

## #1 - 2023 POLICY BRIEFS

Structuring Action: **WAIDMAS** (West African Irrigation Development and Management Agencies)

**#1 - 2023** Project: Review and prospects of the transfer of management to irrigators' associations (IAs) in WAIDMA areas

# The transfer of management to IAs in West Africa: towards supported independence

To contribute to the sustainability of hydro-agricultural infrastructures in WAIDMA schemes, it has become necessary to transfer the management of part of these infrastructures to irrigators' associations (IAs)<sup>1</sup>. What are the main lessons to be learned from the various experiences of the WAIDMAS and irrigators in this area?



## ISSUES AT STAKE AND OBJECTIVES OF THE ACTION

Delegating management to users' associations means applying the principle of subsidiarity, which should make it possible to increase the economic and social relevance of water use and to reduce the cost of managing the infrastructures developed, while guaranteeing their proper maintenance. This involves recognising the role of irrigators, giving them a sense of responsibility and providing them with the material, intellectual and legal resources they need to carry out their tasks. By highlighting and analysing the results achieved and the difficulties encountered by initiatives to transfer the management of large-scale water supply in the Sahel, we can clarify what remains to be done and the lessons to be drawn, either to make progress where the process has begun, or to implement approaches of this type in the future.

The overall issue identified by COSTEA for the WAIDMAS is that of the equitable sharing, sustainable use and management, and optimal development of resources and common goods such as soil and water on the one hand, and the public collective hydraulic infrastructures for which the WAIDMAS are the project owners on the other, for the purposes of agricultural production, the development of rural areas and improving the living standards of the people that live there. The 'transfer' project covered by this policy brief is in the context of this cross-cutting issue and contributes to meeting the following challenges:

- allocating land fairly and over the long term to farmers, both women and men, on irrigated schemes;
- the sustainable management of water resources extracted for irrigation, while respecting the needs of other water uses, in particular those of the natural environment;
- mobilising irrigating farmers to contribute to the proper management of irrigation systems;

## KEY MESSAGES

- 1/ Transferring the management of part of the infrastructures to IAs is a dynamic process that involves regular questioning by all of the actors involved;
- 2/ There is no perfect transfer experience or model that can be applied everywhere, but rather a compendium of experiences from the various WAIDMAS to be promoted and the need to set up an ecosystem of complementary actors;
- 3/ Transferring the management of parts of the infrastructures developed by the WAIDMAS to IAs means sharing responsibilities, which requires constant supervision and objective and constructive dialogue between the WAIDMA and the IAs. To achieve this, the WAIDMAS and the IAs must have appropriate human resources;
- 4/ The sustainability of good IA management can never be taken for granted, even the most operational of them go through periods of crisis;
- 5/ The upkeep and maintenance of the infrastructures transferred to IAs are often poorly understood. Improvements require an adequate definition of the cost of the water service and better application of the O&M notices delivered with the infrastructures transferred;
- 6/ The involvement of the West African Network of WAIDMAS (ROA-SAGI) is now necessary to ensure that the messages are properly conveyed within the WAIDMAS and to key actors in the ecosystem.

1. The terminology 'irrigators' associations', considered to be more generic, has been chosen in preference to one of the official names adopted in West African countries, such as 'Water Users' Associations' or 'Agricultural Water Users' Organisations', for example.

- creating the conditions for an economy that benefits farmers' incomes, to enable them to be fully-fledged economic actors in partnership with agricultural production value chains;
- creating the conditions for maintaining the effectiveness of the major public investments made to develop irrigated schemes, through an appropriate distribution of management responsibilities between the actors, by strengthening their capacities and improving their methods, and by adapting irrigation systems to these management methods;
- renewing traditional approaches to engineering irrigated systems by integrating technological and social innovations.

Faced with the difficulties encountered by the WAIDMAs in managing water efficiently and balancing their operating accounts, the 1980s saw a proliferation of reforms aimed at giving users greater weight in the management of irrigated schemes. The promoters of these reforms drew inspiration from the management methods observed in what were known as 'traditional' or 'community' irrigated schemes, where farmers had demonstrated their ability to manage over the long term, without the presence of the State. The structural adjustment plans of the 1990s provided the framework for many governments to initiate reforms of the management of irrigation systems, such as those of 'Participatory Irrigation Management' and 'Irrigation Management Transfer'.

However, while it is now undisputed that the involvement of irrigators in the governance of irrigation is a key to its successful development, these reforms have not always produced results that live up to the expectations of their promoters, particularly in large public schemes.

The general objective of this project is to advance the participatory management of irrigation in the (large and medium) schemes developed in the WAIDMAs' intervention zones (where a transfer policy is required). Progress and policies in this area vary significantly from one WAIDMA to the next, but all agree on the importance of this subject, either to evaluate what has been done, to support what is currently being done, or to better prepare for a possible transfer. To do this, they wish to draw on (i) feedback from the most advanced WAIDMAs, (ii) experience in this field in West Africa and elsewhere in the world, and (iii) the considerable amount of research carried out in this area.

The specific aim of the study was to evaluate and capitalise on the experience of the WAIDMAs targeted in terms of the specificity of the tools and mechanisms for transfer and to support the IAs in their management of the irrigated schemes, while drawing lessons from the difficulties encountered. The lessons learned from the study should be able to be put to good use and shared within each WAIDMA as part of the WAIDMA network. The results of this study should serve to inform discussions on transfer.

The institutional structuring of the agricultural world around water management and hydro-agricultural developments is also an opportunity to encourage structuring around other agricultural issues (ecosystem supporting the IAs: production/ value chain, etc.). A good linkage between agricultural production

structures and those of water users and the efficient distribution of tasks between them are factors of success or difficulties for the development of the territories concerned.

Typical difficulties can arise due to a mismatch between the associations' resources and the scope of their mission, due in particular to:

- the technical skills of the IA members to manage the irrigation infrastructures for which they are responsible;
- the size of the scheme transferred (quantitative aspects), which may be either too large, leading to complex management, or not large enough, leading to a lack of resources;
- the functional scheme delegated, leaving either too much autonomy or not enough;
- insufficient rules or inadequate powers to ensure that these management delegates are able to enforce the water allocation plan between users, ensure that the developed schemes are respected, recover the cost of the water service, or ensure that their elected representatives act with transparency and integrity;
- the presence of surrounding economic or institutional actors that help the associations to function, or whose absence or weakness hinders them;
- the availability of water resources, guaranteed by the State over the long term for agricultural use, as part of an IWRM approach, which can be a factor in the success or failure of the transfer.

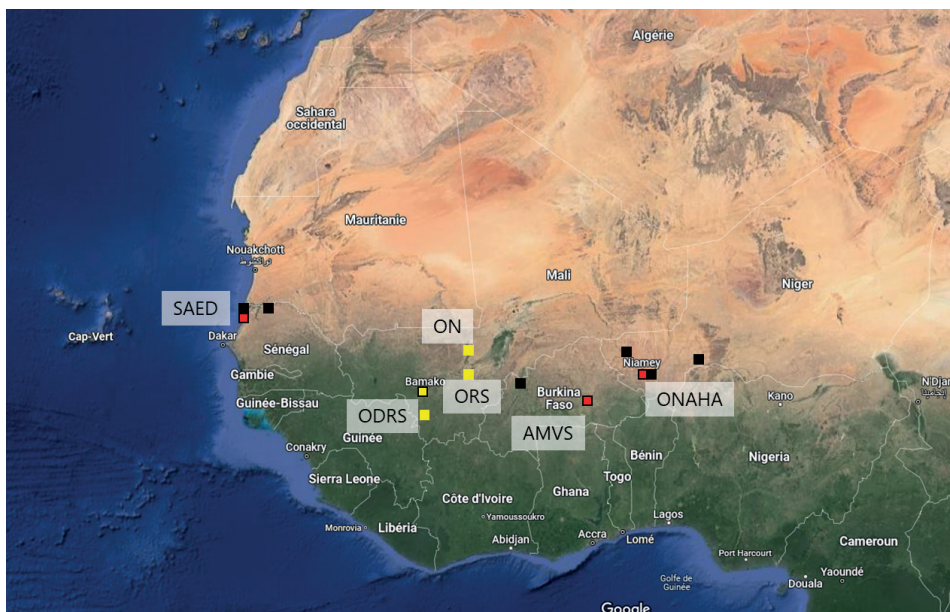
Depending on the human, institutional and economic development of each territory, an optimum scenario and the conditions for success have therefore been analysed to enable a transfer of management that best guarantees the sustainability and economic optimisation of the infrastructures developed and of the water and soil resources concerned.

## PRESENTATION OF THE METHODOLOGY AND CONTEXTUAL ELEMENTS

The '*Review and prospects of the transfer of management to irrigators' associations in WAIDMA areas*' project was the first WAIDMA project to be launched, with the contract being awarded to the GRET-SCP consortium in December 2019. It is one of the four thematic projects of the WAIDMA structuring action.

It was organised around several tasks carried out successively:

- the collection and analysis of documentation on the six WAIDMAs concerned and their context (SAED, ONAHA, AMVS, ON, ORS, ODR);
- a comparative and commented overview of the situation in terms of the transfer of management to IAs in the six same WAIDMAs, drawing lessons from the evaluation and capitalisation on experiences in transferring management to IAs. This overview focused on six thematic areas: (i) transfer policy and procedures; (ii) governance; (iii) the technical management of upkeep and maintenance; (iv) administrative,



Location of the WAIDMA stakeholders in the study and of the main sites visited or not during the field diagnoses of stage 3

- Location of the schemes visited
- Head office of the WAIDMAs visited
- Location of the schemes not visited but included in the diagnosis
- Head office of the WAIDMAs not visited but included in the diagnosis

economic and financial management; (v) organisation and professionalisation; (vi) agricultural development.

- an in-depth field assessment of three schemes selected in the areas where SAED, ONAHA and AMVS operate.

Two main types of actor were met during the fieldworks: actors with direct responsibilities in the management and operation of irrigated schemes and actors belonging to the irrigation ecosystem<sup>2</sup>.

The following diagram presents the actors met<sup>3</sup> according to the typology presented above.

As with each of the WAIDMA projects, the study was organised around an international service provider in charge of coordinating the work, contributing experts<sup>4</sup> from the WAIDMAs concerned by the case studies and focal points<sup>5</sup> from the WAIDMAs concerned by the project but not the subject of a specific case study. At various stages in the study, workshops were held to enable the actors to exchange views on the subject. The comparative analysis was structured around the six themes of management transfer, each analysed by a trio (referent, contributor 1, contributor 2) to avoid working in silos, before re-mobilising them to co-construct an overall analysis and initiate the expected collective learning process.

The lessons that can be drawn at the level of ROA-SAGI come from capitalising on good practices to arrive at the conceptualisation of a hybrid model to be promoted, capable of

adapting to the specificities of each zone. Such a model would not be a reproduction of a case documented in one WAIDMA area to be applied in another, but a compendium of the lessons learned for each theme addressed in this transfer project.

### SAED

The transfer of the management of hydro-agricultural infrastructures in the Senegal river valley arose from a long process of evolving national policies in a global context of questioning the intervention of the State in the irrigation sector. The introduction of the Economic and Financial Recovery Plan (PREF) by the IMF and the World Bank in 1980 marked the real beginning of this process, based on the principle of 'less state, better state.'

In Senegal, the very idea of transferring the management of schemes to producers originated in the New Agricultural Policy (NPA) adopted in 1984, which proposed to 'create the conditions for boosting production within a framework that encourages the effective participation and extensive responsibility of rural populations at every stage of the development process, and consequently reduces the intervention of the State to a role of catalyst and driving force.' This process, which has lasted more than thirty years, has been a success in the SAED zone in view of the organisational capacities of the Hydraulic Unions (*Unions hydrauliques*), which are now a reference in the sub-region, as demonstrated by the exchange visits organised to draw inspiration from the SAED model.

While there were initial concerns about the Unions' ability to take charge of their own affairs and assume the functions that had been transferred to them, it is now evident that these IAs are capable of managing schemes of several thousand hectares, forging partnerships and defending their interests.

According to the evaluations, and in line with the transfer policy desired by the central government, this assumption of responsibility is a reality, even if there are still difficulties and challenges for some organisations in a socio-economic and

2. The notion of irrigation ecosystem includes all the actors that have an indirect role in the management and/or development of irrigated areas and thus contribute to the institutional and technical sustainability of the irrigation. The functions of these actors are not necessarily limited to the irrigation sub-sector.  
 3. As the diagram only includes the actors met during the field diagnosis missions, it does not aim to describe all of the stakeholders involved in the management of IAs and the irrigated schemes that are transferred to them.  
 4. A permanent WAIDMA employee contracted by the international service provider to fully integrate the expert mission and to share and capitalise on it within his/her own structure.  
 5. A WAIDMA member in charge of relaying information within his/her institution, who is not under a contract with the international service provider but whose mobilisation is supported by an agreement between AFEID and each of the WAIDMAs.

Presentation of the actors met during the field visits

	AMVS	ONAHA	SAED
Actors directly involved in the management of the irrigated schemes and IAs	COOPERATIVES AWUOS (IRRIGATORS' ASSOCIATIONS)  CATG (ICDE consultancy firm)	COOPERATIVES IWUAS (IRRIGATORS' ASSOCIATIONS)  THE FEDERATION OF UNIONS OF RICE PRODUCERS' COOPERATIVES (FUCOPRI)	HYDRAULIC UNIONS (IRRIGATORS' ASSOCIATION)  FÉDÉRATION DES PÉRIMÈTRES AUTOGÉRÉS (FEDERATION OF SELF-MANAGED SCHEMES)  CIRIZ CGER
Actors in the irrigation ecosystem	BAGREPÔLE CILSS	Governors DRGR INRAN	CIFA LBA Insurance ISRA Africa Rice

institutional context beset by several shocks and changes impacting the trajectories of the Unions and other key actors of the 'SAED ecosystem'

A more detailed analysis shows that the governance trajectory of certain Hydraulic Unions follows cycles that take them from good management to average or fair management. The key factors in the success of the transfer include the leadership of the president and of the members of the executive board, the quality of the infrastructure transferred (including the match between the technical choices made and the users' management capacities, their ability to pay, etc.) and an effective support system for the IAs. This 'SAED ecosystem' is impressive in terms of the quality of the actors involved and the complementarity of their skills. In particular, the IAs have privileged relationships with SAED, La Banque Agricole (LBA, [Agricultural Bank]), the Centre de Gestion et d'Economie Rurale (CGER, [Rural Management and Economics Centre]) and the Centre Interprofessionnel de Formation aux métiers de l'Agriculture (CIFA, [Interprofessional Training Centre for Agricultural Occupations]).

The diagnosis in the SAED zone made it possible to document enough dimensions of management transfer to identify points of convergence and divergence with the other WAIDMAs.

**ONAHA**

The case of ONAHA shows a two-stage transfer process: an initial transfer in the 1980s from ONAHA to cooperatives, and a second since 2016 from the cooperatives to Irrigation Water Users' Associations (French acronym used by ONAHA: AUEI, *Association d'utilisateurs de l'eau agricole*). Apart from the period and context of the transfer, the main difference is that the first transfer concerned both water management and production functions, whereas the second involves assigning the AUEIs the water management functions that had previously been devolved to the cooperatives.

The transfer to the AUEIs is recent. The few years of feedback, coupled with the small number of functional AUEIs, has limited the analysis of certain dimensions of the transfer. Nonetheless, a number of serious trends have emerged from the analysis.

Firstly, the cooperatives show a high degree of inertia, which has sometimes led to management and governance difficulties. The cooperatives in the sample, which were set up over 40 years ago, benefit from local support from the scheme managers, but the latter are finding it difficult to keep up with the organisational and technical changes in a system that has become routine.

Secondly, the producers' environment (described as an 'ecosystem' in the SAED diagnosis) is not very diversified and the number of actors is limited. All of the relations are thus structured around the ONAHA-cooperative-producer axis. Actors that appear key in other WAIDMAs, such as the agricultural bank or research, play a minor role here. The main advantage of this system is that it maintains a strong and long-standing relationship of trust, while its main drawback is that it limits opportunities for development and innovation. It should be noted, however, that the presence of ONAHA is a guarantee of sustainability in many schemes faced with recurrent catastrophic flooding. In these situations, which are beyond the capacity of the cooperatives, only the public forces that ONAHA can mobilise can provide a proportionate response.

With regard to the second wave of transfers from the cooperatives to AUEIs, the diagnosis shows that ONAHA has become aware of a number of constraints and reservations that it intends to overcome before creating AUEIs on all of the schemes. The first of these is technical: the state of the facilities, which no longer allows some cooperatives to be financially viable, must be improved before the AUEI can take over the operation and maintenance of the infrastructures. In other words, the rehabilitation of the infrastructures is a condition for the creation of an AUEI (an approach adopted by SAED and AMVS). The second constraint is organisational: in schemes managed by a single organisation, the creation of AUEIs calls into question the social balances and leaderships since there will no longer be one single president (i.e. of the cooperative), but two: one for the cooperative and one for the AUEI, as well as two offices for the management of the same hydro-agricultural development. The last is financial, since the cooperatives faced with difficulties in obtaining inputs have very often restricted their activity to the management of fees. Reallocating this important source of financial income from the cooperative to

Presentation of the actors met according to their role in supporting irrigators' associations, based on the functions identified

	AMVS	ONAHA	SAED
Structuring work	AMVS	ONAHA	SAED
Design	AMVS	ONAHA	SAED
Decision making	AMVS	ONAHA	SAED - AGRICULTURAL COUNCIL
O&M	Electromechanical engineer (hired)	ONAHA	SAED - DAM and DAGEE Maintenance fund
Admin. and fin. management	Accountant (hired)	ONAHA	CGER
Agricultural inputs	AMVS	CAIMA FUCOPRI	SAED - AGRICULTURAL COUNCIL CGER
Agricultural production	AMVS	ONAHA	FPA Insurance Agricultural council
Agricultural outlets	AMVS	RINI FUCROPI	CIRIZ
Training and R&D	CATG (ICDE consultancy firm)	INRAN	CIFA ISRA, Africa Rice

the AUEI inevitably raises the question of the future financial viability of the cooperatives.

ONAHA is therefore faced with both the challenge of creating favourable conditions for the operation of the AUEIs and that of adapting its system of support to ensure the necessary evolution of the cooperatives in a process of change and innovation. The sustainability of the cooperatives' activities will therefore depend on the capacity of ONAHA, the State's services and FUCOPRI to support their professionalisation in order to make them major actors in the value chains based on hydro-agricultural developments, that are capable of creating their own resources and thus strengthening their legitimacy in relation to the new AUEIs.

### AMVS

Numerous innovative factors for improving the transfer of management to irrigators' associations were identified during the AMVS field mission.

The management transfer was undertaken in the AMVS zone with the aim of improving the performance of irrigated systems through a policy of giving greater responsibility to producers. Although the results are not yet fully satisfactory, the AMVS experience shows definite progress compared with situations such as those of BAGREPOLE. Giving producers greater responsibility for infrastructure and water management is at the heart of the philosophy underlying this transfer. This means giving them more weight in decisions about the management of hydraulic and agronomic systems and placing them in a better position to assume their responsibilities.

The roles and responsibilities of the actors are set out in clear, comprehensive contractual documents. Specifications tailored to each type of actor are adapted, negotiated and shared. However, the monitoring and evaluation system that has

been put in place needs to be developed further to enable the continuous improvement of the shared governance system, which could take the form of a collective learning mechanism.

In terms of development standards, the success of the pumping systems was highlighted by the experts, in particular the choice of Archimedes screws with electric motors. The other WAIDMAs showed a keen interest in this technical choice. The concreting of canals is a technical choice towards which the country wishes to move. The primary and secondary canals are concreted while the tertiary canals are in the process of being concreted. This will improve the efficiency of the irrigation network and reduce O&M costs.

All the actors met emphasised the importance of the reform that led to the separation of the water service from production functions.

Maintaining democracy in the internal structures of the agricultural water users' organisations (French abbreviation: OUEA, Organisation d'utilisateurs de l'eau agricole) is a daily challenge. In general, there are two complementary ways of ensuring that these rules are observed: through monitoring and control by the WAIDMA, and by the establishment of checks and balances within the OUEAs. Reaching farmers at grassroots level through training, or more generally, information, is a challenge common to all of the WAIDMAs. This is particularly important in order to create checks and balances within the water users' associations and prevent local elites from monopolising power. The water charges appear to be fairly high, with a difference between new schemes and those that have been rehabilitated, with charges being cheaper in the new schemes. The collection rate varies considerably. While it has improved significantly in recent years (around 70% compared to 40% in the 2010s), it still fluctuates excessively depending on the quality of the crop year and the farmers' ability to sell their produce.

The support system set up is based on the creation of jobs by and for the OUEAs to run the pumping station and do the accounting. The AMVS provides support on an ad hoc basis, particularly for monitoring the crop year with the help of agricultural advisers. The agricultural development shows highly satisfactory results in terms of intensification, diversification and yields. Marketing remains problematic, and ways of securing producers' incomes in the face of fluctuating prices and the usurious methods of buyers are central to possible improvements to the system.

For the three WAIDMAs analysed in the framework of this study, the following diagram presents the institutions in charge of supporting the irrigators' associations according to the function that the latter must assume.

## RESULTS OF THE STUDY, KEY MESSAGES AND LIMITS OF THE APPROACH

The analyses resulting from the WAIDMA transfer action have enabled COSTEA to formulate a number of messages and recommendations. These are intended to contribute to increasing the economic and social development of the irrigated territories of the WAIDMAs by:

- establishing good institutional practices between the WAIDMAs and the IAs and establishing good governance practices at IA level (point 1: dynamic processes, and point 2: political will).
- strengthening the economic sustainability of the IAs and the farmers (point 3: constructive dialogue and supervision, and point 4: financial independence).
- increasing the sustainability of the infrastructures (point 5: application of texts and information) to avoid vicious circles of periodic reinvestment in the rehabilitation of schemes.

These recommendations also help to promote a number of innovations implemented by some of the WAIDMAs. This is the case, for example, with the setting up by the WAIDMAs of a 'transfer' unit to guarantee dynamic support over time for IAs and their M&E, the development of a complete ecosystem of support for IAs (management/banking/training, etc.), the widespread use of term deposits and supervision by the WAIDMAs (prior validation) of their use.

**1/ Transferring the management of part of the infrastructures to IAs is a dynamic process that involves regular questioning by all of the actors involved.** A successful transfer requires permanent but dynamic monitoring that takes into account the 'time for change' needed to ensure ownership of the transfer and the emergence of key actors in the 'ecosystem' (advisory support, inter-profession organisations, etc.). In response to strong incentives from technical and financial partners encouraging transfers in public schemes, the first stage generally aims to set up pilot experiments, then to develop a system of intensive support organised by the WAIDMAs for the new IAs (training, temporary co-management, setting up of the necessary

ecosystem). This support can then gradually slide into a role of observer/ad hoc control by the WAIDMA when the producers are capable of being autonomous and the support ecosystem for the IAs is mature. It is important to consider the changing weight of the various actors after the transfer (the leadership of producers, POs, umbrella organisations) in order to adjust the level of relations between the WAIDMA and the IAs.

**2/ There is no perfect transfer experience or model that can be applied everywhere, but rather a compendium of experiences from the various WAIDMAs to be promoted, and the need to set up an ecosystem of complementary actors.** The first key to success is to ensure that there is the political will at national and territorial level to initiate a transfer process. Once this will has been clearly expressed, it should be put into practice through the creation and adaptation of a legislative and regulatory framework appropriate to the transfer and specific to the countries concerned. Defining the status of the IAs is part of these preliminary steps, with questions relating in particular to the obligation for the farmers of the scheme to join the IA, and the question of transfer to specific, not-for-profit entities whose sole purpose is the management of water and hydro-agricultural infrastructures and which do not intervene in agricultural production issues. Although there is now a consensus among specialists on the question of specific status, it has not been dealt with in the same way across the WAIDMAs. Some still transfer the management and maintenance of hydro-agricultural infrastructures to cooperatives (Bagrépôle). Others, after an initial experience with cooperatives, are currently carrying out a new transfer to irrigators' associations (the AUEAs of ONAHA). Finally, some have directly opted for a transfer to specific IAs (the OUEAs in the case of AMVS or the Hydraulic Unions in that of SAED), although it has been observed that this has not prevented some Hydraulic Unions from using their term deposit account to purchase agricultural equipment instead of dedicating it specifically to the upkeep and maintenance of their networks as intended.

**3/ Transferring the management of part of the infrastructures developed by the WAIDMAs to IAs means sharing responsibilities, which requires objective and constructive dialogue between the WAIDMA and the IAs, but also constant supervision to avoid the kind of deviation mentioned in the previous section concerning the use of term deposits.** There is a consensus on the importance of involving irrigators from the design and works phases for both network rehabilitation and extensions. This nevertheless requires the creation/updating of texts setting up joint committees and works monitoring committees, as well as mechanisms for taking into account the observations and corrections made and proposed. The WAIDMAs' proximity to the IAs could be improved by creating temporary or permanent internal WAIDMA structures, that are light and flexible in terms of human resources, dedicated to the monitoring and evaluation of IAs. Careful attention

needs to be paid to the diversification of the IAs' activities (benefits vs. risks) and their propensity to broaden their field of competences (complementarities or risks of conflict with the main mission), sometimes with the need to adapt texts to the new context. Lastly, producers cannot be properly supervised unless they are obliged to join not only the IA, but also the support structures (ecosystem).

**4/ The sustainability of good IA management can never be taken for granted, even the most operational of them go through periods of crisis.** The financial independence of the actors and the existence of crisis exit mechanisms (insurance, disaster funds, debt relief) are necessary. Poor practices and inertia (social hierarchy, non-compliance with terms of appointment and board renewals) are crisis factors observed in all WAIDMA zones. To ensure the sustainable operation of IAs, it is necessary to: (i) improve governance, with, in particular, a renewal of one-third of the longest serving board members, the limitation of terms of office and overlapping, the selection of board members from capable producers, the adaptation of texts, the dissemination of information (keeping records and general assemblies); (ii) improve the security of IAs' financial resources by introducing financial management that respects budgetary planning and by generalising term deposits, albeit with safeguards for their use (prior validation by the WAIDMAs, etc.); (iii) create the conditions necessary for stable agricultural development by guaranteeing irrigators access to credit, the availability of inputs at strategic times in the crop cycle, protection against flooding, etc.

**5/ The upkeep and maintenance of the infrastructure transferred to the IAs are often poorly understood.** Improvements require an adequate definition of the cost of the water service and better application of the O&M notices delivered with the infrastructures transferred. In the WAIDMA region of West Africa, the tariff structures for water services are generally fairly well developed and theoretically cover the costs of infrastructure upkeep and maintenance, however, the collection procedures and the application of the tools in place to guarantee this collection could be improved. The transfer of infrastructures to the IAs is generally accompanied by the drafting of a set of texts (regulations, concession contracts, maintenance manuals, etc.) designed to provide a framework and support the IAs in their tasks and responsibilities. The WAIDMAs need to promote and support the IAs in the application of these texts and organise periodic information and reminder sessions on these elements for irrigators and their IAs.

**6/ The involvement of ROA-SAGI is now necessary to ensure that the messages are properly conveyed within the WAIDMAs and to key actors in the ecosystem.** According to the actors we met at AMVS, the study trips in Burkina Faso were very beneficial, as the producers were able to learn from their peers and exchange experiences in order to set up a collective learning process. This experience could be capitalised on by ROA-SAGI, with a view to organising

cross-visits between WAIDMAs wishing to apply the recommendations. ROA-SAGI could also advocate at the highest levels (national directorates, consular chambers, etc.) with the involvement of ROPPA to raise their awareness of the management transfer modalities.

### Limits of the approach

Despite the interesting results obtained, the implementation of this project on the basis of the methodology proposed by COSTEA nevertheless had certain limits. This was the case, for example, with the ability to agree on a common vision within the team and with the WAIDMA focal points (diversity of positions on key issues and of the WAIDMAs' own experiences). The wide disparity in the number and quality of documents collected made comparative analysis difficult at times. The size of the study, with limited mission days, study sites chosen in security-sensitive areas and a particular health context, meant that remote interviews, field visits and feedback had to be organised in a short space of time. Finally, the differences between the WAIDMAs in terms of the stage reached in the transfer process (not all of the trajectories are necessarily comparable) complicated some of the final analyses and recommendations.

## COSTEA OUTPUTS IN RELATION WITH THE STUDY

- Inception report ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Documentary inventory ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Situational overview report ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Case study diagnostic reports ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Final synthesis and recommendations ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Comparative analysis of large-scale irrigation management structures in West Africa, Morocco and France ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Comparative diagnosis of 11 WAIDMAs (AMVS, ANADER, BAGRÉPÔLE, ODRS, ON, ONAHA, OPIB, ORS, SAED, SODAGRI, SONADER) [www.comite-costea.fr/production/diagnostic-compare-de-11-societes-damenagement-et-gestion-de-lirrigation-en-afrique-de-louest-amvs-anader-bagrepole-odrs-on-onaha-opib-ors-saed-sodagri-sonader](http://www.comite-costea.fr/production/diagnostic-compare-de-11-societes-damenagement-et-gestion-de-lirrigation-en-afrique-de-louest-amvs-anader-bagrepole-odrs-on-onaha-opib-ors-saed-sodagri-sonader)
- Documentary database ([www.comite-costea.fr/base-documentaire-eau-et-agriculture](http://www.comite-costea.fr/base-documentaire-eau-et-agriculture))

## #2-2023 POLICY BRIEFS

Structuring Action: WAIDMAs (West African Irrigation Development and Management Agencies)

Project: Review and development strategy for value chains in WAIDMA areas

# The WAIDMA, a legitimate structure for facilitating dialogue within value chains

In their role as public bodies participating in agricultural development, WAIDMAs are responsible for providing the water service but also services useful to improve irrigated production on their territory. WAIDMAs are specific to West Africa and their action is essential for the development of irrigated agriculture and to achieve food security and sovereignty in their respective countries. They have several thematic areas in which they can intervene to support value chains.



## ISSUES AT STAKE AND OBJECTIVES OF THE ACTION

Providing support for agricultural value chains was traditionally one of the key missions of certain WAIDMAs in their scheme(s). Now, following the WAIDMAs withdrawal and the refocusing of their missions on water services, other local and national organisations and institutions are taking on this objective more specifically. However, the smooth running of WAIDMAs and of irrigated agricultural value chains are closely interconnected, and the WAIDMAs, both from an operational point of view in their day-to-day management and in their long-term strategic vision, need to take account of changes in agricultural production on their territory and its outlets for several reasons:

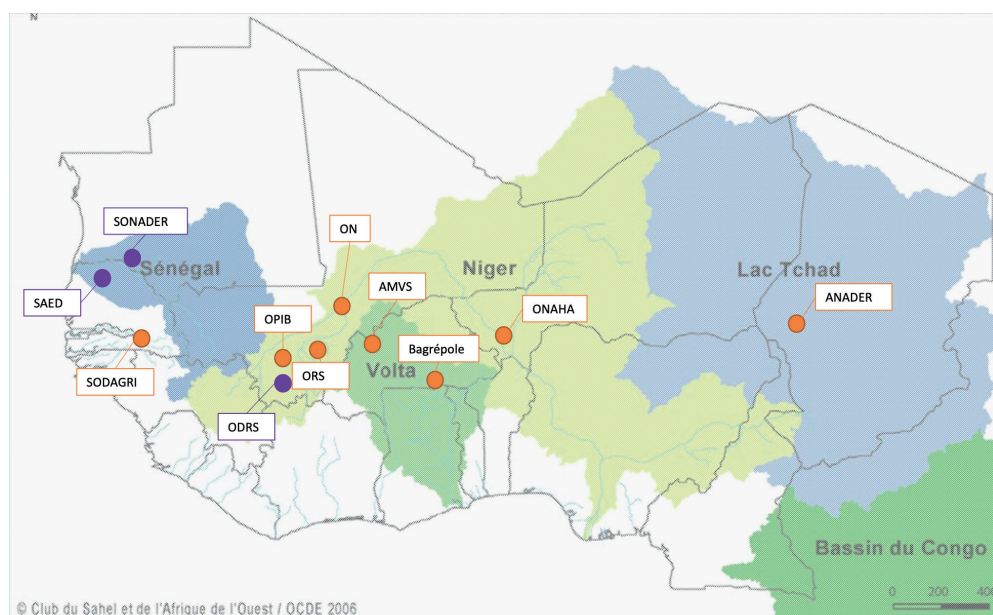
- (i) diversification (on rice-growing schemes) leads to changes in irrigators' needs in terms of calendar, flow rate, frequency of watering and security of the irrigation water service, and the WAIDMA that provides this water service needs to anticipate and adapt to this;
- (ii) the ability of farmers to finance the water service (and therefore the financial equilibrium of the WAIDMA that provides this service) is correlated first and foremost to the income they derive from their production, which is certainly influenced by the institutional environment, marked by price and import policies, but also depends on marketing, which is conditioned by the structure of the value chains.

These points are leading the WAIDMAs and their partners to rethink their role in supporting the agricultural value chains in their territory and the nature of the links they need to forge with the (new) actors in the value chains. They need to ask themselves how they can best carry out their missions and contribute to achieving the objectives set for them by public policies on food security and self-sufficiency.

## KEY MESSAGES

- 1/ By virtue of their history and purpose, the WAIDMAs can play a greater role in the service of producers, with a view to developing value chains towards more efficient agriculture (sustainability and resilience).
- 2/ The WAIDMAs have a legitimate role to play as facilitators of inter-professional dialogue within value chains and to position themselves as 'quality assurance' for production factors, a guarantee of more sustainable and resilient agriculture.
- 3/ As facilitators, the WAIDMAs should be able to intervene as fully-fledged actors in value chains by playing a cross-cutting role in the ecosystem of support for the operation of value chains and market access.
- 4/ The WAIDMAs could intervene directly in three thematic areas to support the development of value chains: developed facilities; value chain performance; market access.
- 5/ In order to support the WAIDMAs in deepening their reflection on the evolution of their missions within value chains, it is recommended that the West African Network of WAIDMAs (ROA-SAGI) formalise a specific working group within the network to follow up on this project and establish a link with the results and recommendations of the other WAIDMA projects (land tenure, transfer to irrigators and project ownership).





Map of the WAIDMAS in ROA-SAGI. In purple, the WAIDMAS that were the subject of case studies in the value chain project

The specific objective of this COSTEA study was to assess the potential added value of WAIDMAS in their area of intervention, in complement to other value chain actors. In particular, this potential added value was to be analysed in terms of support for agricultural development, adding value to production, diversification, structuring value chains, labelling, building and managing storage and/or processing infrastructure, and promoting aggregation and pooling to reduce transaction costs in marketing.

## PRESENTATION OF THE METHODOLOGY AND CONTEXTUAL ELEMENTS

The value chain project of the WAIDMA action concerned six countries and 11 WAIDMAS (Burkina Faso: AMVS and Bagrépôle; Mali: ODRS, ON, ORS and OPIB; Mauritania: SONADER; Niger: ONAHA; Senegal: SAED and SODAGRI; Chad: ANADER).

The study was carried out by a team of international experts working in collaboration with contributing experts (CEs) employed by the WAIDMAS concerned. It was based on the study of three irrigated value chains that are widespread in the sub-region: rice, tomato and onion/shallot. Despite their differences, these value chains were selected both for the important role they play in meeting food needs (particularly

rice) and for their economic weight. Furthermore, they mobilise a significant number of producers in the countries concerned by the study. Finally, these three value chains are highly dependent on water resources. They are thus emblematic of the agricultural value chains dependent on irrigation, whose development could be steered by the WAIDMAS.

The project, which spanned over 24 months, took the form of a sequenced analysis process comprising three main phases:

- **The first phase consisted of capitalising on the data available** at WAIDMA level, but also in the environments of the target value chains. This stage resulted in: (i) the creation of a database that made the information useful for the analysis easily available; (ii) the preparation of syntheses (WAIDMA/country/value chain) through which an initial documentary analysis was carried out to establish the historical, strategic and operational situation of the WAIDMAS as part of a diagnosis of the value chain at national level, accompanied by a sub-regional analysis. This documentary analysis made it possible to **establish the first working assumptions** for the preparation of in-depth field studies, in particular with regard to the WAIDMAS' current roles in value chain management.
- **In the second phase, in-depth field studies were carried out in Senegal** (SAED/tomato value chain), Mauritania (SONADER/rice value chain) and Mali (ODRS/onion/shallot value chain). This phase made it possible to combine a participatory

### Main value chains concerned by the different WAIDMAS/countries

	Burkina Faso	Mauritania	Mali	Niger	Senegal	Chad
WAIDMA/ Value chain	AMVS, BAGRÉPÔLE	SONADER	ODRS, ON, ORS, OPIB	ONAHA	SAED, SODAGRI	ANADER
RICE	X	X	X	X	X	X
ONION	X		X	X		
TOMATO			X		X	

diagnosis of the value chains involving the various actors, with an in-depth evaluation of the WAIDMAs in order to identify the key factors that influence the performance of the value chains and over which WAIDMAs have leverage (areas in which the WAIDMAs can intervene legitimately and credibly). While the first phase was carried out by the CEs within their own WAIDMA, in this second phase, the team sought to encourage the cross-involvement of the CEs in the three selected fields in order to bring out a collective approach to common problems.

- Finally, in the third and last phase, the cross-reviews of the case studies and a regional workshop enabled the WAIDMAs to **share experience** based on an analysis of the in-depth studies, and **recommendations to be prepared** on the evolution of the WAIDMAs in terms of value chain management.

Beyond the final output, the project's interest also lay in the emergence of the CEs' capacities to collectively develop and test a participatory analysis approach based on broad consultation with value chain actors in their respective countries. By involving them very early on in the process and engaging them in giving their opinion on this approach according to the context of their WAIDMA and their value chains, it was expected that they would adopt an approach that they could subsequently adjust and renew with a view to more systematic application.

The analysis of the contexts revealed that within the value chains, the WAIDMAs are subject to different constraints in carrying out their missions that are often common to all six Sahelian countries, but which take on more or less importance locally. It is therefore necessary to be specific in order to address the question of their role in the development of value chains given the great diversity of situations. Some contextual elements are presented in relation to the three thematic areas in which the WAIDMAs could intervene.

### In terms of developed schemes and facilities

In some countries, **access to land as a production factor** appears to be a major constraint for developing production through investment promotion. Either the plots allocated are too small, preventing profitable work, which is most often the case, except in Chad, or land security can be hampered by a customary system with limited flexibility or by public policies that are not inclined to favour private ownership (the case of Mauritania). Taking into account access to land for small-scale producers in local master plans appears to be a solution to be explored to better manage land and water resources (case of Senegal).

**The planning of schemes and facilities** should enable the development of competencies in relation to soil capacity and water availability, taking into account climate change and the disruption of rainfall patterns. The WAIDMAs could play a greater role in feasibility studies upstream of development projects.

New developments require the **application of recognised standards** from the outset, starting from the design stage and then during the monitoring of execution. In Mauritania and

Chad, the lack of consistency in the assignment of delegated project ownership responsibilities between different public agencies has led to a significant deterioration in the quality of the developments.

**The introduction of new technologies/techniques** for the management of developments and irrigation, weather stations or soil analysis, is likely to encourage the application of good practices (particularly in the face of climate change) and the control of irrigation costs. This is a weak point of the WAIDMAs across the six Sahelian countries, even though this promotional role is most often part of their mandate.

**The transfer of the technical management of developments** (fees, infrastructure maintenance) **to producers' organisations/cooperatives** should be accompanied by the strengthening of production planning capacities on the schemes. This transfer has been initiated in several countries, with mitigated results.

### In terms of value chain performance

It is necessary to **structure and organise value chains**, particularly with a view to providing a better production service (access to inputs, seeds, mechanisation) and the concerted planning of productive investments that improve efficiency. Although support for structuring is a mission that can be found in almost all the WAIDMAs, the situations vary greatly in this respect between countries and value chains.

**Adapting technical itineraries** to local conditions and market needs could help make value chains more competitive to the benefit of the actors in the chains. To ensure this periodic adaptation, the value chains need research input. In Senegal, the technical itineraries for tomato production are not differentiated according to zones, even though the Senegal River Valley has a high diversity of soils. In Burkina Faso, the technical itinerary applied to onions is traditional and perpetuated endogenously among producers without significant intervention from technical agencies. The WAIDMAs invest little in coordination with research to guide work in relation to local conditions. Their role in the extension of new cultivation techniques resulting from research is minor.

There is **an agro-environmental issue** linked to the intensity of cultivation carried out on the schemes and to climate change: decrease in water reserves, flooding, pest resistance to phytosanitary products, salinisation of soil, etc. However, these problems are still very little taken into consideration by value chain actors, especially producers, despite the risks to their production capacity. The WAIDMAs do not have an early warning system for diseases, pests or insects. Nor do they have a monitoring system enabling them to anticipate problems related to water services. In Mauritania, a number of solutions such as diversification are mentioned, but the majority of actors are more focused on continuing intensification under the impetus of public policies.

**The quality and reliability of the statistics** produced by the authorities, particularly those related to production, are not



sufficient, which has an impact on the ability of value chain actors to steer their investments and take management decisions. This situation is widely shared among the WAIDMAs, whose production statistics are generally rarely updated and not very consistent with each other.

### In terms of market access

**Better planning of production** according to conditions (quantities, prices, seasonality) and market requirements (quality, specifications, etc.) needs to ensure that it is competitive and meets demand. This reality applies to all value chains, but is rarely taken into account collectively at the value chain level. On Africa's agricultural markets, this failure to adapt to and understand demand too often leads to significant losses and marketing difficulties. Mauritania is a good example of planning that has produced positive results in the rice value chain.

**Better communication** (or in some cases, the beginning of communication) is necessary between the WAIDMAs and downstream economic operators. The issues of seasonality, competition with imports, and quality for conservation cannot be addressed without establishing a dialogue with these actors. This dialogue is enabled by the tomato interprofessional organisation in Senegal with strong involvement of SAED.

The WAIDMAs could also become involved in promoting dialogue to **facilitate contracting** between producers' groups and buyers (collectors, traders, processors). This is the case of SAED, for example, which is a member of the tomato committee that acts as a platform for consultation and exchange bringing together the main actors of the value chain.

**Infrastructure for improving access and post-harvest management** (storage, conservation, primary processing, etc.)

are structuring investments that have a significant impact on the functioning and competitiveness of a value chain. In Mali, for example, the OPIB notes that the lack of adequate onion storage capacity explains the significant post-harvest losses in the value chain.

Finally, the WAIDMAs could support **producers' organisations in developing advocacy in relation to decision-makers** to promote public policies that are more favourable to the development of value chains: financing of infrastructure, subsidising of inputs, loan guarantees, etc. Defending the interests of value chain actors could also include access to institutional purchasing mechanisms, as in the case of Mauritania, where the State purchases 20 to 30% of the national production of white rice annually). It then sells this rice at a subsidised price through its network of shops spread throughout the country as part of a social programme designed to fight food insecurity. In Senegal, the interprofessional organisation of the tomato value chain and SAED have enough weight to incite the State to impose local purchasing quotas on industries.

## RESULTS OF THE STUDY, KEY MESSAGES AND LIMITS OF THE APPROACH

The analyses resulting from the WAIDMA value chain action have enabled COSTEA to formulate a number of messages and recommendations. These are intended to encourage the WAIDMAs to contribute to the economic and social development of their irrigated territories and to support them through change by proposing innovations, particularly at institutional level (positioning of WAIDMAs within the value chain ecosystem).

- 1/ The role of the WAIDMAs in value chains always depends on the mandate received from their political supervisory authority. However, due to their history, the WAIDMAs have the legitimacy to intervene more **in the service of producers** in the perspective of value chain development. Their initial aim was to ensure that the countries concerned were self-sufficient in food, and the primary function of these schemes was family rice-growing. The WAIDMAs originally performed a number of functions that went beyond the construction of irrigation works, their maintenance and water management, and could also cover agricultural advisory services, land management, support for the development of value chains and the supply of inputs. In the 1990s, the functions of these structures were refocused on water management and development, with the establishment of more or less formalised contractual relations with users and the payment of fees to cover all or part of the service. At the same time, other structures - public, private or mixed - developed to provide advisory and support services. The WAIDMAs could, however, support and strengthen the capacity of producers to understand and adapt to market demand, identify buyers and negotiate contractual terms. They would also have a role to play in extending new cultivation practices in conjunction with research.
  - (i) **for the management of developed schemes and irrigation;** the transfer of management to producers' organisations (support and capacity building);
  - (ii) **In terms of value chain performance**, through their role in the **structuring and organisation of value chains** (support for making actors more responsible and role as facilitator); through the information that they can provide on adapting **technical itineraries** to local conditions and market needs (coordination with research; consultation framework, extension); at the level of taking account of **agro-environmental problems** (monitoring and alert systems); by working on the quality and reliability of the data and statistics produced in their zone of intervention (collection and processing of production data) which are very often lacking;
  - (iii) **In terms of market access**, through their role in **better production planning** in line with the conditions; **better communication** between the WAIDMAs and downstream economic operators; consultation to **facilitate contractualisation** between producer groups and buyers; setting up **infrastructures to improve access and for post-harvest management; support for POs to develop advocacy** in relation to decision-makers (promoting public policies that are more favourable to the development of value chains).
- 2/ The objective at the level of the value chains is to **increase the quantity and quality of production** to better meet market requirements and ensure an enhanced value of irrigated production. This intensification of production **needs to be reasoned in the framework of more sustainable and resilient farming** and to be supported by a **better structuring of value chains by encouraging dialogue between actors: the intervention of the WAIDMAs could structure the development of value chains around these two main themes.**
- 3/ Whatever new roles the WAIDMAs may be attributed to improve their services to value chains (in particular that of **facilitating dialogue between actors**), **these latter need them to fully invest in facilitating dialogue between actors, as part of their real integration in value chains, by becoming fully-fledged actors situated transversally in the ecosystem** of support for the operation of the value chain. It is not the WAIDMAs' role to build inter-professional organisations, but they can lead a process, facilitate relations between the different levels of a value chain and provide technical support.
- 4/ Historically, the irrigation development and management agencies have refocused their role on water services. However, while retaining this specificity, the WAIDMAs could intervene in three thematic areas to support the structuring of value chains:
  - (i) **At the level of developments** through their role in **irrigated land management** (production factor); **the planning** of developments and **the application of recognised standards** guaranteeing the good design of the structures (feasibility studies and project ownership role); **the introduction of new technologies/techniques** for the management of developed schemes and irrigation;
  - (ii) **Developing concerted advocacy** in relation to regional governments, for example, on harmonising subsidies and market protection or financing and insurance solutions adapted to the national contexts;
  - (iii) **Strengthening monitoring and evaluation systems and data reliability** (at the irrigated scheme or value chain level).
- 5/ To support the WAIDMAs in deepening their reflection on the evolution of their missions within value chains, it is recommended that ROA-SAGI **formalise a specific working group** within the network to take over from this project based on the case studies. This working group was initially planned in the project but was not formalised. However, the exchanges between the CEs and members of the Network of Farmers Organizations and Agricultural Producers of West Africa (ROPPA) in the final workshop showed the interest of such a group. The objective would be to maintain the group dynamic through discussions on the role of the WAIDMAs and by sharing experience on technical solutions to the constraints encountered (developed schemes, technical itineraries, etc.). In particular, ROA-SAGI could support the WAIDMAs that were not the subject of a case study during this project by helping them to find the budget necessary to carry out such a study and by providing technical assistance for its organisation: documentary review (use of the database and enrichment), field visits and participatory diagnosis, involvement of value chain actors through a value chain working group, etc. Subsequently, ROA-SAGI could support the national WAIDMAs by investing in the following themes at regional level:
  - (i) Pooling of research and development of extension syllabuses, for example on pest management;
  - (ii) Developing concerted advocacy in relation to regional governments, for example, on harmonising subsidies and market protection or financing and insurance solutions adapted to the national contexts;
  - (iii) Strengthening monitoring and evaluation systems and data reliability (at the irrigated scheme or value chain level).

## Limits of the approach

When it comes to taking stock of this project, it should be pointed out that the study process nevertheless had some limits.

With regard to the final output of the study, it is necessary to indicate that the variety of WAIDMA situations did not allow sufficient progress to produce finalised proposals for services that they could possibly be assigned, or that they could strengthen where they already existed, in order to contribute to the development of agricultural value chains. Under these conditions, the recommendations took the form of identifying areas of work to explore further.

With regard to the consultation process, the format of the initially planned missions limited the team's ability to widely mobilise the various actors in the value chains. The consultation was thus reduced to a number of interviews and workshops in the context of the in-depth analysis. No real replicable consultation process, which would have allowed the CEs to maintain regular exchanges with the stakeholders, emerged. At the end of the project, it is therefore not possible to claim to have 'debated the relative positioning of the various actors in the construction of successful value chains' as initially requested in Terms of Reference of the action.

With regard to the method, the constraints resulting from the CEs' capacity of commitment and mobilisation in a project that was mainly carried out remotely and which suffered delays in connection with COVID, should be noted. Given their responsibilities within their WAIDMA, the CEs sometimes lacked availability, which had an impact on the quality of their analyses and on their contributions to the final output. However, it is important to emphasise the value of the collective and cross-cutting approach that enabled the CEs to look at the situations of neighbouring WAIDMAs, while at the same time questioning their own cases.

## COSTEA OUTPUTS IN RELATION WITH THE STUDY

- Inception report ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Country syntheses ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Analysis and synthesis of the participatory diagnosis by case study ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Final synthesis with recommendations ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Comparative analysis of large-scale irrigation management structures in West Africa, Morocco and France ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Comparative diagnosis of 11 WAIDMAs (AMVS, ANADER, BAGRÉPÔLE, ODRS, ON, ONAHA, OPIB, ORS, SAED, SODAGRI, SONADER) [www.comite-costea.fr/production/diagnostic-compare-de-11-societes-damenagement-et-de-gestion-de-lirrigation-en-afrique-de-louest-amvs-anader-bagrepole-odrs-on-onaha-opib-ors-saed-sodagri-sonader](http://www.comite-costea.fr/production/diagnostic-compare-de-11-societes-damenagement-et-de-gestion-de-lirrigation-en-afrique-de-louest-amvs-anader-bagrepole-odrs-on-onaha-opib-ors-saed-sodagri-sonader)
- Documentary database ([www.comite-costea.fr/base-documentaire-eau-et-agriculture](http://www.comite-costea.fr/base-documentaire-eau-et-agriculture))

## #3- 2023 POLICY BRIEFS

Structuring Action: **WAIDMAs** (West African Irrigation Development and Management Agencies)

Project: **Irrigation and land tenure management - rules and tools adapted to large public collective schemes in WAIDMA areas**

# Secure land rights and concerted contractual relations for the peaceful and sustainable development of hydro-agricultural schemes in West Africa

Due to its sensitivity and the reforms or attempted reforms to which it is subject, land tenure is a major concern in the West African countries where COSTEA operates. In the irrigation context, for West African Irrigation Development and Management Agencies (WAIDMAs) and farmers, this general concern results in problems related to recognising a plurality of legal systems and securing land tenure, improving performance, and the sustainability of large public collective hydro-agricultural developments. These considerations, which are common to all of the WAIDMAs, are reflected differently depending on the situations in the different countries and developed areas. This explains the need for comparative analysis and the strong interest of COSTEA and the West African Network of WAIDMAs (ROA-SAGI) in this project.



### KEY MESSAGES

Securing land for farmers and irrigated schemes is critical for the peaceful development of irrigation in West Africa, where customary law and modern law still coexist in several countries. The management of irrigated land in large collective public schemes in WAIDMA areas is based on rules (laws, decrees, orders, etc.), which are in principle backed up by tools implemented by the WAIDMAs or external operators for the management of hydro-agricultural schemes and irrigated land. COSTEA has shown that a dissociation between 'rules' and 'tools' is not appropriate in the WAIDMA zone due to the close links between these two concepts, which do not allow them to be clearly distinguished. A classification of these rules and tools into 'families of instruments,' according to

their purpose and objectives, enables a better appreciation of the limits and opportunities that the WAIDMAs' mandates allow in terms of irrigated land management. A comparative analysis of the WAIDMAs based on their existing management methods has made it possible to formulate generic recommendations that can be applied in practice.

In order to guarantee secure land for farmers and hydro-agricultural developments by the State or its representatives, the work carried out by COSTEA highlights the following five key messages:

- 1/ Diversify the methods of securing land and set up a monitoring system;
- 2/ Promote the effective participation of farmers in the management of irrigated land;
- 3/ Develop a participatory, clear and operational contractual approach between farmers and WAIDMAs for the development of schemes;
- 4/ Integrate the development of schemes and the management of irrigated land into a territorial approach;
- 5/ Make ROA-SAGI a tool for implementing the recommendations and stimulating a permanent benchmark on land tenure practices in WAIDMA areas.

## ISSUES AT STAKE AND OBJECTIVES OF THE ACTION

The central issue in irrigation development policies is the sustainable use of land and water resources and their optimal allocation in the light of the development objectives set and local socio-economic realities. Hydro-agricultural developments, and irrigated agriculture more generally, greatly increase the value of land and bring about major and irreversible changes in practices of land and water access and use. There are major issues involved in recognising the plurality of legal systems, securing land tenure within developed areas and optimising the terms and conditions of development, particularly of large and medium-sized public schemes that have been built at great expense.

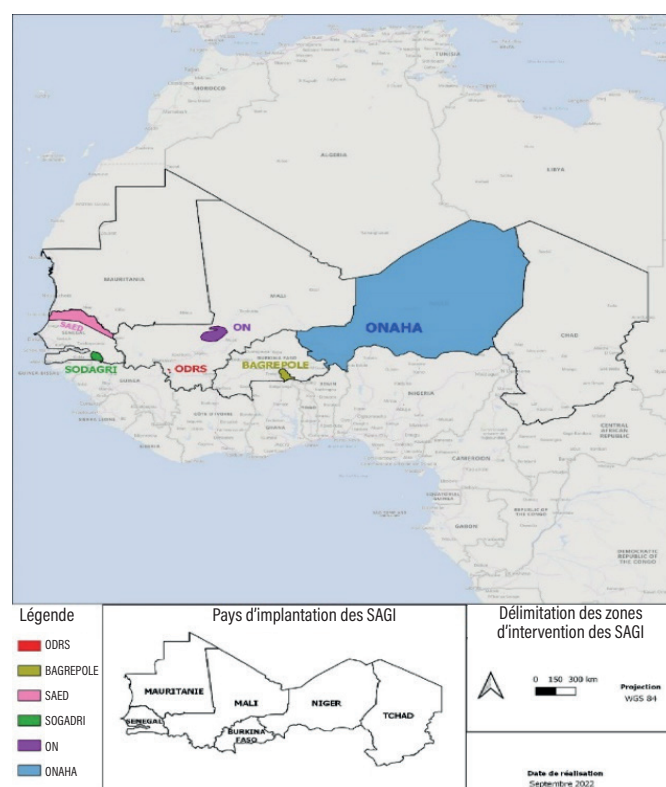
However, depending on the country, there are diverse situations, resulting on the one hand from national land policies and the WAIDMA's responsibilities in land matters, and on the other, from the various methods of managing land, water and the governance of irrigated schemes, based on 'families of instruments' that are formalised and applied to greater or lesser extents. Thus, beyond the adaptation of these families to their context of application, which varies from one country to the next, and even from one developed scheme to another within the same country, the question of their relevance, ownership and adaptability to meet the objectives of the various stakeholders involved in the development of schemes remains crucial.

Taking into account the national legal frameworks, the WAIDMAs' prerogatives in terms of land tenure and their relations with other actors in land tenure, the general objective of this project was to advance land tenure regulation and security within irrigated schemes with the aim of improving their performance and ensuring the sustainability of the developments. Its specific objectives were to: i) draw up an inventory and analysis of land management instruments, establish a consolidated documentary database, define land management within the WAIDMAs, and identify the most noteworthy land management instruments; ii) analyse the theoretical and operational functioning of these instruments through field missions and draw up analysis grids, and iii) carry out a comparative analysis of the instruments between WAIDMAs, compare the results, and draw up recommendations to improve land management in irrigated schemes.

## PRESENTATION OF THE METHODOLOGY AND SITUATIONAL OVERVIEW

The project on the management of irrigated land in large public collective schemes in WAIDMA zones in West Africa began on 1 September 2020 and lasted 18 months. It covered six WAIDMAs (Map 1): Bagrèpôle in Burkina Faso, the ON (Office du Niger) and ODRS (Office de Développement Rural de Sélingué, Rural Development Office of Sélingué) in Mali, ONAHA (Office

Location of the WAIDMAs covered by the study



National des Aménagements Hydro-Agricoles, National Office for Hydro-Agricultural Developments) in Niger, SAE (Société d'Aménagement et d'Exploitation des terres du Delta et des vallées du Sénégal et de la Falémé, National Agency for the Development and Use of the Senegal River Delta and of the Senegal River and Falémé Valleys) and SODAGRI (Société de Développement Agricole et Industriel, Agricultural and Industrial Development Agency of Senegal) in Senegal. The project was led by three international experts in charge of facilitation, coordination and consolidation, and six contributing experts<sup>1</sup> (CEs), one from each WAIDMA involved, with that of Bagrèpôle acting as co-leader of the project.

The project was carried out as follows:

- documentary collection at the level of the six WAIDMAs, constitution of a database and inventory of the instruments (tools and rules) used in land management, development of a grid for their analysis, and three field missions by the CEs (Bagrèpôle, ONAHA, SODAGRI) to gather the stakeholders' views on the real (and not theoretical) implementation of the instruments;
- analysis of the national legal contexts for land governance and the WAIDMAs' missions in terms of land management and security, selection of the most noteworthy land management instruments with regard to the project's objectives and their classification into relevant families;

1. Contributing expert: a permanent WAIDMA employee contracted by the international service provider to fully integrate the expert assignment, and to share and capitalise on it within his or her organisation.

- analysis of the similarities and differences between the most noteworthy land management instruments and identification of experiences that could be replicated in other contexts, organisation of a regional workshop<sup>2</sup> to summarise the results and draw up the study's conclusions and recommendations.

### Rules and tools: factors in understanding the WAIDMA zone

Rules belong to the legal field. They differ in nature and force, with laws on the one hand, and regulations (decrees and orders) on the other, which specify the laws so that they can be implemented in practice. While rules are legal acts, tools are the means of translating rules into practical reality on the ground. To be fully effective, the WAIDMAs' tools for managing irrigated land need to be based on legal foundations, otherwise there is a risk of insecurity. Furthermore, in WAIDMA areas, land management instruments go beyond 'irrigated land' strictly speaking, and address issues such as land development and the management of hydro-agricultural infrastructures. Due to their interdependence in the field, rules and tools are grouped together in this study under the generic term 'instrument'.

### Determinants of land tenure security and disparities in instruments for land tenure security and the contractualisation of the development of hydro-agricultural infrastructures in WAIDMA areas

National land legislation and the WAIDMAs' statutes and missions determine the nature of the instruments used to manage and secure land tenure in hydro-agricultural developments in WAIDMA zones, and are the basis for their differences and similarities. In terms of land legislation, the countries studied (Burkina Faso, Mali, Niger and Senegal) share a heritage from French colonisation, based on land registration and organised around the principle of state ownership. Nevertheless, this common heritage in no way erases the existence of specific features in national land legislation, with each country having progressively made more or less profound formal and substantive adjustments, in particular by legitimising customary rights (Niger, Burkina Faso) or not (Mali, Senegal). These adjustments have an impact on the instruments used to secure land for development projects. With the exception of Senegal (national domain), where land management is entrusted to local authorities, in all of the other countries, hydro-agricultural developments are incorporated into the domain of the State.

The different legal statuses of the WAIDMAs (EPIC, EPA, SEM, SN<sup>3</sup>) have an impact on their relations with the State and on their degree of autonomy. The powers entrusted to them in the area of land, in conjunction with the national legislation, influence their ability to intervene to secure land tenure.

### Significant disparities between the WAIDMAs

The more or less extensive powers the WAIDMAs are granted by governments determine the leeway they have in managing land and contractualising their relations with farmers for the development and maintenance of schemes. The greater their supervisory responsibilities (Office du Niger, Bagrèpôle), the more precise and demanding the contractual commitments of the farmers. The six WAIDMAs thus have a variety of instruments for managing and securing land subject to hydro-agricultural development on the one hand, and for the farming of plots, maintenance of structures and networks, and payments on the other (registration, land titles, leases, assignment, contracts, charters, specifications, joint committees, commissions, etc.). The operational procedures for these sometimes overlap within a WAIDMA. The study shows that there is a wide disparity between all of the WAIDMAs in terms of the consideration given to land issues and the degree of control exercised over them. The levels of implementation of the instruments vary, and therefore so does the control over land allocation, land development, the organisation of management committees, etc.

In terms of the diversity and application of land management instruments, a comparison of the WAIDMAs shows Bagrèpôle, ONAHA, ON and SAED on the one hand, even if the approaches chosen and the targets of each instrument differ, and ODRS and SODAGRI on the other. Bagrèpôle has focused its land tenure activities on making farmers more secure, by registering land and issuing occupancy or ownership titles. The ON, which implements its strong prerogatives in land management through various instruments, prioritises the structuring and efficiency of scheme management and land allocation committees by involving farmers through joint committees. ONAHA is seeking to control the land issue by starting to register hydro-agricultural developments on the one hand, and setting up joint committees to allocate plots on the other. However, on a national scale, the approaches vary depending on the place, but also on external operators (Technical and Financial Partners) which influence the land management to be applied specifically to the projects they finance, and which would be worth harmonising. In Senegal, where land management is entrusted to local authorities, SAED has focused its support in the land sector on large-scale knowledge tools, making it possible to control the distribution of plots and thus avoid conflicts of use. ODRS still has little control over land management, undoubtedly because its main mission is to preserve water resources and develop the Sankarani/Wassoulou-Ballé catchment area, whereby it helps joint committees in terms of their organisation and in taking responsibility for water and land management. SODAGRI is seeking to draw largely on the instruments applied by SAED, but is encountering difficulties in terms of the communes' understanding of these tools and customary law, which is still prevalent.

Of the instruments implemented in the six WAIDMAs, 20 were selected and grouped into four families: i) securing land tenure for schemes and farmers; ii) procedures for the allocation (or withdrawal) of developed land; iii) contractualisation between WAIDMA and farmer; and iv) spatial development/planned

2. This workshop took place from 23 to 25 May 2022 in Saly, Senegal, and was attended by all of the CEs, high-level WAIDMA officials, COSTEA partners and members of COSTEA's Permanent Technical Secretariat.

3. EPIC: établissement public à caractère industriel et commercial (public industrial and commercial entity); EPEA: établissement public à caractère administratif (public administrative entity); SEM: Société d'Économie Mixte (semi-public company); SN: société nationale (national agency), etc.



land management. The study provides a detailed descriptive analysis of these families, their similarities and differences, and their strengths and weaknesses. The lessons learned from these analyses and the study's recommendations were discussed and consolidated at a regional workshop attended by the experts coordinating the study, the CEs from the WAIDMAs studied, and representatives of the other WAIDMAs.

This showed that there is a **strong issue of security of tenure for hydro-agricultural developments and farmers for the State or its representatives**. The heavy investments made in large and medium-sized public schemes are based on land that needs to be made secure by the State so that solid land rights can be granted to farmers. As the legal adage '*nemo plus juris* [...]'<sup>4</sup> says, 'no one can transfer to another person more rights than they have themselves.' In the different countries, the developments can be protected and the investments can be guaranteed by implementing the land tenure security measures provided for by the relevant texts. Many national texts provide for the land registration of developed schemes, depending on the case, in the name of the State or a local authority. However, experience (Bagrépôle, ONAHA and ODRS) shows that the high implementation costs remain a real challenge. The lack of land tenure security for schemes developed by the State also makes it difficult to secure land tenure for farmers, who may be placed in a situation of great land vulnerability. Yet guaranteeing their land security is an essential requirement if we are to achieve the WAIDMAs' objectives of boosting the economy through sustainable irrigated agriculture.

## RESULTS OF THE STUDY, KEY MESSAGES AND LIMITS OF THE APPROACH

Implementing the recommendations arising from this COSTEA study will help to meet two of COSTEA's four challenges, namely: i) the economic and social development of territories and ii) technical, social and institutional innovation. The table below details the study's recommendations and the actions recommended to achieve them. Recommendations 1, 3 and 8 relate to the first challenge, and the others to the second.

### RECOMMENDATION

**1. Secure the land tenure of developed schemes in the name of the State or local authority.**

### ACTIONS

- Require the registration of developed schemes by the competent services.
- Ensure the fair and prior compensation of former occupants.
- Include the costs of securing the land tenure of the schemes in the development budget.

### RECOMMENDATION

**2. Secure the land tenure of developed plots for the benefit of the farmers.**

### ACTIONS

- Formalise the types of rights (use or ownership) adapted to the context and local practices.
- Deliver an official individual deed to each farmer certifying that his/her installation is in order.
- Ensure the computerisation of land management procedures.
- Increase access to texts on land tenure security, including in national languages.

### RECOMMENDATION :

**3. Take account of good local land tenure practices in the procedures for allocating land.**

### ACTIONS :

- Develop criteria for the allocation of land to farmers in a concerted manner.
- Carry out information and awareness-raising campaigns on allocation criteria.

### RECOMMENDATION :

**4. Ensure that the allocation committees are effective, efficient and representative.**

### ACTIONS :

- Define criteria to ensure the representativeness of actors within the committees.
- Strengthen the capacities of committee members with reference to their missions and good governance principles.
- Ensure the coordination and funding of the committees so that they function properly.

### RECOMMENDATION :

**5. Design commitment contracts between the WAIDMAs and users.**

### ACTIONS :

- Ensure an inclusive and participatory drafting process.
- Specify the field of application of the contract (land development, infrastructure maintenance, water management).
- Simplify the content of the contracts by clearly and concisely formulating the commitments.
- Translate the contracts into local languages.
- Standardise the contractual terms and conditions within each WAIDMA.

4. 'Nemo plus juris ad alium transferre potest quam ipse habet'

**RECOMMENDATION :**

**6. Ensure that the contracts are operational.**

**ACTIONS :**

- Set up a joint committee to monitor the implementation of the contracts at WAIDMA level.
- Provide information to the beneficiaries and make the contracts and their annexes available to them.
- Apply the contractual clauses in the management of relations between WAIDMAs and users.

**RECOMMENDATION :**

**7. Effectively apply the sanctions provided for in the contractual documents.**

**ACTIONS :**

- Propose clear, realistic and scaled sanctions according to the infringement of contractual commitments by the farmers or the WAIDMAs.
- Make the joint committee responsible in the application of sanctions.

**RECOMMENDATION :**

**8. Involve the WAIDMAs in territorial planning and development policies to foster the sustainable management of natural resources.**

**ACTIONS :**

- Implement consultation between the WAIDMAs and local actors to ensure that territorial development actions are consistent.
- Ensure that the WAIDMAs contribute to the arrangements for the implementation of territorial planning documents in their areas of intervention.

**RECOMMENDATION :**

**9. Set up a Land Information System (LIS) at WAIDMA level**

**ACTIONS :**

- Institutionalise a service dedicated to the management of the LIS.
- Use the LIS as a tool for territorial knowledge and decision-making.
- Decentralise the LIS at the level of territorial units.
- Make LIS data available to planning bodies and users.

**RECOMMENDATION :**

**10. Make the WAIDMAs and ROA-SAGI responsible in the new participatory management methods.**

**ACTIONS :**

- Give impetus to the ROA-SAGI exchange platform to share knowledge and know-how between partner organisations (ROPPA, etc.).
- Make each WAIDMA responsible for taking forward recommendations related to a family of instruments.
- Broaden the WAIDMAs' missions to include consideration of land tenure security in other developed areas (valleys, lowlands, etc.).

**1/ Diversify the methods of securing land tenure and set up a monitoring system.** In a context of multiple legal systems, where securing land tenure on irrigated schemes is a particularly socially sensitive process due to the persistence of customary land tenure practices, the question of the confrontation between legitimacy and legality arises. An approach to diversifying the methods of securing land tenure should be envisaged through the issuance, depending on the national context, of ownership titles, ordinary leases, long-term leases, operating contracts, etc. The desire to have a tool for controlling land information is observed everywhere, but rarely implemented, with the exception of SAED and, to a lesser extent, ONAHA. All of the WAIDMAs recognise that a land information system is an essential tool for good land management. Its institutionalisation in a dedicated service within the WAIDMA, its sustainability, and the updating and use of data for decision-making purposes in land management are challenges to be met within each WAIDMA.

**2/ Promote the effective participation of farmers in the management of irrigated land.** The participation of farmers promoted by the WAIDMAs in key areas, such as the allocation or withdrawal of land, the agricultural management of plots and water management methods, is an important step forward that needs to be consolidated by ensuring the capacity building, effectiveness, representativeness and resources of the committees set up for this purpose. With the exception of Senegal, the State is the major actor in land management on developed schemes. However, this predominance of the State is attenuated by the WAIDMAs' implementation of the principle of inclusive farmer participation. Joint committees have been set up for the allocation/withdrawal of plots (ONAHA, ON, ODRS), the agricultural management of plots (ONAHA) and the management of maintenance funds (ON, ODRS). So that they can fully play their role, it is important to strengthen the still weak capacities of the farmers' representatives on the committees, as well as their understanding of their tasks and responsibilities. Efforts are also needed in terms of the coordination and mobilisation of the actors, as well as to foster the good governance of the committees, with efficient consultation of the operators who have mandated them and accountability for their activities, as well as a limitation of the terms of office of their representatives.

**3/ Develop a participatory, clear and operational contractual approach between farmers and WAIDMAs for the development of schemes.** Contracts defining the objectives and conditions of use of plots of land are the cornerstone of WAIDMA/user contractual relations for the development of schemes, and particular attention should be given to the way in which they are drawn up and their content. WAIDMA contracts are extremely diverse in terms of format, scope and implementation procedures. Many of them are considered complex and restrictive in terms of content. If they are to be effective and appropriate for all actors, they should be drawn up with the involvement of all stakeholders, and the commitments should be clearly and concisely formulated,

In order to respond to the issue of security of tenure for irrigated land in West Africa, the COSTEA study, in addition to the recommendations presented above, also made it possible to formulate a number of key messages:

specifying their areas of application and providing each party concerned with a copy of the contract. Furthermore, it has been observed that the 'project logic' often imposes different contractual terms on the WAIDMAs, depending on the focus of the Technical and Financial Partners. This diversity of practices is detrimental to overall consistency and to the institutionalisation of a global, coherent contractual modality on the scale of the hydro-agricultural development. Nevertheless, this desirable homogeneity should also leave users a certain leeway so as not to obstruct the dynamics of evolution and innovation. However, the most satisfactory contracts will only have an effect if they are rigorously applied. Yet the failure to apply contractual penalties to users is a fairly general observation, whether for non-payment of water charges, for example, or for insufficient development of plots of land, even though these shortcomings are very frequent. On the other hand, these shortcomings are also partly linked to the fact that users do not always have access to the secure water supply to which they are entitled under these same contracts, due to management difficulties at the WAIDMA level. An important key to success is for the WAIDMAs to work with the stakeholders to ensure that the sanctions defined during the participatory and inclusive drafting of contracts are realistic and scaled according to the extent to which contractual commitments are breached, so that their application does not give rise to rejection. The WAIDMAs also need to honour their side of the contract, first and foremost a secure water supply. As failure by a farmer or a WAIDMA to honour its contractual commitments would be likely to have a collective impact, it would seem desirable for sanctions to be implemented by a joint development monitoring committee.

**4/ Extend the WAIDMAs' missions to integrate the development of schemes and the management of irrigated land into a territorial approach.** In view of the issues at stake in territorial development, it is necessary for the WAIDMAs, over and above their missions of promoting irrigation, to be equipped with institutional skills that strongly involve them in local territorial development policies. Hydro-agricultural investments can, in fact, create islands of development within territories, which create a pull effect on the populations of non-developed areas, thus creating disparities in territorial development. The WAIDMAs' involvement in territories varies in geometrical terms, depending on national policies on the one hand, and their mandates on the other. The WAIDMAs usually implement a sector-based and vertical approach focused specifically on hydro-agricultural developments, which makes it difficult for them to grasp the many issues involved in agricultural water development (in the broad sense of the term, including livestock farming, forestry, etc.) and to link their actions to other sectoral public policies and development initiatives of local authorities and/or other State structures. To overcome these obstacles, institutionalised consultation between the WAIDMAs and local actors would enable hydro-agricultural investments to be better integrated into a territorial project in which agricultural water is linked to other local development

priorities to ensure the synergy and consistency of actions for the benefit of the sustainable development of the territory, with the support of operational tools such as land use and development plans.

**5/ Make ROA-SAGI a tool for implementing the recommendations and stimulating a permanent benchmark on land tenure practices in WAIDMA areas.** It is important for ROA-SAGI to be strongly involved in implementing the recommendations after they have been shared and an in-depth analysis of their relevance and possible adaptation to the legal, institutional and operational contexts of each WAIDMA has been carried out. For each family of instruments, at least one WAIDMA identifies itself as a leader, because it is ahead in its implementation, and could act as a driving force for reflection on their implementation in other contexts and thus enable other WAIDMAs to avoid the same difficulties. ROA-SAGI should also act as a catalyst to encourage a dynamic improvement in the WAIDMAs' land responsibilities within their schemes, thereby guaranteeing the link between land allocation, development, contractualisation and land use planning. A genuine revitalisation of the ROA-WAIDMA exchange platform should encourage the sharing of knowledge and know-how between the WAIDMAs, but also between the WAIDMAs and their partner organisations (producers' organisations, professional organisations at local, national and sub-regional level). Structuring ROA-SAGI within a more formal framework with clear statutes would strengthen it in its mission of coordination, capitalisation and benchmarking.

The study's findings and proposed recommendations should be widely communicated, both within the WAIDMAs themselves and to potential beneficiaries, thus enabling their opinions to be collected, or even to the competent national authorities (supervisory ministries, for example) as spokespersons in favour of the WAIDMAs.

To increase the added value of its support to WAIDMAs, it would be beneficial for COSTEA to encourage the process of strengthening land management proposed by this study. Indeed, it would be possible, through the extension of already existing instruments that are mastered by certain WAIDMAs, to strengthen land management on irrigated schemes and thus to integrate this component in a structured and homogenous manner into all future developments. This could help avoid 'projects within projects,' which can be a direct obstacle to implementation and development in the long term.

### Limits of the approach

Particular attention was paid to analysing the relevance of the distinction between rules and tools as a reference basis for this project. To this end, an analysis of legal standards was carried out, covering rules of law, customs and usage. This analysis was then transposed to the specific contexts of the WAIDMAs, **leading to the conclusion that this complex distinction remains essentially theoretical and potentially debatable.** Furthermore, the analysis revealed that the tools most often have a legal basis



(a rule), and that an analysis that separated rules and tools sharing the same purpose would be meaningless. This is why a classification by family of instruments (securing irrigated land tenure/ definition of land allocation and withdrawal procedures / contractualisation between WAIDMAs and farmers / land management and planning in the territories) has been favoured in this project.

## COSTEA OUTPUTS IN RELATION WITH THE STUDY

- Inception report ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
  - Documentary inventory of tools and rules ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
  - Diagnostic reports on tools and rules ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
  - Comparative analysis of tools and rules ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
  - Final synthesis and recommendations ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
  - Comparative analysis of large-scale irrigation management structures in West Africa, Morocco and France ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Comparative diagnosis of 11 West African Irrigation Development and Management Agencies (AMVS, ANADER, BAGRÉPÔLE, ODRS, ON, ONAHA, OPIB, ORS, SAED, SODAGRI, SONADER) ([www.comite-costea.fr/production/diagnostic-compare-de-11-societes-damenagement-et-de-gestion-de-lirrigation-en-afrique-de-louest-amvs-anader-bagrepole-odrs-on-onaha-opib-ors-saed-sodagri-sonader](http://www.comite-costea.fr/production/diagnostic-compare-de-11-societes-damenagement-et-de-gestion-de-lirrigation-en-afrique-de-louest-amvs-anader-bagrepole-odrs-on-onaha-opib-ors-saed-sodagri-sonader))
  - Documentary database ([www.comite-costea.fr/base-documentaire-eau-et-agriculture](http://www.comite-costea.fr/base-documentaire-eau-et-agriculture))

## #4- 2023 POLICY BRIEFS

Structuring Action: **WAIDMAs** (West African Irrigation Development and Management Agencies)

Project: Project ownership and engineering of hydro-agricultural infrastructures

# How can the competences of the West African Irrigation Development and Management Agencies (WAIDMAs) be strengthened so that they have the methods and tools they need to fully carry out their role as project owners?

The purpose of WAIDMAs is primarily to mobilise water for the development of rural areas to achieve self-sufficiency in rice. To this end, these organisations have played a central role in the development of water mobilisation and distribution infrastructures as project owners delegated by the State and sometimes as project managers or even construction companies. By strengthening their project ownership skills, they should be able to become major actors in the Sahel Irrigation Initiative and thus make a full contribution to the development objectives for irrigation in the Sahel as set out in the Dakar Declaration of October 2013.



### KEY MESSAGES

1/ Analysing the profession of project ownership is complex due to the diversity of the subjects it covers and the variety of possible organisations to carry it out. Efforts are needed to clarify and communicate on the division of responsibilities among WAIDMA services and staff;

2/ Dissatisfaction among WAIDMA personnel has been observed with regard to developments that have been completed or are underway in terms of design, command of the works, and the sharing of skills, responsibilities and technical, administrative, legal and financial experience within the WAIDMAs;

3/ In order for WAIDMAs to exercise their project ownership role effectively, there needs to be: better consultation within and outwith the WAIDMAs in order to design projects according to the needs of the stakeholders; better selection and monitoring of companies, and; effective mobilisation of funds (funding agencies, the State, banks) to ensure that projects run smoothly;

4/ A WAIDMA's degree of autonomy is a factor that influences the diligence and quality with which it carries out its project ownership missions;

5/ Progress could be made by introducing specific tools to assess the WAIDMAs' project ownership performance over and above their indirect performance indicators. Evaluation tools such as the Irrigation of the Future (IoF) tool developed by the World Bank should also be tested at WAIDMA level so that they can adopt it;

6/ With their West African Network (ROA-SAGI), the WAIDMAs should take ownership of all the elements of the action plan resulting from this COSTEA action and continue the project ownership work that they carry out.

## ISSUES AT STAKE AND OBJECTIVES OF THE ACTION

This project follows on from a pre-identification in 2018 by the WAIDMAs of their needs as project owners, with a refocus on the technical dimensions of performing project ownership. The restructuring of the WAIDMAs, which has sometimes been carried out as a 'forced march' under structural adjustment policies, has deprived them of a large part, if not for some of them all, of their competences and resources, including the competences that help them to perform their role of ownership of projects and programmes in their territories. These competences include engineering skills, resulting in an inability to plan, study and carry out their missions as defined in their public mandates. The WAIDMAs are currently faced with engineering challenges related to technical and economic choices in connection with their developments and the diversification of know-how towards other types of developments (basins, valley bottoms, etc.). They are also faced with challenges in terms of human resources to plan developments, identify new areas of intervention, anticipate programming and feasibility studies, draw up investment programmes and take account of management issues. Finally, they must confront new challenges, such as environmental and climatic issues, and the need to develop participatory approaches at different levels: diagnosis, design and management.

The importance of high-quality project ownership for the effective - and financially efficient - management of the development programmes entrusted to them by governments is evident. However, the WAIDMAs' loss of their engineering competence (see the process described in the diagnostic study carried out by COSTEA for 11 WAIDMAs) has been to the detriment of their ability to carry out this major component of their mandate. The WAIDMAs need to be able to rely on in-house expertise to be able to make the 'right' investment choices with full knowledge of the facts and by weighing up external opinions, whether in terms of development or for the selection of suppliers, consultancy firms and works companies.

Taking into account the national institutional and legal framework, the prerogatives in terms of WAIDMA project ownership and their relations with other rural development actors, the general objective of this WAIDMA project was thus to advance the analysis, share points of view and ultimately open up avenues of action to strengthen project ownership skills with the aim of increasing the WAIDMAs' impact on the optimisation and sustainability of developments.

The specific objective of the project was to analyse the current WAIDMA project ownership missions, to classify these missions according to whether they are specific (not covered by the project) or generic to the WAIDMAs (subject of the project), and to propose a common roadmap (detailed action plan). The latter was intended to strengthen the WAIDMAs' capacities and activities in the field of project ownership extended to the technical management (operation and maintenance) and commercial management (contracting, invoicing and collection) of the water service.

## PRESENTATION OF THE METHODOLOGY AND CONTEXTUAL ELEMENTS

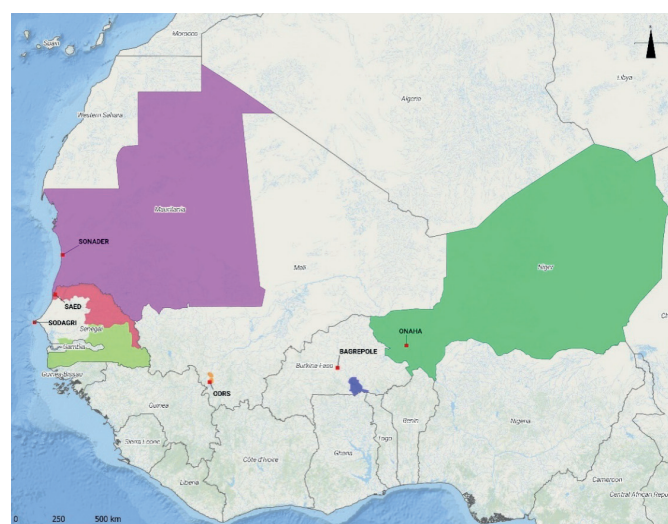
The 'Project ownership and engineering of hydroagricultural infrastructures' study took place over a duration of one year between May 2021 and May 2022. It was carried out in four stages:

- 1) Data collection and documentary review which was integrated into COSTEA's online bibliographical database;
- 2) Diagnoses, analyses and classification of the WAIDMAs' project ownership missions by topic: general management, monitoring and evaluation, implementation-works, upkeep-maintenance, human resources;
- 3) Workshops to share the diagnosis and propose actions;
- 4) Drawing up and quantification of an action plan discussed and shared at a feedback workshop.

Six out of the 12 WAIDMAs were involved in this project: ONAHA (Niger), SONADER (Mauritania), ODRS (Mali), BAGREPOLE (Burkina Faso), SAED (Senegal) and SODAGRI (Senegal). One contributing expert per WAIDMA was integrated into the team formed by the consortium made up of the French regional development agencies (SARs), CACG and SCP. The main role of the contributing experts was to represent their WAIDMA in this project on the theme of project ownership-engineering. They were therefore a source of data on the WAIDMAs and a force for analysis and proposals.

The objective of improving project ownership responds to the main problem identified, namely the lack of sustainability of hydro-agricultural infrastructures.

Zones of intervention of the six WAIDMAs concerned



WAIDMA perimeter  
 ■ BAGREPOLE  
 ■ ODRS  
 ■ ONAHA  
 ■ SAED  
 ■ SODAGRI  
 ■ SONADER

● Location of the WAIDMAs

Sources : CACG\_ESRI  
 Made : CACG\_Juill 2022  
 Projection : WG584

The diagnosis of the six WAIDMAs concerned highlighted a number of similarities but also the specific characteristics of the WAIDMAs which could have an impact on their project ownership mission.

Among the similarities identified, the following general points may be recalled:

- Most of the WAIDMAs are under the supervision of the Ministry of Agriculture, with the exception of BAGREPOLE (Prime Minister);
- The WAIDMAs use practically the same working tools;
- All of the WAIDMAs have well-defined zones of intervention;
- personnel management is handled by the WAIDMAs.

The specificities concern the following points:

- Their legal statuses are not the same which has a significant impact on their financial capacity and autonomy;
- The WAIDMAs are not structured in the same way and have different operating procedures (organisation charts);
- The level of involvement of the various internal services in project ownership activities differs from one WAIDMA to another;
- All of the WAIDMAs hire companies and consultants to carry out works and to monitor and supervise them. Only ONAHA carries out works on its own account, while others have abandoned this aspect of their activities (SAED, for example).

The results of the surveys on targets within the WAIDMAs highlighted strengths and weaknesses in various areas.

GENERAL MANAGEMENT / DEVELOPMENT	
<b>Strengths</b>	All of the WAIDMAs have experience in managing developments, but at different levels. The status and organisation of each WAIDMA also have an impact, which can be positive or negative, on the implementation of project ownership activities by the different WAIDMAs.
<b>Weaknesses</b>	The stumbling blocks common to the various WAIDMAs are the lack of qualified staff, and of financial and material resources to carry out project ownership activities, and staff capacity building. There are also difficulties with external actors such as funding agencies (procurement procedures), companies and consultants (failings in works and studies).
HUMAN RESOURCES / MONITORING AND EVALUATION (M&E)	
<b>Strengths</b>	ODRS, SONADER and SAED have sufficient experience to ensure the M&E of their project ownership, unlike ONAHA, SODAGRI and BAGREPOLE, which need support in the process of setting up M&E.
<b>Weaknesses</b>	ONAHA, SODAGRI and BAGREPOLE have a greater need in the process of setting up an M&E department, as well as for reinforced staff and the necessary financial resources.
MAINTENANCE	
<b>Strengths</b>	All of the WAIDMAs have a service responsible for the upkeep and maintenance of hydro-agricultural infrastructures.
<b>Weaknesses</b>	For some of the WAIDMAs, such as SODAGRI, the maintenance service is limited to pumping and agricultural equipment, which means that it needs to be restructured to take on the maintenance of hydro-agricultural facilities.

On the basis of this very detailed diagnosis (please refer to the reports), three main stages needed to improve the WAIDMAs' project ownership functions have been defined, as well as the current problems they face at each of these stages:

**Improve cross-functionality within the WAIDMAs:** project ownership for the development of hydro-agricultural facilities is a WAIDMA responsibility **requiring diverse skills** (technical, administrative, legal, financial) based on experience, shared within the WAIDMA between different staff. Managing interfaces within the WAIDMAs is therefore a crucial factor in improving project ownership. However, the WAIDMAs currently have to:

- deal with a lack of stakeholder mobilisation for each stage and process;
- decompartmentalise activities and improve the flow of information, with the need for a global vision, even though the internal organisational dichotomy between activities for financed projects and public services amplifies this compartmentalisation;
- overcome the lack of financial autonomy, with the WAIDMAs feeling that external partners, including funding agencies, impose conditions that are not always justified from their point of view;
- deal with a certain degree of political interference.

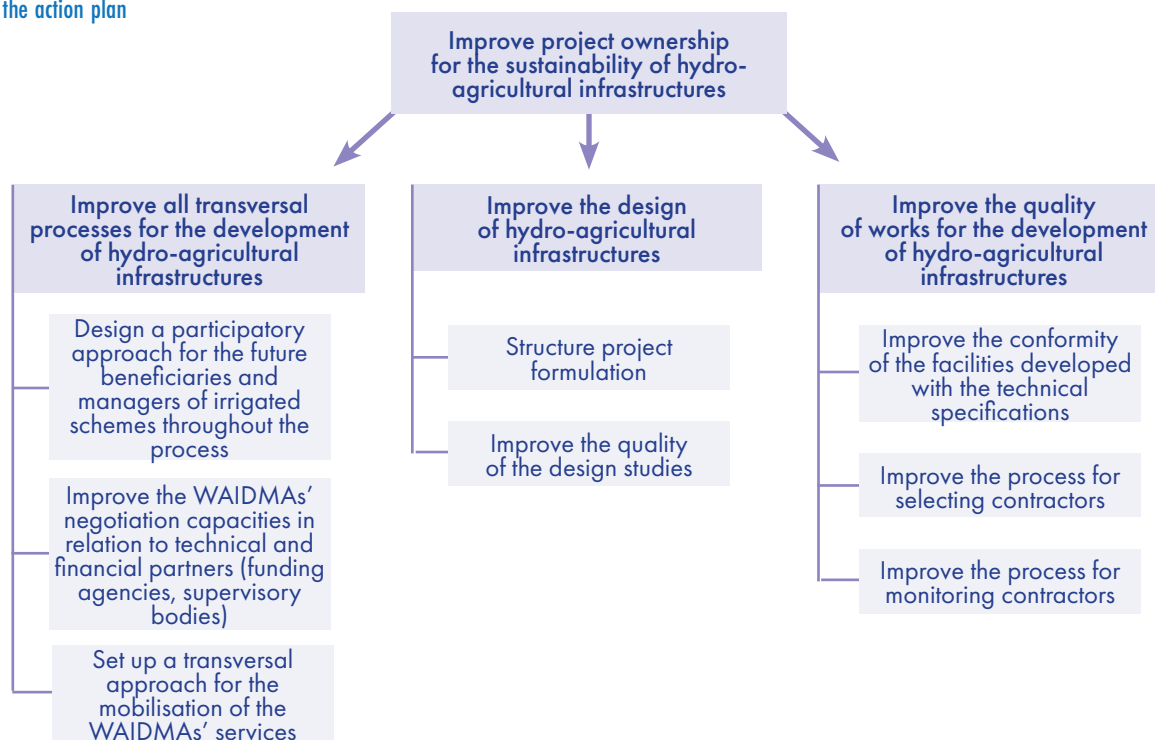
**Improve the design phase of developments:** identify the need, identify the services required and draw up the programme. The WAIDMAs currently face the following problems:

- specific difficulties at the project formulation stage resulting from a lack of identification of responsibilities, a lack of consultation with stakeholders, and a lack of structuring of the design process in relation to the acceptability and sustainability of the investment;
- a sometimes wait-and-see attitude;
- design errors on the part of the companies in charge of design and construction;
- failure to take account of external factors (e.g. land, economics, sustainability, acceptability);
- difficulties in identifying the need, identifying the services required and drawing up the programme;
- the choice of technical specifications for hydro-agricultural developments;
- the failure of external parties (e.g. consultancy firms) to capitalise on achievements;
- difficulties in following project ownership studies.

**Improve the development construction phase:** this involves carrying out the works proposed in the previous phase. These activities are performed in collaboration with other WAIDMA collaborators (internal and external), in particular the project manager (referred to as the 'consultancy firm') and the works companies. At this level, the WAIDMAs face the following problems:

- discrepancies between the execution and the specifications;
- difficulties in selecting service providers and companies and in awarding contracts;
- projects operating as PMUs, as imposed by the funding agencies, with a lack of anchoring in the WAIDMAs;

Objectives of the action plan



- a lack of continuity and presence of the project owner in the monitoring of the works;
- difficulties in implementing decisions on the works on site, with complex interfaces.

Improving the exercise of project ownership with a view to ensuring the sustainability of hydro-agricultural developments therefore involves improving their design, improving the cross-cutting processes involved in producing them, and improving the quality of the execution of the works to build them. On the basis of the detailed information gathered during the diagnosis and the consultations that followed, actions have therefore been proposed as the common core of priority actions to be carried out as a result of the reflections of the six WAIDMAs on their project ownership ('technical' section).

The action plan formulated as part of this project to strengthen the WAIDMAs' competences includes 23 actions linked to three main objectives and eight specific objectives. The following illustration presents the main and specific objectives to which this action plan responds.

Once the 23 actions had been formulated, they were quantified and prioritised. One or more monitoring indicators were proposed for each action. All of this information and the detailed action sheets are available in the synthesis report of the study.

## RESULTS OF THE STUDY, KEY MESSAGES AND LIMITS OF THE APPROACH

The analyses resulting from the WAIDMA project ownership action have enabled COSTEA to provide the WAIDMAs with a detailed action plan designed to strengthen their competences in the field of project ownership, and also to formulate a number of messages and recommendations. In this sense, they meet COSTEA's objective of aiming to strengthening the economic and social development of irrigated areas by improving the WAIDMAs' project ownership to help make hydro-agricultural developments more sustainable. These messages and recommendations also make it possible to support WAIDMAs through change by proposing innovations, particularly in terms of methods and tools, as shown by some of the actions formulated as part of this project.

The actions proposed in the action plan cover several areas associated with the three main stages necessary to improve the WAIDMAs' project ownership functions, as described previously: the WAIDMAs' resources and skills, the degree of autonomy in procedures and choices, the resources mobilised to monitor, report and build trust between stakeholders, the availability of quality external resources (e.g. companies, suppliers, audit offices), and the socio-economic and political context of the countries concerned.

Prior to the action plan, which was voluntarily limited in scope, many elements and opinions on the subject of project ownership were collected through surveys within the WAIDMAs and then debates within the team, which made it possible to develop six key messages conveyed by COSTEA on this subject:





- 1/ Analysing the profession of **project ownership is complex due to the diversity of the subjects it covers** and the variety of organisations to carry it out. The exact scope of the exercise of project ownership by the individual, the department/service or even the WAIDMA, in relation to the limits of responsibilities, varies from one WAIDMA to another, and is sometimes poorly understood. This project has made it possible to clarify how the six WAIDMAs exercise their competence and responsibility as project owners, the similarities, differences, strengths and weaknesses. Project ownership is complex and is acquired through experience. It needs to be explained and appropriated at all levels within the WAIDMA. The lessons learned from this project should be widely shared within the WAIDMAs. Work should also be undertaken to widely disseminate the results beyond the WAIDMAs.
- 2/ **Dissatisfaction among WAIDMA personnel has been observed with regard to developments that have been completed or are underway** in terms of design, command of the works and the sharing of technical, administrative, legal and financial skills, responsibilities and experience within the WAIDMAs. Managing interfaces within the WAIDMA is a crucial factor to improve project ownership; it is part of the WAIDMAs' roles, from top management to the teams. Managing the competences and human resources of project ownership is a major issue because the effective exercise of project ownership depends to a large extent on experience. Project ownership functions could be improved by setting up a genuine training plan that focuses largely on sharing experience between WAIDMAs and between WAIDMAs and French regional development agencies (SARs). This would be in line with SAED's partnership approaches with CACG/BRL/SCP, the example of which could be replicated with other WAIDMAs.
- 3/ In order for WAIDMAs to exercise their project ownership role effectively, there needs to be: **better consultation within and outwith the WAIDMAs** to adapt projects to stakeholders' needs; **better selection and monitoring of companies**, and; **effective mobilisation of funds** (funding agencies, the State, banks) to ensure that projects run smoothly. It is crucial to ensure an iterative loop for participation and feedback from upstream of the project (expression of need) to downstream (commissioning then operation).
- 4/ **A WAIDMA's degree of autonomy is a factor that influences the diligence and quality** with which it carries out its project ownership missions. The distribution of roles and responsibilities within the WAIDMAs and externally (for example: supervisory body, project ownership assistance, project management control) are crucial factors for success. A perfect knowledge of project ownership tasks and their clear distribution between structures and people are keys to success. Procedures manuals are increasingly used to clarify the roles and responsibilities of all parties. They should be able to evolve and make use of the results of this project. Inter WAIDMA exchanges on procedures manuals could be envisaged.
- 5/ Progress could be made by **introducing specific tools to assess the WAIDMAs' project ownership** performance over and above their indirect performance indicators. On this subject, in the continuity of the 'north/south' partnerships

between development agencies and in accordance with the requirements of the supervisory bodies and technical and financial partners, the WAIDMAs have set up monitoring and evaluation units (or people dedicated to do so). They are fairly recent. They propose methods and tools to monitor and evaluate WAIDMA activities and their results. Indicators of progress or of results specialised by topic or by WAIDMA 'function' (for example, project ownership) do not exist as such. One of our project's recommendations, relayed by ROA-SAGI, would be to set up a monitoring system and thematic progress indicators for all WAIDMA projects. The IoF planning and management tool developed by the World Bank would also be worth testing in partnership with WAIDMA staff so that they could adopt it and use it to assess the improvement of their performance.

**6/ With their West African Network (ROA-SAGI), the WAIDMAs should take ownership of all the elements of the action plan resulting from this COSTEA action and continue their project ownership work.** ROA-SAGI has an important role to play in taking charge of the action plan of this project, lobbying, supporting actions and disseminating results, among others. It is strongly recommended that ROA-SAGI operationalise the thematic groups that it planned to set up further to the WAIDMA workshop of Saly in 2022, which would also make it possible to reach the other WAIDMAs that could unfortunately not be involved in this project ownership project.

### Limits of the approach

A number of limits related to this project can, however, be pointed out, in particular the fact that it did not address certain aspects which are also a project ownership responsibility, whether directly or by delegation: water management, the upkeep and maintenance of hydro-agricultural developments, and pricing. These last two subjects are also dealt with by PARIIS. A link between the four WAIDMA projects and the PARIIS studies is necessary, in particular through ROA-SAGI. The WAIDMA project ownership function is also transversal to two of the WAIDMA structuring action projects: land tenure and transfer. The seminar organised by ROA-SAGI in May 2022, bringing together the teams of the four WAIDMA SA projects, provided an opportunity to share the initial results, but only the 'project ownership' project proposed an action plan. Specific work could be carried out between the projects in order to clarify links and coordinate future action plans that could result from the three other projects.

## COSTEA OUTPUTS IN RELATION WITH THE STUDY

- Inception report ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Syntheses and comparative analysis of the project ownership roles of WAIDMAs with a documentary inventory ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Diagnostic reports ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Final synthesis and recommendations ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Comparative analysis of large-scale irrigation management structures in West Africa, Morocco and France ([www.comite-costea.fr/actions/sagi](http://www.comite-costea.fr/actions/sagi))
- Comparative diagnosis of 11 West African Irrigation Development and Management Agencies (AMVS, ANADER, BAGRÉPÔLE, ODRS, ON, ONAHA, OPIB, ORS, SAED, SODAGRI, SONADER) [www.comite-costea.fr/production/diagnostic-compare-de-11-societes-damenagement-et-de-gestion-de-lirrigation-en-afrique-de-louest-amvs-anader-bagrepole-odrs-on-onaha-opib-ors-saed-sodagri-sonader](http://www.comite-costea.fr/production/diagnostic-compare-de-11-societes-damenagement-et-de-gestion-de-lirrigation-en-afrique-de-louest-amvs-anader-bagrepole-odrs-on-onaha-opib-ors-saed-sodagri-sonader)
- Documentary database ([www.comite-costea.fr/base-documentaire-eau-et-agriculture](http://www.comite-costea.fr/base-documentaire-eau-et-agriculture))

## #5- 2023 POLICY BRIEFS

### Project: (Developing and Managing) Irrigated Floodplains

# Territorial approaches to rethink irrigated agriculture in large floodplains

Large floodplains, whether they are coastal or continental, have undergone major hydro-agricultural developments since the beginning of the 20th century to protect them from flooding and develop intensive irrigated agriculture. Despite these developments, they are nonetheless prone to and subject to flooding - at least partially and during major events. These large plains catalyse a wide range of socio-economic (population density, urbanised areas, etc.) and environmental (wetlands and rich biodiversity) issues, and are undergoing profound changes due to the combined effects of development upstream of the catchment areas and the acceleration of climate change.



## ISSUES AT STAKE AND OBJECTIVES OF THE ACTION

For a long time hostile, the large floodplains, particularly the coastal and deltaic plains, have been the subject of colossal efforts since the 19th century to rehabilitate them, to limit the extent and impact of the flooding to which they are prone, to increase the availability of water resources during the dry seasons, and thus to intensify farming practices on land whose fertility was constantly renewed by the silt deposited there. These regions are now among the most densely populated on the planet, and are of major economic importance.

These development projects, based on the notion of 'control', have resulted in the construction of what is referred to as 'grey' infrastructure (the colour of concrete): ever higher dykes and ever more imposing networks of irrigation, drainage and sanitation canals, as illustrated by the Vietnam delta. As a result, irrigated floodplains are now among the most productive regions in the world (rice growing, aquaculture), but these development projects are also coming under growing criticism, as the infrastructures for controlling the water resources (and the associated risks) call for ever more infrastructures to face events with increasingly extreme and unpredictable consequences - a phenomenon known as 'infrastructure lock-in'.

The choice of agricultural intensification - through the control of water resources - has been accompanied by the growing vulnerability of these areas to hazards; it is now being called into question with a view to the need for resilience and adaptation to the effects of climate change. This is leading to a rethink of the ways in which large floodplains are developed and managed by putting their multifunctionality back at the heart of the approach.

## KEY MESSAGES

- 1/ Large irrigated floodplains are subject to multiple risks and offer many functionalities: their development, and the irrigated agriculture that depends on it, should be considered from the perspective of shared control of water with a view to diversifying uses and distributing benefits rather than optimising the 'land' resource.
- 2/ The agricultural intensification of large irrigated floodplains raises environmental and health issues and tends to 'transfer' rather than limit risks: putting the ecosystem services of these plains back at the heart of development programmes can help populations to become more resilient, but remains a challenge.
- 3/ Participatory territorial consultation processes are needed to renew approaches to the development and governance of large irrigated floodplains.
- 4/ The socio-environmental dynamics of large irrigated floodplains are complex: to understand them, it is necessary to set up long-term decentralised observatories combining participatory monitoring, a network of in-situ measurements and remote sensing.

This is in line with the notion of a 'nature-based solution' and the principles of ecological engineering, which would be the key not only to environmental sustainability but also to fair and frugal development, that is respectful of planetary limits and their territorial and local variations. For COSTEA, this means thinking about the development of irrigated agriculture on the basis of the partial control of water resources, planned on a territorial scale and which is compatible with other uses of common resources dependent on the good functioning of fragile ecosystems facing multiple pressures.

## PRESENTATION OF THE METHODOLOGY AND CONTEXTUAL ELEMENTS

COSTEA's 'floodplains' project was launched in December 2019 for a period of three years and was implemented in three countries, Cambodia, Ecuador and Morocco, by consortia involving research institutes, higher education bodies and non-governmental organisations (NGOs). The study areas selected combine what are referred to as 'developed' areas, i.e. with water control infrastructures for drainage and crop irrigation, and areas, often lower and wetter, where practices are generally less intensive and more diverse. COSTEA's activities were based on the past work of these consortia in each of these regions and benefited from the active partnerships they had forged with certain actors in these territories. In the three study areas, the projects had three components: (1) analysis of hydrological dynamics; (2) analysis of the multiple uses and services of large floodplains, with particular attention to the issue of trade-offs between intensification and vulnerability; and (3) multi-actor consultation processes. The studies were carried out:

- **in Cambodia**, in the upper Mekong delta, by a consortium comprising the Institut de Recherche pour le Développement (IRD, the French National Research Institute for Sustainable Development), the Royal University of Agriculture (URA), the Institut de Technologie du Cambodge (ITC, Institute of Technology of Cambodia) and the Irrigation Service Center (ISC). The project was carried out in the province of Kandal, where numerous canals known as preks form a complex meshed hydrographic network and are the subject of rehabilitation projects for the sustainable agricultural intensification of the floodplain.
- **in Ecuador**, in the floodplain of the river Daule, by a consortium comprising Agronomes et Vétérinaires Sans Frontières (AVSF, Agronomists and Veterinarians Without Borders) and the Escuela Superior Politécnica del Litoral (ESPOL, a university in Ecuador). The project was carried out in various cantons located in the catchment area, and in particular, in the floodplain of the river Daule, where irrigation and drainage systems and the exploitation of groundwater enable the development of rice-growing, which is intensive in terms of inputs, but not very profitable and highly vulnerable to flooding, which also

threatens the downstream city of Guayaquil and its water and sanitation services.

- **in Morocco**, in the Gharb floodplain, by a consortium comprising CIRAD and the Institut Agronomique et Vétérinaire Hassan II (IAV, Hassan II Agronomic and Veterinary Institute). The project was carried out in the area covered by the Office Régional de Mise en Valeur du Gharb (ORMVAG, Regional Agency for the Development of the Gharb), which includes both developed areas (with irrigation and drainage networks) and undeveloped areas (locally known as merjas) - the latter having received renewed attention over the past decade for their dual potential as agricultural land and as 'buffers' against flooding, which is particularly damaging for the town of Kenitra downstream from the plain.

## RESULTS OF THE STUDY, KEY MESSAGES AND LIMITS OF THE APPROACH

The activities carried out as part of the structuring action on floodplains contribute to the debate on how to reduce the risks faced by irrigated farming and thus increase its resilience and environmental sustainability on a territorial scale.

- 1/ **Large irrigated floodplains are subject to multiple risks and offer many functionalities: their development, and the irrigated agriculture that depends on it, should be considered from the perspective of the shared control of water with a view to diversifying uses and distributing benefits rather than optimising the 'land' resource.** One of the specific features of large floodplains is that they are subject to multiple and joint hazards that are increasingly difficult to predict. Water control infrastructures (whether in the floodplains themselves or upstream of them) are built to minimise the risks of flooding and drought to which these regions are subject. While a risk mitigation and adaptation strategy cannot be called into question as such, development programmes still often make 'zero risk' an objective, even though it has become clear that this does not exist. It is necessary to acknowledge the inevitability of risks and design developments accordingly, from a multifunctional perspective, which leads to a rethink of the agricultural models sought. The COSTEA studies confirm that the construction of infrastructure to control water resources in large floodplains is accompanied by agricultural intensification and specialisation, including in the lowest-lying areas, which provide numerous ecosystem services such as flood control, the recharging of aquifers and the regulation of saline intrusions in the case of coastal plains. Of the three case studies, this intensification is most marked in the Gharb plain, where there is a public organisation dedicated to managing the area's hydro-agricultural developments. However, this intensification of the large floodplains has also led to a process of farm differentiation.

On the one hand, there are relatively large agricultural entrepreneurs (several dozen hectares) generating significant income, and on the other, small-scale farmers owning limited areas of land if they have not already become sharecroppers on land they have been forced to sell due to very high indebtedness. This differentiation can be explained in particular by the specialisation of the agricultural systems and areas, which makes them more vulnerable to external shocks, whether climatic (drought, floods), agricultural (disease) or economic (price fluctuations). This specialisation of areas and the resulting vulnerabilities are linked to the fact that total water control infrastructures tend to make land a 'fixed' resource whose uses need to be optimised, whereas the large floodplains are characterised by resources whose very nature changes. The same place can be 'land' or 'water' or 'forest' from one season to the next and from one year to the next, and can therefore be used in different ways. This changing nature of the large floodplains and the low-lying areas scattered across them (esteros, merjas, boeuings) is an obstacle to any control strategy (all the more so in a context of climate change); on the contrary, it is an asset from a resilience perspective (because different resources are not affected in the same way by different hazards). Thus, more basic investments in 'ecological engineering' aimed at the shared control of water and encouraging multiple modes of access and use (fishing, livestock farming, transport), could lead to a fairer distribution of benefits (as different social groups tend to use different resources) while at the same time ensuring resilience to crises. The aim here is to make the irrigated areas of the large irrigated floodplains tolerant to floods that will remain unavoidable - including by experimenting with agro-ecological technical itineraries.

**2/ The agricultural intensification of large irrigated floodplains raises environmental and health issues and tends to 'transfer' rather than limit risks: putting the ecosystem services of these plains back at the heart of development programmes can help populations to become more resilient, but remains a challenge.** The agricultural intensification made possible by the construction of water control infrastructures in the large floodplains is now leading to major environmental degradation. This is due in particular to the extremely intensive use of phytosanitary products, which accumulate in the environment and also raise public health issues. The 'natural capital' on which agricultural production depends is deteriorating, and it is important to reverse this trend. COSTEA has highlighted the existence of areas with more basic developments that are regularly flooded within the large irrigated floodplains: boeuings in Cambodia, esteros in Ecuador, and merjas in Morocco. These areas are cultivated for part of the year when the floods recede, often for input-intensive rice farming. They are also used as grazing land for livestock (merjas), capture fishing grounds when they are flooded (boeung, esteros), and for more diffuse uses (hunting, collection of natural vegetation, etc.). As a result of the multiplicity of resources and uses, these areas can be subject to tensions and conflicts over how they are accessed and developed, with a tendency

towards forms of land concentration and exclusion that are very real but not very visible. In addition, the local people recognise that these areas play a role in absorbing floods, which has yet to be assessed in detail (especially when towns are located downstream), and they emphasise that their biodiversity is higher than in areas that have undergone more extensive hydro-agricultural development. However, the 'ecological value' of these areas and the attachment of local populations to them have declined sharply in recent decades. This may partly explain why the vast majority of actors (including farmers) still always see them in terms of their potential for agricultural intensification, even though the intensification of floodplains may prove to be of limited profitability and a source of increased vulnerability for households as a result of massive recourse to credit, which generates debt. For COSTEA, putting the multifunctionality of these areas on the agenda and restoring it with a view to forecasting and managing risks, is an alternative to the current development trajectories which result in a concentration of short-term benefits for a minority of actors and increased vulnerability for the majority in the long term, including in downstream urban areas. However, there is a need for a more detailed analysis of the benefits that such an approach could generate and the ways in which it could be implemented, including with actors outside the agricultural world, in a context where pressure on water resources is constantly increasing. In practice, the scarcity of resources is often the result of a political and social desire to use and develop them in the short term, in this case by intensifying irrigated agricultural production, but as mentioned above, this can have many negative repercussions in the medium and long term. This awareness, which in some situations is difficult to accept, is nonetheless a necessity in the global context of environmental vulnerability, and requires a search for alternative solutions and support measures for those most affected. In Europe, for example, there are mechanisms whereby farmers are paid from public funds to maintain some of their plots of land in a natural state for all or part of the year in the public and environmental interest. Other awareness-raising, incentive and support mechanisms that are better adapted to local contexts still need to be devised and implemented.

**3/ Participatory territorial consultation processes are needed to renew approaches to the development and governance of large irrigated floodplains.** The COSTEA studies show that the large floodplains form heterogeneous 'mosaic landscapes' whose management is complex due to: (1) the multiplicity of actors involved and the diversity of their respective agendas and interests, but also (2) the lack of knowledge and the uncertainties that persist concerning the current socio-environmental dynamics of these mosaics and the impacts that various interventions could have on them. In such a context of uncertainty, multi-scale territorial consultation processes can help to bring out a wide range of knowledge, while at the same time bringing to light the diversity of viewpoints and roles that different actors may assign to the different entities that make up these mosaics.



This is a prerequisite for the concerted identification of development trajectories, whose consequences on various social groups can then be made explicit. Implementing such participatory processes also requires a detailed understanding of institutional and political networks and issues as well as of decision-making processes. Translating debates into action requires the implementation of multiple engagement strategies over the long term to set up 'advocacy coalitions' joining multiple actors, while being vigilant as to opening 'windows of opportunity' such as the formulation of new development projects or the elaboration of new policy frameworks. By way of example, in Cambodia, and within the framework of COSTEA, such a strategy has led to the rehabilitation of preks no longer being considered independently of each other, as could be the case in the past, but in an 'integrated' manner, taking into account not only hydrological factors, but also economic and social factors such as the dynamics of access to and the development of agricultural land. In Ecuador, the concerted construction of a shared vision of the risk of flooding and its differentiated causes and effects, has led stakeholders not linked to the agricultural world, such as the Guayaquil town council or the drinking water supply and sanitation company, to take an interest in the development of the catchment area and the use of agricultural land in the floodplain and beyond.

**4/ The socio-environmental dynamics of large irrigated floodplains are complex: to understand them, it is necessary to set up long-term decentralised observatories combining participatory monitoring, a network of in-situ measurements and remote sensing.** Determining the hydrographic limits of large floodplains remains a difficult exercise in itself, as these regions are characterised by complex networks made up of natural watercourses, earthen or concrete channels, water spreading and storage areas, and various aquitards and aquifers, all of which are in constant interaction. The directions of water flows can also vary from one season to the next, and even within the same day, as they depend on very sensitive level balances in regions with little relief that are sensitive to tides. Conventional models (such as HEC-RAS, Modflow, etc.), which require large amounts of data, have their limitations

and their results remain highly uncertain. To understand the hydrological dynamics of large floodplains, it is necessary to combine (hydrological) modelling with tools derived from remote sensing (satellite image analysis), but above all, in-situ hydrographic and sedimentary measurements, which remain essential in terms of calibration. Isotopic and hydro-chemical marking techniques can also be used to understand the dynamics of exchanges between groundwater and surface water, which play a crucial role in the functioning of ecosystems on large floodplains. While many governments continue to envisage the construction of water control infrastructure to develop large floodplains, the lack of data makes it impossible to analyse the relevance and potential impact of such projects. However, setting up networks of hydrographic (or more generally biophysical) measurements, while essential, is not sufficient. The complexity of large floodplains and the large number of actors involved means that such networks should be devised in the framework of decentralised participatory observatories in which national research and higher education institutes, governmental and non-governmental agencies and citizens all have a role to play. Such observatories could then contribute to inclusive territorial governance processes.

### Limits of the approach

Understanding the hydrological dynamics of the study areas is essentially based on remote sensing approaches due to the limited availability of in-situ data and the complexity of the networks to be represented and modelled (which it has been possible to do on pilot areas of several km<sup>2</sup>). While COSTEA's work has highlighted the multiple environmental services provided by large floodplains, this qualitative understanding still needs to be supplemented by ecological studies to better characterise the trade-offs between agriculture and the environment. Lastly, territorial consultation activities are built up over a long period of time and could only be initiated in the context of COSTEA - they therefore call for continuation.

## COSTEA OUTPUTS IN RELATION WITH THE STUDY

- Understanding the cambodian upper Mekong delta: towards new approaches for floodplain governance ([www.comite-costea.fr/actions/zones-inondables](http://www.comite-costea.fr/actions/zones-inondables))
- Les enjeux de la plaine inondable du sous-bassin versant de la rivière Daule [Issues of the floodplain of the sub-catchment area of the river Daule, in French] ([www.comite-costea.fr/actions/zones-inondables](http://www.comite-costea.fr/actions/zones-inondables))
- Les enjeux de la plaine inondable du Gharb au Maroc [Issues of the floodplain of the Gharb in Morocco, in French] ([www.comite-costea.fr/actions/zones-inondables](http://www.comite-costea.fr/actions/zones-inondables))
- Documentary database ([www.comite-costea.fr/base-documentaire-eau-et-agriculture](http://www.comite-costea.fr/base-documentaire-eau-et-agriculture))

## #6-2023 POLICY BRIEFS

### Structuring Action: Agroecological Transition of Irrigated Systems

# How can we move towards agroecological irrigated agriculture? Placing it on the political agenda to kick-start the transition

Until now, irrigated agriculture has mainly been developed on the basis of conventional intensification methods following the principles of the Green Revolution. Agroecology is a promising approach to tackle climate change and limit the impact of irrigated agriculture on the environment, while at the same time meeting countries' needs for food security and sovereignty.



## ISSUES AT STAKE AND OBJECTIVES OF THE ACTION

In view of the stakes of food and nutritional security, climate challenges, biodiversity protection and the fight against land degradation, agroecology is now high on the international agenda as a way to promote sustainable agricultural systems. However, questions remain as to the feasibility, efficiency and effectiveness of this form of agriculture to meet the challenges of food security.

In the spirit of the Green Revolution, irrigation has led to the intensification and specialisation of many crop and mixed crop-livestock systems, sometimes including the transition to several annual crop cycles thanks to the reduced risks associated with better water management. This intensification has often gone together with crop specialisation and the increased use of external inputs (mineral fertilisers, synthetic pesticides, selected commercial seeds) to increase yields and productivity. This objective of profitability has also been linked with that of making a return on the significant investments made in water infrastructure, particularly in large schemes combining dams, collective water distribution networks and management services.

However, although irrigation combined with agricultural intensification based on external inputs has led to remarkable gains in yields, this model is now showing its limitations at the level of farms, territories and small regions. In rice-growing systems, for example, diseases and parasitic attacks are on the increase while yields are stagnating; in market gardening systems in urban and peri-urban areas, the high level of exposure of farming and urban populations to pesticide contamination of water and food is creating obvious public health risks. Finally, the challenges of climate change and limiting greenhouse gas emissions (in particular CH<sub>4</sub> and N<sub>2</sub>O), are calling into question

## KEY MESSAGES

- 1/ Agroecology is a holistic and systemic approach that can only be developed if governments pursue proactive policies;
- 2/ Agroecological practices, mainly individual, are to be found in irrigated systems, but they are limited and do not form a system;
- 3/ The socio-economic and agro-environmental performances related to most of the agroecological practices observed in the irrigated systems are encouraging;
- 4/ Agricultural water and infrastructure management should be a lever for agroecological transition;
- 5/ Research and development should be continued and stepped up to further demonstrate that agroecology can enable irrigated agriculture to meet the challenges of climate change and food security.

the intensification schemes that have been proposed in the past. Irrigated farming contributes over 40% of the world's agricultural production on less than 20% of its agricultural land. An agroecological transition appears necessary, but convincing people that this transition will not jeopardise food security in the short, medium and long term remains difficult. It is also essential to demonstrate that water, in the face of increasingly recurrent droughts, is a real lever for agroecology and not exclusively a production factor (in the same way as external synthetic inputs) at the sole service of input-intensive irrigated agriculture that is disconnected from environmental and sustainability concerns. In this sense, the dichotomy between irrigated and rain-fed agriculture needs to be questioned at the relevant territorial levels, so that water, considered as a common good, can contribute as much to the greening of today's irrigated agriculture as to the rain-fed agriculture that will undoubtedly require supplemental irrigation in the future.

However, the references available in the field of agroecology and irrigation are still limited, partial or too dispersed (in space and between stakeholders), for different types of irrigated systems and farming, whether in terms of feedback, tested and/or validated practices, or the qualification and quantification of their effects and impacts. This is particularly true of large irrigated schemes, where questions are being asked about the introduction of diversification crops and the role of trees and livestock. Livestock has often been relegated to the outskirts of irrigation zones, with the result that organic matter of animal origin is not widely available or used. Furthermore, the extreme specialisation of certain irrigated systems linked to the existence of a highly structured value chain for a pivotal crop (e.g. rice), can block the rethink of the socio-technical system needed for an agroecological transition, which requires other species and other types of development via new value chains. Nevertheless, agroecological practices do already exist, based on traditional knowledge and sometimes hybridised with innovations (for example, fertigation using compost in drip systems). This is a 'silent agroecology' that is rarely identified or known about, and therefore even less qualified, validated, shared or enriched in conjunction with agricultural and territorial research and development actors.

To meet these challenges, the COSTEA action undertook to take stock of the situation and of evolutions in the greening of irrigated agriculture in different contexts in Algeria, Cambodia and Senegal.

The specific objectives were to:

- identify innovative agroecological practices by capitalising on feedback from farmers in irrigated systems;
- qualify their socio-economic and agri-environmental performance;
- identify constraints and conditions for the development of agroecological transitions;
- network national and regional actors and COSTEA members to strengthen multi-actor dialogue on this subject.

## PRESENTATION OF THE METHODOLOGY AND CONTEXTUAL ELEMENTS

To carry out this work, COSTEA commissioned a group of French organisations coordinated by AVSF (GRET, CARI, CIRAD) and their partners (ENDA Pronat, ISRA, University of Battambang, APEB, TORBA and CREAD).

This structuring action involved three countries with two study areas per country - one area with large-scale hydraulics and one with smaller systems, with the assumption that there would be greater flexibility of action towards transition in the smaller systems.

In Algeria, the study areas focused on the large scheme of the Mitidja and the oasis zone of Mزاب; in Senegal, on the Guédé scheme in the SAED intervention zone and on the Mboro scheme with small market gardening schemes in the peri-urban zone of Senegal; in Cambodia, on the large rice-growing scheme of Kanghot with partial to total water control and on the rice-growing scheme of Veal Krorpeu with partial water control. These three areas have their own specificities in terms of the types of irrigated farming systems, the challenges associated with water resources, and specific questions in terms of agroecological practices and innovations.

The methodological approach used to carry out the six field studies was based on the integration and adaptation of various tools:

- **the Handbook for the Evaluation of Agroecology**, based on the global approach of the diagnostic study of agrarian systems in order to answer questions relating to agroecology. It proposes a series of indicators to measure the socioeconomic and agri-environmental effects of these practices and systems, and identifies obstacles and levers for their development.
- **the nexus analysis matrix**, a multi-scale and multi-dimensional framework used to understand irrigated systems in all their complexity and to highlight their main issues. It was filled in during the first stages of the diagnosis of the study areas. The issues identified made it possible to formulate evaluation questions that facilitated the selection of socioeconomic and agri-environmental evaluation indicators;
- **the matrix for inventorying and characterising agroecological practices**, which helps guide the choice of priority agroecological practices and systems to be studied in the following phase of evaluating and measuring the performance of agroecological systems;
- **the agroecology matrix**, which consists of estimating the extent to which a farm meets agroecological principles. To carry out this evaluation, the method calculates an 'agro-eco-score' based on these different principles. This matrix was used in the phase to characterise and compare the typology of the farms.





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Local consultation workshops were organised in each of the territories studied in order to share and debate: (i) the results of the territorial diagnosis and of the inventory of agroecological practices, then (ii) the results of the socioeconomic evaluations and the initially identified conditions for the development of agroecology in the irrigated schemes. The results and recommendations were then presented in national consultation workshops.

This brief shares a number of elements of the situational overview in relation to aspects of the management of irrigation and agrarian systems:

**The study revealed a significant difference in the diversity and combination of agroecological practices identified in systems with individual irrigation (examples of the Mboro area in Senegal and the Mzab Valley in Algeria) compared to the large-scale collective hydraulic systems (examples of the west Mitidja in Algeria, the Kanghot area in Cambodia and the Guédé area in Senegal).** This can be explained by the greater room for manoeuvre available to individual irrigation farmers in terms of access to water (wells, individual boreholes, sometimes collective boreholes), its use and the possibilities for diversifying production. However, there are other limitations that may justify the lack of diversification within the schemes studied.

Indeed, farmers who cultivate in large and medium-scale collective irrigation systems are often limited by:

- access to water that is coordinated by the group (EIG<sup>1</sup> in Senegal, FWUC<sup>2</sup> in Cambodia) or directed by the manager of the irrigation system (such as the strategic citrus, cereal and potato value chains prioritised by the ONID in west Mitidja in Algeria);
- the specialisation and intensification of these schemes. This has led to the homogenisation of cropping schedules and technical itineraries between water users in the plots in order to make costly developments profitable (e.g. rice and tomato production in the Guédé plots situated in the zone of intervention of the SAED). They are sometimes also the response to a political or market orientation or a cultural attachment to a crop (for example, the obligation in Cambodia to grow rice on a low-

lying plot when it is irrigated, as a farmer who wanted to grow another crop would risk losing access to this plot). They can also result from the need to manage the collective organisation of tillage in the plots.

- problems of soil hydromorphism in some of these large schemes and relatively high upper water table rises, which in themselves limit the possibilities of diversifying production.
- difficulties in supplying organic matter due to the specialisation of large irrigated areas. These difficulties create a gap between plant and animal production that does not facilitate the reintegration of livestock farming, which is fundamental to gradually move away from these irrigated farms' dependence on chemical inputs. Experiments with the introduction of ducks and fish in rice fields in Cambodia, for example, have proven beneficial from an economic and environmental point of view.

These observations concerning the obstacles encountered by farmers in all the irrigated areas studied must also be linked to other factors, both internal and external to the farms, which were highlighted during the agrarian diagnoses and the evaluations of the conditions for the development of agroecological transition. However, some of the constraints, although identified in the irrigated farming territories of the COSTEA study, also concern agroecological development in rain-fed areas. Nevertheless, these constraints are reinforced by the structuring of the space and the developments specific to irrigated systems. They concern in particular:

- constraints at farm level (technical know-how, capital to invest, land constraints, availability of organic matter, working time);
- political, institutional and value chain constraints (absence of public policies; absence of markets; poor organisation/ structuring of producers; still insufficient research results on the performance of agroecology in irrigated systems; infrastructural barriers related to traditional hydro-agricultural development models);
- environmental constraints (reduced water availability due to overexploitation of groundwater; soils with low water retention; soil impoverishment and pollution of groundwater and watercourses);
- organisational constraints (start-up of crops and irrigation of plots centralised at the level of the heads of unions of farmers' groups; weight of individual interests to the detriment of the collective and difficulty in agreeing on a transition model at the scale of the hydro-agricultural unit; social obstacles hindering any initiative to divide up plots and/or allocate them definitively).

## RESULTS OF THE STUDY, KEY MESSAGES AND LIMITS OF THE APPROACH

The analyses resulting from the agroecological transition action have enabled COSTEA to formulate a number of messages and recommendations. Their general aim is to strengthen the environmental sustainability of irrigated agriculture and to support change through technical and institutional innovation. This action also contributes to providing elements linked to the economic and social development of irrigated territories

1. Economic Interest Group.

2. Farmer Water User Communities.

through the analysis of existing agroecological practices. Finally, by considering agroecological transition in irrigated areas, it suggests way of increasing the resilience of farmers and hydro-agricultural developments in the face of climatic and market risks.

**1/ Agroecology is a holistic and systemic approach that can only be developed if governments pursue proactive policies.**

While the notion of agroecology is becoming increasingly widespread, with the aim of reconciling agriculture and the environment, multiple dimensions need to be considered and qualified in order to promote it. First of all, we need to recognise the reality of agroecological practices that are often silent and carried out by family farmers, particularly women, and to encourage them, even if they are sometimes limited in relation to all of the dimensions of agroecology. Indeed, if it is to have a truly transformative purpose, the development of agroecology must take place at several levels, ranging from the management of individual plots of land (or herds), to the holistic and systemic management of cultivated land, from small regions and their landscapes right through to the overall reorganisation of trade flows of agricultural and livestock products. However, in all the situations studied in this structuring action, there was a near total absence of tools to support and raise awareness of agroecological transition. This translates into an overall lack of technical knowledge in the field of agroecology and the various constraints to be overcome, but also in a lack of downstream promotion policy for agroecological farming products. These include: difficulties in accessing appropriate credit to equip farmers with water-saving irrigation systems; low availability of organic matter due to the absence of livestock farming in irrigated schemes; land that is often too small to take the risks involved in the transition; an available workforce that is often insufficient to meet the increased labour requirements associated with agroecological transition; and prices that offer little incentive to promote agroecological products. To succeed in getting governments to develop these policies, it will be necessary to demonstrate that agroecology can perform as well as conventional agriculture, particularly irrigated agriculture, which is still considered to be one of the pillars of the Green Revolution for the food security of many countries.

**2/ Agroecological practices, mainly individual, are to be found in irrigated systems, but they are limited and do not form a system. An inventory of practices was carried out in the six study areas of this structuring action.**

A number of agroecological practices were observed, such as crop rotation, the integration of agriculture and livestock farming, the incorporation of manure into the soil for organic fertilisation, the implementation of water and soil conservation techniques, and some agroforestry practices. These practices are generally isolated at the individual, plot or farm level. The few signs of ecological services on the scale of an irrigated scheme are generally linked to deficient maintenance of the network, such as the grassing of canals or the presence of trees in the drainage networks. No practices were observed on a territorial scale. In short, the practices observed do not form a system. However, there is a notable difference

between individual and collective irrigation systems. The number and diversity of agroecological practices identified in individual irrigation systems are far higher than in the large-scale collective irrigation systems, which are most often specialised and geared towards single crop farming. While around 20 different practices per site were identified in small and medium-scale hydraulic systems, only 10 or so practices per site were observed in large-scale hydraulic systems. In several situations, improved water-saving irrigation practices were observed, helping to improve the efficiency of water use.

**3/ The socio-economic and agro-environmental performances related to most of the agroecological practices observed in the irrigated systems are encouraging.**

From a socio-economic point of view, farms that combine agroecological practices can achieve higher yields, lower input costs and greater resilience to annual climatic risks such as drought. The diversification of production, within or outside irrigated plots, can also play a key role in securing agricultural incomes for farming families. Finally, chemical inputs account for a large share of intermediate consumption in the cropping systems, making it all the more economically worthwhile to replace them with organic fertilisers made from local resources (in the case of rice cultivation in Kanhhot, Cambodia, for example, mineral fertilisers account for 30% of production costs). From an agro-environmental point of view, fewer infestations are observed in agroecological cropping systems, and the soils respond rapidly to agroecological practices in terms of biological activity. For example, in the Kanhhot area of Cambodia, a comparison between plots cultivated using green manure with direct sowing and ploughed plots showed a significant improvement in soil health from the very first years of cultivation, with a higher water retention and infiltration capacity.

**4/ Agricultural water and infrastructure management should be a lever for agroecological transition, and not an obstacle. Indeed, the current lack of initiatives in terms of agroecological practices in collective irrigation schemes can be partly explained by the lack of flexibility in terms of water management in these systems due to their design, especially when they are gravity-based.**

This is a form of infrastructural blockage that would require a review of the design and management rules to allow greater autonomy for farmers in introducing more individualised and diversified crops and technical itineraries. This conceptual shift calls for a move beyond the technical and productivist approaches of rural engineering to develop genuine ecological engineering. On the other hand, efforts are being made to save irrigation water resources and increase their efficiency, in particular with the development of the drip irrigation technique observed in various study areas of the structuring action. However, experience from other studies has shown that this technique may not be mastered and that, since its use facilitates irrigation, it may lead to an increase in the irrigated area and pressure on water resources, particularly groundwater. Its adoption is therefore not necessarily synonymous with agroecological practice.

**5/ Research and development should be continued and stepped up to demonstrate that agroecology can enable irrigated agriculture to meet the challenges of climate change and food security.** The fact that irrigation is a strategy for adapting to climate change has, until now, mainly been considered from the perspective of controlling water resources by storing them and distributing them during periods of drought. The resulting model of irrigated agriculture, derived from the principles of the Green Revolution and based on specialisation and intensification, is now a source of new vulnerabilities. These vulnerabilities are mainly linked to the depletion of water resources as a result of increasingly severe droughts and ever more intensive use, long-term soil depletion, market fluctuations and farmers' indebtedness. Which agroecological models and which transition trajectory should be promoted in irrigated systems to develop sufficiently resilient and productive irrigated agriculture, including with less water inputs? In return, what gains can we expect in terms of greenhouse gas reductions, and what methods should be used to assess these gains, taking into account the water dimension (carbon impacts of developments, energy consumed in transporting and pumping water, emissions linked to certain irrigated crops such as rice, etc.)? The expected effects of agroecology in relation to the climate challenge in terms of adaptation and mitigation need to be more clearly set out, as do the other forms of pollution generated by agriculture, such as the over-exploitation and pollution of water resources, particularly groundwater, reduced fertility and pollution in various irrigated situations.

### Limits of the approach

The methodology used to carry out the studies nevertheless had a number of limits.

Despite the relevance of the methodology used, it was highly complex due to the multiple steps to be carried out in a short time: agrarian diagnosis, nexus matrix, inventory of practices, socioeconomic analysis, agri-environmental analysis, analysis of development conditions.

The teams also encountered difficulties in identifying agroecological practices given the few initiatives in the study areas and, in particular, in detecting those that are discrete. Furthermore, the teams lacked knowledge and hindsight to determine or estimate the degree of application/adoption of each identified practice at the scale of the zones.

The analysis of the economic and environmental performances of agro-environmental practices was carried out on the scale of cropping systems and not on larger scales (irrigated system or territory) due to the very nature and small number of practices identified.

Measuring the impact of agri-environmental practices needs to be a long-term process, which was not possible within the framework of this structuring action. The results obtained in this area are therefore incomplete and need to be combined with

more permanent observation systems to be developed in the various irrigated farming contexts, with substantial observation, monitoring and analysis resources.

## COSTEA OUTPUTS IN RELATION WITH THE STUDY

- An inception report ([www.comite-costea.fr/actions/agroecologie](http://www.comite-costea.fr/actions/agroecologie))
- Presentation of the sites in Cambodia ([www.comite-costea.fr/wp-content/uploads/Presentation-Cambodge.pdf](http://www.comite-costea.fr/wp-content/uploads/Presentation-Cambodge.pdf))
- Presentation of the Algeria Mitidja site ([www.comite-costea.fr/wp-content/uploads/Presentation-Mitidja\\_Algerie.pdf](http://www.comite-costea.fr/wp-content/uploads/Presentation-Mitidja_Algerie.pdf))
- Presentation of the Algeria Mzab site ([www.comite-costea.fr/wp-content/uploads/Presentation-Mzab\\_Algerie.pdf](http://www.comite-costea.fr/wp-content/uploads/Presentation-Mzab_Algerie.pdf))
- Presentation of the Senegal sites ([www.comite-costea.fr/wp-content/uploads/Presentation.SENEGAL.pdf](http://www.comite-costea.fr/wp-content/uploads/Presentation.SENEGAL.pdf))
- A report inventorying practices in Algeria (Mitidja) ([www.comite-costea.fr/wp-content/uploads/L1a\\_Inventaire\\_PratiquesAE\\_NTissa\\_ALGERIE-vf.pdf](http://www.comite-costea.fr/wp-content/uploads/L1a_Inventaire_PratiquesAE_NTissa_ALGERIE-vf.pdf))
- A report inventorying practices in Algeria (N'Tissa) ([www.comite-costea.fr/wp-content/uploads/L1b\\_Inventaire\\_PratiquesAE\\_Mitidja\\_ALGERIE-vf-.pdf](http://www.comite-costea.fr/wp-content/uploads/L1b_Inventaire_PratiquesAE_Mitidja_ALGERIE-vf-.pdf))
- A report inventorying practices in Cambodia ([www.comite-costea.fr/wp-content/uploads/L1c\\_Inventaire\\_PratiquesAE\\_CAMBODGE-vf.pdf](http://www.comite-costea.fr/wp-content/uploads/L1c_Inventaire_PratiquesAE_CAMBODGE-vf.pdf))
- A report inventorying practices in Senegal (Mboro) ([www.comite-costea.fr/wp-content/uploads/L1d\\_Inventaire\\_PratiquesAE\\_Mboro\\_SENEGAL-vf.pdf](http://www.comite-costea.fr/wp-content/uploads/L1d_Inventaire_PratiquesAE_Mboro_SENEGAL-vf.pdf))
- A report inventorying practices in Senegal (Guédé) ([www.comite-costea.fr/wp-content/uploads/L1e\\_Inventaire\\_PratiquesAE\\_Guede\\_SENEGAL\\_vf.pdf](http://www.comite-costea.fr/wp-content/uploads/L1e_Inventaire_PratiquesAE_Guede_SENEGAL_vf.pdf))
- A report inventorying and characterising agroecological practices in irrigated systems ([www.comite-costea.fr/wp-content/uploads/Grille-dinventaire-des-pratiques-AE\\_Costea\\_VF.pdf](http://www.comite-costea.fr/wp-content/uploads/Grille-dinventaire-des-pratiques-AE_Costea_VF.pdf))
- A synthesis of agroecological inventories and practises ([www.comite-costea.fr/wp-content/uploads/L1\\_Synthese\\_Inventaires\\_PratiquesAE-vf.pdf](http://www.comite-costea.fr/wp-content/uploads/L1_Synthese_Inventaires_PratiquesAE-vf.pdf))
- A documentary database ([www.comite-costea.fr/base-documentaire-eau-et-agriculture](http://www.comite-costea.fr/base-documentaire-eau-et-agriculture))

## #7-2023 POLICY BRIEFS

### Structuring Action: Reuse of Wastewater in Agriculture

# The reuse of treated wastewater in agriculture: The keys to successful implementation and overcoming obstacles

To address the increasing pressure on water resources due to population growth and high demand from the industrial and agricultural sectors, declining water availability, the deterioration of the quality of water bodies and the impacts of climate change, the reuse of treated wastewater (REUSE) has become a real alternative to safeguard natural resources, make up for shortages of conventional water resources, particularly in agriculture, and improve water security, sustainability and resilience.

REUSE, also known as water recycling, recovers volumes of water from domestic wastewater, then treats it sufficiently to be safely reused for beneficial purposes such as agriculture.

REUSE projects have been undertaken in most countries around the world. COSTEA has chosen to focus on six countries (Algeria, Bolivia, Morocco, Palestine, Senegal and Tunisia) where they are particularly numerous and which are working to develop an appropriate framework for the use of recycled water in irrigated agriculture. What are the main lessons learned from their experience of reusing wastewater, and which avenues should be explored to take advantage of this resource to support more sustainable and resilient agriculture?



## KEY MESSAGES

REUSE programmes still face numerous technical, economic, social, regulatory and institutional challenges. Certain questions related to water quality and the assessment of long-term environmental, agronomic and health impacts remain unanswered. In addition, the economic benefits and financial performance of reuse for irrigation are difficult to assess and demonstrate. In order to propose solutions and avenues of reflection to identify levers for developing REUSE, six countries with contrasting contexts were the subject of the COSTEA study aimed at highlighting the lessons learned from REUSE projects, the difficulties encountered and recommendations for the success of REUSE projects.

COSTEA's structuring vision is to place REUSE at the heart of integrated water resource management on a territorial scale, so that it can constitute a sustainable alternative for improving water and food security in countries.

The five key messages that emerged from COSTEA's work are as follows:

- 1/ REUSE should be planned into the water cycle as a fully-fledged component of integrated water resource management.
- 2/ Sewage sludge and septage should be considered as a source of recoverable by-products and agricultural inputs rather than a constraint to be managed.
- 3/ Consolidate a governance framework conducive to the development of REUSE by strengthening procedures and the political, institutional and legal framework.
- 4/ The cost-effectiveness of REUSE should better integrate the social and environmental benefits, while relying on a clear definition of the role of the actors (both women and men) and the economic model.
- 5/ Controlling the health and environmental risks linked to REUSE requires REUSE project stakeholders to develop key components to anticipate risks and propose solutions adapted to the uses and territories.

## ISSUES AT STAKE AND OBJECTIVES OF THE ACTION

REUSE in irrigated agriculture is at the heart of several issues, demanding a concordance between multiple expert opinions and different actors, the economic viability of projects, the availability of funding, technical constraints, sensitive health and environmental issues and, in some cases, public acceptance. Therefore, the key factors for the successful planning of water reuse include not only technical know-how and the right regulatory and institutional framework, but also economic, environmental and social considerations.

Planned REUSE experiences have often failed for reasons related to poorly functioning treatment processes, limited institutional capacity, or the insufficient financial capacity of local communities to pay for water treatment services. Paradoxically, unplanned water reuse practices for irrigation purposes are very common but present a high health and environmental risk.

These issues highlight the interest in identifying and analysing the successes and constraints of REUSE projects in each of the COSTEA target countries from several perspectives (technical, institutional, economic and social), to carry out a benchmark of them, particularly in regulatory and institutional terms, and to make recommendations to decision-makers that could lead to progress in existing REUSE projects and guarantee the success of future projects.

The 'REUSE' project, which is the subject of this policy brief, addresses these issues and contributes to tackling the following challenges:

- Sustainably managing REUSE operations by integrating the entire value chain, from wastewater collection to the final product resulting from REUSE;
- Taking advantage of the opportunities offered by REUSE and the possibilities of recovering its by-products by distinguishing two scales for REUSE: the peri-urban scale and the scale associated with extensive sanitation systems in rural areas;
- Developing a good governance framework for REUSE projects through the coordination of operations, the involvement of actors at different levels, the clear division of responsibilities between sanitation and reuse actors, the adaptation of the monitoring and control systems of the value chain to the context, and the inclusion of farmer users;
- Improving regulation through standards for the use of treated wastewater and sludge that are adaptable to the context of use;
- Renewing the approaches for evaluating the profitability of REUSE projects within the framework of integrated and territorial management, in order to better assess the economic and financial balance of projects.

The general objective of this project was to analyse the conditions for the success of REUSE and to provide keys to decision-makers and actors in REUSE projects to identify opportunities to develop or improve existing or planned REUSE schemes. The ambition is to support public policies to promote the roll-

out of this practice, which aims to be sustainable, efficient and innovative, by tackling all aspects of the problem and targeting all actors involved.

The specific objectives of the study were to: (i) produce knowledge on the different aspects of REUSE and on different sites, in response to local needs and ongoing operations, (ii) capitalise on feedback by identifying pilot projects, good practices and developing reference tools, while learning from the difficulties encountered, and (iii) network national and regional actors and create opportunities for exchanges between COSTEA members with expertise in reuse, to capitalise on and transfer what has been learned through the work carried out, and strengthen multi-actor dialogue to support the emergence of sustainable projects, designed in an integrated vision of REUSE.

By conducting this project simultaneously in six countries and applying it to two scales of operations: formal operations in peri-urban contexts and decentralised operations in rural areas, this study aims to promote the structuring of REUSE projects around the issues of sustainable irrigated agriculture and to draw conclusions on the main factors of success.

Depending on the regulatory, institutional and socio-economic frameworks of each target country, the conditions for success and possibilities for improvement have been analysed from different angles to support the implementation of REUSE projects that best guarantee the sustainability, viability and safety of the operations and the associated products.

## PRESENTATION OF THE METHODOLOGY AND CONTEXTUAL ELEMENTS

The REUSE Structuring Action was launched in December 2020. As international operator, Société du Canal de Provence (SCP), was in charge of coordination and facilitation in order to document REUSE systems and experiences for the six countries (Algeria, Bolivia, Morocco, Palestine, Senegal and Tunisia) through collective and participatory workshops, and including wastewater reuse projects in small extensive systems in small localities (<1000 population equivalent) and urban and peri-urban treatment plants.

In connection with SCP, pairs of national operators in each of the six countries played a reference role by ensuring a national interface to carry out the work of identifying experiences, for the choice of the study sites, and to facilitate the national and local workshops with the participation of the various target actors and national supervisory authorities.

Countries of intervention of the REUSE SA

Country	Pilot sites and study scales
Algeria	Wadi el Bir (centralised approach) and Tafilalet eco-district (decentralised approach)
Bolivia	Sacaba (centralised approach) and Cliza (decentralised approach)
Morocco	Tiznit (centralised approach) and Sidi Abdallah el Bouchouari (decentralised approach)
Palestine	Jericho (centralised approach) and Anza-Jenin (centralised approach)
Senzgal	Niayes and Thiès (centralised approaches)
Tunisia	Sfax Sud and Nabeul Souhil (centralised approaches)



The study was organised in five stages:

1. The development of a common intervention methodology for the six target countries;
2. Analysis of the REUSE situation in each country and a comparative summary of the six countries;
3. The choice of two exemplary operations for each country corresponding to the two scales selected, and the organisation of four participatory workshops, two at national level and two at the level of the study sites;
4. The development of a regulatory and institutional benchmark for the six countries;
5. The organisation of a final feedback seminar leading to the recommendations of the study.

For each of the countries, the first national workshops, which were held with institutional actors (ministries, state agencies, research, civil society, etc.), were devoted to validating the situational overviews and selecting sites based on a multi-criteria evaluation applying each of the four themes and following the logic of the two levels of scale. The local workshops for each of the selected sites brought together the local actors and users involved in REUSE operation (decentralised services, local authorities, WWTP managers, women and men farmers, value chain actors, etc.) in order to collectively identify the main difficulties encountered as well as the key success factors of REUSE projects. The second national workshops formalised national recommendations for the development of REUSE.

To close the study, a feedback seminar held on 14 and 15 June 2022 in Tunisia, brought together all of the actors to share the conclusions and agree on the collective follow-up to be given to

this structuring action. At the end of the study, a community of experts was created made up of COSTEA members interested in this topic, the international operator, national operators, institutional focal points, researchers and international organisations.

In the Mediterranean region, **several international organisations** have launched similar initiatives for the development of REUSE in the region. In order to provide collective support, COSTEA took steps to consult with the Sahara and Sahel Observatory (OSS), the Food and Agriculture Organization (FAO) and the Mediterranean Water Institute (IME), to ensure that the various studies are complementary and bring specificities to the reflections led by these organisations on this subject. The situational overview of REUSE in the six target countries, presented briefly below, is based on documentary research that has provided a rich bibliographic database available on COSTEA's website.

**Algeria**

Of the 200 wastewater treatment plants in operation in 2021, 17 were subject to REUSE for irrigation purposes, mobilising a volume of 18 million m<sup>3</sup> of purified water which has been used for agricultural purposes to irrigate 11 500 hectares, notably fruit trees (date palms, olive trees, etc.) and some cereals. The reuse potential amounts to 45 000 hectares from 81 purification systems in operation and under construction. The REUSE governance process consists of three interconnected stages: the concession study, sanitary control and water use. Each stage involves a number of actors. In rural areas not connected to the public sewage system, unplanned REUSE initiatives are carried out by local actors such as farmers and civil society. Algeria does not currently have a regulatory text on sludge management.

**Bolivia**

Bolivia has a regulatory framework for the conservation, protection and use of water resources but no specific framework for wastewater reuse. A regulatory framework governs the quality of all water bodies, and quality classes are assigned to different types of crops. It is estimated that more than 7 000 ha (2% of the country's irrigated production area) is subject to direct or indirect wastewater reuse. Approximately 40% of the wastewater volumes from the country's WWTPs are reused indirectly. The direct reuse of effluents is practised in 8% of WWTPs and the treated wastewater reuse systems are self-managed by the farmers themselves. The classification of water bodies according to their quality and suitability for use (and reuse) must be carried out in strict compliance with the maximum permissible values of 80 parameters. In addition, reuse is only envisaged for the production of high-stemmed crops and not for the production of vegetables. With regard to sludge management and reuse, the country's experience is still limited.

**Morocco**

In 2021, there were 156 operational WWTPs and 79 WWTPs under construction. The volume of treated wastewater is approximately 400 million m<sup>3</sup>, not counting the water discharged into the sea from the outfalls of coastal cities. Agricultural REUSE

is struggling to emerge while other uses, such as watering of golf courses and green spaces and industrial use, have proven to be operational and are being developed with strong support from the Moroccan government. Indeed, despite a strong national will to develop agricultural REUSE, projects are in a mixed situation between stalling and attempting to start up (20 million m<sup>3</sup>/year by 2021). No large-scale project is operational to date and only small pilot projects (400 to 1 000 m<sup>3</sup>/day) have been carried out and made it possible to develop technical reference systems and strengthen scientific skills. Sludge management is not sufficiently integrated into the 'water' value chain, although initiatives have been stepped up in the last decade, encouraged by the National Shared Sanitation Programme (PNAM, Programme national d'assainissement mutualisé).

### Palestine

With the scarcity of water resources and lack of access to water, Palestine considers treated wastewater as one of the sources of water that can be used for different purposes, including agriculture. The Palestinian Water Authority (PWA) considered REUSE as one of the five strategic 2017-2021 objectives for the water sector. Currently, more than two thirds of the wastewater collected in the West Bank and Gaza is treated by 22 WWTPs producing 48 million m<sup>3</sup> of treated wastewater annually. However, not all treated wastewater meets the REUSE specifications and standards set between 2010 and 2012, partly due to the poor operation of some treatment plants. There are already planned REUSE operations in Ramallah (green areas), Jenin (for agricultural use on 500 ha), Gaza (for less than 5% of wastewater) and other large cities in Gaza and the West Bank. On a small scale, there are about 15 small wastewater treatment plants that practice REUSE, often after extensive treatment. There is no experience of sludge management on an operational scale; all of the practices and projects are either at pilot or research project level.

### Senegal

Senegal has a legal, institutional and regulatory framework for REUSE. However, only three cases of planned REUSE were identified, at the pilot stage and supported by the World Health Organization (WHO) and the Food and Agriculture Organization (FAO). These sites are located on the northern outskirts of Dakar and in the Thiès area and use a volume of 600 000 m<sup>3</sup> of treated water for the irrigation of market garden crops. The main reuse of sludge currently concerns septage from non-collective or semi-collective sewerage (latrines). It is used for agricultural purposes after a summary treatment. It is in this context that there is currently a whole value chain for the recovery of septage in market gardening activities in the Niayes area and for the two pilot sites of Patte d'Oie and Pikine.

### Tunisia

Tunisia was a pioneer in agricultural REUSE, which began in 1965. According to the latest available report on REUSE, there are 31 irrigated schemes with an irrigable area of 7 437 ha, of which 22 are operational with an area of 6 387 ha. There were 122 WWTPs in 2020 treating a volume of 287 million m<sup>3</sup> annually. However, the WWTP stock is ageing, which explains

the non-functionality of some schemes. The REUSE regulatory framework is in place but bacteriological analyses are infrequent and the sanitary measures (protective equipment for farmers, vaccination, ban on direct grazing) as defined in the REUSE specifications are often not respected. No monitoring of the water salinity or soil is carried out in the majority of projects. As far as sludge is concerned, the Tunisian regulatory framework aims to protect public health and the soil under the country's specific climatic conditions. Restrictions on use are applicable to market gardening. It is also forbidden to use liquid sludge and non-sanitised sludge. In 2015-2016, an action plan for sludge management was broken down into four regional master plans (Greater Tunis, North, Centre and South) which defined the sludge treatment and recovery chains (agricultural, energy and landfill), infrastructure planning and accompanying measures.

## RESULTS OF THE STUDY, KEY MESSAGES AND LIMITS OF THE APPROACH

The analyses resulting from the COSTEA REUSE action make it possible to formulate a number of messages and recommendations which are developed below. These aim to contribute to the emergence of sustainable agricultural REUSE projects to meet the challenges of adapting to climate change, the social and economic development of territories, and the introduction of technical, institutional and economic innovations to ensure the success of projects.

**1/ REUSE should be planned into the water cycle as a fully-fledged component of integrated water resource management.** Much of the world's agricultural land is irrigated by unplanned wastewater reuse systems, i.e. reuse with or without treatment after return to the natural environment and dilution via surface or groundwater. The lack of planning does not allow for the necessary control of the health and environmental risks or the cost-effectiveness of wastewater treatment (where it exists). The planned reuse of wastewater in agriculture, on the other hand, consists of integrating REUSE into the hydrological cycle as an integral component of integrated water resource management on a territorial scale. It thus aims to make REUSE safe through an adequate treatment of the wastewater according to the intended uses and their required quality, and the environmental sensitivity of the surroundings. REUSE planning is not incompatible with an indirect reuse of the water after it has passed into the natural environment. In this case, self-purification phenomena can be taken into account in addition to treatments by purification processes (barrier effect). REUSE planning also includes the question of monitoring and controlling water quality throughout its cycle to ensure that the level of water treatment effectively matches the intended use and environmental requirements. In this respect, Bolivia has an interesting regulatory framework that classifies all water bodies (including treated wastewater) into categories according to the quality of the water. On the basis of this, the

regulations impose a water class depending on the different types of irrigated crop.

**2/ Sewage sludge and septage should be considered as sources of recoverable by-products and agricultural inputs rather than a constraint to be managed. Although septage is perceived as a difficult issue to manage, it is in fact an opportunity and an asset for territories.** This by-product, even more than wastewater, represents on the one hand, an environmental and health risk, and on the other, a nutrient resource that can contribute to improving the organic matter content of soils and their fertility. Sludge management can be a relevant option, as shown by the example of Senegal, where several secondary towns have treatment plants for septage that is recovered and used in agriculture as substitute fertilisers. We also note the emergence of a parallel market for untreated septage, which is risky from a health point of view and requires support from the public authorities. Spreading sludge after its stabilisation seems to be another relevant solution, which would also make it possible to maintain the moisture and organic matter content of the soil, which is crucial in irrigated agriculture in hot climates. The development of the sludge value chain requires a systemic territorial approach that involves stakeholders at the local level and at each stage of the chain in order to progress towards complete and functional services. Strategic plans for septage management should cover the whole territory and define implementation actions by area, taking into account urban development, land use, types of habitat and the characteristics of the sanitation systems. Communication and coordination mechanisms in the different planning and management phases will enable the value chain to become a real driver of local development.

**3/ Consolidate a governance framework conducive to the development of REUSE by strengthening procedures and the political, institutional and legal framework.** The major obstacles to the development of REUSE projects are largely associated with political and institutional constraints. Conflicting policies and a lack of institutional support often explain the failure of REUSE projects. The main success factors to be considered in the definition of this framework are: (i) **the prioritisation of REUSE in water policy to promote a more efficient use of water resources**, through regulations, financial resources and incentives. This support at government level encompasses national policies and sectoral strategies, but also the receptiveness of local authorities and decision-makers ; (ii) **the coordination of stakeholders**, and their involvement through the designation of an operations coordinator, the definition and application of the roles and responsibilities of each actor in the chain, strong commitment from the authorities, an operational governance framework for projects and capacity-building strategies ; (iii) **the national and international harmonisation of standards** in order to reduce the excessive differences in standards between countries, which constitute a serious barrier to trade. The harmonisation of regulations could be progressively strengthened as each country gains experience; (iv) **the consideration of the socio-cultural**

**dimension** at different scales, through formal mechanisms for consulting women and men farmers and consumers at the design stage and throughout the life cycle of projects; (v) **effective risk management**: REUSE always involves a certain level of risk in terms of the quality of the treated water and of the agricultural products and the uses to which it is put (see message 5). To mitigate this, it is recommended that the Sanitation Safety Plan (SSP) developed by the WHO be integrated into the planning process for REUSE projects, in order to identify the risks and define the measures to be taken to reduce the health risks generated by the use of wastewater and sludge in agriculture.

**4/ The cost-effectiveness of REUSE should better integrate the social and environmental benefits, while being based on a clear definition of the role of the players and the economic model.** Conventional economic and financial evaluation methods almost systematically make REUSE projects unjustifiable. This is mainly due to the fact that the social aspects (for example, the involvement of local people in small rural REUSE projects) and environmental aspects (in relation to the preservation of other water resources through substitution effects) are undervalued in conventional analyses, even though they are - or should be - considered to represent considerable added value in terms of the general interest. However, examples from countries such as Palestine show that the sustainability of REUSE projects in its three components (economic, but also social and environmental) can be approached through methodologies such as life cycle analyses or cost-benefit analyses that explicitly take into account externalities of a social nature (job creation and fertiliser savings) and environmental nature (preservation of surface and groundwater quality and ecosystem services), as well as the benefits of the multi-use of water (industry, green spaces, etc.). Nevertheless, to ensure the sustainability of REUSE projects, it is essential to clarify its institutional and financial set-up as soon as possible (Who finances the storage and distribution infrastructures? Who is in charge of the operation? What remuneration for the reused water?)

**5/ Controlling the health and environmental risks linked to REUSE requires REUSE project stakeholders to develop key components to anticipate risks and propose solutions adapted to the uses and territories.** Health and environmental risks are among the main concerns regarding REUSE in agriculture. Achieving health and environmental objectives requires monitoring and evaluation of the system, the definition of the responsibilities of the monitoring and control institutions and services, documentation of the status and operation of the treatment, and independent confirmation that it is functioning properly. A risk analysis approach is recognised as the basic methodology for developing standards for the safety of water users and agricultural products. Where a REUSE project involves an extensive treatment process attached to a decentralised rural sanitation system, the health risks can be addressed by adopting a WHO 'multi-barrier'-type approach, supported by local development and project guidance rather than



an approach based on restrictive limit values. Upon the completion of COSTEA's work, it was apparent that REUSE is a field that requires continuous innovation to fill the gaps raised and remove the constraints to its development. Much of the existing knowledge comes from laboratory or field research without a real horizontal (between institutional actors) and vertical (integrating farmers and consumers) interconnection. It is imperative to develop methods to increase the level of local expertise and support institutional capacities. COSTEA therefore recommends setting up **living labs for REUSE based on the interconnection and development of the COSTEA study sites to support innovations in REUSE projects**. The living labs could be set up as long-term collaborative platforms for disseminating knowledge, capitalising on experience and producing information to improve REUSE processes. **A COSTEA-REUSE living lab** will be set up with the teams involved in the study (experts, institutions, farmers, local civil society) to create, in a participatory approach in each of the countries and at the level of their pilot sites, research and development poles producing innovative educational tools and services in the various REUSE disciplines. The study sites will thus serve as showcases for disseminating and communicating good practices, research results and the various approaches tested (cost-benefit analysis, life cycle analysis, etc.). This living lab could be opened to other countries and pilot sites on an international scale.

### Limits of the approach

Despite the interesting results obtained, the implementation of this project nevertheless had certain limitations. This was the case, for example, with the choice of sites representing the two scales, which was not possible in all of the countries due to the non-existence of case studies (Senegal) or the preferences of the institutions (Tunisia). The national and local workshops also created expectations among institutions and actors to translate the study's recommendations into concrete projects in the field, which are beyond the scope of this study but which could be the subject of future projects.

## COSTEA OUTPUTS IN RELATION WITH THE STUDY

- An inception report ([www.comite-costea.fr/actions/reuse](http://www.comite-costea.fr/actions/reuse))
- The bibliographical inventory report ([www.comite-costea.fr/actions/reuse](http://www.comite-costea.fr/actions/reuse))
- The country synthesis reports ([www.comite-costea.fr/actions/reuse](http://www.comite-costea.fr/actions/reuse))
- A benchmark report on wastewater reuse regulation and governance in agriculture ([www.comite-costea.fr/actions/reuse](http://www.comite-costea.fr/actions/reuse))
- A final synthesis report with recommendations ([www.comite-costea.fr/actions/reuse](http://www.comite-costea.fr/actions/reuse))
- A documentary database ([www.comite-costea.fr/base-documentaire-eau-et-agriculture](http://www.comite-costea.fr/base-documentaire-eau-et-agriculture))

#8- 2023

# POLICY BRIEFS

## 'Valley Bottoms' Structuring Action

# The valorisation and development of valley bottoms in West Africa: a new approach to design more sustainable projects

Valley bottoms are humid facets of land in Sudano-Sahelian Africa. They have a complex water regime with alternating floods and droughts. They have a variety of uses, playing multiple roles in food security, and are coveted for their productive potential (concentration of water resources and fertile soils) despite their ecological fragility (erosion, biodiversity issues, pollution). In addition, global changes - climatic and demographic - are having a major impact on these areas, with high economic, social and environmental stakes. Since the great droughts of the 70s and 80s, these areas have been the focus of development programmes, mainly for rice growing and sometimes for market gardening. The aim is to create water conditions that are more favourable to the expansion and intensification of crops. The results of these programmes in terms of sowing, yields, durability of the structures and facilities, the environment and social ownership (land disputes) are often inadequate, which means that overall sustainability is poor. The design studies appear to be partly the cause of these shortcomings.

## KEY MESSAGES

1/ Place valley bottom development projects in a long-term perspective aiming for the social, economic and ecological sustainability of the development; this approach is not explicit in current study and design programmes for valley bottom development, where only environmental and social protection measures are planned (compensation and not impact avoidance or reduction).

2/ Promote the active participation of beneficiaries in the co-construction of a development 'solution'. This means a transition from consultations that are scarcely taken into account to a project that is defined jointly, in all its dimensions.

3/ Integrate an interdisciplinary approach for a more comprehensive pre-development diagnosis; this involves taking into account the multiple issues at stake on the sites (multi-functionality, biodiversity, water regulations, social organisation) but also documenting the land redistribution and agricultural development projects at an early stage, which until now have been considered after the dykes have been implemented.

4/ Implement five complementary methods proposed to operationalise the principles of sustainability and participation: (i) adopt a spatial and interdisciplinary approach to the context, (ii) introduce an environmental diagnosis as early as the detailed preliminary design phase, (iii) focus the hydrological analysis on agronomic and water management purposes, (iv) carry out a more in-depth social and land tenure diagnosis to



ensure fair access to the valley bottom, (v) add an agronomic study with a view to sustainable development to the detailed preliminary design.

5/ Provide adequate material and human resources to conduct detailed preliminary design studies integrating complementary methods dedicated to each site.

## ISSUES AT STAKE AND OBJECTIVES OF THE ACTION

The growing interest for the agricultural development of valley bottoms in West Africa, in particular through the Sahel Irrigation Initiative (2IS), has motivated this COSTEA structuring action (SA) carried out in collaboration with the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS). The objective of this SA is to analyse and improve methods for designing and supporting valley development projects in terms of: (i) better knowledge of the physical and social environment and of economic and technical opportunities, (ii) the participation of beneficiary users in the preliminary diagnosis and choice of design options, particularly by taking into account the implications of these options on water, crops, the environment and access to resources.

By mobilising national and international experts, the COSTEA 'Valley Bottom' action implemented case studies in Mali, Burkina Faso and Niger, in the context of a development process led by the Sahel Irrigation Initiative Support Project (PARIIS). Two valley bottom sites were used as illustrations in each country to test interdisciplinary and participatory diagnostic methods and tools, with a view to identifying the main issues at stake in a development project and proposing improvements in project design and monitoring procedures.

The study principle adopted was to cover three main themes, each giving rise to field expertise, in 'hydrology and hydraulics', 'agronomy and the environment' and 'socio-economics and land tenure' respectively, and then to integrate these expert assessments into a joint diagnosis and participatory approach at each study site. These studies were coordinated by a tandem made up of a 'national key expert and an international expert' from the consortium. This involved coordination and collaboration between the thematic experts in the interface areas of: the agricultural and social management of water, the strategies and practices of local stakeholders, and land development and allocation.

## PRESENTATION OF THE METHODOLOGY AND CONTEXTUAL ELEMENTS

The study was conducted by the CIRAD-INSUCO-IRD consortium<sup>1</sup> in partnership with the IER in Mali, the INERA and the HCS office in Burkina Faso, and the University of Niamey in Niger. The experts brought together by the consortium exchanged regularly with the PARIIS teams in order to gather documentation on the case study sites, learn about current development projects and report on the progress of the diagnostic work. The following sites proposed by PARIIS were selected, mainly in Sudanese climatic zones:

- Mali: micro-dam projects for rice and market gardening:
  - Doumba-Sokorola (commune of Doumba, Koulikoro cercle), a densely populated area, with sesame and market gardening as cash crops;
  - Senou (commune of Kemekafo, Dioila cercle) in a cotton-growing zone;
- Burkina Faso: contour bund projects for valley bottom rice cultivation:
  - Tialla (commune of Fara, province of Boucle du Mohoun), sesame and gold mining zone, with the rehabilitation of older schemes;
  - Nambé (commune of Koubri, Centre province); peri-urban site with strong market gardening activity.
- Niger: (the only sites in the Sahelian zone), weirs to recharge the water table for market gardening:
  - Founkoye (commune of Tahoua) peri-urban, water-rich valley segment with weirs to be rehabilitated;
  - Valley of Tadiss (commune of Tahoua), diffuse developments with wells.

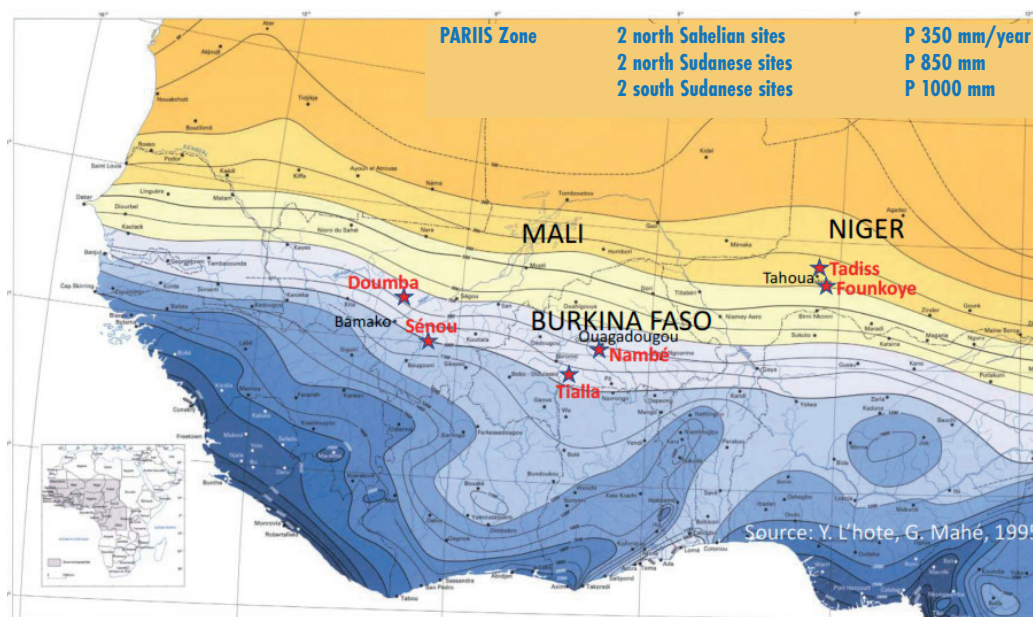
The expert assignments were carried out according to a common six-phase approach:

1. Meeting to introduce the teams to each other. Review of the detailed preliminary design and environmental and social impact assessment documents for each project underway;
2. Pre-characterisation of the study sites based on the available documentation and information gathered from the operators of the development projects on the sites (project ownership, PARIIS management units and consultancy firms). The study methodology, and in particular the content of the field surveys, was refined based on this prior knowledge of the sites and the detailed preliminary design studies;
3. A pre-diagnosis of the sites, which consisted of providing an initial overview of the resources, uses, social structures and constraints to be overcome with a view to development. This part of the assignment was preceded by a feedback meeting on the pre-characterisation with the national PARIIS team and discussions on the participation of PARIIS in the pre-diagnosis mission;
4. In-depth diagnosis of the sites with an evaluation of the physical and social sustainability of the current way in which the resources are used, the risks and potential, as well as the projected development options;
5. Feedback mission and participatory evaluation of the results of the diagnosis with local actors;
6. Feedback of the results and consultation with the project owners and the technical and financial partners of the development projects underway during a regional workshop on the methodological lessons learned.

The case studies carried out in each of the countries enabled lessons to be drawn on which the recommendations of this COSTEA structuring action are based. These lessons are outlined below, and are based on the contributions and limits of the current procedures for designing developments (detailed preliminary design) identified during the study.

1. CIRAD: Centre de Coopération internationale en recherche agronomique pour le développement (French Agricultural Research Centre for International Development); IRD: Institut de Recherche pour le Développement (French public research institution); IER: Institut d'Economie Rurale (Rural Economics Institute of Mali); INERA: Institut de l'Environnement et de Recherches Agricoles (Environment and Agricultural Research Institute of Burkina Faso); HCS: Hydro Climate Services.

Map of the case studies



### Pre-defined development models based on rural engineering expertise

Project design and feasibility studies are carried out by rural engineering experts who define a site development plan using four basic studies: (i) topographical; (ii) pedological; (iii) hydrological-hydraulic; and (iv) socio-economic. These plans involve a single model for valley bottom structures, defined from the outset at the level of the country on the basis of experience gained. These include the reinforced contour bunds of the Action Plan for the Rice Value Chain (Plan d'Action pour la Filière Riz, PAFR) in Burkina Faso, micro-dams in Mali and weirs in Niger. This standardisation reduces design costs and facilitates monitoring. It makes the most of national expertise, but hinders the identification of alternatives that could prove to be interesting and adapted to new site configurations (depending on the size of the catchment area, the pre-existing development dynamics, the objectives and constraints of the farmers, etc.).

The various technical and socio-economic studies are compartmentalised, and agronomy is either absent from or split between the different studies. The purposes of the structure or facility, and therefore the implications of the development options chosen for its exploitation, are not explored in depth. In particular, the hydrological studies in the detailed preliminary designs consulted deal only with the estimation of hydrological risks ('design floods') and do not assess the hydric risks (drought, flooding) to which crops are exposed, and the capacity of developed structures or facilities to mitigate them. Detailed preliminary designs are based on the assumption that there is a need to increase water resources, whereas excess water is another risk in valley bottoms. This inductive reasoning places the irrigation solution before the explanation of the problem to be solved: drought or excess water.

### General objectives focused on 'production development' but whose sustainability is not yet clearly set out

The detailed preliminary design reports generally begin by recalling the objectives of the PARIIS project as defined by the CILSS Task Force: assess **technical feasibility** (conditions to be met) and **viability** (socio-economic dimension), so that the development can **increase the irrigated area** (quantitative objective), **diversification** and ensure **optimum** conditions for the exploitation of the valley bottom (**efficiency, production**). Environmental and social considerations are limited to compensatory, social and ecological safeguards in the event of impacts, i.e. the environmental and social impact assessment (ESIA), which comes at the very end of the objectives. The second objective of diversification would mean promoting more than rice alone. While this is indeed the case in Mali and Niger, in both cases in Burkina Faso, the aim is to move from the diversified crops before development to an exclusively rice-growing programme, including in a peri-urban market-growing situation such as in Nambé.

The sustainability (economic, social, ecological) of this agricultural development is therefore not identified as a central objective. Ecological and social concerns are only to be found in the Environmental and Social Impact Statements, as though they were a condition coming 'after' the detailed preliminary design, in the shape of a formal procedure aimed at offsetting 'impacts.' However, given that social and environmental issues have become so prevalent everywhere, as have hydrological risks, particularly in the rare wetlands of these dry regions, it would be a form of modernisation to consider these goals from the outset, on an equal footing with the objective of economic production, so that these developments can play a pilot role in terms of awareness and innovation.

### **A normative approach to agricultural development and an implicit, standardised agronomic diagnosis**

In the basic studies preceding the identification of a development design, only scattered elements were found concerning current agro-sylvo-pastoral practices, the state of the environment or the type of enhancement that would add value to the development and protect the environment. Only the pedological study, based on the suitability of the land, proposes technical standards for development on the basis of the current technical research sheets. The reports from the various sites thus have a common basis. The projects are largely designed in advance on a standardised basis, despite the advantages of taking better account of local knowledge and context in order to improve the project. Even when developed, valley bottoms remain restrictive, at-risk environments, and the market price of local rice aligned with the low costs of imported industrial rice, is insufficient. All of these constraints mean that rice is still a secondary crop in the allocation of resources and working time, despite its potential. This justifies a more nuanced analysis, taking into account the different types of actors, their capacities and priorities.

This dispersed, all-purpose, normative agronomic approach which is not very comprehensive and not concerted, is partly due to the traditional preference of multi-site agricultural projects for a low-cost, prescriptive approach (top-down, technical sheets), as well as to a certain disciplinary culture of the consultancy firms hired for the detailed preliminary design (hydrology, rural engineering, pedology, socio-economics) that are not very familiar with agronomic and environmental issues. A comprehensive and concerted approach (surveys, focus groups, workshops), rebalanced (agronomic themes taking into account environmental objectives) and dedicated to each site, will require special arrangements (visiting the site at multiple seasons, involving an additional expert).

### **Consideration of environmental issues reduced to feasibility considerations, without integration into the project**

The environmental and social impact assessment is currently driven by a legal rather than a technical rationale, with a view to the validation of the project's feasibility by the supervisory authorities, and identifying measures to compensate for impacts, to be implemented via the Environmental and Social Management Plan (ESMP) accompanying the development. This study depends on another source of funding and specific consultancy firms. It is therefore not closely linked to the detailed preliminary design in terms of timetable and teams.

However, if the 'description of the environment' part of the Economic and Social Impact Statement was carried out at the same time as the other baseline studies, and included in the detailed preliminary design, the development project designed would undoubtedly be very different. It would be confronted from the outset with the fragility and unsustainability of a rice-growing development: the initial destruction of the entire wetland ecosystem, the transformation of a complex environment into a homogeneous area with several dozen hectares that lie barren

in the dry season, crossed by floods of increasing intensity, the lack of consideration given to the risks of erosion and the limited capacity of producers' organisations to maintain large structures. Similarly, the project would be able to take into account the many previous activities (multifunctionality of wetlands) and the relics of natural environments to be preserved, and could establish ways of greening rice and market gardening practices that are compatible with the local and regional natural and human contexts.

### **Limited participation of local people**

The principle of involving the beneficiaries in the process of developing valley bottoms is now recognised as a key to ownership and sustainability. The participatory approaches currently in place mainly involve public information meetings, consultation on the beneficiaries' contribution to the construction of the structures (labour to collect materials), and the setting up of a management committee and complaints committee. But this approach is more akin to awareness-raising or consultation than to effective, active participation by the users.

Another limitation to participation that was identified is linked to the posture of experts with technical knowledge and the capacity to prescribe, which the Project Management Units (PMUs) and consultancy firms maintain with regard to the beneficiaries. This stance does not always allow local knowledge to be collected and capitalised on (i.e. farming practices that have succeeded in coping with the constraints of valley bottoms and taking advantage of their resources, and vernacular classifications - soil, terrestrial and aquatic fauna, vegetation, crop varieties). This can create a discrepancy between the 'expert' vision of what valley bottom development should be and the beneficiaries' vision of what development should do for them to remove the constraints that have hitherto limited agricultural development.

### **Little account taken of the complexity of land tenure**

The organisation of plots of land, the customary rights governing access to land and the holders of rights over the valley bottom are poorly documented in the pre-development diagnosis, beyond the identification of the major landowning lineages and lists of rights holders that are not always exhaustive. The projects often envisage a reorganisation of the valley bottom land plots in order to ensure full development and to open up access to the land to a larger number of users (in particular to include those who have contributed to the work). However, the precise arrangements of these reallocations are left to the community to define once the development has been completed. Discussions about land ownership are perceived by project sponsors and developers as a potential source of conflict which would be detrimental to the completion of the project.

In principle, making land available for development is a condition of the site's eligibility. However, the issue of formalising the provision of land is rarely addressed by the projects and creates a degree of ambiguity. It is generally a 'land transfer statement'

which, for PARIIS, is supposed to represent a 'purge of rights' and their transfer to the project, and therefore to the State. In some cases, private projects can use this land transfer document to introduce forms of exploitation that are far removed from the interests of local communities. However, these documents may appear to be at odds with the national legal land tenure frameworks.

## KEY ISSUES ANALYSED IN OUR SITE STUDIES

The site diagnoses provided a deeper understanding of the key issues raised by valley bottom development and enabled methods to be tested to better integrate all of these issues into project design. The following five key issues emerged:

- mobilising and sharing water to secure crops and other uses (agriculture, livestock, fishing, foraging, wood) in the face of climatic risks, to extend crops and valorise the dry season;
- the functionality and sustainability of the development, ensuring that it is in line with the technical constraints of the site and is adopted by organised users;
- preserving a satisfactory environmental state: controlling the major risk of erosion, conserving biodiversity, rationalising multiple uses to make the most of the diversity of the environments, preventing pesticide pollution, etc;
- the social cohesion of the community and inclusion through appropriate management of the land in the developed area;
- adapting farming practices: limited-risk intensification, diversification, more environmentally-friendly practices, etc.

## RESULTS OF THE STUDY, KEY MESSAGES AND LIMITS OF THE APPROACH

The analyses carried out by this structuring action concerning valley bottom development have enabled COSTEA to formulate a number of messages and recommendations. These aim to promote the economic and social development of these areas and remove the obstacles to sustainable development.

**1/ Place valley bottom development projects in a long-term perspective aiming for the social, economic and ecological sustainability of the development.** Until now, sustainability has not been explicitly given as an objective for development projects, which remain focused on increasing agricultural production in the name of national food sovereignty or local food security. Only compensation measures (social and environmental safeguards) are proposed, with the idea that the adverse social and environmental impacts of any project are a matter of financial compensation or reforestation elsewhere. And yet technical failures, environmental degradation and past conflicts linked to previous developments have made local actors themselves aware of the risks and of sustainability. Some damage

cannot be compensated for because it cannot be assessed, such as the destruction of rare wetland species, soil erosion, the loss of power of former land managers as a result of the devolution of land to a project, foraging activities, etc. Previous developments have been accompanied by severe degradation of the environment through erosion and deforestation and by forms of social injustice, and local people feel that they have not been listened to enough, and would like new projects to start by managing these problems. Thinking about sustainability from an early stage (site identification, detailed preliminary design) rather than afterwards, will make it possible to equalise the three objectives of human, economic and environmental progress, without reducing the valley bottom to its purely productive dimension. Firstly, it is necessary to get back to the basics of development, which is not merely economic expansion but also human gain (building capacity, empowerment, independence and equity), in a spirit of adaptation to the environment (and so without a standardised vision). To implement the objective of sustainability, it is up to the project (and its funding agency) to accept to reconcile the project's economic ambitions (even if it means reducing them) with its social and environmental ambitions, and to reason in terms of 'areas of the environment sustainably managed without conflict' and not merely 'area of rice that can be sown in the scope of the development.' The environment involves long-term commitment, and therefore also has a value, which has several components: 'intrinsic' (the right of species to exist in their environment), 'use' (the material and immaterial value accorded to it by its many users) and 'non-use' (the potential future uses arising from its preservation and the ecosystem services resulting from good conservation). The social dimension involves listening to and effectively taking account of society, its expectations and the demands of its most vulnerable or dominated members (such as women and young people), while respecting local social structures.

**2/ Promote the active participation of beneficiaries in the co-construction of a development 'solution.'** The principle of participation is now recognised as an essential condition for the success of development projects, by going beyond a passive type of participation through information and awareness-raising. PARIIS has already taken a number of steps in this direction, including: identifying potential sites for intervention through surveys involving local actors to discuss viability criteria; analysing beneficiaries' objectives and expectations in the socio-economic baseline study of the detailed preliminary design; asking beneficiaries to contribute their labour to build the structures; and setting up a 'complaints committee' to readjust the approach when the development is being carried out. However, the objective of participation appears to be hampered by several factors that need to be corrected. Firstly, it is in contradiction with another project objective, which is to speed up execution by standardising the models of structures that are disseminated on a large scale. The pre-determination of the structure dedicated to valley bottoms on a country-wide scale limits the possibilities of adapting to farmers' preferences and

sometimes leads to increased development complexity to deal with sites with poor suitability for the model. Furthermore, participation also comes up against the habits and time constraints of the experts in charge of the diagnoses. Unfortunately, little use is made of local knowledge on the environment and the perceived restrictions for development. Gathering this knowledge requires additional survey resources, not limited to sociologists alone, but extended to technical experts in hydrology, soil science and agronomy or agro-ecology, where available. Finally, the participation of beneficiaries in project implementation is generally limited to material handling tasks, and local artisans are rarely involved, even though they could acquire maintenance skills. Moving towards the beneficiaries' active participation would therefore involve opening up the development options for each site, capitalising on the range of models of structures identified by PARIIS, taking greater account of the knowledge of the various valley bottom users (both women and men) about the constraints and opportunities for developing their environment, and integrating local artisan masons in skilled labour tasks.

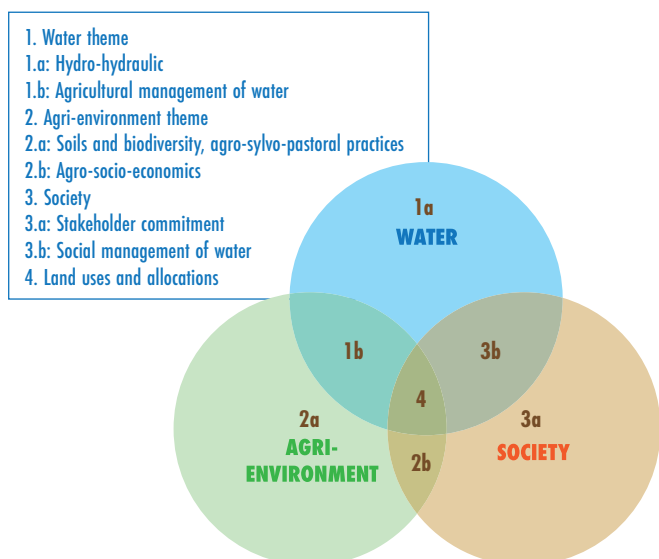
**3/ Integrate an interdisciplinary approach for a more comprehensive pre-development diagnosis taking into account the multiple issues of the sites.** Conventional pre-development diagnoses lack an overall understanding of the current site, the issues at stake (the valley bottom's current multiple functions, the expectations of the different categories of farmers, agronomic and environmental diagnoses) and the likely systemic consequences of various development scenarios. Indeed, everything is interconnected by well-established links and logics: the organisation of local society (land tenure system, economic system, hybrid customary/modern governance), the valley bottom ecosystem and the current system of activities. After development, the transformation will affect each of these elements. There will be winners and losers, and the target population will be confronted with the gap between the new development and their expectations. It would

therefore seem that the added value of a reform of the study processes should focus on three areas: (i) adding new themes to fill in the many gaps (e.g. no agronomy, environmental baseline produced afterwards, hydrology not sufficiently included in the agricultural management of water, the current land tenure system and its post-project reform scarcely addressed, etc.); (ii) strengthening the participation of local stakeholders, making the most of their local knowledge and taking current logics into account; (iii) integrating the three disciplinary viewpoints through interface themes: agricultural management of water, agro-economics, agri-environment, joint collection of knowledge and expectations, and cross-functional workshops with the beneficiaries and their support.

**4/ Implement the five complementary methods proposed in the framework of the COSTEA study to operationalise the principles of sustainability and participation:**

- The first method consists of providing a **synthetic and integrated (interdisciplinary) overview of the resources and uses of the valley bottom and their implications** for the development, and of the place of the valley bottom within the territory, based in particular on cartographic and territorial approaches.
- The second method involves **integrating the environment right from the pre-development study phase**. In particular, this involves understanding how the ecosystem has evolved to its current state and assessing ecosystem services in terms of their provisioning, regulating, cultural and support functions. It includes studying the prospects for greening productive development. Finally, once the development has been defined, an ESIA will lead to the definition of compensation arrangements for the ecosystem services lost.
- The third method aims to **focus the hydrological analysis on agronomic and facility management purposes**. In particular, this involves assessing the water risks for crops, and analysing the operation of the structures and their capacity to mitigate risks (agro-climatic analysis, rule curve for micro-dam reservoirs, drainage/retention functions of dykes).
- The fourth method aims to gain a better understanding of land tenure issues through a **social and land tenure diagnosis** to anticipate post-development tensions and foster equitable access to valley bottom land.
- The fifth method is to help reason the **adaptation of cultivation models** and uses for improved and diversified development, through an 'agronomy of practices' approach based on what already exists and know-how, and reasoning the adaptations and transformations.

**5/ Provide adequate material and human resources to conduct detailed preliminary design studies integrating complementary methods dedicated to each site.** The implementation of detailed preliminary design studies as recommended requires additional expertise and longer lead times. It also requires a reorganisation of the project cycle, integrating the environmental study as early as the





detailed preliminary design phase. As far as the environment thematic is concerned, the additional cost is therefore nil if it is ensured that the baseline study, currently included in the impact assessment, is produced in view of the detailed preliminary design, i.e. before the design of the development, which will be followed by an impact assessment.

### Limits of the approach

During its implementation, the COSTEA study encountered a number of difficulties in gaining access to the field due to the security situation in the countries concerned. The project team also mentioned that an additional expert in civil engineering would have allowed deeper reflection on the implications of the study's results on the design of structures.

With regard to the limits related to the results, it should be noted that the reorganisation of the detailed preliminary design and ESIA studies may come up against regulatory constraints that set the conditions for the assessment of environmental and social impacts. In addition to the formal validation of the study's recommendations by the final workshop, it would be advisable to test them initially with a view to refining the operating methods to make them compatible with the dedicated resources.

## COSTEA OUTPUTS IN RELATION WITH THE STUDY

- Three country reports: Burkina Faso, Mali and Niger, on the issues involved in developing valley bottoms and the conditions for designing projects ([www.comite-costea.fr/actions/amenagement-des-bas-fonds](http://www.comite-costea.fr/actions/amenagement-des-bas-fonds))
- Six site reports ([www.comite-costea.fr/actions/amenagement-des-bas-fonds](http://www.comite-costea.fr/actions/amenagement-des-bas-fonds))
- A report on pre-development diagnostic methods in West Africa ([www.comite-costea.fr/actions/amenagement-des-bas-fonds](http://www.comite-costea.fr/actions/amenagement-des-bas-fonds)) (deliverable 2)
- A report on the organisation of project studies and new methods for pre-development diagnoses of valley bottoms ([www.comite-costea.fr/actions/amenagement-des-bas-fonds](http://www.comite-costea.fr/actions/amenagement-des-bas-fonds)) (deliverable 3)
- A documentary database ([www.comite-costea.fr/base-documentaire-eau-et-agriculture/?\\_thmes=bas-fonds](http://www.comite-costea.fr/base-documentaire-eau-et-agriculture/?_thmes=bas-fonds))



## #9-2023 POLICY BRIEFS

Project: Irrigated Land Tenure in South-East Asia

# Irrigated land tenure in South-East Asia: the subject of limited attention; a major issue for the sustainability of irrigated territories

Agricultural development policies in South-East Asia are very often accompanied by land transformations that have two complementary faces: land concentration and exclusion. By changing the prospects for exploiting land, investment in irrigation tends to reinforce these trends. However, relatively little attention has been paid to the issue of irrigated land tenure, whereas it is crucial to take it into account to achieve the sustainable economic and social development of territories.



### KEY MESSAGES

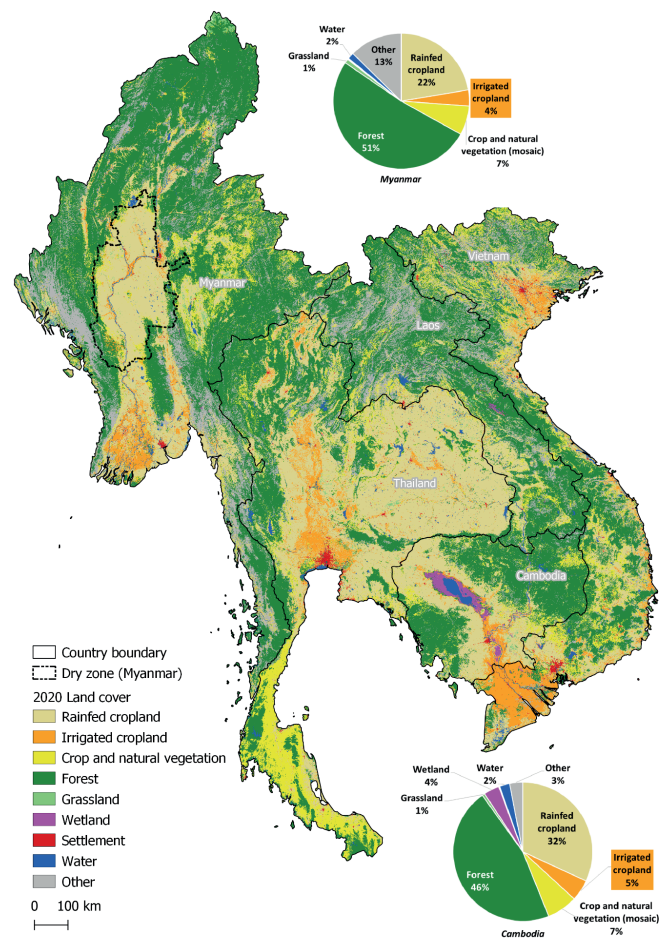
- 1/ Various texts govern the rights of access to and use of irrigated land, which are therefore generally recognised institutionally. The development of irrigated agriculture in forest and floodplain areas calls into question the conditions of access to and use of the resources that are prevalent in these areas. Accompanying measures need to be implemented to limit environmental degradation, the risk of conflict between actors and inequalities.
- 2/ Although farmers' rights are institutionally recognised, there is a high level of land tenure insecurity. This is linked to the dynamics of agrarian differentiation that affect intensive irrigated rice farming. Greater technical and financial support for the most vulnerable farmers would help to reduce the phenomenon of land concentration currently observed in favour of a minority of entrepreneurs.
- 3/ The land tenure dynamics associated with irrigated agriculture need to be the focus of specific attention from actors in the sector, which could take the form of territorial approaches and cross-sector collaboration..

### ISSUES AT STAKE AND OBJECTIVES OF THE ACTION

The development of irrigated agriculture is a priority for governments in South-East Asia, including those of Cambodia and Myanmar. By offering new prospects for agricultural development, investment in the sector is profoundly changing the relationships between societies and their environment, particularly the dynamics of access to, use and development of land, which are leading to major socio-environmental reconfigurations. However, to date in South-East Asia, and in contrast with other regions, little attention has been paid to the land tenure dynamics associated with the development of irrigated agriculture and their implications for the sustainability of the sector. The objective of this study was therefore to put this issue 'on the agenda' for actors in the sector, including ministries, funding agencies and non-governmental organisations. By carrying out a diagnosis of the various land tenure issues raised by irrigated agriculture in the different agro-ecosystems of South-East Asia, the study aimed to identify 'points of attention' to be taken into account in the formulation and implementation of projects aimed at developing sustainable irrigated agriculture that contributes to the fair and resilient development of rural territories.

### PRESENTATION OF THE METHODOLOGY

COSTEA's 'Irrigated Land Tenure in South-East Asia' project was implemented discontinuously over a three-year period starting in November 2019, in two countries, Cambodia and Myanmar. The project was led by two independent researchers specialised



Land use map for the Mekong region of South-East Asia (source: ESA-CCI land cover - mapping by J.-C. Diepart)

in land tenure issues, in close collaboration with COSTEA's Technical and Permanent Secretariat and CTFD (Comité Technique 'Foncier et Développement', Technical Committee on Land Tenure and Development). The aim of the study was to: (i) characterise the land tenure issues associated with the various irrigated agricultural systems in South-East Asia, and (ii) make recommendations on how these issues could be taken into account in future projects aimed at developing irrigated agriculture.

The study began by categorising irrigated systems by comparing: (i) the types of hydro-agricultural infrastructures and the level of water control they provide with (ii) their vulnerability to flooding. This cross typology was justified by the fact that irrigated agriculture is largely found in the region's large floodplains, as illustrated by the land use map presented here.

A review of the political, legal and institutional frameworks and interviews with resource persons (funding agencies, sectoral ministries) enabled us to draw up a (theoretical) situational overview of the way in which the question of land tenure is dealt with in the context of projects aimed at developing irrigated agriculture. In Cambodia, it was possible to compare this situational overview with the land tenure issues encountered in practice in five irrigated schemes that are representative of the

diversity of the systems existing in the country. Unfortunately, it was not possible to carry out this fieldwork (surveys with local resource persons and focus groups with farmers) in Myanmar, but the results obtained in Cambodia echo the literature existing on the subject in Myanmar.

## RESULTS OF THE STUDY, KEY MESSAGES AND LIMITS OF THE APPROACH

The analyses produced by the action on land tenure in South-East Asia have enabled COSTEA to formulate consensual findings and messages. These provide elements aimed at strengthening the economic and social development of irrigated territories by securing land tenure for farmers in the face of the phenomenon of land concentration and the development of agriculture in the 'pioneer fronts.' They also seek to promote territorial and participatory approaches in relation to land tenure dynamics.

**1/ Various texts govern rights of access to and use of irrigated land, which are therefore generally recognised institutionally.** There is no specific institutional framework for the governance of irrigated land, which is therefore regulated by various texts relating to the definition of land tenure systems (the Farmland Law in Myanmar, the Land Law in Cambodia), to land tenure management (the Land Acquisition, Resettlement and Rehabilitation Law in Myanmar, the Law on Expropriation in Cambodia), but also to the management of water, irrigation and fisheries, or environmental protection. Despite this multiplicity of texts, which can lead to confusion in some cases (see below), the majority of irrigated systems are located in the large floodplains where the population mainly belongs to the dominant ethnic groups (Bamar or Khmer). Rights of access to and use of irrigated land are generally institutionally recognised. Indeed, the majority of the irrigated land is eligible for land titles that can be transferred by inheritance or sale (whether as property rights, as in Cambodia, or usage rights, as in Myanmar). This can be explained in particular by the fact that, from the colonial period (late 19th century/early 20th century) and even earlier, the development of irrigation was associated with rice growing and took place in parallel with the creation of a land register aimed at generating income for the authorities, but which also had the effect of institutionalising access and use rights in areas considered to have high development potential. This approach, whereby the State builds its legitimacy on the development of irrigated rice growing (which is partly based on the institutionalisation of rights), has persisted regardless of the political systems and crises that these two countries have experienced since their independence.

**2/ The development of irrigated agriculture in forest and floodplain areas calls into question the conditions of access to and use of the resources that are prevalent**



in these areas. Accompanying measures need to be implemented to limit environmental degradation, the risk of conflict between actors and inequalities. The (land tenure) insecurity linked to the development of agriculture in the 'pioneer fronts' that make up the forest and floodplain areas is twofold. The first form of insecurity relates to the nature of the resources and the multiplicity of uses - in time and space - to which they are put. In forest areas, a large proportion of the population belongs to ethnic minorities, who historically practised slash-and-burn farming. The development of permanent agriculture, in which irrigation has played a part, has contributed to policies of sedentarisation and control of forest margins, largely based on a dual process of the privatisation and individualisation of land rights, with little regard for pre-existing customary rights. In rainforest areas (the Mekong and Ayeyarwadi deltas and around Tonle Sap), irrigated agriculture tends to establish 'the land' as the primary resource to be optimised, with water mainly being considered as an agricultural input in the same way as fertiliser and seeds. This has resulted in a lack of recognition of certain uses of these areas - and the associated access rights - first and foremost small-scale capture fisheries. The development of irrigation is responsible for the deterioration of these fragile environments, and can be a source of conflict between actors with divergent interests in the construction/management of hydro-agricultural infrastructures. The second form of insecurity relates to land tenure status in these pioneer front areas, which are generally not eligible for titling (protected areas, land in the domain of the State,

land considered 'virgin' or 'vacant'). It should be noted that the development of irrigated agriculture on these pioneer fronts is generally in contradiction with existing environmental legislation, but can take place either through the mobilisation of government funds (projects) or in the form of private investment by farmers and/or entrepreneurs and investors. Whatever the case may be, the fact that it is not possible to issue land titles means that the level of security of access and use rights is the result of multi-actor negotiations that form part of networks of patronage and influence from which small-scale farmers are often absent.

**3/ Although farmers' rights are institutionally recognised, there is a high level of land tenure insecurity. This is linked to the dynamics of agrarian differentiation that affect intensive irrigated rice farming.** Greater technical and financial support for the most vulnerable farmers would help to reduce the phenomenon of land concentration currently observed in favour of a minority of entrepreneurs. The development of irrigated rice growing has always been accompanied by the use of credit (seasonal credit to finance inputs and/or medium-term credit to finance agricultural equipment). Due to price volatility and a lack of maintenance, hydro-agricultural infrastructures can only provide a very partial guarantee of water supplies (particularly in the dry season). In this context, the widespread use of credit often results in high levels of debt. Debt, combined with a liberalised land market, has led to a concentration of land in the hands of a minority of individuals made up

of entrepreneurs, users and/or investors, while small-scale farmers find themselves agricultural employees and/or sharecroppers on land they have been forced to sell. In Myanmar, this phenomenon of land concentration has also been accelerated by the fact that the government has not hesitated to take back the land use rights granted to farmers if they are unable to comply with the obligation to cultivate rice, and redistribute them to entrepreneurs who are often close to the powers that be (who may or may not have complied with this obligation).

**4/ The land tenure dynamics associated with irrigated agriculture need to be the focus of specific attention from actors in the sector, which could take the form of territorial approaches and cross-sector collaboration.** The fact that land is irrigated (or that projects to develop irrigated agriculture are being planned and/or implemented) is not a criterion that the cadastral authorities, responsible for issuing land titles throughout the country, take into account when defining their titling programmes. These follow other logics, mainly the eligibility of the plot for titling, which does not depend on irrigation. The funding agencies, for their part, endeavour to identify the owners of land located in the schemes whose rehabilitation and/or construction they are financing, but this identification work: (i) is primarily aimed at identifying the people liable for future financial contributions dedicated to infrastructure maintenance and (ii) does not make it possible to monitor the numerous land transactions that characterise irrigated agriculture (see above). The fact that rights to irrigated land are generally recognised institutionally undoubtedly explains the lack of specific attention paid to the subject by actors in the irrigation sector. However, the sources of insecurity and the risks of conflict are real, and closer attention needs to be paid to the land tenure dynamics that accompany the development of irrigated agriculture. As these land dynamics are part of wider socio-eco-environmental transformations, it is necessary to adopt planning and monitoring approaches that are territorial, cross-sectoral and multi-actor. These approaches should pay particular attention to land transactions and recourse to credit, with a view to avoiding over-indebtedness and distress sales of land by the most vulnerable households, so that the development of irrigated agriculture is not accompanied by a growth in inequalities.

### Limits of the approach

The study on irrigated land in South-East Asia was mainly confronted with difficulties linked to health and political crises. These made fieldwork difficult, particularly in Myanmar. More generally, one of the major issues remains finding levers to provide operational responses to the problems identified in this policy brief, which are closely linked to strong political choices in terms of agricultural development priorities and methods. In particular, this would mean strengthening links with the ministries in charge of management and putting the specific issue of irrigated land tenure on the (political) agenda.

## COSTEA OUTPUTS IN RELATION WITH THE STUDY

- Interim report on the Cambodia project (in English) ([www.comite-costea.fr/actions/foncier-irrigue](http://www.comite-costea.fr/actions/foncier-irrigue))
- Final report on the Cambodia project (in English) ([www.comite-costea.fr/actions/foncier-irrigue](http://www.comite-costea.fr/actions/foncier-irrigue))
- Final report of the Myanmar project (in English) ([www.comite-costea.fr/actions/foncier-irrigue](http://www.comite-costea.fr/actions/foncier-irrigue))
- Synthesis on 'Irrigated land tenure in Myanmar and Cambodia' (in English) ([www.comite-costea.fr/actions/foncier-irrigue](http://www.comite-costea.fr/actions/foncier-irrigue))
- First articles of a special issue posted online for Cahiers Agricultures ([www.comite-costea.fr/actions/foncier-irrigue](http://www.comite-costea.fr/actions/foncier-irrigue))
- A documentary database ([www.comite-costea.fr/base-documentaire-eau-et-agriculture](http://www.comite-costea.fr/base-documentaire-eau-et-agriculture))

# Major challenges for the sustainable management of groundwater-irrigated land in the Maghreb countries: food security, resource conservation and social justice

The management of land and water rights has become a crucial issue in the Maghreb, where the commodification and individualisation of these resources are increasing. Policy makers are therefore faced with a major challenge: how can we encourage dynamic irrigated agriculture while guaranteeing its long-term sustainability? The over-exploitation of resources due to the individualisation and commodification of land rights has accentuated this challenge. It is therefore essential to clarify and secure women and men farmers' rights to land and water, while ensuring the responsible and sustainable management of these natural resources.

## KEY MESSAGES

- 1/ The constitution, importance and management of public agricultural land in the Maghreb countries reveal (i) a similar historical legacy resulting from the introduction of modern law and the influence of standards inherited from colonisation and local traditions, and (ii) divergent post-independence political choices and sectoral priorities linked to national agricultural policies and the choice of agrarian reforms.
2. The liberal land reforms in the Maghreb are marked by a hesitant/slow move towards the institutionalisation of land markets, including the market in rights of use.
3. The development of irrigated land has led to remarkable production performances but the emerging production models are manifestly unfair and unsustainable.
4. It is necessary to harmonise land extension policies and water policies to preserve groundwater, for the sustainable and equitable agricultural development of the arid zones of the Maghreb.
5. It is essential to rethink the policy on irrigated land in order to meet the current and future challenges facing the agricultural sector, by promoting the sustainable management of natural resources and equitable access to irrigated land and water.

## ISSUES AT STAKE AND OBJECTIVES OF THE ACTION

The major challenge currently facing policymakers in the Maghreb (Algeria, Morocco and Tunisia) is how to ensure that irrigated agriculture, which is dynamic but largely informal, is sustainable. To this end, one of the issues at stake is to strengthen the security of farmers who hold rights to land and access to water, depending on the types of rights they hold or to which they refer, and according to the formal and informal transactions that take place concerning these resources.

The aim of the structuring action on irrigated land tenure in the Maghreb was to address the issue of securing rights to state-owned land and to the land of ethnic communities that is administered by the State, where processes of the individualisation of rights of use and ownership are underway. These latter are accompanied by increasing access to groundwater and the development of land transactions.

The specific objectives of this action were as follows:

1. Characterise the modes and rights of access to land and water, and understand the interactions between the range of rights and practices in force on the ground, between individuals and collectives on the one hand, and that are formal and informal on the other;
2. Evaluate the economic, social (equity) and environmental efficiency of land access methods for the development of irrigation in the context of the accelerating individualisation and commercialisation of land and water rights;

3. Analyse the ways in which transactions involving these resources are regulated in different land and water access configurations.

## METHODOLOGICAL APPROACH OF THE STRUCTURING ACTION AND ELEMENTS OF ANALYSIS

The study adopted a global approach to analyse the land tenure systems and their historical evolution, examining the impact of public policies on these latter. It also presented a detailed panorama of modes of access to land through an analysis of diverse representative practices, characterised by significant differences in terms of land and water resources. The choice of case studies focused on groundwater-irrigated land incorporating different types of water table (fossil, renewable, coastal) and land tenure systems (collective land, private domain of the State and melk land) in the three countries. Finally, the study culminated in informed conclusions on trends, whether in favour of land concentration or in favour of facilitated access to land for new actors.

Countries of intervention of the structuring action on irrigated land in the Maghreb

Country	Case study
Algeria	Mitidja plain
Morocco	Saïs plain
Tunisia	Governorate of Zaghouan



The study was carried out on behalf of COSTEA by the consultancy firm Agrconcept, responsible for regional coordination, and by several national operators from the three countries of the Maghreb (Algeria, Morocco and Tunisia). In the three countries where the action was implemented, the study involved local institutions in the diagnostic and result-sharing phases. The COSTEA study also placed the subject of irrigated land tenure in the debate with the national authorities and the CTFD. To do this, feedback and discussion workshops were organised at regional or national level depending on the approaches adopted by the countries<sup>1</sup>. The objectives of the workshops were to:

- inform institutional actors of the ongoing agrarian dynamics and trends, but also of less visible evolutions;
- discuss the issues at stake in relation to the ongoing agrarian dynamics in terms of sustainability, efficiency or equity, from a forward-looking perspective.

The work carried out in the Saïs plain highlighted a crisis in the groundwater resource management model due to a lack of alignment of sectoral policies in Morocco, but this observation also applies to the other two countries. An agricultural policy focused on high value-added irrigated farming has led to an increase in agricultural GDP and exports, an extension of irrigated areas and an intensification of abstraction from already over-exploited water tables. Furthermore, agricultural development has been achieved by disconnecting ownership from the farm, affecting women and creating insecure jobs and statuses. As far as land is concerned, there is a disconnection between the price of agricultural land and agricultural productivity, a concentration of farming in areas with large farms, urbanisation and urban sprawl on agricultural land on the outskirts of towns.

## RESULTS OF THE STUDY, KEY MESSAGES AND RESPONSES PROVIDED

The analyses resulting from the action on irrigated land in the Maghreb have enabled COSTEA to formulate a number of messages. Their general aim is to provide inputs to strengthen the economic and social development of irrigated areas by securing land tenure for farmers. They also seek to highlight the need to take into account the environmental sustainability of irrigated agriculture by promoting a more sustainable management of natural resources.

**1/ The constitution, importance and management of public agricultural land in the Maghreb countries reveal a similar historical legacy and divergences in post-independence political choices.** The countries of the Maghreb have a heritage of public or state-administered<sup>2</sup> land that they use as land reserves for their agricultural policy. This land heritage has been forged from the past, and is characterised by the introduction of modern law, which has established tenure systems for land whose rules of appropriation, use and exploitation were previously determined by the relationships that the populations had with their territories. These land tenure systems are diverse and often mix standards and institutions inherited from colonisation with standards derived from local traditions.

After independence, the States' land reforms aimed to mobilise public or state-administered land (public property or property under the State's responsibility for its management and use) to intensify agriculture on land that was already cultivated,

1. Due to the health context, the regional workshops in Tunisia were replaced by individual interviews with regional managers using an interview guide.

2. The main difference between public land and state-administered land lies in the question of ownership. Public land belongs to the State, while state-administered land belongs to other entities and is simply managed by the State.

or to extend irrigated agriculture on pastoral or desert land. Although all three countries attempted to introduce agrarian reforms, these were quickly abandoned or put on hold.

The political choices of the countries in the region are influenced by their geography and sectoral priorities. In Algeria, oil revenues and food imports are favoured. In Morocco, the surface water resources of the Atlantic plains have allowed the development of commodities and the preservation of cash crops for export. In Tunisia and Algeria, however, water resources are limited, and other priorities, such as education, sub-contracting and the development of the maritime coastline, have taken precedence over agriculture. The region's historical heritage is marked by different land tenure systems, such as 'melk', 'habous', collective and state-owned land. The divergences between the countries are also reflected in the public management of recovered land in Tunisia and Morocco, and in the self-management of nationalised land in Algeria. The agrarian reforms in the three countries were relatively limited and abandoned in favour of transfers and grey transactions.

From 1962 to 1983, Algeria nationalised and collectivised agricultural land, creating state-controlled cooperatives and socialist agricultural estates (domaines agricoles socialistes, French acronym: DAS). However, these policies led to insufficient results despite state support. The State merged the self-managed estates and some cooperatives into DASs under its control in 1982, while most of the Agricultural Production Cooperatives of the Agrarian Revolution (Coopératives Agricoles de Production de la Révolution Agraire, French acronym: CAPRA) were allocated individually to members of the cooperatives.

In Morocco, colonial lands were placed under public administration from 1956 in order to preserve their productive potential and export agreements. The agrarian reform was transformed into a redistribution programme in 1974, and land ownership was highly concentrated. Collective land has also been under state administration since 1919 and its surface area remains large.

The Tunisian State acquired a significant land heritage through the nationalisation of colonial lands from 1964, and the liquidation of public and mixed habous in 1956. It also created the Office des Terres Domaniales (Office for State-Owned Land, French acronym: OTD) to manage the colonists' farms. On the other hand, unlike Algeria and Morocco, Tunisia has recognised the collective ownership of communities that exploit land in steppe and pre-desert areas, but has privatised land intended for agricultural purposes.

**2/ The liberal land reforms in the Maghreb are marked by a hesitant/slow move towards the institutionalisation of land markets, including the market in rights of use.** During the 1980s, agricultural investment promotion policies converged towards concessions. This led to the liberalisation of public property, the 'melkisation' of collective land and

the emergence of markets for rights of use. Concessions on public land have taken different forms depending on the configuration of each country. This evolution has led to an intensification of farming and an expansion into arid zones. Capital investment has increased to this end, enabling a rise in labour productivity. However, this race for groundwater resources with virtually unrestricted access has posed challenges in terms of environmental sustainability.

In practice, the land reforms have led to the emergence of a market for the indirect exploitation of land, taking a variety of forms. After a period of collective management in Algeria and of direct management by public companies in Tunisia and Morocco, the land reforms have led to the generalisation of concessions on public land or state-administered land. These concessions make it possible to grant exploitation rights that are regulated (for example, by specifications or restrictions on transactions) without transferring ownership, which remains collective or state-owned.

The land reforms have thus led to the dissociation of land ownership and use, affecting not only state-owned land and state-administered land, but also private land, for various reasons, such as undivided ownership or restrictions on ownership rights in irrigation areas.

In Algeria, a new phase of land reforms to rehabilitate private exploitation began in 1980, but without completely privatising public agricultural land. Two categories of reform were undertaken: the privatisation of the right to use the public land of the former DASs, and the development of previously uncultivated public land. Law 87/19 of 1987 restructured the DASs into smaller collective or individual farms under private law, but ownership of the land remained public. The 2008 agricultural orientation law (loi d'orientation agricole) extended these developments by opting for concessions as the only means of accessing public land, and enabled the decollectivisation of the collective farms (referred to as exploitations agricoles collectives, French acronym: EAC) and the commercialisation of rights of use. The reforms aimed to facilitate access to land and water to encourage the development of arid land for agriculture.

Morocco introduced an agricultural policy focused on rationality and centralised decision-making, as reflected in the Green Morocco Plan. This plan is based on the long-term leasing of state and collective land, the reform of land tenure systems, and the allocation of collective land to those entitled to it. Policies on access to water resources are characterised by a liberal approach, with flexible procedures for authorising and regulating private drilling, but also by policies supporting drip irrigation equipment and surface water transfer and desalination projects to safeguard water tables. Faced with the difficulties encountered by the public companies in charge of managing state-owned agricultural land, the reform of state-owned land aims to promote agricultural investment and employment through long-term leasing to private actors through public-private partnerships (PPP). Between 2002

and 2013, 95 000 hectares of state-owned land were allocated under PPPs, for 600 projects. Land leasing by invitation to tender concerns large farms, and projects must explain the investment plan and yield targets in line with the priorities of the Green Morocco Plan.

In Tunisia, land tenure policy has been marked by the privatisation of collective land (granting to any member of a community a parcel of land that they have developed, mainly by planting), and the transfer then concession of state-owned land. Since the 1980s, the government has implemented a policy of privatising collective land by accelerating the process of allocating non-pastoral collective agricultural land in a private capacity. In 2016, a new law was enacted to better protect collective land from grabbing under the pretext of vivification, and to update the distinction between types of collective land. State-owned land was transferred or sold to members of cooperatives in the 1970s and 1980s, and since the 1990s, has been granted by way of concession to agricultural development agencies (*sociétés de mise en valeur et de développement agricoles*, French acronym: SMVDA). The law of February 1995 prohibits the State from selling state-owned land and establishes the principle of separating the ownership of property by the State and the delegation of its management. Today, 40% of state-owned land is leased to private actors.

**3/ The development of irrigated land has led to remarkable production performances but the emerging production models are manifestly unfair and unsustainable.** The processes of privatisation, ownership and use of land, and their impacts on agricultural and territorial dynamics in the Maghreb countries, highlight similar trajectories that are leading to a water crisis and a precarious situation for rural populations. The modernisation of agriculture can lead to the excessive exploitation of water resources and the deterioration of soil fertility. The trajectories of the irrigated areas and countries can be placed in the chronology of the different stages of the evolution of groundwater-irrigated farming in arid zones. This evolution goes through an initial phase of the emergence of new pumping technologies, a boom in pump-irrigated agriculture, over-exploitation of the water resources, and finally, a decline in areas, where irrigated crops are abandoned due to a lack of water resources.

According to macroeconomic indicators, investments to mobilise water and public land have encouraged agricultural growth. All three Maghreb countries have seen sustained growth in agricultural GDP since the early 2000s. The agricultural policies have used public, collective or state-administered land to intensify agriculture or extend irrigation to varying degrees depending on the country.

Tunisia has experienced a relatively limited increase since the 1980s, while Algeria has been in a catch-up process since 2000, and Morocco has undergone massive investment in 'modern' agriculture since 2008. These policies have led to an increase in agricultural added value and created opportunities for a

variety of actors, but they have also depleted water and soil resources, and not everyone can keep up with the pumping race. This fact can lead to precariousness for rural populations in contexts where the dynamics of agriculture and territorial recomposition do not benefit the most vulnerable local actors, including women.

In Algeria, many market gardeners practise itinerant market gardening on irrigated public land in the Mitidja plain. This land is often acquired on the illegal indirect tenancy market, without official authorisation. These professional tenants practise hyper-intensive market gardening in constant rotation with an average of three years' production, and use chemical inputs, which raises questions about soil health and sustainability. Although the market garden areas are relatively concentrated among the largest market gardeners, small-scale tenants can also cultivate plots depending on their financial capacity and the available labour.

In Morocco, the intensive cultivation of early-season crops and fruit trees is moving to areas with better water resources, while the large farming groups are moving from the well-endowed plains to the pre-Saharan territories in the south of the country. The reforms of the 2000s have attracted new investors, particularly investment funds looking for projects with high financial returns in fruit tree and date palm cultivation. Sales and rentals have increased following the reform of the land release procedure in the agricultural reform centres, with strong demand for intensive open-field market gardening, which consumes a lot of water. However, the race for water resources has led to the first signs of depletion, even affecting some major PPP investment projects.

The development of irrigation in Tunisia intensified from the 1970s, with economic and social development plans. Irrigated agriculture began with public irrigation schemes before private initiatives took over to develop private irrigated schemes. However, overexploitation of the water table has led to 'illicit' drilling and signs of depletion of the water resources. In heavily exploited aquifers, this irrigation crisis is manifesting itself in a gradual return to non-irrigated farming for family farms unable to keep up with the race to pump, and agricultural intensification for the large farms.

This diversity of farms and actors is highlighted by the trajectory of the race to exploit groundwater resources, which can be characterised by intensification or extension depending on the country and the area. This excessive exploitation leads to a fall in groundwater levels at different paces. Although sectoral regulation, such as pumping authorisations and groundwater contracts, has certain limits, new territorial responses are emerging, such as the example of the Zagora watermelon<sup>3</sup> and the redefinition of property rights over land and water by

3. In the arid Drâa valley in south-east Morocco, watermelon cultivation has expanded rapidly due to the arrival of major investors. Young local women and men farmers have taken steps to solve the problems of overproduction of watermelons and a shortage of groundwater by establishing rules for sharing irrigation water and selling their produce.





local collectives. These territorial responses can also take the form of claims, as is the case in the Jemna oases in southern Tunisia.

**4/ It is necessary to harmonise land extension policies and water policies to preserve groundwater, for the sustainable and equitable agricultural development of the arid zones of the Maghreb.** The development of arid regions through irrigation poses challenges for the sustainability of water resources, due to the increase in illegal drilling and the growing pressure on the aquifers exploited, raising questions as to the coherence of land and water policies.

Water regulations in the Maghreb countries have been influenced by the region's colonial history, but there are notable differences in the way each country has regulated water since that period to ensure equitable access to water for all, in line with the system of public ownership of water resources in the three countries.

The privatisation of irrigated land has led to a 'de facto' privatisation of water, as the landowners or farmers can control access to and the use of water on their land. This can limit the access of other water users to this vital resource.

In the absence of any real policy for monitoring and controlling abstractions, the intensification of irrigated agriculture using groundwater has led to the over-exploitation of water resources and a general fall in groundwater levels in the three countries. In an attempt to save jobs and the local economy, costly public projects have been launched, such as deep drilling, water transfers and non-conventional

water mobilisation. Despite these measures, some areas are experiencing a marked decline and irrigation is being abandoned, leading to the decapitalisation and devaluation of the investments.

In Algeria, the drop in drilling costs has facilitated access to groundwater and enabled the development of a new form of Saharan agriculture, while in Tunisia, the Plan de Développement des Eaux du Sud (Southern Water Development Plan) has been put in place. In Morocco, the boom in date palm plantations on collective land supplied by a deep aquifer with limited renewability in the Meski-Boudnib area raises the question of the sustainability of this type of agriculture, which will depend on limiting the area planted and the amount of water abstracted, as well as on the anticipated mobilisation of additional resources by a dam on the Wadi Guir. Equity is also a concern, as small-scale farmers could be excluded if operating costs rise or if the water table runs dry. The question of income from this irrigated agriculture is also raised.

In Tunisia, the governance of water resources raises complex questions due to the different superimposing legal and institutional references. Although water resources are part of the public water domain and come under the authority of the State, their exploitation varies depending on their nature and the region in which they are located. In the oases, water remains attached to the palm groves and the old institutions of sharing, despite the introduction of modern forms of governance. The expansion of oases in the south includes traditional oases and modern oases with single-crop farming



of Deglet Nour<sup>4</sup>. Public investment in the 1980s was followed by private investment in the 1990s, with the expansion of areas under date palm based on the availability of and access to groundwater resources through drilling. Private actors gain individual access to collective land on the basis of the El Ihya law (vivification or development) and once planted, the land is automatically privatised.

**5/ It is essential to rethink the policy on irrigated land in order to meet the current and future challenges facing the agricultural sector, by promoting the sustainable management of natural resources and equitable access to irrigated land and water. With climate change underway, rising prices for agricultural products and inputs, and the economic disruption caused by the Covid pandemic, current agricultural models are being called into question.** There are major concerns about the sustainability of water resources, the capacity to promote food sovereignty and social equity. It is therefore crucial to reconsider these models and adopt more sustainable and equitable approaches to meet current and future challenges. These challenges are closely linked to irrigated land policy, which should evolve towards the sustainable and equitable management of the use of irrigated land for agricultural production. To ensure sustainable and equitable land management in the Maghreb countries, it is recommended to take into account the diversity of the systems and actors involved in agriculture and their links with the natural resources. The preservation of the peri-urban irrigated melk land and the adoption of new forms of regulation in large irrigated schemes are essential to guarantee food security and job creation. It is also recommended that the specifications for public land concessions be renewed to include clauses to protect the environment and encourage the participation of local actors. For a more equitable and participatory form of land management, a new territorial governance and governance by local authorities for public land or collective land administered by the State are also necessary.

4. Date variety.

### Limits of the approach

The study on irrigated land in the Maghreb was mainly confronted with the complexity of bringing to the fore general avenues for improvement in response to the problems currently observed and described in this brief. This was made difficult by the diversity of the cases studied in the three countries and by the high sensitivity of the subject in each of the contexts. In addition, the approach and implementation of the study did not allow for a detailed analysis of the gender aspect to the extent initially expected. This specific point will therefore need to be addressed in future studies.

## COSTEA OUTPUTS IN RELATION WITH THE STUDY

- An inception report ([www.comite-costea.fr/actions/foncier-irrigue](http://www.comite-costea.fr/actions/foncier-irrigue))
- The Algeria country report ([www.comite-costea.fr/actions/foncier-irrigue](http://www.comite-costea.fr/actions/foncier-irrigue))
- The Morocco country report ([www.comite-costea.fr/actions/foncier-irrigue](http://www.comite-costea.fr/actions/foncier-irrigue))
- The Tunisia country report ([www.comite-costea.fr/actions/foncier-irrigue](http://www.comite-costea.fr/actions/foncier-irrigue))
- A final regional synthesis ([www.comite-costea.fr/actions/foncier-irrigue](http://www.comite-costea.fr/actions/foncier-irrigue))
- A documentary database ([www.comite-costea.fr/base-documentaire-eau-et-agriculture](http://www.comite-costea.fr/base-documentaire-eau-et-agriculture))
- The first articles of a special issue have been posted online for Cahiers Agricultures ([www.comite-costea.fr/actions/foncier-irrigue](http://www.comite-costea.fr/actions/foncier-irrigue))

#11- 2023

# POLICY BRIEFS

## Structuring Action: Services to Irrigators

# 'Services to Irrigators'

## An innovative approach that places irrigators at the heart of development strategies

The reflection on services to irrigators is part of the broader framework of services to men and women farmers, implemented to consolidate their productive capacity and promote the sustainability and development of their farms. They also make it possible to achieve the objectives of agricultural policies and, in particular, the objectives expected from public investment in the irrigation sector.

Services to irrigators include the technical and intellectual services that men and women farmers may need. They relate in particular to the supply of inputs and equipment (e.g. water service, mechanisation services), strengthening their technical capacity to produce (e.g. agricultural extension and advice, training, research) and to manage their farms (e.g. management advice), securing their farms (e.g. land tenure and rights, legal advice, insurance), financing their investments and/or working capital (e.g. loans to farmers), their access to information (e.g. price monitoring), their access to markets (e.g. product aggregation, commercial mediation, certification), their organisational capacity (e.g. integration in a PO, advice to the PO), negotiation capacity (e.g. participation in an interprofessional organisation), and lobbying capacity (e.g. membership of a trade union). These services concern farms as well as farmers' organisations (e.g. cooperatives, water users' associations). They may be provided by the public sector, the private market sector or the farming profession.



### KEY MESSAGES

Five main key messages related to the 'services to irrigators' action have been drawn up following work that combined analysis of the existing literature, individual interviews and surveys, focus groups, and feedback and consultation workshops held as part of this project:

- 1/ A package of services is needed that extends far beyond the water service alone, forming a complete ecosystem of services. The absence of an explicit demand from irrigators does not mean that there is no need. The establishment of this ecosystem of services is highly dependent on local dynamics and their logics (commercial, short-termist, even monopolistic). Its balanced implementation, allowing more socially and environmentally sustainable dynamics to emerge, is a real challenge that requires services to be constantly adapted to the changing context and needs, and the ability to intervene in the dynamics that are spontaneously at work.
- 2/ Depending on the services, they can be provided by the public sector, the private (commercial) sector, the agricultural profession and even from farmer to farmer. The services should not be left to the private sector alone; there is a risk that the offer would be incomplete, overly self-serving, that it would only consider short-term objectives, or would only serve individual interests (possibly converging) without integrating objectives pertaining to the common good or the general interest. This underlines the need for public regulation and the reappropriation of certain services by the farmers. However, the private sector, the public sector and the farming profession are all three needed to strike a balance between the quest for growth and the preservation of the common good.

- 3/ Contrary to what might be presumed, the services in place do not always serve the true interests of irrigators. In particular, depending on the balance of power within value chains, the services may instead be to the advantage of the players upstream or downstream of the chains. When services are steered by a value chain, there is a risk that they will direct and block irrigators' strategies. It is therefore necessary to analyse the interests and resources of irrigators - and of each type of irrigator in an irrigated scheme using a typology - and to decipher the balance of power at work in the scheme, the territory or the value chain in order to check whether the services in place genuinely meet the irrigators' interests.
- 4/ A service plan for irrigators links the micro, meso and macro level services, with the three levels mutually reinforcing one another. 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.
- 5/ Operational plans to strengthen services should be drawn up on a case-by-case basis and cannot be standardised. They need to be based on full diagnoses: value chain-territory diagnosis, mapping and assessment of existing services (using the 'service rosette' tool), typology of farms and assessment/prioritisation of service needs, assessment of the match between the service offer and the needs. Each operational plan presents a theory of change for the development of services and sets out the operational arrangements (sharing of roles for the main services, funding mechanisms and roadmap).

## ISSUES AT STAKE AND OBJECTIVES OF THE STRUCTURING ACTION

The overall challenge identified by COSTEA for this action is to contribute to the economic and social development of irrigated areas, in particular by consolidating the productive capacity of irrigators.

By applying a similar methodology to two different contexts (oasis schemes in Tunisia and rice-growing schemes in Cambodia), COSTEA's structuring action provided food for thought on the issue of strengthening services to irrigators. The action enabled these services to be better identified and defined, provided feedback on different irrigation support programmes in each of the two contexts studied, enabled an operational plan to be drawn up to develop services on each site, drew general conclusions and capitalised on an approach for analysing services to irrigators. Finally, this action has encouraged the emergence of a joint reflection between farmers, researchers, decision-makers and operators on systems of services to irrigating farmers and the place they should be given

in the formulation and implementation of support programmes and development policies for irrigated agriculture, in their various components (development of agricultural production, improvement of services, sustainable management of natural resources and management of negative externalities, territorial economic development, development of agricultural and agri-food value chains, etc.).

In each of the two countries concerned by the action, COSTEA anchored this work institutionally by formally involving the national authorities: in Tunisia, with the Directorate-General for Rural Engineering and Water Usage (Direction Générale du Génie-Rural et de l'Exploitation des Eaux, 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).

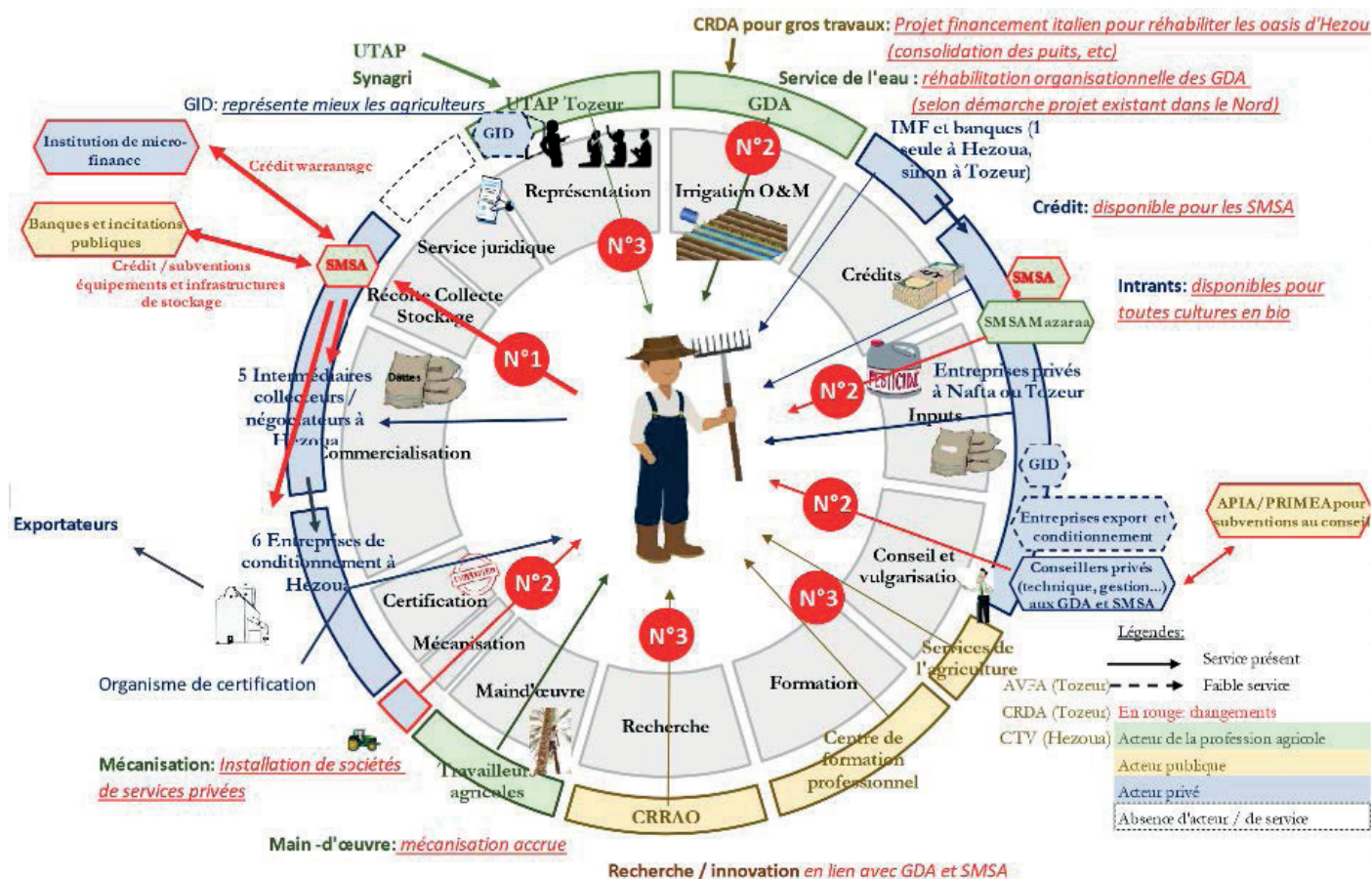
## PRESENTATION OF THE METHODOLOGY AND DIAGNOSTIC ELEMENTS FOR SERVICES IN TWO DIFFERENT CONTEXTS

The study was carried out at two sites, one in Tunisia and the other in Cambodia. On each site, the approach focused on three main areas of analysis:

- **value chain-territory: a territorial analysis** was carried out based on a literature review and a number of interviews. In Tunisia, a **rapid diagnosis of the date value chain** was also carried out to gain a better understanding of the marketing issues, which appeared to be particularly crucial.
- **service needs: surveys of farms** were carried out enabling a **typology of farms** and an analysis of **service needs** to be drawn up. These surveys also enabled an assessment to be made of farmers' **current level of satisfaction** with the various services.
- **service offer:** a mapping of the service offer was also carried out. The key (prioritised) services were **evaluated** and the match between service offer and service needs was assessed. In Cambodia, these analyses were supplemented by a **historical analysis of the deployment of services** in Stung Chinit and their correlation with the actual development of the irrigated scheme.

These elements were then combined to formulate an operational plan for strengthening services. 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, path of change) and then describe the operational arrangements (sharing of responsibilities, funding mechanisms, technical elements). A summary roadmap was drawn up for each site to identify the next steps. These operational plans did not cover the entire field of services to irrigators, but a number of aspects considered to be priorities in the light of the diagnoses carried out and the key issues at stake.

Operational plan of services to irrigators proposed for Hezoua 1



**Main results for the Hezoua 1 site in Tunisia in the Governorate of Tozeur**

The Hezoua 1 site is a modern 72-hectare collective oasis dominated by the production of Deglet Nour dates, which was created in 1962 and rehabilitated in 2018.

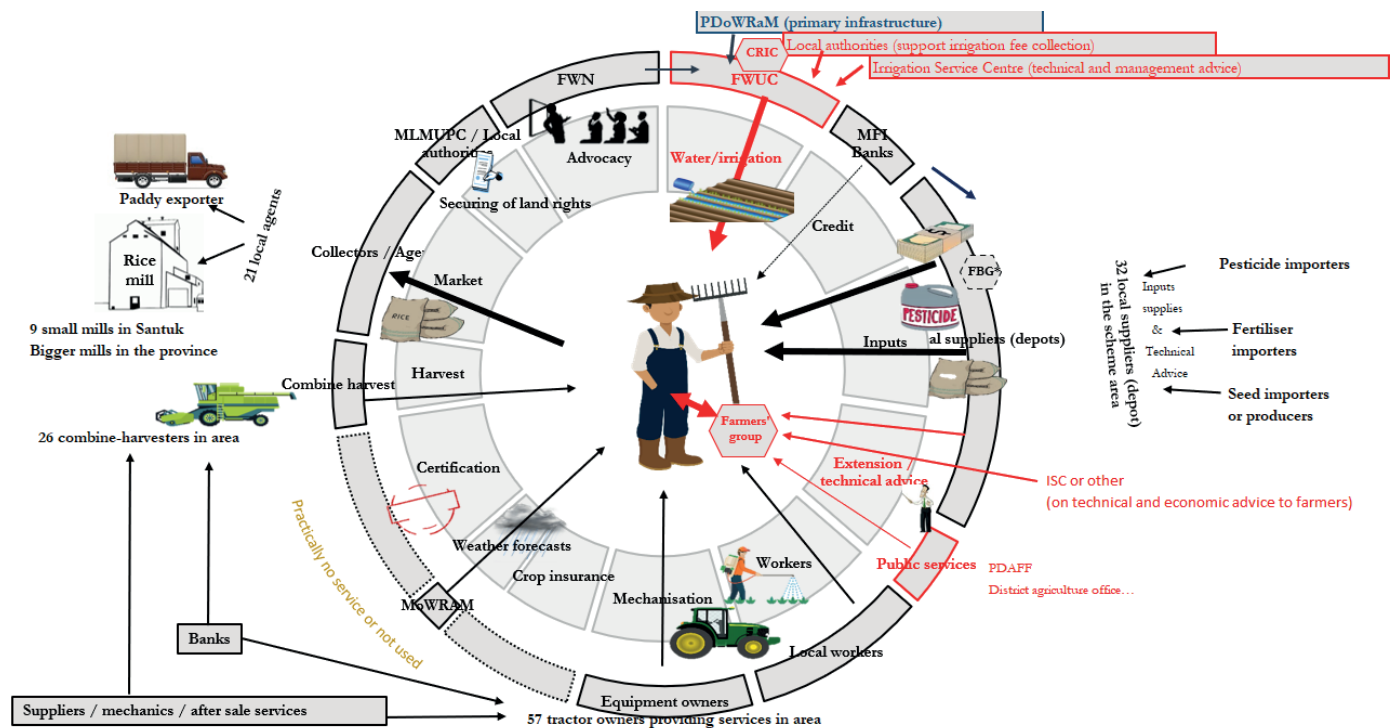
The diagnosis revealed farms in serious difficulty, and in particular, some that are in the process of being abandoned. There are many reasons for this: excessively small farm structures (fragmentation due to inheritance), a lack of labour (linked to cross-border trade), a tendency to specialise in dates, a date sector dominated by a handful of downstream actors (date value chain unregulated, with weak farmers' organisations), and an insufficient service offer which is not always in the irrigators' interests (the services being mainly focused on data production and in the interest of downstream actors in the value chain). Moreover, the new context of overproduction in the sector for the past two years, which has become the 'new normal' in this sector, has aggravated the situation. Finally, the very environmental 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' (transition from organic to conventional). 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 value chain of Tunisia

(the world's leading exporter) is thus partly based on non-viable family farms and a threatened agroecosystem.

The operational plan defined as part of the COSTEA study recommends 'structuring 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 in response to the specific interests and needs of irrigators in oasis agroecosystems.' The proposed pathway has two stages: (i) start by removing the priority constraint of marketing; (ii) then, 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. 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). The road map thus proposes some emergency measures and others that are medium- to long-term.

Operational plan of services to irrigators proposed for Stung Chinit



**Main results for the Stung Chinit site in Cambodia in the province of Kampong Thom**

The Stung Chinit site is a rice-growing scheme of approximately 2 800 ha, 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 match between the offer and the 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 (operation and maintenance) system, and (ii) adopting more sustainable and profitable agricultural 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 – in a concerted manner to avoid conflicts between non-compatible water uses and management methods) 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.

**RESULTS OF THE STUDY, KEY MESSAGES AND LIMITS OF THE APPROACH**

The choice of these two sites clearly illustrates the need for a complete range of services for irrigators that extends far beyond the water service alone: a complete 'ecosystem of services' whose systemic dimension is emphasised. The study also shows the link between services, performance and the sustainability of the schemes, and more broadly, of the agricultural practices that are implemented therein.

**1/ A package of services is needed that extends far beyond the water service alone, within an ecosystem of services that must adapt over time and to evolving contexts. The sole presence of a water service is not enough to ensure the performance and sustainability of the schemes, which require the effective presence of other types of service (supply, marketing, equipment and labour,**

land, producers' organisations, advisory and extension services, social services, etc.). The study shows that the water service must first be secured, then the other services should be deployed more or less synchronously or 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 water and land services). However, the sustainability of irrigated systems **may be called into question due to the environmental impact of the processes of the homogenisation, simplification and intensification of the cropping and production systems that they engender**. It thus emerged that medium- and long-term issues are not taken into account by the current services and that the environmental dimensions are neglected by the services offered in the two case studies. In addition, not all of the services are necessarily explicitly requested by irrigators, yet the absence of an explicit request does not mean that there is not a need.

**2/ 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 should not be left to the private sector alone:** there is a risk that the offer would be incomplete, overly self-serving, or that it would only consider short-term objectives, etc. The service cycle might not be virtuous. The study therefore stresses the need for intervention by the State (at national and local authority level), to ensure the general interest and medium- and long-term interests, and to strike the right balance between economic, environmental and social issues. **The private sector, the public sector and the agricultural profession are nevertheless all necessary** to find a balance between the quest for growth and the preservation of the common good. At the two sites studied, the service offer is dominated by private actors, and the services available are not always in the interests of the farmers (depending on the balance of power present, as shown in Tunisia), or become factors that constrain their choices instead of broadening the range of options available to them. Public intervention is therefore also necessary: (i) on the one hand, to provide services that the private sector does not cover or to subsidise them, and (ii) on the other, to regulate these services (or regulate the sector). This public intervention makes it possible to arbitrate between the sometimes divergent interests of stakeholders, to arbitrate between short, medium and long-term interests, and finally, to arbitrate between economic, social and environmental interests. The study also shows the need for farmers to reappropriate these services to a certain degree (farmer-to-farmer services and the role of farmers' organisations) and for farmers to exercise control over these services.

**3/ A service plan for irrigators links services from the micro, meso and macro levels, the three levels being mutually reinforcing.** The study shows the need for services at these three levels. Indeed, the notion of 'services' is more adapted to the micro and meso levels, but public policies at the meso and macro levels should support these services. At Hezoua 1,

the fact that the services are concentrated on the date value chain leads to the specialisation of the farms (thus reducing their resistance to shocks and their resilience) and to the specialisation of ecosystems (less ecosystem functioning, whereas oases are traditionally multi-tiered and diversified). The study underlines the State's withdrawal since the 2010 Revolution and the need for a number of public actions at the macro- and meso-levels: regulation of the value chain, control of extensions, improvement of farm structures and revitalisation of farmers' organisations.

**4/ It should not be assumed that the services provided to irrigators are necessarily always in their best interests. When services are heavily dominated by the private sector, only services that are profitable in the short and medium term are offered to farmers, with no possibility of arbitration in the event of divergence between the stakeholders.** Similarly, the value chain approach directs service provision towards the interests of a priority value chain. This is even more problematic if the balance of power within the value chain is unfavourable to irrigators. This steering of services by the value chain can, in turn, direct and constrain the possible strategies of the farms. The case of Hezoua 1 clearly showed that the services respond relatively well to the interests of the value chain but not to the interests of the irrigators or the environment. At Hezoua 1, the services are dominated by a few downstream players and seem to be mainly in the interests of the value chain (producing quality dates), rather than in the interests of the irrigators (having a sufficient income). On the other hand, in the case of Stung Chinit, the farmers are satisfied with the services on offer, although there is a risk of the scheme malfunctioning in the medium and long term. The approach based on services to irrigators puts the farmers back at the centre of concerns. The focus is not on development, the territory or the value chain, but truly on the farmers. Consequently, two questions need to be asked: (1) Do the proposed services enable the implementation of strategies chosen by the farms, or do they predetermine the strategic orientations of the farms by restricting the 'field of possibilities'? and (2) Do the farmers have the means to access them? It is therefore necessary to analyse the interests and resources of irrigators - and of each type of irrigator in an irrigated scheme using a typology, and to decipher the balance of power at work in the scheme, the territory or the value chain, in order to check whether the services in place really do meet the irrigators' interests. Forward thinking with local stakeholders can also be useful and beneficial to bring out the medium- and long-term issues and take them into account strategically and in anticipation. In itself, this work of coordination and foresight can constitute a service to be developed, which can be anchored in a territorial management approach with an important role for the local authorities.

**5/ Operational plans to strengthen services should be drawn up case by case, and should be based on comprehensive, on-the-ground diagnoses:** value chain-territory diagnoses, mapping, history and assessment of the service offer, farm typology, assessment and prioritisation of the service needs of the farms, and assessment of the match between service

offer and needs. The 'service rosette' tool used on the two sites, both for the diagnosis and for the presentation of the operational plan, is relatively functional and provides a simple way of approaching the complexity of a development. This tool can be downloaded from COSTEA's website <https://www.comite-costea.fr/production/loutil-la-rosace-des-services-aux-irrigants>. Within a given area, there will of course be similar trends, but also specific features depending on the characteristics of each development (for example, whether it has been rehabilitated or not). Within the same development, service needs vary according to the type of farm, but the development tends to standardise the priority needs, which are the most effective and quickest levers to activate. The operational plan can therefore contain a standard range of services to meet these priority needs, followed by services tailored to different types of farm (family farm advisory services will then help to formulate more specific service needs for each farm). These plans ultimately seem particularly useful for planning public action and thus complementing private sector intervention.

With development issues calling for an ever-increasing search for efficiency and impact, this situation tends to lead to an oversimplification of approaches, which are too rapid, sector-based and standardised. Yet this study brings to the fore the value of system and comparative agriculture approaches, diagnostic tools (farm typologies), field surveys and the analysis of power relations.

The study also shows the medium- and long-term limitations of approaches to irrigation that are strictly value chain- or development-based, and of conventional production models such as the Green Revolution, and calls for agroecological transitions in these irrigated systems.

Finally, this service-based analysis approach, although developed for the irrigated sector, can also be used for the entire agro-sylvo-pastoral and fisheries sector, both rainfed and irrigated.

The service-based approach (offer and needs) proposed for this COSTEA study has thus made it possible to cover a wide range of fields in a new way (agronomy / irrigation / economy / value chains / land tenure / organisational / institutional / environmental), while linking the micro, meso and macro levels. Above all, it has put farmers back at the heart of the analysis, and has provided concrete field data through surveys. The final recommendations made at the level of the proposed operational plans made it possible to define concrete actions aimed directly at safeguarding agricultural activity in the areas studied in Tunisia and increasing the sustainability of farms in the areas studied in Cambodia. The study thus shows that the development of service plans for irrigators, in this broad sense, makes it possible to respond to the four major challenges identified by COSTEA.

### Limits of the approach

This approach nevertheless had a number of limitations, such as the need to broaden the territorial diagnosis by including a value chain diagnosis, and the difficulty of working on and proposing an operational plan without any concrete prospect of support and funding. Mobilising the private actors who provide a significant proportion of the services also proved difficult at times. Finally, the initial idea of breaking down service offer and needs by type of farm proved to be relatively superfluous insofar as the schemes tend to standardise the types of farm to a considerable extent and no strong specificities emerged in terms of services (need and demand) according to the types of farm identified; needs that cut across all types of farm appeared to be a priority. A specific analysis of gender aspects was not requested as part of the study, but could have been relevant in order to analyse the specific needs of women irrigators in terms of services.

## COSTEA OUTPUTS IN RELATION WITH THE STUDY

- Inception report ([www.comite-costea.fr/actions/services-aux-irrigants](http://www.comite-costea.fr/actions/services-aux-irrigants))
- Reports presenting the territorial diagnoses and typologies of the farms ([www.comite-costea.fr/actions/services-aux-irrigants](http://www.comite-costea.fr/actions/services-aux-irrigants))
- Reports on the operational plan for services to irrigators ([www.comite-costea.fr/actions/services-aux-irrigants](http://www.comite-costea.fr/actions/services-aux-irrigants))
- A final synthesis report with recommendations ([www.comite-costea.fr/actions/services-aux-irrigants](http://www.comite-costea.fr/actions/services-aux-irrigants))
- An AFD Question of Development (QDD) report ([www.comite-costea.fr/productions](http://www.comite-costea.fr/productions))
- The service rosette tool which can be used to carry out diagnoses on services and propose operational plans for other irrigated or non-irrigated systems elsewhere ([www.comite-costea.fr/actions/services-aux-irrigants](http://www.comite-costea.fr/actions/services-aux-irrigants))