

PARTICIPATION IN A COMPLEX AND CONFLICTING CONTEXT: IMPLEMENTING A SHARED DIAGNOSIS IN A NORTHERN TUNISIA IRRIGATION SCHEME[†]

S. HANAFI^{1*}, S. MARLET², J.Y. JAMIN², A. IMACHE³, A. ZAIRI¹, H. BAHRI¹, J.E. ROUGIER³ AND S. BOUARFA⁴

¹*Institut National des Recherches en Génie Rural, Eaux et Forêts (INRGREF), Tunis, Tunisia*

²*French Agricultural Research Centre for International Development (CIRAD), Montpellier, France*

³*Lien social et décision (Lisode), Montpellier, France*

⁴*GEAU Unit, INRAE, Univ Montpellier, Montpellier, France*

ABSTRACT

Promoting innovation to improve both productivity and sustainability of irrigated farming systems is crucial for the first question addressed within the Sustainable Development Goals process led by the United Nations. This is a complex task that requires methods and processes which include a diversity of knowledge. For this reason, participatory approaches have been increasingly encouraged. A broad range of methods have been developed in the literature. However, debates on the effectiveness of the results, including questions on how different stakeholders influence results and how the context influences platform processes, remain theoretical. In this article, the authors evaluate the results of a participatory diagnosis aiming to identify the constraints and possible innovations to improve agricultural production in the Brahmi irrigation scheme in Tunisia. The process was implemented with individual interviews and focus groups operationalized through two types of platforms, ‘Community of Practice (CoP)’ and ‘Learning and Practice Alliance (LPA)’. We highlighted that both CoP and LPA offer fruitful platforms for the interaction of all stakeholders. However, the results could be biased by the context and the expectations and strategies of powerful participants. Individual interviews are complementary to focus group results, especially in situations where open or latent conflicts exist. Copyright © 2018 John Wiley & Sons, Ltd.

KEY WORDS: irrigation scheme; participatory approaches; diagnosis; stakeholders; Tunisia

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RÉSUMÉ

Promouvoir l’innovation pour améliorer la productivité et la durabilité des systèmes agricoles irrigués est crucial pour répondre aux premiers objectifs du développement durable promu par les Nations Unies. Cette tâche exige l’effort de diverses disciplines. Les approches participatives ont donc été de plus en plus encouragées et développées dans la littérature. Cependant, les débats sur la qualité des résultats, y compris des questions sur les biais relatifs au type des parties prenantes et au contexte, restent théoriques. Dans cet article, les auteurs évaluent un diagnostic participatif visant à identifier les contraintes et les innovations possibles pour améliorer la production agricole dans un périmètre irrigué en Tunisie. Le processus a été mis en œuvre d’une part avec des entretiens individuels et d’autre part avec des ateliers collectifs à travers deux types de plates-formes, Communauté de pratique (CoP) et Forum d’échange d’expérience (LPA). CoP et LPA offrent tous deux une plate-forme fructueuse pour l’interaction de toutes les parties prenantes. Cependant, les résultats peuvent être biaisés par le contexte, les attentes et les stratégies des participants puissants. Les entretiens individuels sont complémentaires des ateliers collectifs, en particulier dans les situations où des conflits ouverts ou latents existent. Copyright © 2018 John Wiley & Sons, Ltd.

MOTS CLÉS: périmètre irrigué; approches participatives; diagnostic; parties prenantes; Tunisie

*Correspondence to: S. Hanafi, INRGREF Avenue Hedi Karray Tunis 2080, Tunisia. E-mail: salia.hanafi@yahoo.fr

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INTRODUCTION

How securing irrigation contributes to securing food, which is compulsory for securing the livelihood of rural populations, was the first question addressed within the Sustainable Development Goals process led by the United Nations (Gao, 2016). It is therefore crucial to promote innovations to improve both productivity and sustainability of irrigated farming systems. But this is a complex issue and requires multidisciplinary approaches (Froeblich *et al.*, 2018) and cannot be solved simply by farmers, managers, extension workers, researchers or policy makers. Decision-making processes are jointly influenced by these different categories of stakeholders and require that appropriate participatory approaches are developed (Von Korff *et al.*, 2012).

In recent years, participatory approaches have become an important tool for addressing complex problems in different management contexts. Moreover, participatory processes for the implementation of planning and management actions have been applied in the field and evaluated in the scientific literature. Beyond the participatory mechanisms, experts are convinced of the need to involve every stakeholder by establishing multi-stakeholder platforms (Kulkarni, 2012). These platforms offer opportunities to exchange knowledge and experience on specific issues, facilitate cross-learning among stakeholders by sharing and intersubjectively validating their understanding of the situation, and reach consensus (Rist *et al.*, 2006). Learning may also enhance the relevance of decisions because they consider more comprehensive information inputs and support their implementation. Participation is especially advisable to ensure higher adoption rates of innovations among end-users (Imache *et al.*, 2009). Heydarian (2013) showed the importance of the local, national and global levels in finding key indicators and strategic issues. Such a combination would be necessary to improve the productivity of water and soil resources and achieve successful interventions in irrigated areas.

However, the quality and effectiveness of these diverse participatory processes remain uncertain (Rowe *et al.*, 2004). Furthermore, their evaluation is difficult because participation is a complex and value-laden mechanism. There are no widely recognized criteria for judging the success and failure of an exercise, and there is no full agreement about evaluation methods. Effectiveness, however, is not an obvious, unidimensional and objective criterion that can easily be identified, described and then measured. Given that, the quality of the output of any participation exercise is difficult to assess. The quality of decisions made through stakeholder participation is also strongly dependent on the nature of the process leading up to them (Reed *et al.*, 2009). Lamers *et al.* (2010) mentioned that a careful process

design has to be respected for successful output of the participatory planning process, and each process should be tailored to the community that expresses it (Menconi *et al.*, 2017). Farmers have their own goals and ambitions and can exploit opportunities (Oteros Rozas *et al.*, 2013) especially if they are powerful. Future research is still needed to evaluate whether outputs of participatory processes may be considered to be more holistic, representative of diverse values and effective with regard to the rationale and needs of the participants. Lessons from previous platforms could inform subsequent processes.

In Tunisia, since 1989, the state has transferred water management systems to water users' associations (WUAs) without real participation of farmers in the design of the WUAs. Misunderstandings and conflicts exist between all actors. Bachta (2012) highlighted the deterioration of the institutional environment marked by this irrigation management transfer. Given this context characterized by complex relationships between farmers and the agriculture department, it was unclear to what extent participation could be achieved. In this article we evaluate a participatory diagnosis that was implemented in an irrigation scheme in northern Tunisia within the European Union project EAU4Food, in which the authors of this article participated. The current study is based on the contrast of a participatory process through focus groups and through individual interviews with farmers. We will develop the hypothesis that, in focus groups, results could be biased. In this article, we will focus on the mobilization of farmers and the influence of the participants' strategy, power and identity, and the influence of the overall context of the study area for the participatory process.

MATERIALS AND METHOD

The study area

The Brahmi irrigation scheme is located in the upper valley of the Medjerda in the governorate of Jendouba in northern Tunisia (Figure 1). It was created in 1978 over roughly 5000 ha. The medium annual rainfall and evapotranspiration are 560 and 1350 mm, respectively. The high soil quality of the Medjerda River flood plain and the abundant water resources from the Medjerda River and the BouHeurtma Dam in the neighbouring mountains provide great potential for agricultural production. The crops are mainly cereals, forage, legumes and vegetables.

Currently, six WUAs manage the operation and maintenance of the distribution system at tertiary level. These WUAs face a lot of challenges related to technical, financial and social aspects. Obsolescence, lack of maintenance of the system and accumulation of debts cause frequent incidents at all levels, while shared responsibility, but with unclear

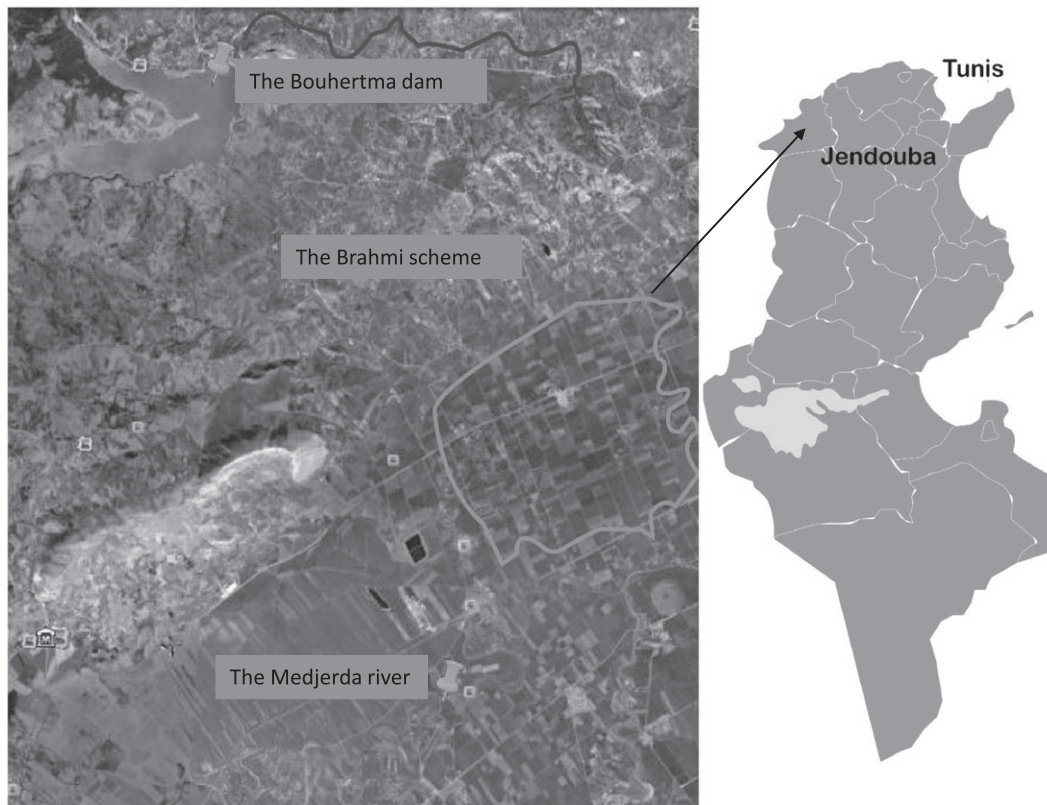


Figure 1. Location map of the Brahmi scheme (Google Earth)

limits in practice, is the source of frequent misunderstandings or even conflicts between farmers, WUAs and the state.

Presentation of the participatory processes

The EAU4Food project 'European Union and African Union cooperative research to increase Food production in irrigated farming systems in Africa' placed great emphasis on participatory research for identifying innovations that target local constraints of food production which will be implemented with research (Froeblich *et al.*, 2018). The participatory process is based on two kinds of multi-stakeholder platform (MSP) that partially overlap. The first is called a 'Learning and Practice Alliance (LPA)' and represents the regional/national level. An LPA brings together a range of stakeholders to exchange knowledge and generate innovations, share experiences, develop joint agendas for change, and test new solutions to common problems. The second is called a 'Community of Practice (CoP)' and represents the local level (Dionnet *et al.*, 2008, 2013). The CoP's main focus is to facilitate farmers' implementation of innovations at local level and to enable farmers, and other local-level stakeholders, to come together and share ideas. More details of the transdisciplinary research protocol are presented in Froeblich *et al.* (2018).

Participatory mechanisms range from standard public meetings to innovative consensus conferences, and from mechanisms that seek individual responses through surveys to those involving many participants interacting in focus groups. This study considers the participatory process applied on the one hand through focus group meetings and on the other through individual surveys. The objective of this participatory process was to identify constraints of irrigated agriculture. Innovative solutions were to be subsequently identified, co-designed and tested with farmers.

The participatory process based on focus groups was implemented through some meetings (Figure 2). Other meetings within the project are not mentioned in this article. The process practitioners are among the authors who were in charge of organizing the meetings. At a first step, local stakeholders were identified through preliminary visits undertaken by the project team at the regional state office for rural development (Commissariat Régional au Développement Agricole, CRDA), local extension offices (Cellule Territoriale de Vulgarisation, CTV), WUAs, and a local agricultural research institute (Institut National des Grandes Cultures, INGC). The choice of farmers for the participatory process was made by the project team with the collaboration of the agents of each WUA who are well informed about the farmers and their membership of the

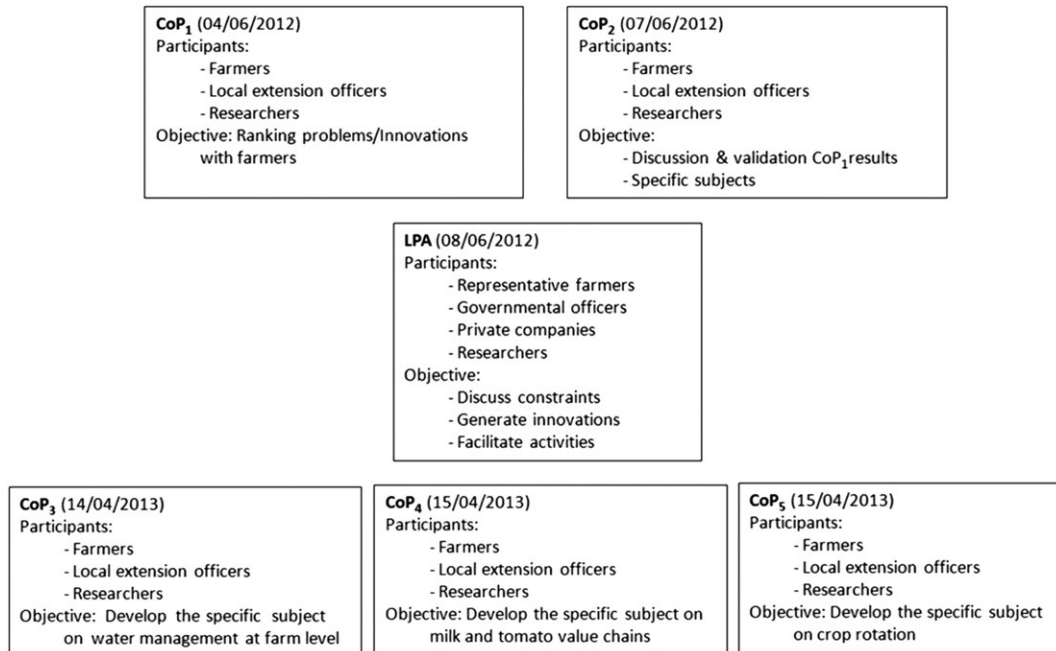


Figure 2. Schematic visualization of the organization of the focus groups meetings

WUA, the size of their farm, the most important grown crops and the presence of dairy livestock. Other farmers were selected by the INGC. Farmers were informed about the subject of the meetings and the entire project in the invitations to focus group meetings. The participatory practitioners insisted on the importance of getting the same farmers to participate in different meetings.

A first CoP meeting (CoP₁) was held on 4 June 2012, in the INGC offices. This location, several kilometres outside the scheme and the farmers' village, was not pure coincidence: as strong tensions existed between farmers, the dairy plant and local authorities, a 'neutral' (research) and remote site had to be chosen for this first meeting. Farmers were invited to list the constraints that hinder optimal agricultural production and to identify solutions/innovations to address them. Then a ranking exercise was performed and each farmer was asked to select the two most important constraints and the two most appropriate solutions or innovations. These activities were supported by photographs taken in the field separately by farmers and researchers on 5 and 6 June, in order to illustrate issues discussed in the CoP₁. The research group was asked concurrently to illustrate additional issues. A second CoP meeting (CoP₂) was held on 7 June 2012. In contrast to CoP₁, where researchers only listened to farmers, the two groups were asked to debate the various issues identified by farmers and researchers in their photographs and to develop specific issues.

An LPA was set up on 8 June 2012 in the INGC offices to which were invited a larger range of stakeholders, including

representative farmers, government officers at regional (CRDA) and national (Ministry of Agriculture) levels, and managers of private companies, i.e. the sugar factory and a private milk collector. During this LPA meeting, results obtained from the CoP meetings were presented and discussed with the LPA participants.

Additional CoP meetings were held later in the CTV office to further discuss specific issues selected during the LPA meeting on water management at farm level (CoP₃ on 14 May 2013), milk and tomato value chains (CoP₄ on 15 May 2013, am) and crop rotation (CoP₅ on 15 May 2013, pm).

During focus group meetings, some of the authors positioned themselves as external observers of the process while others were in charge of facilitating it, and others were free to participate in discussions.

Method

As preparation of the process and to invite farmers to whom the objective of the meetings and the whole project was explained, preliminary interviews were undertaken on the constraints/innovations faced in the irrigated area. Open and deep discussions were held with individual farmers visited in their fields. The constraints and suggested solutions were noted, along with the respective strategy of farmers interviewed.

During focus group meetings we noticed visible signs of power of some participants and the influence of their

respective strategies. The authors paid particular attention to the number of participants and the outputs of the workshops. A hypothesis emerged when comparing the results of the CoP₁ meeting and preliminary interviews: individual surveys could be complementary to focus group results. So, further individual interviews were conducted. Sileshi *et al.* (2008) believe that interviews in large groups tend to produce mutually agreed responses and fail to capture individual points of view.

Individual interviews were conducted with 43 farmers representing the diversity of farms; of course some focus group participants were among the interviewees. Farmers were interviewed on their farms, according to their availability; open-ended questions were posed to the farmers regarding their constraints and possible solutions. Interviewers did not suggest any specific constraints to allow farmers to develop their own vision. The farmers were then asked to rank the constraints they identified in decreasing order of importance. A Pareto diagram (Catton *et al.*, 2008) was used to prioritize the problems cited by farmers during individual interviews. The occurrence of constraints ranked first and second by each farmer was considered for prioritization, as done in the CoP meetings.

The authors' reflections focused on the change of farmers' behaviour when they are in individual or collective discussions and tried to analyse the interactions between all pieces of information. Analysis of different discourses conjugate to the agricultural history of the area enabled understanding of the influence of the context and overcame the difficulty of the complex dynamics between stakeholders.

RESULTS

Output of focus group meetings

The CoP₁ meeting gathered together 15 farmers, 12 researchers and 3 local CRDA officers. Out of 27 farmers invited by the project, only 9 attended the meeting. The other 6 farmers were invited by INGC with whom they maintain extensive relationships through multiannual agricultural

experiments on no-tillage cropping systems. A list of constraints and solutions was established by agreement between the participants (Table I). Ranking showed that the key issues were, in decreasing order of importance: waterlogging and drainage, absence of the collective organization of farmers, labour shortage, access to technical innovations, seed quality and value chain problems. Although the study area is an irrigation scheme no problems/innovations related to irrigation were mentioned. Waterlogging was identified as a priority concern for the farmers even if only 20% of the area was actually affected and half of this threatened area is equipped with a drainage system. The farmers' request was to extend the drainage system which currently only benefits a small part of the area. However, no solutions were identified because of a lack of means put forward by the state.

For the CoP₂ meeting, the subject of which was discussion and validation of CoP₁ results with researchers in the light of visits and photographs in the field, only four farmers attended the meeting. Two from these four farmers were highly motivated because they saw the meeting as an opportunity to solve their problems. Despite the low number of farmers, interesting discussions between farmers and researchers, supported by photos taken by both sets, were held on irrigation and drainage management, organization of the milk supply chain and changing crop rotation with the introduction of sugar beet. Further discussions on each of these specific topics were planned for forthcoming meetings.

The LPA meeting was seen to be more interesting to attend as it was planned to involve national and regional government officers. Attendees numbered 37, including 10 farmers, 14 researchers, 5 CRDA officers, a consultant from the sugar factory, a private milk collector and 6 WUA staff. The issues identified in the CoP meetings, supported by photographs taken in the field by farmers on the one hand and by researchers on the other, were debated. But much more time was given to discussing new problems according to the CRDA officers, such as water counting and pricing and the poor condition of tracks and windbreak hedgerows. So, waterlogging and farmers'

Table I. Results of the ranking exercise of problems and innovations

Problems	Ranking	Solution
Waterlogging	1	Extend the drainage system
Lack of farmers' organization	2	Organization of farmers in cooperatives
Labour shortage and cost	3	Organization of farmers in cooperatives
Access to technical innovations	3	Support of the state and organization of farmers in cooperatives
Seed quality	3	Support of the state and organization of farmers in cooperatives
Value chain (milk and sugar beet)	4	Organization of farmers in cooperatives

organization problems received less attention. Despite conflicting relationships between participants, especially between farmers and CRDA officers, in-depth discussions took place harmonizing many points of view and clarifying some ambiguities. At the end of the LPA meeting, farmers expressed their disappointment that some CRDA officials and government officers at national level were absent. Their motivation for attending was not to address technical issues with local officers, but to have the opportunity to put forward issues with decision makers at higher levels.

Farmers' participation in following CoP meetings (CoP₃, CoP₄, CoP₅) on specific topics was limited although they were organized at the CTV offices, not far from their farms. In the CoP₃ meeting on water management at farm level 13 farmers and 16 researchers and students attended. But only four of them had previously attended the CoP₁ meeting and were convinced of the purpose of the process. Moreover, they were disappointed because they expected concrete results from the previous meetings. The problems/solutions outlined in previous meetings were issues of higher decisions (drainage network) or time (cooperatives). The topic of drainage was extensively discussed again. The researchers reported experiences from other areas but farmers did not seem convinced. They insisted that the state should provide an extension of the drainage network. Water management problems were noted in the scheme during field visits by farmers and researchers. But farmers were not interested in these problems and the useful opportunity to resolve them with research support. In the CoP₄ and CoP₅ meetings on milk and tomato, value chains and crop rotation respectively, only three and two farmers were present, respectively. The reluctance of farmers to participate regularly in meetings seemed high and the research team was facing difficulties in getting them involved. Working

with a random group of individual farmers instead of informal dialogue groups could fail to bring the expected results (Dolinska *et al.*, 2018).

Results of individual interviews

Only 2 farmers out of 43 refused the invitation to participate in the interviews, saying that they were not convinced of the utility of the project approach to improve agricultural production in their area. Both had their diagnosis of the situation and were convinced that solutions to their constraints were dependent on high-level decisions. The different constraints and their ranking according to individual farmers' perceptions are summarized in Table II; 80% of the mentioned constraints match the five main issues, whereas farmers' organization was not mentioned at all. The main issue is the high production costs. Most farmers considered that production costs had increased much faster than their income over the last 10 years. The poor condition of the tracks was seen as a major impediment to the marketing of products, especially for the daily collection of milk. The difficult access to credit is a key issue because this requires farmers to use expensive credit from distributors for the purchase of inputs such as concentrated feeds, fertilizers or pesticides. The labour shortage and its related high cost constrained the farmers, especially because they were not allowed to transport the manpower. The problem of waterlogging which was at the first level of importance and extensively discussed during the CoP meetings did not seem to have the same degree of importance in individual farmers' perceptions.

Individual interviews also allowed the identification of feasible innovations that were not mentioned during the CoP meetings. Open-ended questioning can lead to in-depth discussions with farmers, and thus allow more relevant

Table II. Cited constraints and their ranking according to individual farmers

Problems	Frequency of voting 1	Frequency of voting 2	Index of importance	Frequency (%)	Ranking
Production costs	11	9	20	23	1
Agricultural trucks	6	9	15	17	2
Financing	9	3	12	14	3
Labour	6	6	12	14	3
Waterlogging	4	3	7	8	4
Market problems	3	2	5	6	5
Water cost	2	2	4	5	6
Quality seeds	0	3	3	3	7
Fragmented holdings	2	1	3	3	7
Loss of vitreous aspects of wheat	0	2	2	2	8
Flat fee	0	1	1	1	9
Agricultural extension	0	1	1	1	9
Conflict with WUA	0	1	1	1	9

information to be obtained (Lado, 2004). Adopting some practices to decrease production costs, reducing waterlogging by deep tillage and introducing ryegrass in rotation to fight against weeds, were notably cited. In some cases, farmers expressed conflicting opinions. For instance, they denied that seed quality was bad, arguing that farmers should know how to buy good quality seeds and not simply seek to buy seeds at the lowest prices.

Elements of reflections

Farmers' perception of the origins of problems conjugate to the area history allowed understanding of the production context. Following the conversion of rainfed to irrigated production systems, advocated by hydro-agricultural development, the designers proposed the creation of institutions with the mission of accompanying farmers during the adaptive process. The Ginor sugar complex, the dairy milk centre and the irrigation management office, the Office de la Mise en Valeur de la Vallée de la Medjerda (OMVVM), were created in the 1960s and were the main institutions responsible for this accompanying mission. The OMVVM was in particular in charge of providing water and technical support for the farmers. In 1989 the institutional environment underwent a major transformation. The OMVVM was disbanded. Its missions were gradually shared out among the CRDA and WUAs. Farmers were not satisfied with the WUAs service which was not the same as that of the OMVVM. The Ginor sugar complex and the dairy milk centres have been closed. Farmers have lost the support they have become accustomed to. We think that the role that the state played in the support of farmers did not make them ready and able to innovate for themselves. We believe that the principal motivation of those who participated in the focus groups was the opportunity to lobby for development of the drainage network, although this problem was not widespread on the area, as they had faced waterlogging during the preceding rainy season which was greater than usual; this explains the ranking results during CoP meetings. Farmers frequently stated that agriculture was at its height in the 1980s and early 1990s and then there was a deterioration of the situation. This provides evidence that waterlogging could not be the principal constraint to agricultural production in the area as the geographical area is the same.

The transfer of irrigation management from OMVVM to CRDA and WUAs was done without participation of farmers and without preparation of all the actors. This has led to conflicts. In addition, some interviewees claimed that the decline in agricultural production is a result of decisions that had not been undertaken transparently, with rumours of corruption. This lack of confidence that could not be expressed during focus groups explains the reluctance of farmers to participate in meetings.

DISCUSSION

Results contrast between focus groups and individual interviews

In this study, the participatory diagnosis to identify constraints and develop innovations for improving agricultural production in an irrigation scheme showed that substantial differences exist between the results of individual interviews and focus groups. During individual interviews, farmers naturally expressed the difficulties they face in managing the technical, economic and organizational aspects of their own farms, but they did not mention the collective aspects involved in the management of irrigation and agricultural systems. However, demands for improved collective organization of farmers were made several times in focus group meetings. Though individual interviews are not adapted for identifying common solutions, they allow the constraints encountered by the members of the community to be identified in a more comprehensive and objective manner. The process is much more complex during collective meetings since they involve adaptive behaviour and strategies according to the context and identity of the participants. Analysis of these biases is important for understanding the relevance of the outputs. In spite of the potential of approaches that allow multiple stakeholders to collectively participate in problem identification and innovation development, setting up and implementing multi-stakeholder platforms including non-traditional partners such as policy makers is still dysfunctional (Adekunle and Fatunbi, 2012). The CoP and LPA as they are defined theoretically are, in some contexts, difficult to implement in reality, but this does not prevent them from being operational and effective. Individual interviews could be complementary to focus group meetings.

Challenges of mobilizing participants

Farmers might be regarded as traditional partners of research. In deep discussions, interviews and experimentation can be implemented almost without any difficulty, whereas policy makers and private-sector practitioners are non-traditional partners and MSPs can be difficult to realize. Creating a learning community is actually difficult to design and properly manage (Ison *et al.*, 2014). In this project, organizers initially encountered difficulties in mobilizing farmers who, after the invitation step, were mainly interested in what concrete outcomes would come from the meetings. At the first focus group meeting, only one-third of the invited farmers actually attended. The number of participants declined in the following meetings. On one hand, the problems addressed could only be solved by the high-level decision makers; on the other, the government played only a secondary role in the process. The team project could not motivate or mobilize enough participants during all the

meetings and failed to convince farmers that it is possible to achieve concrete results. One of the challenges of mobilizing participants is a trusting relationship and to ensure that the participants are convinced of the group's ability to help reach solutions. The designers and organizers of the process should offer guarantees as to its ability to contribute to solving problems. It also seems advisable to focus on specific subjects instead of trying to engage different participants around a large topic such as improving agricultural production in an irrigation scheme. Preliminary interviews to define homogeneous groups with specific topics might be more promising.

Power and identity issues

Wenger (1998) wrote that CoPs do not place enough emphasis on issues of power and identity. Our results already showed that MSP output could be biased by the strategy and the identity of participants. Placing stakeholders' agendas on the table of a platform is part of participation, but some powerful farmers involved in the meetings had another agenda not supported by the majority and they were able to place their agenda at the heart of discussions. This contrasts with what Cullen *et al.* (2014) described in the Ethiopian context where researchers and officials had a decisive influence on the platform process. Tunisian farmers have proven their ability to emphasize their own ideas with respect to government officers. Subject to the government office before the Tunisian revolution in 14 January 2011, farmers are now able to express their views freely. The identity of officials also influences the subject of discussion; farmers during the LPA meeting tended to adapt their speech to the presence of those officials likely to meet their needs. The influence of participants during the process was raised, pointing out that the participatory process could be exploited.

Influence of the context

In Tunisia, the key influence of the context was repeatedly demonstrated in the course of the workshops. Farmers considered that the conditions of production in the irrigation scheme had deteriorated following the disengagement of the state and the suppression of different institutions supporting them. This context illustrates the difficulties in establishing MSPs for innovations. Farmers refused to consider that it was now up to them to manage their farms' activities and problems. This was why the LPA meeting, expected to involve national and regional government officials, proved to be much more attractive than the CoP meetings where only farmers, local officers and researchers were attending. Every MSP allows learning and identifying creative solutions (Hemmati, 2002). But in our context farmers were driven by what they could gain from these meetings outside

of their own efforts. They mainly focused on problems to be solved by head office during the collective meetings. Basically, they were not interested in learning platforms and exchanging experience and solving problems themselves with the support of research and views of all stakeholders. Although policy makers should be committed to a multi-stakeholder approach to give legitimacy to operations and facilitate the necessary governmental support (Adekunle and Fatunbi, 2012), this also requires the establishment of trust relationships that currently do not exist in Tunisia. Achieving effective outcomes may be unrealistic in a short time period in such a challenging context.

Realities crossed

It is surprising that although the problems of the irrigation water management were noted during field visits, farmers were not interested in this useful opportunity to resolve them with research support. In fact, these problems are concealed within the conflictual relation at the interface between farmers/WUAs/state. WUAs have often diagnosed mediocre performance (Ben Mustapha *et al.*, 2015). Obsolescence and lack of maintenance of the system cause frequent incidents at all levels, while the shared responsibility is the source of frequent misunderstandings, or even conflicts, between individual farmers, WUAs and the state. As farmers are not convinced of the services of the WUAs they are refusing to pay for water. Accumulation of debts is making things worse. This institutional environment is a barrier to any useful efforts to improve irrigation water management. Farmers are more interested in resolving these structural problems before focusing on technical problems or working on innovations. The efforts and incentives for better irrigation water management could fail. Strategies used for improving irrigation water use should be rectified and adjusted to a specific context, and lessons from previous platforms can be drawn and perhaps used to inform other processes (Cullen *et al.*, 2014). More transdisciplinary studies and efforts should be deployed in parallel with innovations on irrigation technologies to achieve better water management and sustainable use of water resources.

CONCLUSION AND RECOMMENDATIONS

Improving the performance of irrigation for better water resources management is closely related to the issue of improving agricultural production in irrigated systems. Participatory processes have been encouraged due to the complexity of this issue. This study is a contribution to participatory research through a participatory diagnosis to identify constraints and develop innovations for improving agricultural production in an irrigation scheme in Tunisia. On the one hand, the participatory process with focus groups

appears to be influenced by the context and strategies of the participants. On the other hand, individual interviews are not adapted for identifying common solutions; this is an important issue in irrigated schemes, where collective action programmes could be expected to help farmers solve issues like commercialization, and where the larger part of the irrigation network is not individual but collective, and uses a common resource, water, shared at the regional, and even national, level. Special attention should be deployed in implementing the participatory process with focus groups as the process should be adapted to the context. The approach combining complementary individual interviews and focus groups was useful as farmers' behaviour strongly changed from one level to another; it allowed valuable lessons that could be used to inform other processes.

In a participatory diagnosis, individual interviews focusing on a main objective (e.g. improving agricultural production) should be done first to establish homogeneous groups with the same interest. This first stage ensures the representativeness of future participants in focus groups. It would be interesting during this stage to identify suitable leaders for mobilization of participants. At a second stage, focus group meetings, with clear and precise objective focusing on specific subjects (e.g. water management at farm level, waterlogging and drainage, milk and tomato value chains, crop rotation, optimizing production costs ...) could be organized. Their motivation enables their mobilization and engagement. Particular attention should be paid to whether they had already participated in such meetings—this affects their opinion whether the process could be relevant and worth their interest. The organizers of the process should offer guarantees as to its ability to contribute to solving problems. Tangible results should be provided for participants following a series of meetings organized at a sufficient speed in order to avoid frustration and demobilization.

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