** ('vision of services', objectives, pathway to change) and then elaborate the **operational modalities** (sharing of responsibilities, funding mechanisms, technical aspects). A summary **roadmap** was developed for each site to identify the next steps.

.....
1. In accordance with our methodological offer, however, we do not have the mandate to capitalise on this methodology in the form of a finished product. It will therefore be up to COSTEA to exploit the results of the study after the final feedback workshop: to debate and disseminate the results to its members and to a wider public, to deepen the reflection on a stabilised methodology for defining service programmes for irrigators and to finalise this methodology.

2. NB: the analyses per site are summarised in a few pages, whereas the diagnostic and operational plan reports are each over 50 pages long.

The final results (diagnosis and operational plan) were then presented and discussed at national feedback meetings in each country (May and June 2022).

Throughout the process, **(video) meetings were held with COSTEA** to present and discuss the interim results:

- videoconference with COSTEA’s Scientific and Technical Committee on 30/06/2021 to present the initial analyses based on the bibliography and the first field missions;
- videoconference with COSTEA’s Consultative Group on 01/12/2021 to present the two complete diagnoses;
- videoconference with COSTEA’s Consultative Group on 11/04/2022 to present the complete diagnoses, the operational plans and a number of cross-cutting analyses.
- Finally, a videoconference with the COSTEA Consultative Group was scheduled for September 2022 to discuss the conclusions of the last deliverable.

COSTEA’s Permanent Technical Secretariat commented on and suggested improvements for each of the deliverables, and then approved the edited versions.

2.2 Deviations from the initially proposed methodology

The health situation in 2020, 2021 and 2022 required some adjustments to the methodology:

- The main adjustment concerns the timeframe: 9 months were planned for the production of the two operational plans, which were produced in 21 months. 12 months were planned for the entire project, whereas it actually took 27 months (closure at the COSTEA symposium held in November 2022). These delays, beyond the consortium’s control, diluted the reflections of the local actors and of the consortium and made the consortium’s work more complex and ultimately more substantial (significant overrun of the person-days worked for all team members).
- Other adjustments were also made due to COVID: the two Iram start-up missions were replaced by remote support, the start-up workshop (Tunis) was organised by videoconference in Tunisia, the kick-off meeting in the field could not take place in Cambodia, and Iram was unable to participate in the consultation workshop in Cambodia.

In addition, the methodology also benefited from changes – whether or not related to COVID - which are considered improvements:

- Whereas the ToR provided for 2-day consultation workshops, it was deemed preferable to conduct one-day multi-stakeholder workshops and then to continue with focus groups on more targeted topics (2 focus groups in Cambodia and 3 in Tunisia)³. Local stakeholders were thus involved in validating the diagnoses and also in defining the broad outlines of the operational plans (which was not requested in the ToR);
- As sector issues are particularly important in Tunisia, a rapid sector diagnosis was also carried out in addition to the other analyses;

Figure 1: Actual implementation of the methodology

		3 main areas of analysis			
		Territory and sector	Service OFFER	Service NEEDS	
September 2020 to January 2021	Biblio and 2 national kick-off workshops	Identify the general issues Select the site and validate the methodology Involvement of national authorities - Tunisia: DGGREE, Cambodia: MAAF, MoWRAM			2 inception reports
April to June 2021 M1 Tunisia: April M1 Cambodia: June	Field Mission 1	Identify the issues of the site, zone and sector Describe the scheme	Establish a map of service providers	Establish a typology of farms	
September to November 2021 M2 Cambodia: September M2 Tunisia: October Reports: November	Field Mission 2	Describe the trajectory of the scheme’s evolution	Assess the priority services	Evaluate the priority service needs Describe the trajectories of the farms	2 diagnostic reports
January to April 2022 Tunisia: March Cambodia: January	Consultation workshop in the region		Validate the map and assessment	Validate the typology and needs analysis	
			Assess the balance between service offer and needs		
		Develop the operational plan to strengthen services to irrigators			2 operational plans
May to November 2022	Synthesis	Feedback in each of the countries (Cambodia, May; Tunisia, June) Discussions with the consultative group of COSTEA on the cross-cutting dimension Final feedback at the COSTEA event in November 2022			2 country feedbacks + 1 final report + workshop France

3. The initial reason was to adapt to the health context, but this format ultimately allowed both broad multi-stakeholder consultation and more concrete and operational discussions.

Table 1: Activities carried out in relation to the initial methodology

Planned according to the ToR and/or the technical offer	Carried out in each country		
	Tunisia	Cambodia	
Start-up workshop in the capital	Organised on 13 January 2021 By videoconference (COVID)	Organised on 15 January 2021 Face-to-face	
Iram start-up mission	Only remote support (COVID)		
1 data collection field mission	2 missions carried out: the time between them allowing perspective	2 missions carried out: the time between them allowing perspective	
Use of surveyors	Survey carried out by the two consultants and not by the surveyors	1 survey sub-contracted to the Irrigation Service Centre (ISC)	
2-day consultation and operational plan development workshop	1-day workshop + 3 focus groups	1-day workshop + 2 focus groups	
Iram mission to report on the diagnosis and draw up the operational plan	Carried out (8-day mission instead of the 3 days planned)	Not carried out on-site (COVID), remote support	
Territorial diagnosis	Carried out	Carried out	
Typology of farms	Carried out	Carried out	
Assessment of the adequacy between supply and demand	Carried out	Carried out	
Evaluation of services	Carried out	Carried out	
Operational plan	Carried out	Carried out	
Meetings of COSTEA's Consultative Group	2 meetings to date with each deliverable and 1 with the Permanent Technical Secretariat.		
Other activities not planned in the ToR or the offer			
Kick-off meeting in the field	Held	Not held (COVID)	
Intermediate validation of the results	Carried out with CRDA upon each field mission	-	
Rapid diagnosis of the value chain	Carried out	-	
Historical analysis of services		Carried out and is highly explanatory	
Final feedback workshop in each country	Held on 13/06 in Tunis	Held on 17/05 in Phnom Penh (in the framework of COSTEA's national workshop)	
Colour code:	In compliance with the ToR and the methodology	Improvement in relation to the ToR and the methodology	Shortcoming in relation to the ToR and the methodology

- Iram conducted an 8-day mission to Tunisia to organise the consultation workshop whereas only 3 days of support were initially planned⁴;
- In Cambodia, a ‘historical analysis’ enabled a link to be established between the performance of the scheme and the chronology of the establishment of services.

The table 1 lists these main changes.

Overall, it is felt that despite these changes, the deliverables remain highly satisfactory for both countries. However, the comparative and cross-cutting analyses are probably weaker than initially expected due to the lower number of Iram missions in the countries.

2.3 Critical analysis of the methodology

The tables 2 and 3 list the main limitations and strengths of the methodology followed.

3. MAIN CONCLUSIONS FOR EACH OF THE TWO SITES AND COMPARATIVE ANALYSES

This section does not present the diagnostics and operational plans in detail for each of the two sites. Readers are referred to the two diagnostic reports and the two operational plan reports for the full analyses, and to the annexes for summary tables and diagrams. The deliverables of the study are available on the website: www.comite-costea.fr/actions/services-aux-irrigants

3.1 Hezoua 1 site in Tunisia

Concise presentation and location of the site

The Hezoua 1 oasis is located in the west of the Governorate of Tozeur, at the Algerian border.

The Hezoua 1 oasis is a 72 ha modern oasis fed by three boreholes. It was created in 1962 and the main infrastructures were rehabilitated in 2018. Initially operated by 62 farmers (sedentary livestock farmers to fix the border), there are now 94

4. Given the many shifts in the dates of the consultation workshops in both countries and the changes in health restrictions, it was finally decided to renounce the Cambodia mission and to invest more time in the Tunisia mission.

Table 2: Limitations of the initial methodology and adjustments made

Limitations of the initial methodology	Adjustments made
The ToR required a territorial diagnosis, not a sector-territory diagnosis.	<ul style="list-style-type: none"> In Tunisia, where the challenges of the date sector appeared crucial, a rapid diagnosis of the sector was nevertheless carried out. A more in-depth analysis (with more quantitative and objective data) could have been useful. The need to carry out a sector diagnosis was not apparent in Cambodia, where the sector functions fairly well.
The study did not initially originate from a local demand in either country.	<ul style="list-style-type: none"> The Permanent Technical Secretariat was informed of this. In Tunisia, a partnership agreement was drawn up at the outset with the DGGREE (Tunisia). In Cambodia, the MAFF and MoWRaM were also formally involved. The consortium ensured that national and local authorities were involved as much as possible during the process through partial feedback during the field missions and final feedback in both countries. In the deliverable 2 reports, the consortium stressed the need to maintain political dialogue between COSTEA, the national authorities and AFD in each of the two countries to ensure that the operational plans are adopted and valorised.
Difficult to propose a truly operational plan without knowing who will support it.	<ul style="list-style-type: none"> Formal presentations of the studies to the national authorities during national workshops (not initially planned in the ToR). The two operational plans suggested topics for feasibility studies to refine the proposals. In Cambodia, links were established with the WAT4CAM project, notably through the participation of this project in the field consultation workshop (January 2022) and in the national COSTEA workshop in May 2022. In Cambodia, the study was able to contribute to the reactivation of the Chinit Reservoir Irrigation Committee (CRIC) to a certain extent, which is a first step towards the implementation of the operational plan.
Difficult to mobilise private actors (Cambodia)	<ul style="list-style-type: none"> Bilateral consultations with service providers in the area, but their participation in the collective workshops was low.
The final validation of the operational plan by national actors was not foreseen in the ToR.	<ul style="list-style-type: none"> In Tunisia, the Iram mission presented the results to CRDA right away as part of the public actor focus group. In each country, an additional meeting was held to present the final conclusions.
It would have been preferable to allocate more time for the development of the operational plans.	<ul style="list-style-type: none"> In Tunisia the Iram mission for the consultation workshop was effectively extended from 3 to 8 days. In both countries, the number of person-days implemented far exceeded the estimated time.
The farm typology does not seem to be the most useful tool for the service plan (as the services are not really broken down by type).	<ul style="list-style-type: none"> It was difficult to know beforehand that the typology would be less useful than expected for the operational plan. To a certain extent, the scheme tends to somewhat standardise the types of farms. In the future, for other sites, it nevertheless seems necessary to maintain this typology tool as: (i) it compels one to really ask the question of the interests and resources of the irrigators, and (ii) to think in terms of the evolutionary trajectories of the farms. The question of the interests and resources of the irrigators remains crucial. For example, the study in Tunisia shows that the services are more in the interest of the sector's downstream actors than of the farmers.
Rather broad topic and impossible to collect quantitative data for all aspects.	<ul style="list-style-type: none"> Additional effort made on sector aspects in Tunisia. Cross-referencing of quantitative and qualitative data but impossible to substantiate all aspects (e.g. break-even point of farms in Hezoua 1, sharing of added value throughout the sector, environmental impacts in Stung Chinit, comparative cost of organic/conventional production in Hezoua 1).
No gender analysis was requested	<ul style="list-style-type: none"> Gender issues were kept in mind but without specific analyses. This remains a grey area.

Table 3: Strengths of the initial methodology that were effectively implemented

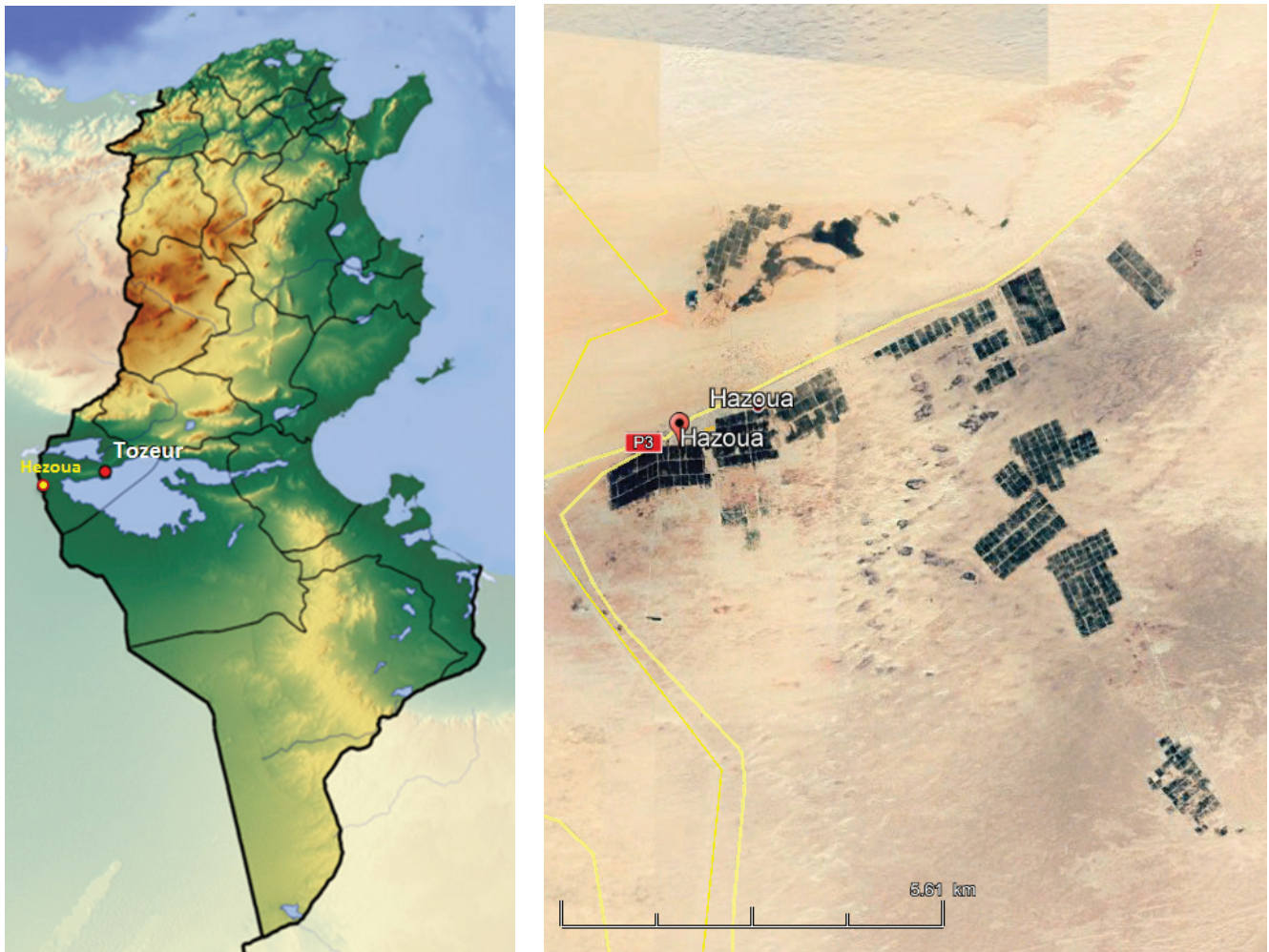
Strengths of the methodology	Observations
Reporting of data from the field and of concrete facts and figures through surveys.	<ul style="list-style-type: none"> The surveys of 31 farmers in Tunisia and 21 farmers in Cambodia were very useful to provide quantitative and objective data that justify the proposed operational plan. Qualitatively, these surveys made it possible to determine the irrigating farmers' perception of and satisfaction with access to various services. In Cambodia, a survey carried out by ISC enabled an exhaustive inventory of the service providers on the scheme to be drawn up (at least for the mapping of input suppliers and mechanisation). In Tunisia, the inventory is not completely exhaustive but remains entirely reliable.
The approach based on services makes it possible to cover a variety of fields in a renewed manner.	<ul style="list-style-type: none"> Fields addressed: agronomy, irrigation (hydraulics and management), economics, sector, land tenure, organisational, institutional, etc.
The service-based approach puts farmers back at the centre.	<ul style="list-style-type: none"> The summary figures (mapping of the offer and priorities of the operational plan) are very illustrative of this point. The study poses two questions: Are the services in place in the interest of farmers? Do farmers have the means to access them?
The service-based approach makes it possible to interlink the micro, meso and macro levels.	<ul style="list-style-type: none"> The limitation, however, is that the implementation of a plan for services to irrigators requires changes at the macro level, which are mentioned in the 'operational plans', but not developed.
The dual approach based on offer and needs allows two different and complementary perspectives.	<ul style="list-style-type: none"> In a way, this dual approach allows for cross-checking. However, the prioritisation of services is not always easy as it combines prioritisation by the irrigators (demand) and prioritisation by the consultants (appreciation of needs, foresight on emerging issues). For example, representation issues seem to be underestimated by the farmers in both countries. The study prioritised the needs and the priorities are indeed different between the two sites.
A certain degree of flexibility over time.	<ul style="list-style-type: none"> The team demonstrated a good capacity to adapt to make the approach evolve over time.

farmers, and there will soon be probably more than 120. The oasis is dominated by the cultivation of dates (Deglet Nour) but there is also horticulture, market gardening, cereals and small livestock, although all these activities are declining.

Hezoua 1 is fairly representative of the modern collective oases of the South. However, it has two singularities: (i) having been recently rehabilitated, the water service is now quite functional, unlike many other oases for which this remains a major constraint; (ii) the lack of labour is probably more marked due to its location

Figure 2: Location of the Hezoua 1 site

Left map: the black lines correspond to the boundaries of the governorates and the grey lines to the boundaries of the delegations. Right map: the yellow lines correspond to borders and roads.



at the border. As for the rest, the main constraints identified, in particular marketing problems, are found in other modern collective oases.

Lessons learned on the Hezoua 1 site

The farm typology highlights three types of farm: small, fairly specialised farms (after inheritance), larger farms that are still somewhat diversified, and farms that are in the process of being abandoned. The surveys show that all the farms are currently in difficulty: areas below the break-even point, very strong labour constraints, renunciation of ensuring all agricultural operations (the system of selling standing crops is widespread, reduced maintenance of palm trees), a tendency towards crop specialisation (Deglet Nour) making the farms less resilient and the agroecosystem less sustainable, etc.

The causes are to be found in various areas:

- **The territorial diagnosis** shows the impact of cross-border trade with Algeria (young people's lack of interest in agriculture), but also of a certain withdrawal of the State since 2010 and of an insufficient vision for the oases of the south.
- **The rapid diagnosis of the sector** shows the power relations within it and the particularly inequitable sharing of added value between farmers and exporters. This diagnosis shows

the paradoxical situation of a sector that is quite successful on a macro-economic level (world's leading exporter), but which is based on non-viable family farms and on agroecosystems that are under threat (decline in the water table, crop specialisation, climate change, etc.). The study also shows that the new situation in the value chain since 2020 (overproduction) should become the new normal and is therefore not at trend but structural.

- Finally, other shortcomings are also highlighted concerning the structure of the farms (fragmentation due to inheritance), the weakness of farmers' organisations and the inadequacy of extension controls.

The study shows that not only farms are threatened in the short term, but also the oases in the medium to long term. After two particularly difficult years for the farmers, the study sounds the alarm: will the farmers be able to endure another year under these conditions without numerous farm collapses? The risk of a socio-economic crisis in the oasis areas is very real.

The mapping of services and their evaluation show a situation where the vast majority of them are failing. Only the water service remains satisfactory for the moment due to the recent rehabilitation (2018), which makes Hezoua 1 a singular case among the 14 other oases of Hezoua. However, due to

Table 4: Assumptions formulated in the inception report and the kick-off workshop

Initial hypotheses	Confirmed or not?
The Hezoua 1 site is considered a model by the actors: a combination of services (historical supervision, commercial contracts, etc.) has enabled this model trajectory.	ASSUMPTION ONLY PARTIALLY CONFIRMED. The case of Hezoua 1 is indeed singular because it is the only one of the 15 oases of Hezoua to have been rehabilitated: its water service is thus relatively functional. However, Hezoua 1 is nevertheless not a model due to: (i) the weakness of the services and (ii) the fact that the farms are in great difficulty. The integrated organic-fair trade sector that has developed in the area, but which only benefits about one hundred farmers therein (about 10%), is nevertheless an interesting experience that could serve as a starting point to build a value chain.
The marked sector logic directs the services towards the development of the sector. Depending on whether this sector is a value chain or not, the farmers' interests will or will not be taken into account.	ASSUMPTION ENTIRELY CONFIRMED. The date export sub-sector is dysfunctional. It is dominated by exporters and the services respond to their interests and not those of the irrigators. The case of the integrated organic-fair trade sub-sector is somewhat different and seems to respond better to the interests of farmers, but its impact remains limited. The development of the date sector is controlled by the private sector (exporters, new large plantations). The risk is that in the long term, the value chain will no longer be based on a multitude of farmer oases but on a number of valorisation companies. The social and territorial impact of such an evolution would be terrible.
The degree of organisational maturity of producers is an important factor in explaining the trajectory of the Hezoua 1 scheme. In a destructured post-revolution context, the organisational model of Hezoua can serve as a reference today.	ASSUMPTION NOT CONFIRMED. Hezoua 1 is not an organisational model and its farmers' organisations are weak, as in the other oases. However, discussions are underway to have the organic agriculture development group, 'Groupement de Développement de l'Agriculture Biodynamique' (GDA-BD), (which covers several oases) evolve into an SMSA with mixed capital with the Beni Ghrib company. This could represent an interesting institutional innovation.
There are not only external services, and if Hezoua 1 is a model site, it is also perhaps because the producers have succeeded in developing their own services (endogenous services, farmer-to-farmer services) by valorising their farming knowledge and asserting their own development vision.	ASSUMPTION NOT CONFIRMED. Hezoua 1 is not a model and the study did not reveal endogenous or farmer-to-farmer services. On the contrary, the study showed the farmers' decline through the generalisation of the sale of standing crops and the abandonment of certain farms.

the economic difficulties of the farms, a drop in the collection of water fees and a deterioration of the water service have been observed over the past two years. A vicious circle has thus been set in motion where economic problems (inequitable sharing of added value, farms below the profitability threshold) threaten the water service. The fact that the water service is still currently satisfactory allows us to better understand the constraints on other services. Marketing problems seem to be the most crucial today, and this is structural (not cyclical). Then come the problems of input supply (to maintain diversified farms) and a lack of labour, mechanisation, support and advice. The weakness of the farmers' organisations seems to be a cross-cutting constraint for several services. The services are in fact mainly provided by private actors in the date sector. They therefore respond above all to the interests of the sector (producing quality dates in quantity⁵), rather than to those of the irrigators (decent income, diversified and resilient farms).

Recommendations and key elements of the operational plan for the Hezoua 1 site

The vision of the operational plan is as follows: 'a structuring of services based on a new balance between the State, the agricultural profession and the private sector - and in particular, an increase in the power of professional agricultural organisations, responding to the specific interests and needs of irrigators in oasis agroecosystems'.⁶

The proposed pathway has two stages:

- Stage 1: start with the priority constraint - marketing: this is the entry point;
- Stage 2: in a second phase, set up - or revitalise, the 'ecosystem of services' to deal with problems in a more systemic manner and thus set a virtuous circle of services in motion.

A concrete and innovative approach is proposed as an 'entry point' of the service plan: the **inventory credit, or credit secured on stock system**, which does not seem to be known in Tunisia. This would involve farmers organising themselves into mutual agricultural service agencies (SMSAs) at the oasis level (other organisational models are also possible), in order to reappropriate the stages of harvesting, collecting, sorting and primary storage of dates, and therefore the corresponding added value. This activity would be financed through inventory credit provided by a microfinance institution (MFI). The feasibility of this approach should be studied by a specific study⁷ and a pilot project should be formulated if necessary. This improved vertical integration of farmers in the sector would give them more weight and they would then be in a better position to participate in its co-management (horizontal integration). The sector could ultimately evolve to be co-managed by the actors and supervised by the State, in particular by drawing lessons from the experience of the integrated organic fair trade sub-sector.

Avenues are also proposed for stage 2. Within this 'ecosystem of services', some services are easier and faster to activate than others. This is the case for mechanisation services: private service

.....
5. The hypothesis that buyers' interests may lead them to maximise the quantity of production, so that they can drive down prices and increase their margins can also be put forward. However, this hypothesis could not be confirmed or refuted by the study.
6. The vision formulated during the workshop was slightly different, but took up the same ideas/terms 'A new sustainable structuring of services responding to the specific needs of the irrigators of oasis ecosystems'.
7. The first discussions with an MFI in Tozeur seem encouraging.

Figure 3: Location of the Stung Chinit site



companies can be deployed fairly easily and quickly for certain agricultural activities (financing mechanisms exist and private individuals are motivated). This is also the case for ‘accompanying advice’⁸ which is being rolled out throughout the country within the framework of PRIMEA (advisors are already present in Tozeur). Addressing the issue of the land structure of farms will be longer and more complicated and requires changes at the macro, meso and micro levels, but remains crucial. Similarly, the management of illicit extensions will have to be addressed.

The operational plan also clearly highlights the links between the micro, meso and macro levels.

Have the initial assumptions been confirmed?

Notwithstanding the observations made in the table 4, the choice of Hezoua 1 proved relevant:

- The absence of major constraints on the water service made it possible to better highlight the other constraints and in particular the marketing problems common to all oases;
- The Hezoua area is the cradle of development of the integrated organic-fair trade sub-sector. This sub-sector provides encouraging leads (sharing of value added, GDA-BD/Beni Ghrib partnership, SMSA with mixed capital, etc.) for the development of a date value chain. Moreover, the fact that a new trend towards ‘deconversion’ can be observed in this area, where organic farming has been well established for many years, is also an important warning.

3.2 Stung Chinit site in Cambodia

Concise presentation and location of the site

The Sung Chinit scheme is located in the province of Kampong Thom in the centre of the country.

Its initial construction (2 400 ha) dates back to 1977 during the Khmer Rouge regime. It was rehabilitated between 2002 and 2006 and now covers approximately 2 800 ha. It is fed from a dam on the Chinit River. It has a primary canal, five secondary canals and tertiary and quaternary canals, as well as a drainage network. The management of the scheme is transferred to a Farmer Water User Community (FWUC) from the secondary infrastructures. The plots were initially allocated to 2 828 farmers and there are now 2 850 owners. The scheme is almost exclusively cultivated with rice in two to three annual seasons according to the Green Revolution model.

Lessons learned on the Stung Chinit site

While the irrigation service has been in place since 2007-2008⁹, it is only between 2015 and 2020 that rice cultivation truly developed, thanks in particular to a structured upstream and downstream sector from 2015, and then to the development of mechanisation services in the years that followed. **The historical analysis** of the establishment of services is very informative and is an important element of the diagnosis.

The territorial diagnosis shows how factors outside the scheme also influence the strategies of irrigators on the scheme:

- On the one hand, the decrease in economic opportunities linked to the end of wood cutting/clearing of forest areas in the east of the province forces irrigators to make better use of their irrigated plots. It is therefore in the irrigators’ interest to intensify their activities on the scheme due to the reduction of this opportunity for ‘off-farm’ activity in the dry season;
- On the other hand, the economic development of the region makes intensification on the scheme possible. The irrigators therefore have the means to intensify, and service providers to invest.

8. ‘Accompanying advice’ is a type of advice that is currently provided in the framework of PRIMEA and which is partly similar to management advice.
 9. The land tenure service should also be associated with the water service during the first period of Stung Chinit.

The mapping of services shows that they are dominated by private actors. However, because the market is competitive, irrigators can benefit from them, at least in the short term. Overall, irrigators' service needs are fairly well satisfied today.

The weight of private services (particularly advisory services and credit, integrated in the offer of agricultural input suppliers) and of the downstream part of the sector, as well as the collective constraints linked to water management in the scheme, are determining factors of the agricultural production model that is imposed on the producers.

However, the technical model of agricultural intensification is already showing its limits in terms of environmental viability (and therefore also economic viability in the medium and long term): soil degradation, contamination by pesticides and impacts on fishing, etc.

The irrigation service itself is threatened by its institutional weaknesses.

The evaluation of the services and the adequacy of the offer compared to the needs thus highlights current satisfaction, but significant future risks.

The typology of farms highlights five types of farm and the beginnings of land differentiation. However, there is little variation in the need for services depending on the type of farm. While differences do exist, they are not sufficiently important to determine the operational plan.

Recommendations and key elements of the operational plan for Stung Chinit

The vision of the operational plan is: '(i) to restore an efficient and economically viable O&M system, and (ii) to adopt more sustainable and profitable agricultural practices on the Stung Chinit irrigation scheme.'

The service plan is based on two main pillars:

- Promotion of environmentally sustainable cropping systems;
- Consolidation of the viability of the management of the irrigation service.

It should be noted that these two aspects do not appear to be immediately urgent, either for the irrigators or for the majority of the actors (with the exception of fishers who are already heavily impacted by pollution).

To promote environmentally sustainable cropping systems:

- Set up technical-economic research-action groups to test and evaluate other production models (diversification, cover crops);
- Support the emergence of an advisory and service offer allowing the scaling-up of sustainable production models (particularly soil fertility restoration practices – and especially the use of cover crops, crop diversification [alternation] to reduce phytosanitary pressure, and lower use of pesticides).

To consolidate the viability of the management of the irrigation service:

- Reactivate the alliance between the irrigators' organisation and the territorial authorities;
- Restore the principle of calculating users' contributions based on the budget for operation and maintenance services to be paid by the users;
- Put the emphasis back on communication with users.

3.3 Comparative analyses of the two sites

The need for a package of services and their logical roll-out

A. A package of services available in Stung Chinit compared to rather deficient services in Hezoua 1

The Stung Chinit site illustrates a situation where a fairly complete range of services has been progressively set up and where the irrigators' needs for services are quite well met today. Moreover, as the market is competitive, these services are effectively in the interest of the irrigators - at least in the short term. Evaluated through the usual performance indicators (development rate, cropping intensity), the performance of the scheme is now good. After years of average performance, the existence of a complete and satisfactory offer of services (water, land, marketing, supply, mechanisation, advice) allows the scheme to fulfil its promises.

Have the initial assumptions been confirmed?

Table 5: Assumptions formulated in the inception report and the kick-off workshop

Initial assumptions	Confirmed or not?
The formulation of services to irrigators is an original entry point that requires the actors to have the same vision of irrigation development (which is rarely the case).	ASSUMPTION FAIRLY CONFIRMED. This entry point is original and has, in a certain way, allowed the question of irrigation development to be approached in a new manner. Indeed, the actors assign different objectives to irrigation. However, they all seem relatively satisfied with the current operation.
Unless the farmers' vision is truly recognised, the services will not produce the expected benefits.	THIS ASSUMPTION IS NOT REALLY CONFIRMED IN THE SHORT TERM but remains valid in the long term. In fact, the market seems to function sufficiently well (upstream and downstream) to meet the farmers' immediate needs. The question remains in the long term.
After the water service, the services related to the sector are strong motivations to achieve the irrigation potential.	ASSUMPTION CONFIRMED. The chronological analysis of the services shows this quite well.
A systemic approach is needed	ASSUMPTION CONFIRMED.

On the contrary, the Hezoua 1 site illustrates a situation where the majority of services to irrigators are deficient: many services are insufficient or inexistent and they are not always in the farmers' interests. As a result, the vast majority of farms are in great difficulty, with some farms even being abandoned.

The choice of these two sites thus clearly illustrates the need for a range of services to irrigators and the link between services and the performance of the scheme (in the short term and judged according to economic criteria).

The study therefore shows the need for a complete 'ecosystem of services'.

B. A (chrono)logical sequence of services: mere coincidence or real logic?

The historical analysis of Stung Chinit shows a chronological sequence in the improvement of services: water and land tenure services first (2007-2008), then marketing and supply services (2015) and farmer-to-farmer advice for the introduction of dry season rice (the pioneers 'imported' this practice from Vietnam), and finally, mechanisation and more formal advisory services (2020).

The operational plan for Hezoua 1 suggests the same chronological sequence. The water service has already been improved through the 2018 rehabilitation. The land tenure service remains deficient. The operational plan now suggests addressing marketing issues as a priority (a very operational lever), and then in a second phase, to systemically address the other services to allow the establishment of a virtuous circle of services (including land tenure aspects, advisory services, etc.).

We could therefore be inclined to see a certain logic: first secure land and water; next, as the farmers are involved in markets, improve marketing and supply services; then (or concomitantly) the rest. Marketing thus plays a driving role in the irrigated system. This may seem logical in the framework of irrigated systems dominated by one sector and if no other constraint is a priority. However, it is difficult to extrapolate this conclusion to all irrigated systems.

Nevertheless, it seems possible to extrapolate the following elements:

- The water service is a priority, otherwise there is no irrigation.
- Once the water service is secured, the other services must be deployed in a logical sequence, first addressing priority constraints, then secondary constraints. In the end, all the constraints will be taken into account by a coherent set of services via an 'ecosystem of services'. It is therefore a question of finding the 'right entry point' (the major constraint of the irrigated system).
- The private sector can provide a certain number of services but if some services remain deficient, then the public sector must intervene, or producers' organisations supported by the public sector.

C. From a (chrono)logical sequence to a cycle of services

However, the Stung Chinit site shows that service needs cannot be satisfied once and for all. Although the physical and organisational rehabilitation in 2007-2008 removed the water constraint, the O&M aspects are again a threat to the site today. As the site is further exploited, O&M needs have increased (while the collection of contribution payments from users has eroded) and new issues have arisen.

The same is likely to be true for all the other services. Questions regarding agronomic techniques may arise at one point in time, be resolved, and then other agronomic questions will emerge at a later date to which new answers will have to be found.

The proposed service schemes are therefore only valid at a certain point in time and for a few years. The farms will then face new constraints, as will the irrigated system as a whole, and the services will have to evolve to help the farms overcome these new constraints. The services will therefore have to continue to develop and be renewed. This shows the need for the continuous monitoring and evaluation of the services and of the performance of the irrigated system¹⁰.

The fact that most of the services are 'green' in Stung Chinit does not mean that a virtuous circle of services has been sustainably set in motion. While the services are satisfactory in terms of a production objective (which was probably and still is required of the scheme), they are not so in terms of a sustainability objective. A cycle is therefore well and truly underway, which meets the objectives of the agricultural policy, but it is not virtuous.

D. Services are not always formal and structured

The term 'services' may suggest mainly formal, structured services. However, the example of Stung Chinit shows the role played by pioneer farmers from Vietnam in the dissemination of dry season rice. This dissemination was first carried out from farmer to farmer through advice, information, and informal interaction between them, before moving on to more traditional extension services.

This shows the existence of more informal but no less important services.

Short-term vs. long-term interests of farmers? What guarantees does the private sector offer? The need for public action and farmers' organisations

A. A clear need for public action

The example of Stung Chinit clearly shows the need for public action at two different times of the scheme:

- Firstly, historically, public action was essential to secure water and land (the first two operational services).
- The analysis of the situation today still shows the need for public action. The services currently meet the immediate needs of the irrigators and the sector: everyone is delighted with the good performance of the scheme which has finally been achieved. It is finally fulfilling its promises. The market seems to be working

10. The implementation of a territorial- and sector-based monitoring and evaluation system, of the PESTEL type, by or for service providers and local authorities, could encourage better anticipation and adjustment of the offer to the needs of farms and to the evolution of their physical and socio-economic environment.

Table 6: Are the services in the interests of the irrigators?

	Cambodia	Tunisia
Services in the farmers' short-term interests	Yes	No, not always
Services in the farmers' long-term interest	No, not always	No, not always
Services in the sector's short-term interests	Yes	Yes
Services in the sector's long-term interests	?	?
Are the services in the interests of the environment?	No	No

sufficiently well to meet the farmers' short-term interests. The problems raised by the study are little perceived by the actors¹¹ because they are medium- to long-term problems: the tendency of the soil and fertility on the scheme to deteriorate, environmental degradation downstream (decrease in the fish population observed by fishers), and threats to the health of agricultural workers. The market logic is probably not sufficiently framed to guarantee the interests of farmers and the environment in the medium to long term. This shows the need for public action. It also demonstrates that assessing the performance of a scheme through the rate of development or cropping intensity alone is far from sufficient, and on the contrary, may even encourage unsustainable and potentially harmful practices in the medium and long term.

In Hezoua 1, the sector is dominated by a few downstream actors and is dysfunctional. However, it is they who currently direct the services to irrigators. These services are therefore not always in the irrigators' interests, either in the short or long term. The fact that the services are concentrated on the date sector leads to a specialisation of the farms (thus decreasing their resistance to shocks and their resilience) and a specialisation of the ecosystems (less ecosystemic functioning whereas traditionally the oases are tiered and diversified). The study highlights the withdrawal of the State since the 2010 Revolution and the need for several public actions at the macro and meso levels: regulation of the sector, control of extensions, improvement of the structure of the farms, revival of farmers' organisations.

The table 6 shows that the services are not always in the farmers' interests, which fully justifies public regulatory action. These two sites clearly show the need for the private sector and for public action.

In both cases, the productivist production models encouraged by the sector-based approaches are called into question by the diagnoses, but not yet by local actors (or too rarely).

Worse still, in the case of Tunisia, the study warns that if uncontrolled extensions continue, the sector could eventually change radically: instead of providing a living for 10% of the Tunisian population and a very high number of family farms, it could be supplied by a handful of development companies and private individuals that have set up without authorisation since the Revolution. The economic, social and environmental consequences would be dire and it is thus the very future of these territories that is at stake.

Finally, the 'ecosystem of services' is a reflection of the vision of agriculture promoted (and of what kind of agriculture in which society) and therefore of the agricultural policy. The case of Hezoua 1 also shows the need for governance of services (or governance of the ecosystem of services/governance of the sector). Indeed, the State has been in retreat since 2010, the agricultural profession is struggling to emerge, and it is therefore the private sector that provides this governance alone, and more specifically a handful of exporters in the context of an unregulated sector. The services respond relatively well to the sector's interests, but little to those of the irrigators (small-scale farms) or to environmental interests.

B. The need for farmers' organisations? It depends...

The Hezoua 1 study underlines the need for a revival of farmers' organisations to strike a new balance between the private sector, the public sector and the farming sector, and to break away from the situation where the sector is dominated by a few private parties. This revival is all the more necessary (but also possible) since the 2010 Revolution, which marks a strong withdrawal of the State. A recent FAO/EBRD study also recommends a revival of farmers' organisations.

On the contrary, this need for farmers' organisations is not apparent in Stung Chinit, which has just experienced two failures of farmers' organisations in supply and sale (paddy selling groups/ input buying groups) that were unable to sustain efficiency gains compared to the many private bodies in the area. For the time being, the private sector seems to be sufficiently competitive for the irrigators to benefit from it.

C. The need for a 'balance' between the private-, public- and farming sectors, regulation (according to what criteria) and governance of services

This is not a question of seeking a 1/3, 1/3, 1/3 balance between the public sector, the private sector and the farming sector.

Instead, 'balance' means:

- balance between the interests of the different actors. For example, the interests of one actor should not dominate the others, as is currently the case in Hezoua 1. This balance is possible within sectors co-managed by the actors, i.e. within value chains.

11. The difficulties concerning the water service are perceived to a limited extent and the environmental risks are only perceived by actors of the scheme through the observation of certain 'symptoms' (for example, the drop in fish catches or the need to increase fertiliser doses just to maintain yields).

- balance between short-, medium- and long-term issues. For example, medium- and long-term issues should not be forgotten in the face of immediate issues, as is the case at both sites.
- balance between economic, social and environmental issues. For example, environmental issues should not be neglected, as is the case on both sites.

The regulatory role of the State therefore seems essential. The Hezoua 1 study suggests regulating the date sector as is the case for the country's other strategic sectors.

The necessary interconnection of the micro, meso and macro levels: at which level is the notion of services more relevant?

A. Strategic changes required beyond services to irrigators

The Stung Chinit study underlines that strategic changes at the sector level are also necessary:

- The question of the production model based on the Green Revolution model which is not sustainable;
- The question of the private sector's supremacy in the service offer and the excessively weak roles of farmers' organisations and of the State;
- The question of financing, underlining the need to subsidise certain services (at least in a transitional phase and in particular to support the emergence of more sustainable agronomic practices).

Strategic changes are also necessary for the date sector and oases in Tunisia, and even for the agricultural sector as a whole:

- The revival of producers' organisations is vital, but the study stresses that a rupture in approach is necessary (this is also a strong recommendation of a 2019 FAO/EBRD study which uses the term 'rupture');
- The power relations within the sector must be changed and the study suggests regulating this sector, as is the case for the other strategic sectors (olive, milk, cereals);
- The question of the structure of the farms is also raised and changes concerning the mode of farming (indirect farming, where the farmland is worked by someone other than the landowner, as opposed to owner-operated farming) seem necessary;
- The issue of the control of extensions must also be addressed.

The establishment of meso- and micro-level services is therefore insufficient and policy changes (of services?) at the meso- and macro-level are needed.

B. At what level is the notion of service more relevant?

The two operational plans attempt to link these macro-level strategic questions with meso- and micro-level issues. The following question then arises: at what level is the notion of services to irrigators more relevant?

These linkages are presented in the table 7.

From our point of view, the notion of 'services to irrigators' is more adapted to the meso and micro levels. It differs from the notion of public policies or public services which are more related to the macro level (or meso in the case of regional policies, for example). However, while the services are provided at the local level, the financing of deconcentrated public services is a matter of political arbitration at the national level. Moreover, the study clearly shows the need for interventions - or services - at all three levels, in synergy.

What diversity on hydro-agricultural facilities?

A typology of farms has been developed on each site, with the assumption that the service needs of the irrigators would be fundamentally different according to their type of farm.

This assumption must be nuanced. It is true that the typologies did highlight the existence of several types of farms: three types in Hezoua 1 and five types in Stung Chinit. However, the analyses show that the priority service needs are not fundamentally different according to the types of farms in the same scheme. The irrigation scheme underlies a certain production model and tends to standardise the technico-economic models of the farms and therefore their priority service needs. More precisely, before satisfying the specific needs of each type, it seems more effective and efficient to first satisfy the priority needs common to the different types of farms in the same scheme, and then to refine them by addressing more specific needs. Management advice to farms seems to be a good way of refining strategies according to type and farm.

Moreover, there is a certain convergence of vision between the sector approaches and the irrigation schemes: these approaches leave little room for the diversification of productions on a scheme.

And the grey zones?

A. What about land? What about the evolutionary trajectories of irrigators?

The question of farm structure is a major issue in Hezoua 1: the average size of the farms has been divided by two over 60 years and they are no longer viable today. Type 3 farms are even being abandoned. However, owner-operated farming is the only mode of farming to date and there are no leases of plots or date palms. Farms in the process of being abandoned are not accompanied towards cessation. The other farms are not helped to grow. These issues of the transmission or takeover of farms, access to sufficient land (regardless of the type of tenure) and its security, do not seem to be sufficiently addressed, and there is no functional land service to deal with these aspects. In the operational service plan, land tenure is not taken as the first lever as the marketing lever seems more operational, but it is involved in the second stage (in a systemic way with the other services and linking micro, meso and macro level services).

The situation is very different in Stung Chinit. A public land tenure service was set up during the first period of Stung Chinit. It enabled producers to secure their farms while allowing a fair reorganisation of plots for the management of rights of way related to the infrastructures. Although it is invisible today, its absence would not have allowed the development of irrigation observed. Currently in Stung Chinit, land concentration and the

Table 7: Linkages of the different levels

Service areas	Level of intervention		
	Macro	Meso	Micro
Water	- Water policy - Regulation	- Water policing - Multi-actor consultation - Major works	- Advisory services to irrigators' organisations - Water policing
Marketing and supply	- Regulation of the sector - Trade policy	- Co-management or fair management of the sector - Control of suppliers	- Advice to POs on marketing - Marketing service - Supply service
Mechanisation / labour	- Investment support policies - Agricultural labour policy	- Collective planning at the level of the scheme/facility	- Provision of mechanisation services - Collective organisation / mutual assistance
Structuring of farms / land	- Facilitation of indirect farming (farmland being worked by someone other than the landowner) - Policy on the structure of farms	- Oasis land management and information system (cadastre, transmission, taxation, etc.)	- Accompanying advice - Management advice - Legal advice
Producers' organisations (POs)	- National PO policy - Representation and advocacy	- Federation of grassroots POs - Representation and advocacy	- Farmers organising themselves into POs at the grassroots level - Advice to POs
Advisory services and extension	- National policy on advice and extension (and public budget allocation)	- Support functions for advice and extension (research, training, etc.)	- Advisory and extension systems in the field
Basic social services	- Public services: education, health	- Public services: education, health	- Mutual assistance associations
Others	- Agricultural insurance	- Weather forecasts	

practice of renting out plots is beginning. Sometimes such rental is for a single season, which does not encourage sustainable land and soil fertility management practices.

The comparative analysis clearly shows the need for a land tenure service for irrigators. In both cases, it might be useful to recognise the interest of indirect farming and to support it.

B. What about services to women irrigators?

The ToR did not ask for specific analyses on gender aspects. This aspect was certainly kept in mind but was not analysed in detail. The question of the specific needs of women irrigators in terms of services therefore remains a grey area.

C. What is likely to happen if we do nothing? Rapid outlook and warning signals

In Tunisia, two main risks came to light:

- **An environmental risk** that combines several factors: the lowering of the water table (which is fossilised) due to extensions that are partly illicit. This risk is already well known to local actors. In addition, the trend towards single-species cultivation (dates) and single-variety cultivation (Deglet Nour) could lead to the disappearance of tiered oases and thus a loss of biodiversity and ecosystemic functioning. Finally, the new trend towards 'deconversion' is also a cause for concern and is less well known to the actors. These risks are aggravated by climate change (with impacts already visible on the oases).
- **An economic and social risk:** The bankruptcy of a large number of family farms is already underway (type 3 being abandoned and many other farms below the viability threshold). At the same time, large private farms (valorisation

companies) are developing around boreholes (legal or not) which supply the date sector. The date sector thus manages to maintain itself but is beginning to look fundamentally different. It may ultimately no longer provide a living for 10% of the Tunisian population as it does today, but for a smaller number of private investors. These risks are little perceived by the actors. On the other hand, the Interprofessional Organisation for Dates (Groupement interprofessionnel de la date, GID) had clearly foreseen the risk of overproduction (the peak of overproduction arrived earlier than expected, however).

In Cambodia, the main risk is environment- and health-related, linked to agricultural intensification according to the Green Revolution model.

In both cases a question emerges: Which services to avoid the worst? Or what agricultural policy to avoid the worst?

In Cambodia, this means setting up services to enable a better dissemination of agroecology. However, the difficulty is that although the need exists (according to our diagnosis), the demand is very low to date. There is a need to support technical and economic action research to gradually demonstrate the benefits (including economic) of alternative production models.

In Tunisia, the study shows the need to regulate the date sector in order to better reconcile divergent interests (farmers vs. exporters, short term vs. medium term/long term, economic vs. social vs. environmental). It can be considered surprising that a sector that supports 10% of the population is not deemed a sufficiently high priority or strategic sector to be regulated. Perhaps the past situation of supply being lower than demand made such

regulation less necessary. The new situation of overproduction, the new normal, fully justifies this regulation and real co-management of the sector.

In both cases, forward-looking thinking with local actors can be useful and beneficial in order to bring the medium- and long-term stakes to the fore and take them into account in a strategic and anticipatory manner. In itself, this work of facilitation and foresight (partly carried out by the study) can constitute a service to be developed that can be anchored in a territorial management approach, with an important role for the territorial authorities.

4. CONCLUSIONS

4.1 What lessons can be extrapolated beyond the two sites?

It should not be assumed that the services to irrigators in place are always necessarily in their interests: this must be confirmed in the field. The example of Hezoua 1 is particularly illustrative.

When the services are in the interests - at least in the short term - of the farmers and when a complete service offer is in place, these services should allow the irrigators to use and maintain the scheme in the best possible way and to develop and sustain their farms. The example of Stung Chinit between 2006 and now is particularly instructive.

A package of services is needed, which is much broader than the water alone, within an ecosystem of services. Their deployment should follow a certain logic specific to each scheme: the water service must indeed be secured first, then the priority constraint(s) must be identified in order to find the right 'service entry point', and finally all the services must be approached in a systemic manner (service ecosystem). The services must then be regularly readjusted according to a virtuous cycle of services. Nothing can be taken for granted and service failures can again threaten the water service and thus the irrigated system. The two examples of Hezoua 1 and Stung Chinit, which have a good water service today but which is at risk, are illustrative of this new threat to the water service.

Operational plans to strengthen services must be drawn up case-by-case and be based on diagnoses: sector-territory diagnosis, mapping, history and evaluation of the service offer, typology of farms, evaluation and prioritisation of the farms' service needs, evaluation of the adequacy of the service offer compared to the needs. Within a given territory, we will of course find similar trends but also specificities depending on the characteristics of each developed scheme (for example, is it rehabilitated or not). Within a given developed scheme, service needs will vary according to the type of farm, but the scheme tends to standardise the priority needs that are the most effective and quickest levers to activate. The operational plan can therefore contain a standard service offer for these priority needs, and then services adapted to each type of farm (the family farm advisory service would help to formulate the service needs more specifically for each farm).

Depending on the service, it can be provided by the public sector, the private (commercial) sector, the agricultural profession and even from farmer to farmer. The services cannot be left to the private sector alone: there is a risk that the offer would be incomplete, too self-serving, or that it would only consider short-term objectives, etc. The service cycle might not be virtuous. However, the private sector, the public sector and the agricultural profession are all necessary, each according to their comparative advantages. If the private sector dominates the service offer, institutions to regulate and govern the services must be in place at the very least (to ensure that the general interest and the farmers' interests are respected). These regulatory and governance bodies must allow for a balance of services between: (i) the farmers' and other actors' interests, (ii) short-, medium- and long-term interests and (iii) economic, environmental and social interests. The study also shows the need for a certain reappropriation of services by the farmers (farmer-to-farmer services and the role of farmers' organisations) and for farmers' control over these services.

A service plan for irrigators links micro, meso and macro level services, the three levels being mutually reinforcing. The micro and meso level services are logically more operational while the macro level is more concerned with the public policies in support of these services.

While all services are not necessarily the subject of an explicit demand from the irrigators, the absence of an explicit demand does not signify an absence of need. Forward thinking with local actors can be useful and beneficial to bring medium- and long-term issues to the fore and take them into account in a strategic and anticipatory manner. This work of facilitation and foresight can constitute a service to be developed in itself, which can be anchored in a territorial management approach, with an important role for territorial authorities.

4.2 Relevance of the approach based on services to irrigators and of an operational service plan

The box 1 recalls some defining elements proposed by the ToR.

In the end, was the methodology followed really original or innovative? This section answers this question.

Relevance of the approach based on services to irrigators

The methodology that was implemented mobilised tools and approaches that are, all in all, quite classic for diagnostic missions and the formulation of projects or programmes:

- surveys, multi-stakeholder workshops, focus groups, intermediate consultation/feedback, meetings, etc.
- typologies, historical analyses, mapping, SWOT analyses, prioritisation tools, theory of change, etc.

The study emphasises the systemic dimension but any other (good) study of these two sites would probably have done the same.

**BOX 1:
DEFINING ELEMENTS OF THE NOTION OF SERVICES
TO IRRIGATORS ACCORDING TO THE TOR**

'The reflection on services to irrigators is part of the wider framework of services to farmers, implemented to consolidate their productive capacity and to favour the sustainability and development of their farms. Services to irrigators therefore include the different types of services that farmers may require, such as strengthening their technical capacities to produce (e.g. agricultural extension) and to manage their farms (e.g. management advice), securing their farms (e.g. statutes and land rights), their capital endowment (e.g. loans to farmers), their access to information (e.g. price monitoring), their organisation capacity (e.g. integration into a PO), their negotiation capacity (e.g. participation in an interprofessional organisation), their capacity to make demands (e.g. membership of a union), etc. However, as irrigators remain above all farmers, their needs must be understood on the scale of their farms in order to take into account all the constraints that weigh on their productive activity, and ultimately limit their possibilities and orient their choices in terms of irrigation. [...] The offer of services to irrigators includes a number of generic tools designed to meet the challenge of securing the productive potential of irrigating farmers. These tools are of a technical, informational, organisational and institutional nature, integrated in the framework of agricultural, irrigation and commercial policies. They can be applied operationally in the form of training, experiments, organisations, rules, etc., to counterbalance the constraints identified.'

The main innovation is therefore more related to the subject of the study - services to irrigators - than to the approach or tools used. Why was the approach based on services to irrigators relevant for the sites studied?

First of all, because addressing services to irrigators puts farmers back at the centre of the concerns. The focus is not on the developed scheme, the territory or the sector, but on the farmers. The two service diagrams (mapping of the offer and priorities for the operational plan) are very illustrative of this (with the farmers at the centre of a circle of services).

Consequently, a dual question is asked: (1) are the existing services really in the interests of the farmers? and (2) do the farmers have the means to access them? The case of Hezoua 1 has clearly shown that 'services to irrigators' does not necessarily mean services in the primary interest of irrigators. In Hezoua 1, the services seem to be above all in the interest of the sector (producing quality dates), rather than in the interest of the irrigators (having a sufficient income).

The service-based approach is quite concrete and complete (see the box below on this subject). For each service, the technical model (what service is it?), the institutional model (who provides this service? who controls it?) and the business model (how is it financed?) are described.



**BOX 2:
SERVICES TO IRRIGATORS,
MORE THAN JUST WATER SERVICES**

When talking about 'services to irrigators', the stakeholders spontaneously tend to think of the irrigation service/ water service, and often limit it to this. However, the study clearly shows that the services required by irrigators go far beyond this. The study shows that in the case of Hezoua 1, the water service is far from being the primary constraint, as this site was rehabilitated in 2018. The service needs are much broader and today the service priority is less on the oasis (irrigation, technical practices) than on the meso level of the equitable integration of farmers into the sector. The choice of the Hezoua 1 oasis enabled a better understanding of the sector issues that are too often masked by water problems. The choice of this oasis was therefore relevant. The study shows that in Stung Chinit, while improving the water service was a necessary condition, it was not sufficient to improve the performance of the scheme. The historical approach showed that it was first necessary to improve the water service from 2007-2008, then the marketing and supply services from 2015, then the mechanisation and advisory services from 2020, for the scheme to finally achieve a high performance rate. The choice of this site was therefore useful to allow this historical reading.

The service-based approach clearly links the micro, meso and macro levels. While the services are essentially at the micro and meso levels, they are reinforced by public policies at the meso and macro levels.

The interest of the notion of 'operational plan' to strengthen services to irrigators

The notion of 'operational plan' was not defined in the ToR of the study. It is not a project formulation document (irrespective of the stage of identification, feasibility, formulation, etc.) although it has some of the same characteristics (synthesis of a diagnosis, theory of change, operational modalities). Nor is it a document for planning the development of irrigation, a sector or a territory. As such, what is its main interest?

The example of Cambodia provides some answers to this question. While the mission met with private stakeholders individually, they did not take part in the workshop for consultation and the development of the operational plan. This can be taken as an indication that in the fairly competitive Cambodian context, private actors do not need an operational plan to strengthen their services. This tool would therefore be much more useful for planning public action and the agricultural profession. Indeed, this tool makes it possible to verify:

- if the offer of services to irrigators is complete and in the farmers' interests: this is the case in Stung Chinit but not in Hezoua 1;
- if the services are satisfactory in the short-, medium- and long-term: the study shows that in Stung Chinit and Hezoua 1, the medium- and long-term issues are not taken into account by the current services;
- if the services interlink the economic, environmental and social dimensions: environmental dimensions are neglected in both cases.

The operational plan therefore highlights the issue of the governance of services (or of the sector) and their regulation (short/medium/long-term linkage, environmental/economic/social linkage, linkage between farmers and other actors).

ANNEXES

MAIN ANALYSES FOR THE HEZOUA 1 SITE

- Synoptic record of the scheme;
- Current mapping of the service offer;
- General assessment of the service offer in relation to priority service needs;
- The issue of the sustainable development of irrigation and services;
- Possible stages of the operational service plan;
- Diagram of services to irrigators.

BOX 3: SYNOPTIC RECORD OF THE HEZOUA 1 SCHEME

Location		Hezoua, to the east of the Governorate of Tozeur, border with Algeria.
Area (ha)	Initially developed	72ha
	Currently developed	72ha
	Currently used within the scheme	72 ha – attention: some plots are on the verge of being abandoned.
	Used outside the scheme	0 ha
Date	Initial development	1962 – modern type oasis.
	Rehabilitations	Construction of a reinforcement well, rehabilitation of the main water pipes in 2018.
Number of farmers	Initially	48 farmers.
	Currently	94 according to the agricultural development group (ADG).
	Land tenure status of the farms	Private owners with ownership certificates.
	% of women assigned plots	None.
Water	Water resources	3 deep wells, each with a flow rate of 140 l/s.
	Water distribution system	According to the water turn.
	Water management	Transferred to the ADG which is responsible for day-to-day management. CRDA is responsible for major repairs.
	Fees and collection rate	The collection rate has dropped significantly over the last two years and debts towards STEG (Tunisian electricity and gas company) have accumulated.
Agriculture	Average farm size on the scheme	0.8 ha on average (in this sample, this varies from 0.25 to 1.75 ha).
	Production systems	Déglet Nour dates dominant (and, according to the farms, + arboriculture + market gardening + livestock farming).
	Cropping intensity	120 plants/ha, i.e. 180 plants for 1.5 ha.
	Agroecological practices	About 50% of the farms are certified organic (however this often leads to the abandonment of other crops) but a new trend towards ‘deconversion’ is emerging.
Organisations	Farmers’ organisations	1 ADG and 1 SMSA that are moderately functional.
	Water users’- and/or scheme management association	1 ADG.
	Others	Interprofessional grouping for dates, but which is dominated by the downstream sector.
Ongoing and/or planned projects		On the Hezoua site: Project co-financed by Italian cooperation to fight silting, improve the quality of dates, and develop infrastructure. National: other projects.

Figure 4: Map of the current offer of services to irrigators in Hezoua 1

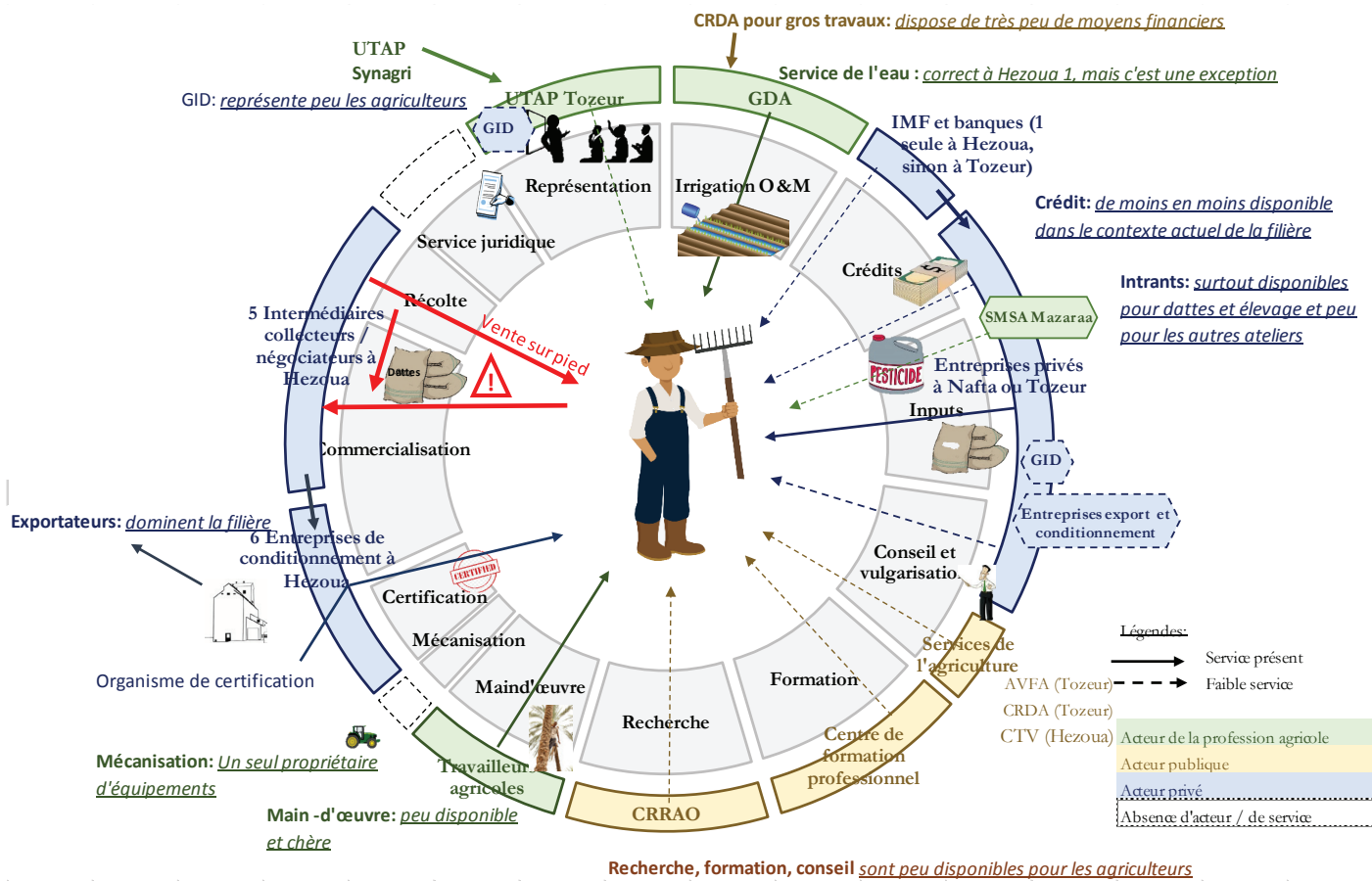


Table 8: General assessment of the service offer in relation to priority service needs in Hezoua 1

Services to irrigators	Priority	Perception of the users / level of satisfaction or non-satisfaction	Economic model and viability	Other challenges and risks in relation to the service	Difficulties / constraints	Possible improvements
Marketing	1	84% of farmers are not satisfied. 81% of farmers have difficulties in selling their produce: price, access to the market, non-respect of verbal agreements. But a 'social enterprise' exists which has developed an integrated sector.	Tunisia remains the number one exporter of dates of recognised quality but the sector is organised for the benefit of downstream actors. The sector is based on many non-viable farms (below the profitability threshold).	Organic certification does not seem to be of much benefit to the farmers, except in the case of the integrated organic-fair trade sector.	For the past two years, the overproduction of dates has led to a fall in prices. Will producers be able to withstand a third year of low prices? There is a great risk of bankruptcy of family farms and socio-economic crisis.	Producers should get involved in the harvesting/collection/primary storage links to capture this added value. The sector should evolve towards a real 'value chain' co-managed with the farmers.
Labour and mechanisation	2	42% of irrigators lack ordinary labour and 97% lack skilled labour. Difficult access to external labour. 3% of farms are mechanised.	Since it is too scarce, labour is becoming expensive (>100 dinars/foot) and farmers are no longer providing the necessary care to the palm trees, which threatens the quality of the dates.	Loss of knowledge and know-how.	Young labour is more interested in non-agricultural jobs. Labour sometimes comes from other regions. Size of farms too small (not viable).	Develop mechanisation adapted to oases as a complement to labour. Private service companies could offer these services.
Input supply	2	90% non-satisfaction: inputs too expensive, only available for dates (difficulty for other crops, especially those approved for organic farming).	The suppliers are mainly private companies. Viability OK although the date sector is in difficulty.	Very poor access to (organic) inputs for other crops, leading to a tendency to specialise farms.	Irrigators are not collectively organised for supply (except a little through the SMSA).	The SMSA could take charge of this service as well as private parties.
Credit	2	Low access to credit for farmers: lack of land titles, low viability of farms.	The providers are private banks or MFIs and are viable. But farmers are not very 'bankable'.	-	The current context of the sector does not encourage banks and companies to grant credit.	Management advice to family farms and POs to improve access to credit and incentives (subsidies).
Irrigation	3	58% satisfaction with the water service, system in good condition, no silting up, water turn relatively respected, 90% satisfaction with the ADG. NB: the oasis of Hezoua 1 is a unique case in Hezoua; the 14 other schemes have water problems.	Only 3% consider the cost of the water to be affordable and farmers are finding it increasingly difficult to pay the fees. The CRDA has fewer resources (human and financial) to carry out major repairs and support the ADG. Two years of low collection of fees (unpaid fees are increasing).	Decline in the water table. Trend observed in other oases towards illicit pumping. Decline in the collection of fees.	Despite the good level of satisfaction with the GDA, it only provides a 'minimum service' and, like the other POs, is not very professional and does not receive much support.	Strengthen the ADG ('organisational rehabilitation') to ensure the sustainability of the water service. Reduce pumping costs through solar installations (but beware of the risk of increased water consumption).
Extension, advice, training	3	The farmers feel left to their own devices.	Free of charge: either by public structures (but which have fewer and fewer resources) or by supply companies (integrated into the purchase price).	Young people are not interested in the training offered.	Technical extension dominates the offer and other fields (management, marketing, organisation) and approaches (advice) are absent. Extension only on dates.	Advice on all production systems. Service companies are beginning to be set up to provide advice but this remains very limited for the moment: an avenue to be supported.
Representation and advocacy	4	Farmers did not make an explicit demand for this service.	-	Absence of a farmers' movement that could really influence the sector.	Very weak structuring of farmers' organisations. Very low weight of farmers in the GID.	National programme of support to POs: need for a 'rupture' in terms of the PO model and approaches to supporting POs.
Research	4	Some research programmes but limited replicability among producers. Some innovations by GID and companies have been adopted.	Public research (CRRAD) free for producers. Innovations by GID and companies supported by the sector.	Fewer and fewer resources are being allocated to public services.	-	Increase farmers' participation in research governance bodies. An important topic: mechanisation adapted to oases.
Veterinarian aspects	5	The SMSA Mazarra provides some zootechnical and veterinary inputs.	-	-	-	Legal advice for the installation of young people, for access to credit?
Legal aspects	5	No explicit demand.	-	-	-	

Legend / colour code: SERIOUS PROBLEMS SOME PROBLEMS SATISFACTORY No explicit demand although the need exists

Figure 5: The issue of the sustainable development of irrigation and services in Hezoua 1

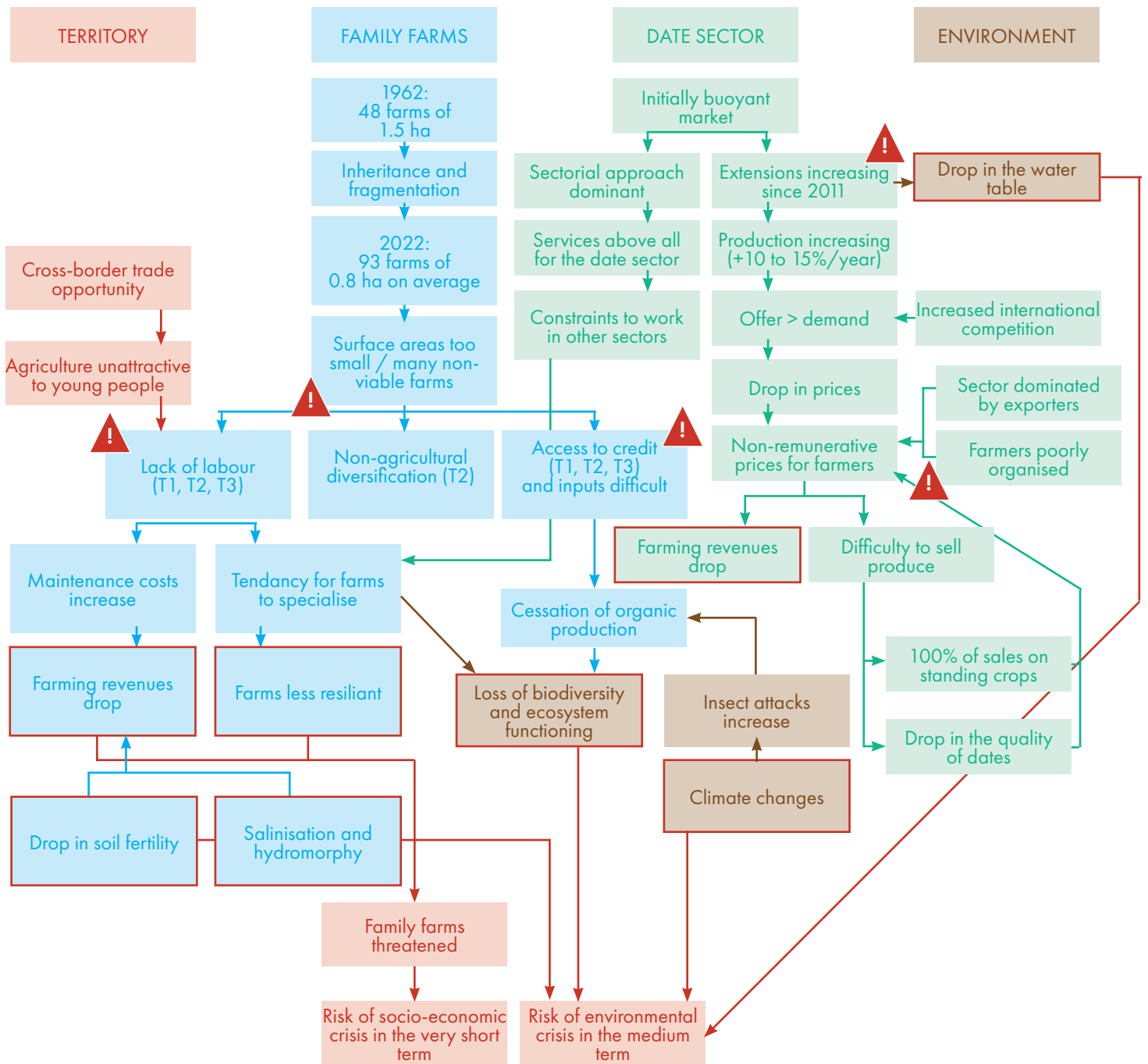


Figure 6: Possible stages of the operational service scheme in Hezoua 1

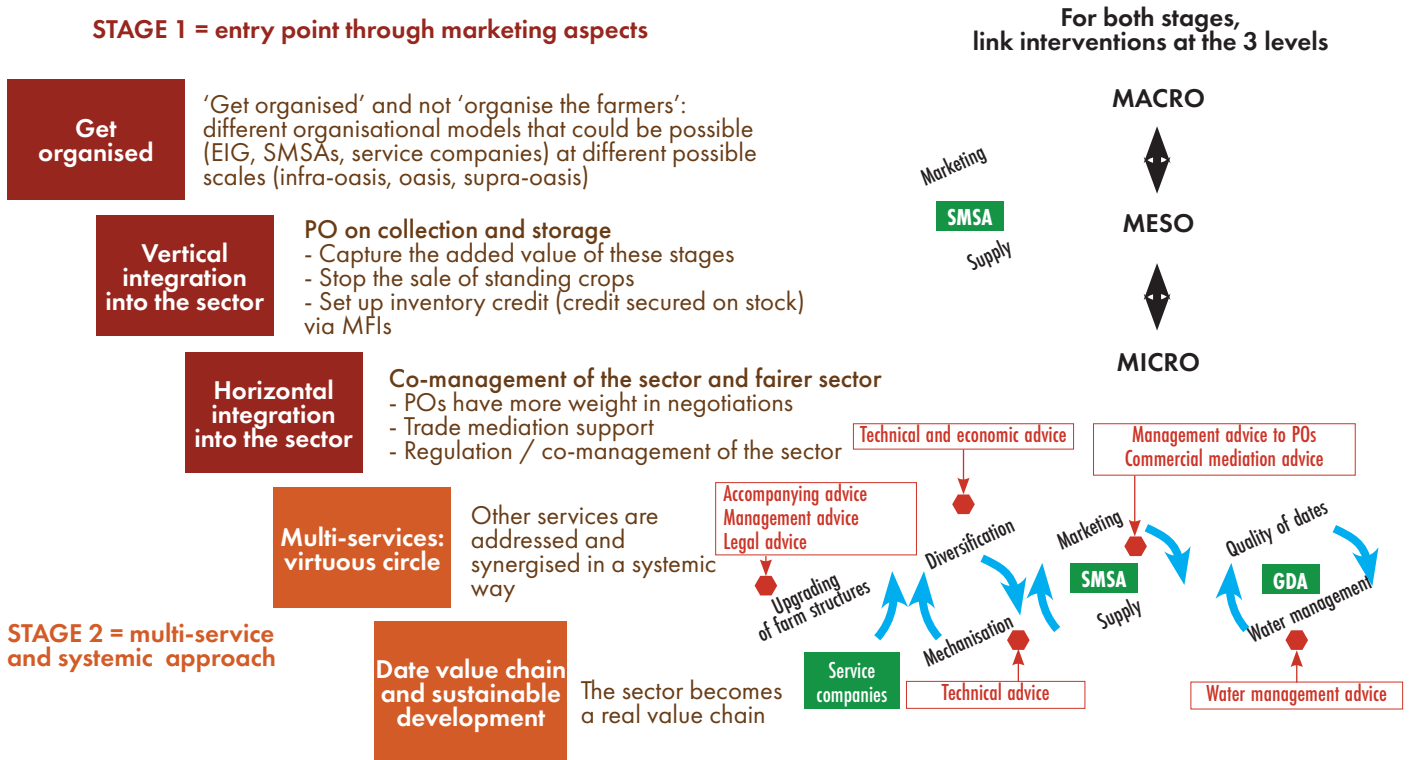


Figure 7: Diagram of services to irrigators in Hezoua 1

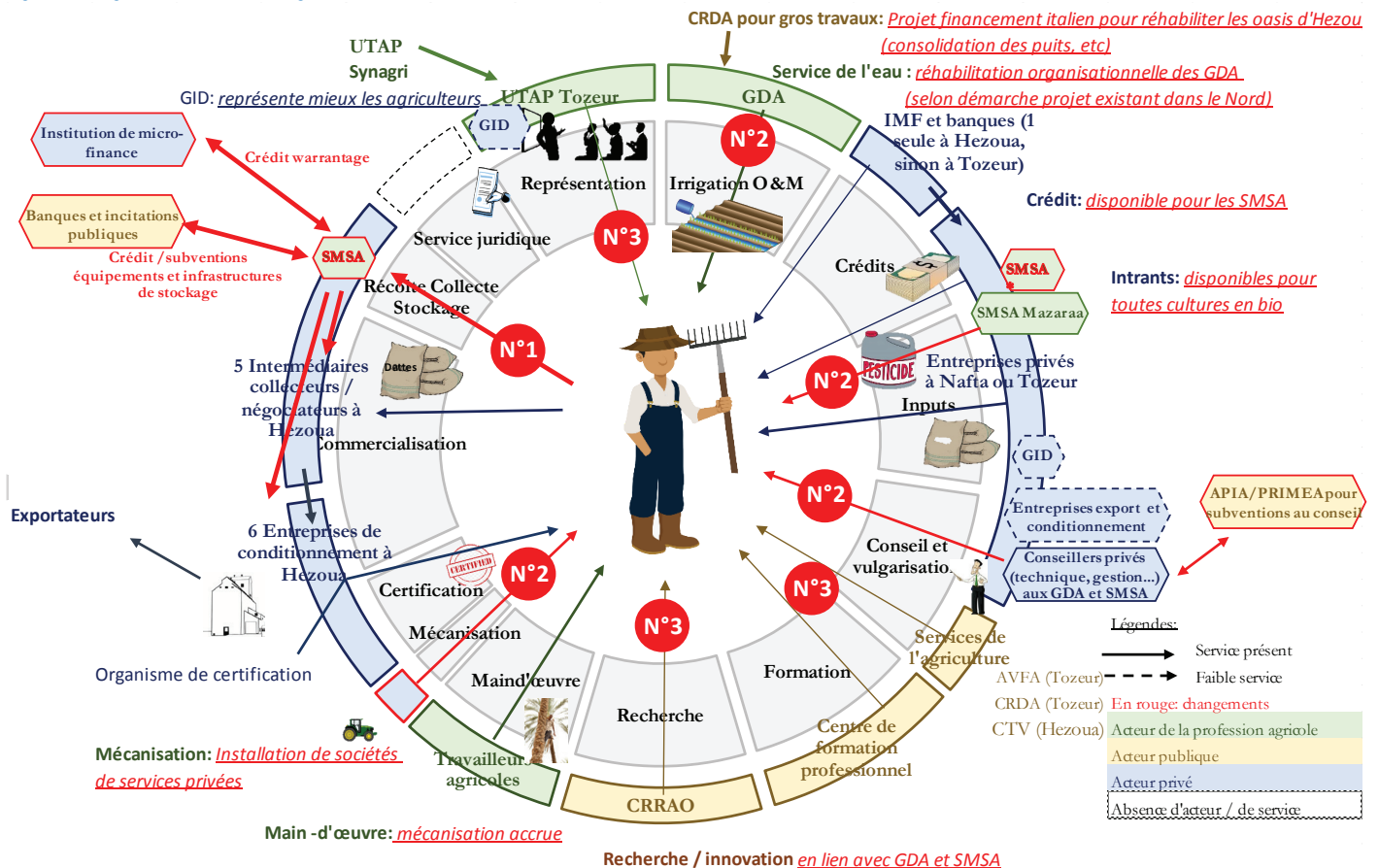


Table 9: Sharing of roles in the operational plan

Stakeholders	Roles and responsibilities
ADG (by oasis)	Water management and other activities according to official ADG texts. NB: the organisational rehabilitation of the ADGs is necessary in many oases (but this is not a priority in Hezoua 1) (see GIZ project in the north).
SMSA (by oasis)	<ul style="list-style-type: none"> Collecting/sorting/storing dates to aggregate production at oasis level and offer it to downstream actors. Supply of inputs in order to aggregate orders from suppliers.
SMSA (supra oasis)	<ul style="list-style-type: none"> Coordinated negotiation with downstream actors in the sector. Pooling of support services with SMSAs: for example, pooling of certain posts (accounting) or certain forms of advice, mediation in the event of conflict at SMSA level.
Private service firms	<ul style="list-style-type: none"> Provision of mechanisation services for tillage, pollination/maintenance of date palms, harvesting, etc.: equipment rental to farmers, service provision (carrying out operations on behalf of farmers by organising labour and equipment).
	<ul style="list-style-type: none"> Provision of advisory services to ADGs and SMSAs: organisational advice to ADGs and SMSAs, management advice to SMSAs and ADGs, advice on trade mediation to SMSAs. Provision of advisory services to farmers: technical advice (in conjunction with CTV [technical extension centre] and AVFA [agency for agricultural extension and training]), accompanying advice, management advice and legal advice. <p>NB 1: The economic model will be easier to establish with the SMSAs, then the ADGs, than with individual farmers for whom subsidies will still be necessary.</p>
	It is also possible to get involved in the collection/sorting/storage and supply links if the company is owned by farmers.
Private collectors	Purchase of aggregated dates from SMSAs.
Downstream firms	Supply contracts with SMSAs. Possibility of four-party SMSA-MFI-farmer-downstream buyer contracts in the framework of inventory credit.
MFI	Inventory credit (farmer-SMSA-MFI or farmer-SMSA-MFI-downstream buyer contract).
Banks	Investment credit for SMSAs and service companies according to the investment code (also provides for subsidies).
APIA	<ul style="list-style-type: none"> Subsidy for advisory services to POs and farmers (cf. PRIMEA). Investment subsidies (according to the investment code).
CRDA	<ul style="list-style-type: none"> Rehabilitations/major hydraulic works (one project with Italian funding). Control of extensions (water police) and implementation of 'arrangements'. Ensuring that the service plan functions well overall and that other agricultural strategies are properly implemented (on farm structures, extensions, the professionalisation of POs).
GID	<ul style="list-style-type: none"> Conducting fair negotiations within the sector: i.e. allowing farmers to be better represented Developing the sector into a value chain Contributing to the financing of certain services through its 'date quality promotion fund'.
CRRAO	Research/innovation with farmers, particularly concerning mechanisation adapted to oases
State / Ministries	<ul style="list-style-type: none"> Recognising the date sector and oases as strategic and regulating the date sector. Institutional developments concerning the structure of farms, the revival of POs, extensions.

MAIN ANALYSES FOR THE STUNG CHINIT SITE

- Synoptic record of the scheme;
- Current mapping of the service offer;
- General assessment of the service offer in relation to priority service needs;
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Table 10: Synoptic record of the Stung Chinit scheme

Location		Santuk district, Kampong Thom province.
Surface (ha)	Initially developed	Approximately 2,400 ha (rehabilitation since 2002, completed in 2006).
	Currently developed	Approx. 2,800 ha (2,786.87 ha as per the last update database of FWUC, with 9,020 rice field plots registered)
	Currently used within the scheme	Approx. 2,800 ha (100 % of irrigated surfaces are used)
	Used outside of the scheme command area	Another (formal) scheme developed in the South (approx. 5,000 ha), using water from the same reservoir on the Chinit river.
Date	Initial construction	First Built around 1977 during the Khmer Rouge regime
	Rehabilitation(s)	Rehabilitation in 2002-2006 (water availability and use started in 2006-2007) (More recent construction of quaternary canals since 2018-2019).
Number of farmers (users)	Initially	2,828 land owners inside the scheme
	Nowadays	2,850 land owners in the up-dated register of FWUC (2021) – Note that owners and users are not necessarily the same: a number of plots are rented.
	Land tenure statute of farmers	Secured land ownership (« hard » land titles) for a very large majority of surfaces.
	% of women owners	Data not available
Water	Source of water used	Reservoir (barrage) on the Chinit river
	Water distribution system (supply down to land plot level)	Primary canal / 5 secondary canals / Tertiary canals supplying water to irrigation blocks. More recent Quaternary canals to distribute water to each plot (for part of the scheme) + drainage canals.
	Water management	Transfer of responsibility for the operation and maintenance to the FWUC from Secondary infrastructures.
	Irrigation service fees	Irrigation Service Fees (now named « contribution ») of 60,000 KHR/ha/year (approx. 15 US\$) regardless of the number of crop cycles. Charged to land owner. Collecting the ISF becomes increasingly difficult for the FWUC.
Agriculture	Average size of farms in the command area	Average surface per land owner = 0.98 ha. But this does not necessarily reflect the average size of farms.
	Production systems	Rice crop practically exclusively.
	Cropping intensity	Nowadays two to three cycles of rice crop per year (early wet season / late wet season / dry season).
	Agroecological practices	Nowadays : a conventional intensification of rice crop (« green revolution » model) : mono-cropping of rice, 2 or 3 cycle per year, intensive use of chemical fertilizers, pesticides and herbicides, intensive use of machines.
Organisations	Farmer Organisations	Scarce cases of farmers being members of an Agricultural Cooperative (AC) in the area. AC providing support to their members on cash credit, production of paddy seeds, and collaboration with inputs supplier company. Attempts at establishing collective input supply and marketing of paddy have failed.
	Water User organisation	FWUC established since the rehabilitation of the scheme
On-going or foreseen projects		None identified on-going project covering Stung Chinit scheme area.

Figure 8: Current mapping of services to irrigators on the Stung Chinit site

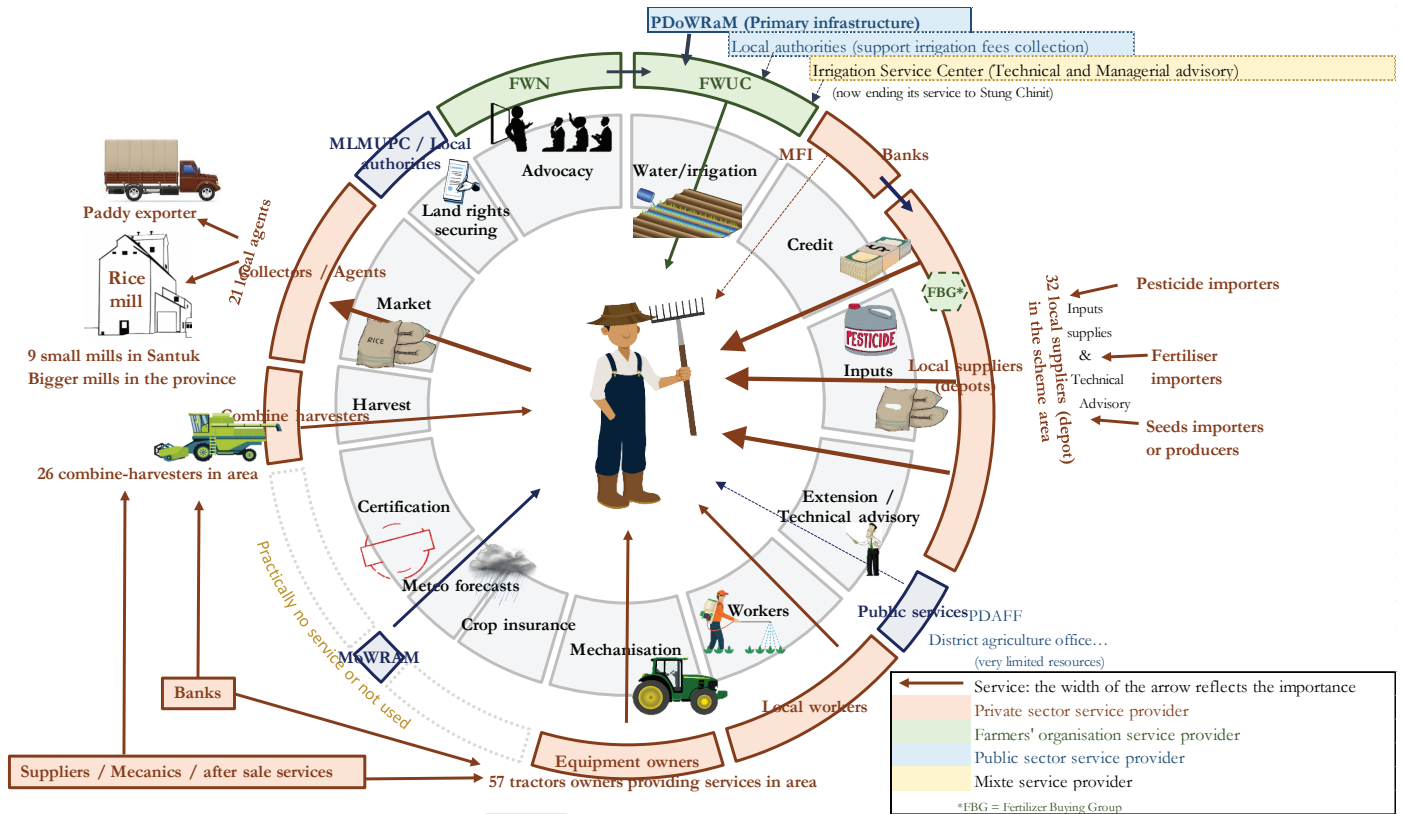


Table 11: Evaluation of the service offer and prioritisation of needs on the Stung Chinit site

	Priority level (how important the service is for farmers)	Perception by users: Level of satisfaction (or reasons of complains)	Economic model and viability	Other stakes (external) or risks on the service	Difficulties / constraints	Possible improvements
Irrigation	1	Generally good (so far). A bit lower for larger farmers and for owners of parcel in higher land	ALERT Increasing needs for maintenance. Lower level of service fee payment (ISC services charged to FWUC at a lower price than real costs)		Service fee collection. Degradation of the support from Local Authorities. End of ISC support threaten the quality of services	Re-discuss and re-shape the organisation of the O&M service and economic model + Institutional capacity building
Mechanization (soil preparation)	1	Good (some farmers complain a little on price)	OK viable economic model for service providers with the current level of pricing.	Increased mechanization comes with increased damage on irrigation infrastructures	A bit of tension on the availability of service at peak period	
Input supplies	1	Availability, diversity and efficiency of products (near at hand) + embedded credit appreciated Complain on prices of inputs (in particular fertilizer)	Economic viability (market based + sufficient margins)... But a risk link to embedded credit and working capital engaged. One seller mentioned that she reduce the sell on credit.	Environmental impact (on fisheries / human health...)	Guarantee on the quality of fertilizers not always sure	Reinforce technical advices by public services (with budget allocated for that) Quick intervention if pest / disease Buying group
Harvesting services	1	Good level of satisfaction thanks to the increase of availability of CH Some complain of high price	OK viable economic model for service providers with the current level of pricing.		A bit of tension on the availability of service at peak period	
Market	1	Availability of buyers Not always happy with the selling price of paddy	Collectors financed on their margin, or local "brokers" paid on commission	Depend on Vietnam market for DS varieties.		
Technical advices	2	Generally good	Mainly technical advices provided by inputs suppliers at no extra costs (economic model based on the sale of fertilizers and phyto-sanitary products)	Environmental impact (on fisheries / human health) and sustainability (soil fertility)	Conflict of interest when advice is given by input suppliers Lack of budget resources for public services extension. Advices focused on yield and not on profitability	
Credit	2	Farmers quite satisfied Easy to access.	Actual interest rate applied between 1.8 et 2.7%/month for credit embedded in input sales. Risk of default of reimbursement	What would be the impact in case of economic or natural hazard affecting most of the production in the scheme?		Insurance to cover risk of incapacity to repay in case of major hazard on crops?
Workers	3	Generally available in WS but sometime lack of workers available in DS	Remuneration of work has to align with opportunity cost for the worker	Human health for workers		Drone?? (evoked by some farmers and one input supplier...)
Advocacy	3	Quite unknown by farmers FWUC appreciates FWN support	Difficulty to finance the advocacy role.		Low perception of stakes by farmers	

Color codes:

SIGNIFICANT CONCERNS OR RISKS

SOME CONCERNS OR RISKS

QUITE SATISFACTORY

SATISFACTORY

Figure 9 : Overview of some of the key issues to be addressed and vicious cycles regarding O&M management

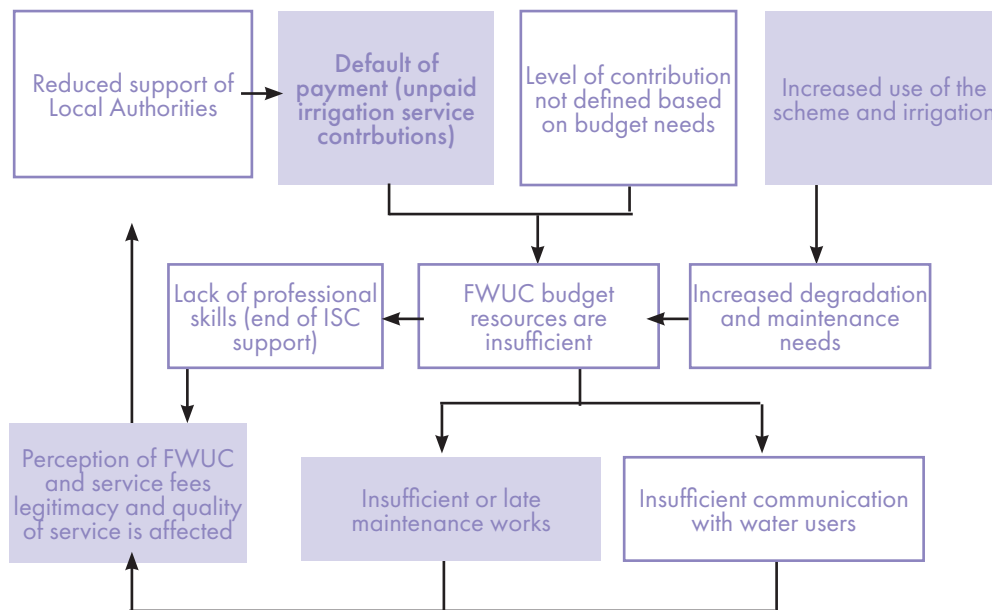


Figure 10: Overview of some of the key issues to be addressed and vicious cycles regarding rice cropping practices intensification and lack of independent technical / economical advisory

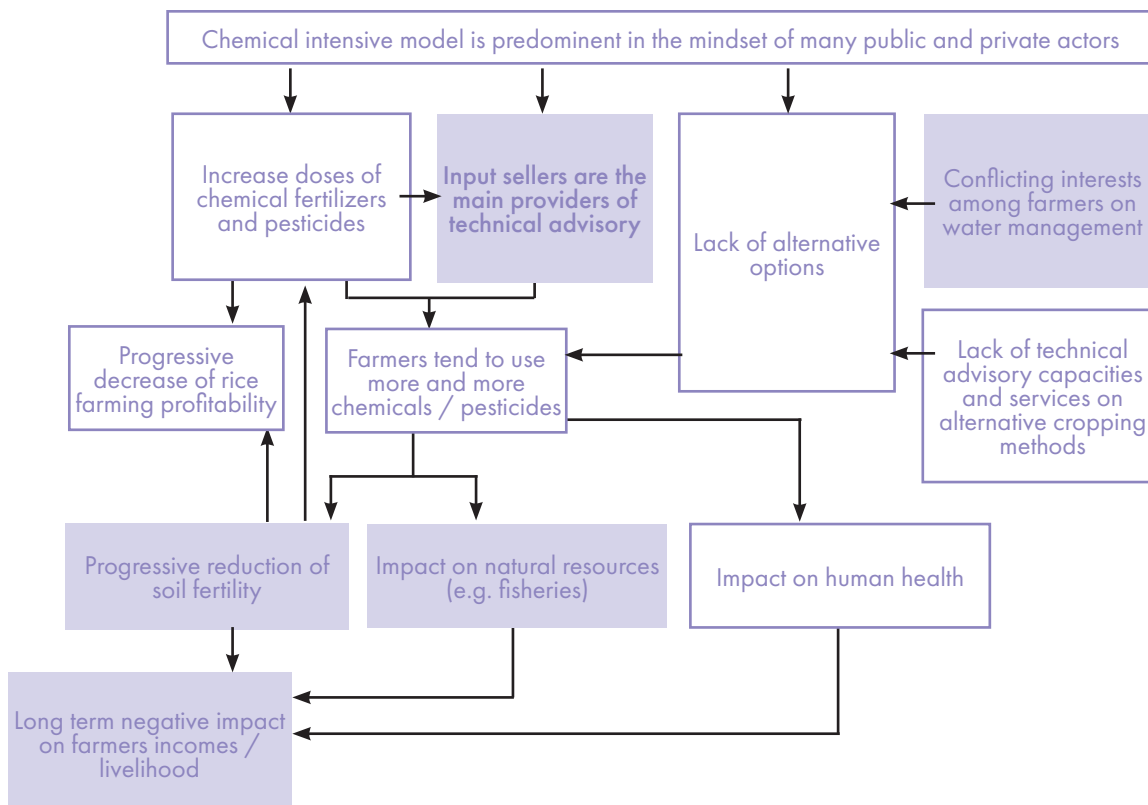
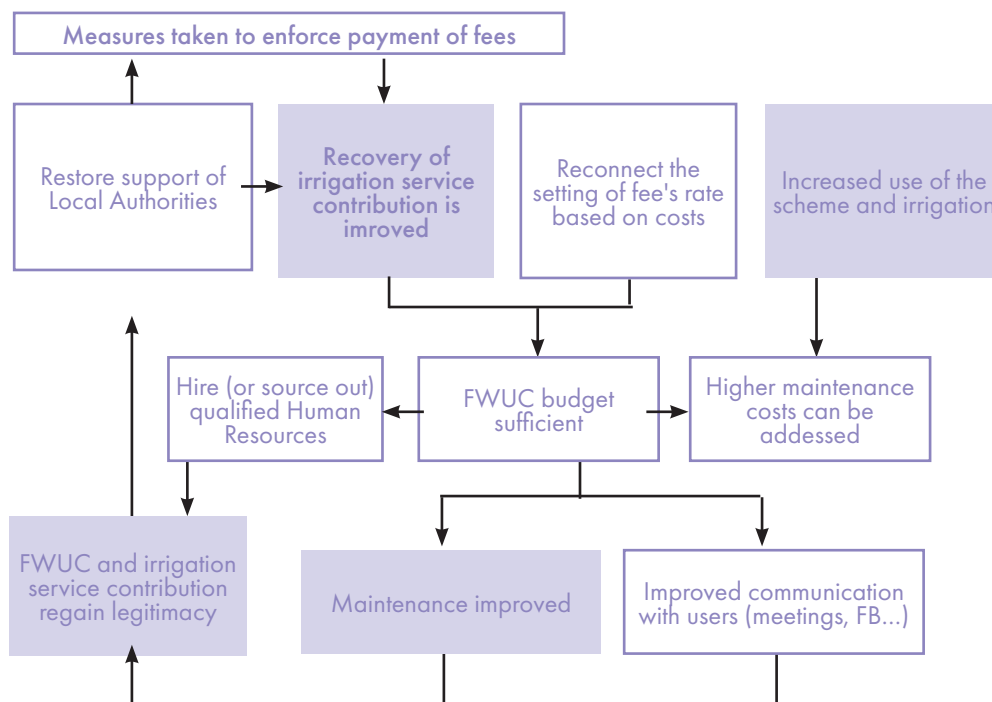


Figure 11: A summarized vision of addressed issues and restoration of a positive / virtuous cycle related to O&M



[Note: Boxes in white background and bold fonts indicate the main entry points to initiate the changes / improvements].

Figure 12A summarized vision of pathway toward changes of cropping practices

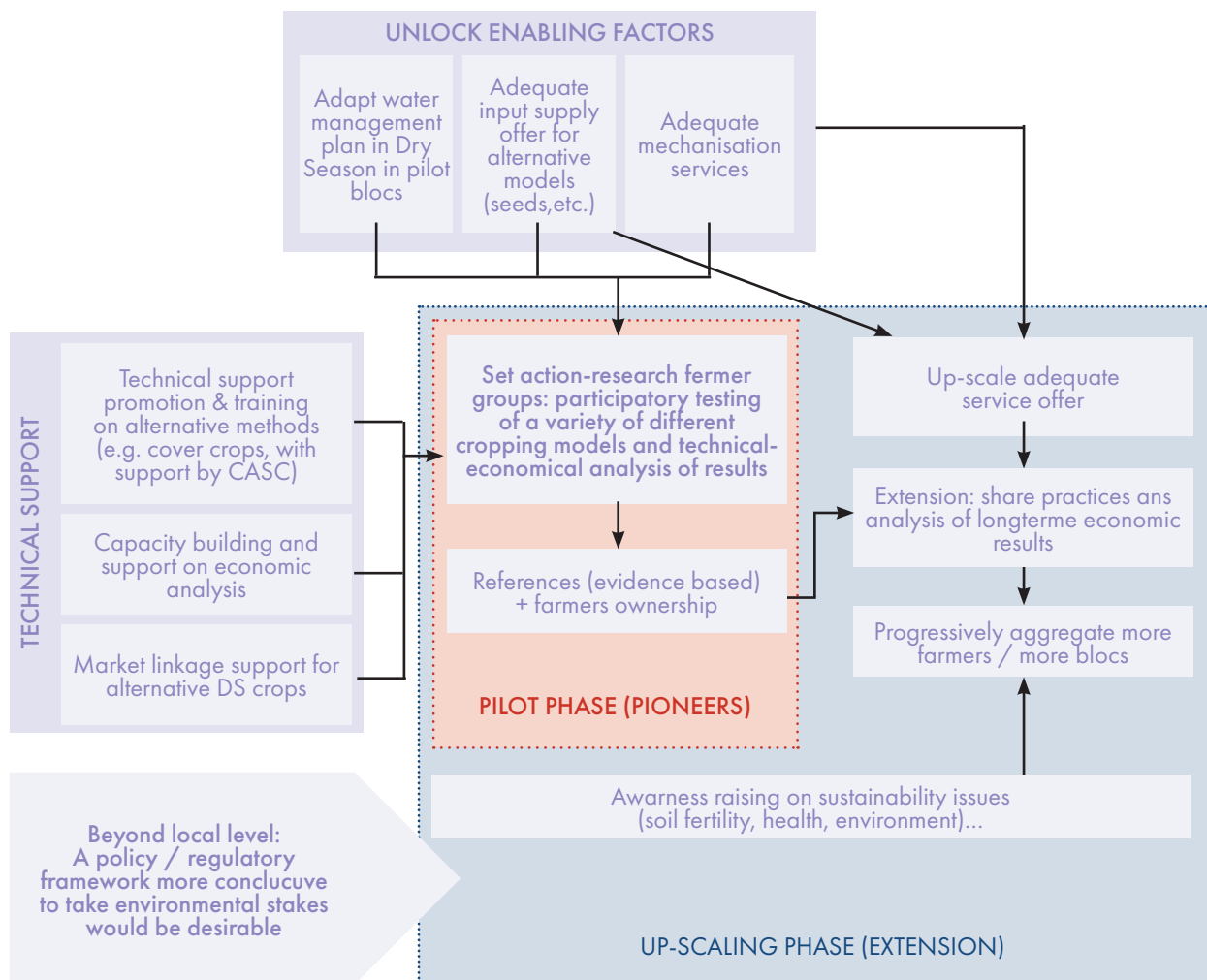


Figure 13 : Schéma de services aux irrigateurs

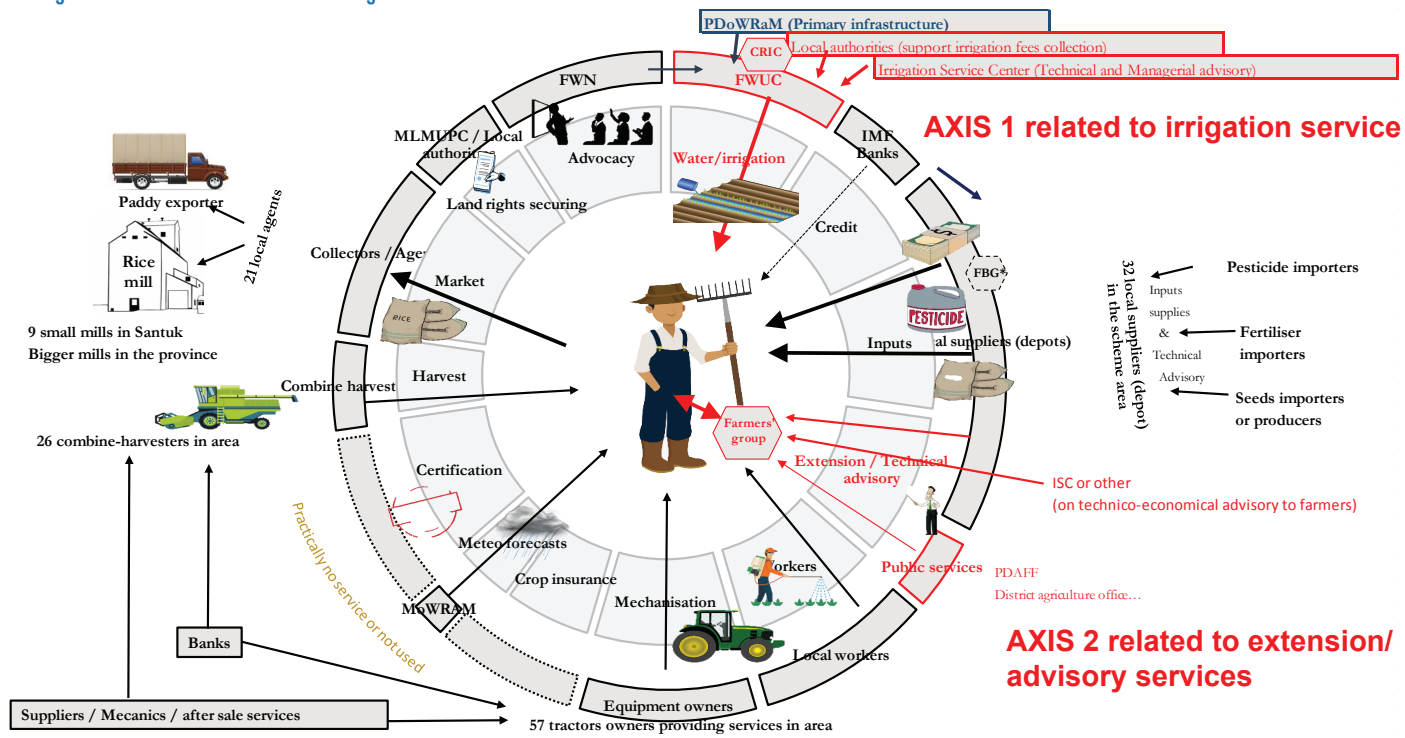


Table 12 : Stakeholders roles and responsibilities in the renewed structure for the management of O&M

Stakeholders	Roles and responsibilities
FWUC Committee + salaried staffs	<ul style="list-style-type: none"> Prepare an annual work plan and budget plan, and use it to serve as the basis for setting the billing rate per hectare and per season (in consultation with CRIC); Prepare comprehensive action report and financial report on FWUC's O&M activities to ensure transparency; Organise meetings with users at village level at least one or two time per year to provide information, consult on water management, and get feedback from users; Set up a link for more regular information provision to water users, so the perception of FWUC service is better perceived. Organise the billing of irrigation service costs to users. Make decision and implement water management and maintenance work. Manage FWUC finance in an efficient and transparent way.
FWUC Village representatives	<ul style="list-style-type: none"> Be the first interlocutor of farmers / water users to deliver and collect information; Organise village level meetings and invite farmers / water users; Gather data on land ownership and land use within the scheme; Collect Contributions to Irrigation Service Costs and transfer to FWUC committee / bank account.
Head of Communes / Commune councils	<ul style="list-style-type: none"> Support communication to users on FWUC role and encourage farmers compliance with collective rules and principles Help to address cases of non-payment of fees that could not be addressed by FWUC alone or by village authorities. Take part in CRIC meetings.
District governor	<ul style="list-style-type: none"> Convene and chair CRIC meeting. Ensure communes and village authorities are fully aware of their roles and undertake their support to FWUC fully and diligently. Help to address directly the most severe and cases of non-payment or non-respect of rules by users (long lasting unsolved cases, concerning large surface of land and important amount at stakes).
CRIC	<ul style="list-style-type: none"> Advice on the general management of the irrigation infrastructures; Take part in the decision of ISF level (taking into account acceptability and technical constraint). Follow-up and solve the conflicts or problems which occur in the FWUC; Collaboration and coordination between FWUC committee with PDOWRaM, and other organizations; Collaboration and coordination with FWUC committee on ISF collection and enforcement of internal regulations.
ISC (or alternately FVN, or hired salaried staff...)	<ul style="list-style-type: none"> Provide support to develop the information collection system on land use in dry season; Provide support to develop the data management and irrigation service billing system to help FWUC to switch from annual billing to seasonal billing.
PDoWRaM	<ul style="list-style-type: none"> Ensure that water is supplied adequately within the main canal; Ensure the maintenance of infrastructures that remains under MoWRaM responsibility; Participate in meetings with FWUCs, local authorities and users as required to support FWUC work.
Farmers / Water Users	<ul style="list-style-type: none"> Help to provide feedback to the FWUC and to identify maintenance needs; Provide information on land ownership (especially in case of change of owners) and on land use in dry season; Attend village meetings to get clear information on water management and on FWUC activities; Pay their due contribution to irrigation service costs, fully and on time.

Table 13 : Stakeholders roles and responsibilities in the promotion of more sustainable cropping practices

Stakeholders	Roles and responsibilities
Group of innovative farmers	<ul style="list-style-type: none"> • Set up action-research group. • Test innovations, document and share results (technical and economic); • Contribute to disseminate results to other farmers (extension). • Contribute to the reform of extension/advisory approaches and mechanisms
CASC or other specialized technical services (notably on Conservation Agriculture Model)	<ul style="list-style-type: none"> • Present technical innovative options; • Provide on-the-ground guidance and advisory services to farmers; • In a transitory period, help to procure special mechanization services required and inputs.
PDAFF or DOANRE	<ul style="list-style-type: none"> • Raise awareness of farmers on impact of conventional rice intensification on soil fertility, natural resources and health; • Take part in facilitation of groups of innovative farmers and documentation of results; • Take part in the implementation of extension at scaling up stage; • Support the reform of extension/advisory approaches and mechanisms towards more co-creation of knowledge and valorisation of farmers' know-how; • Contribute in encouraging engagement of private sector (service providers, input suppliers, and buyers of agricultural products for new commercial productions, if any).
FWUC	<ul style="list-style-type: none"> • Contribute to identify suitable irrigation blocs to implement pilots (taking into account criteria of access to water in DS, practice or not of DS rice, land use by land owners, etc.; • Integrate the possibility of alternative to rice crop in dry season and other cropping option in the consultation and development of water management plans.
Farmers' organisations (FWN, FWUC, others?)	<ul style="list-style-type: none"> • Contribute to the reform of extension/advisory approaches and mechanisms
A service provider to identify... (could be a project, an NGO or local service company)	<ul style="list-style-type: none"> • Build capacities in economic analysis (farm management, economic comparisons of technical models, assessment of profitability...); • ... and support financially the costs of technical-economic advisory services; • Accompany the action-research groups in economic analysis of results; • Train extension services to be able to progressively integrate economic analysis.
	<ul style="list-style-type: none"> • Help to develop market connection for new crops introduced in dry season.
Input suppliers	<ul style="list-style-type: none"> • Integrate additional inputs required in their offer (e.g. cover crop seeds...); • Better inform farmers on health and environmental hazards related to pesticide use.
Mechanisation service providers	<ul style="list-style-type: none"> • When sufficient scale is reached, consider investing in special mechanisation equipment needed (notably for cover-crops + no-tillage model).