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INCLUSIVE LAND AND WATER GOVERNANCE: EXPERIENCES FROM MAURITANIA AND SENEGAL

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Abstract

Land and water rights are closely interdependent – it is not possible to use one resource without the other. Effective land and water governance must address issues as diverse as regulating the creation of water infrastructure (e.g. through permits for digging wells) and its land tenure implications; determining the nature, content and duration of the property rights over land, water and the water infrastructure; establishing systems for recording those rights; creating institutions and processes for resource management; and providing fora for the settlement of disputes. This paper looks into the experiences of three irrigation schemes in Mauritania and Senegal and how they are dealing with property rights and the respective institutional arrangements to coordinate water uses. There is no single, optimal property right system for irrigations systems—in developing countries or elsewhere. Rather, we need a range of options and the understanding necessary to be able to tailor them to their (ever-changing) physical and institutional context.

Key Words: Land tenure, water rights, irrigation

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1. Introduction

Experience with the past 30 years of irrigation has shown that technology alone is not sufficient to ensure productivity gains, let alone sustainability. In many cases, the technologies were not adopted or maintained, or the poor, women, and other marginalized groups were excluded from the benefits of technologies. Appropriate institutions are needed to accompany technologies for sustainable irrigation. Among these key institutions, property rights play a particularly important role. When resources are abundant, there is little need to define property rights, but as the resource becomes more scarce, users of the resource compete and even come into conflict. In such contexts, there is pressure to define property rights over the resource, to clarify expectations, and assign both rights and duties.[1]

Attention to property rights in developing country irrigation systems came to prominence in the 1980s and 1990s in response to concerns with irrigation system maintenance and water scarcity. With regard to irrigation systems, there are three types of property rights that are important: to the land, the infrastructure, and the water. All three of these resources are necessary for productive use of the water, and how rights over these resources are distributed will affect both the amount and distribution of benefits. It is not only the content of the rights that matter, but the security with which they are held. Especially the strength of incentives to sustain irrigation systems depends on how confident right-holders can be that they will hold that right in the future. Key aspects of tenure security include the expected duration of the right and its robustness.[2]

This paper looks into the experiences of three irrigation schemes in Mauritania and Senegal and how they are dealing with property rights and the respective institutional arrangements to coordinate water uses. The first section looks into the specific issues irrigation schemes raise in relation to both water and land rights. While the second section provides an overview of the Senegal River Basin, the next sections describe the experiences of three irrigation schemes located in the area. In each case a different approaches were used when the irrigation infrastructure was established: land agreements in Maghama (Mauritania), land use and allocation planning and land registration in Diama (Senegal), and the "One household, one hectare"-principle for land allocation and pastoral units in Matam (Senegal).

[1] Otsuka, K., Place, F. (2001). Issues and theoretical framework. In: Otsuka, K., Place, F. (Eds.), Land Tenure and Natural Resource Management: A Comparative Study of Agrarian Communities in Asia and Africa. Johns Hopkins University Press, Baltimore, MD, pp. 3–33.

[2] Meinzen-Dick, R. (2014). Property rights and sustainable irrigation: A developing country perspective. Agricultural Water Management 145, 23–31.

2. Land, water and irrigation schemes

Irrigation schemes raise specific issues in relation to both water and land rights. Water rights issues concern two main ―levels‖: the right to abstract water from the natural source to feed the irrigation scheme, a right held by the irrigation agency usually through a licence or permit; and water delivery rights, held by individual water users – the farmers – on the basis of a contract with the irrigation agency and in return for a water fee.[3] To further complicate the picture, over the past few years responsibility for the operation and maintenance of state irrigation schemes has been (partly) transferred to water users. Key water delivery rights issues include farmers' security of access to water, nature and level of the water fee, accountability mechanisms to ensure timely and effective water delivery, and the responsibilities and functioning of water users associations.[4]

As to land tenure, irrigation schemes raise three broad groups of issues.[5] Firstly, the very creation of irrigation schemes on the part of government or development agencies is likely to entail the suppression of existing land rights, and the reallocation of land-cum-water rights to users who may or may not be the original right holders. Legislation typically empowers the government to do this. This raises issues as to the extent to which local land rights are recognised by legislation, and right holders are compensated for loss of their rights.

In some cases, right holders receive "improved" (i.e. irrigated) plots rather than cash compensation. The allocation of use rights to irrigated plots after the completion of the irrigation scheme is usually made on the basis of criteria determined by legislation or development projects. Such criteria may include: pre-existing land rights; labour or cash contribution for the construction of the irrigation facility; household size; capacity to cultivate the land; local residence; and others.

Creating irrigation facilities and allocating water rights raise land tenure issues that vary substantially depending on the size of the irrigation scheme and the legal regime applicable to it. Large-scale, state-owned schemes raise very different land tenure issues to village irrigation schemes. And, projects

[3] Hodgson, S. (2004). Land and water - the rights interface. Livelihood Support Programme-LSP, Working Paper, 10, Food and Agriculture Organisation of the United Nations, Rome, Italy.
[4] Ibid.
[5] Cotula, L. (2006). Land and Water Rights in the Sahel - Tenure Challenges of Improving Access to Water for Agriculture. Issue Paper, 139. International Institute for Environment and Development, London.

designed and implemented by outsiders – whether government or development agencies – are more likely to be prone to manipulation by local actors and to produce unintended consequences.

A community is not a homogeneous entity. Within it, different actors position themselves to make the most of the irrigation project. These actors manipulate external interventions in the village to their advantage. In so doing, they exploit the interplay between statutory and customary rights systems. Legislation on cooperatives provides for democratic decision making in land/water user groups. These egalitarian and democratic principles are often at odds with customary principles, which entrench social hierarchies and gender inequalities. Divisions within the community may also reflect conflicting economic interests (e.g. tenant vs. holder). Some IFAD project designs stipulated allocation criteria favouring the landless, poor and women farmers, but in spite of these socio-economic selection criteria, plots were more often allocated to the more powerful, and the majority to male farmers. In order to provide long-term security for individual land rights of vulnerable groups, especially women and youth, schemes have been launched to negotiate and formalize collective (joint) rights to land and water.

Secondly, there is the issue of the land tenure security enjoyed by farmers on irrigated plots (nature and duration of use rights, etc). In most publicly funded irrigation schemes, farmers do not own the irrigated plots they cultivate. Rather, they enjoy conditional land use rights. Conditions typically include putting land into productive use ("mise en valeur") and payment of the water fee. The former entails that land is allocated to those farmers that are better able to cultivate it, using their own and their family's labour. However, legislation rarely defines what qualifies as "mise en valeur". This leaves wide discretion to government bodies responsible for monitoring fulfilment of this requirement, and opens the door to abuse and to manipulation by the more powerful. In case of non-payment of the water fee, the irrigation agency may deprive farmers of the land they cultivate. This provides an effective sanction to ensure payment of the water fee. But it makes farmers vulnerable to fluctuations in harvests and income, and to losing their land after a bad harvest. Land evictions for failure to pay the water fee remain a thorny issue.

Moreover, recent reforms have transferred, to varying degrees, management responsibilities for irrigated land to the local level. In theory, giving land/water users greater say in resource management may increase their real or perceived tenure security. However, this devolution of powers has been curtailed by important caveats, such as, artificially separating land and water rights management and limiting the devolution to water user groups, with decisions still taken by government agencies. A range of land tenure

options are being explored to grant tenure security to those investing in irrigation facilities. These efforts have focused on attracting large-scale capital. Questions remain as to creating appropriate incentives for investment by local smallholders – who have provided the bulk of agricultural investment. The special land tenure treatment of those investing in water facilities may also result in greater land concentration.

Problems related to land tenure can affect WUA performance negatively. The land tenure system in some countries where farmers are allowed to hold or use land only for a short period of time does not encourage the formation of stable WUAs. In addition, in many countries membership of WUAs is restricted to the registered landowners, excluding tenants, holders of customary land rights and sharecroppers.[6] Excluding these groups of water users is very likely to affect the sustainability of WUAs. Tenant farmers and sharecroppers with insecure land rights were unwilling partners in providing labour contributions for construction and operations and maintenance, hence affecting negatively WUAs performance.[7]

A third issue regards land transactions fostered by the increased land values that irrigation brings about. In most cases, land transactions on irrigated plots are prohibited – whether rentals, sales or other. Yet field studies have documented widespread practices of informal land transactions. Water provision may have a major impact on land prices and as result in absentee land owners returning after many years of absence. This renewed influx can lead to an increased land fragmentation and boundary disputes. Whereas appreciation in the value of land is positive, the high land prices might tempt some farmers, especially the poorer ones to sell their land. When they sell, they usually buy land in more marginal areas where the weather is harsher, quickly spend any money left and eventually end up remaining poor.

3. The Senegal river basin

The three cases described below are all located in the Senegal river basin. The Senegal river, the second-largest river in Western Africa, originates in the Fouta Djallon Mountains of Guinea where its three main tributaries, the Bafing, Bakoye, and Faleme contribute 80% of the river's flow. After originating in Guinea, the Senegal river then travels 1 800 km crossing Mali, Mauritania and Senegal on its way to the Atlantic Ocean.

[6] Salman, M.A. (1997). The legal framework for water users' associations: a comparative study. World Bank Technical paper no. 360. World Bank, Washington D.C.

[7] International Fund for Agricultural Development (2001). Thematic study on water user associations in IFAD projects. International Fund for Agricultural Development, Rome, Italy.

The river is a key resource for all countries. Large herds of cattle, camels, goats and sheep migrate season to season across these borders and herders rely on this water source to sustain their herds. The basin region receives only an average of 660mm of rainfall per year, therefore the Senegal river waters represent the key to agriculture in the region. After agriculture, fishing is the largest economic activity in the region. Other river based economic activities include sugar cane production, rice framing and, to a lesser extent, mining.[8]

Since independence, there has been a desire between basin countries to cooperate in the management of the basin so that all countries would benefit from its development. In 1972, Mali, Mauritania, and Senegal established the Organization for the Development of the Senegal River (OMVS, Organisation pour la Mise en Valeur du fleuve Sénégal[9][10]. The organization's goals are: (i) the development of food security for the populations of the basin; (ii) the reduction in the economic vulnerability of OMVS states to external factors such as climate changes; (iii) the acceleration of the economic development of member states the preservation of ecosystem balance in the sub-region and particularly in the basin; and (iv) secure and improved revenue of the valley populations.

The Senegal river basin has long been recognized for its development potential made possible by the Senegal River. The region boasts a rich history of national and international investments aimed at mobilizing water resources to achieve development objectives, including irrigated agricultural production. These development initiatives have had significant impact on the local environment and populations. But development programs alone did not contribute to a complex and nuanced local context regarding land tenure and land allocation. Among the dynamic factors influencing agricultural production patterns and practices are climate and ecology, migration and demography, local land tenure status based on national policy, decentralized land management authority, increasing private investment in agricultural production, and increasingly knowledgeable and mobilized producer and interest groups.[11]

[8] Newton, J. (2007). Case Study of Transboundary Dispute Resolution: Organization for the Development of the Senegal River. http://www.transboundarywaters.orst.edu/research/case_studies/OMVS_New.htm Accessed on 23 February 2017.
[9] http://www.portail-omvs.org/
[10] Guinea joined in 2006.
[11] Elbow, K. & Diouf, A. (2013). Achieving Fair and Transparent Land Allocation of High-Value Agricultural Lands in the Senegal River Valley: The Delicate. Question of Selecting Project Beneficiaries. Millennium Challenge Corporation, Washington DC.

However, the Senegal river basin, by its climatic and geographical features, is subject to extreme phenomena such as flooding, which are, in the perspective of climate change, becoming more frequent and more severe.[12] In addition, the construction of two dams, in Manantali (1986) and Diama (1988) have had an impact on local communities. Seasonal flooding and water movement decreased dramatically after the dams were built. This has caused an increase in the incidence of numerous waterborne diseases: diarrhea, schistosomiasis and malaria.[13] Reduced flood patterns also prevents pollution from industrial agricultural from flushing out of the basin. The dams have caused a reduction in pastureland, degradation of river fisheries, increased soil salinity and riverbank erosion. Traditional agricultural and pastoral productions systems have been superseded by irrigated, in some cases industrial size, agriculture. This emphasis on irrigation has created problems for social cohesion and access to land in some areas of the river basin, and in some cases artificial flooding has been so poorly planned that it has wiped out crops.[14]

In April 1989, a confrontation between herders and farmers in the Senegal river valley escalated into widespread violence and fatalities that reached the capital cities of both Senegal and Mauritania, the repatriation of as many as 50 000 citizens of each country from the opposite side of the border, and a diplomatic rift that took years to heal. Although the Mauritanian-Senegalese border dispute of 1989-1990 was particularly dramatic and far-reaching in its scope, land conflict continues to pose a significant threat to the tranquillity of the Senegal River basin. One of the potential, and sometimes realized, sources of conflict is a lack of transparency in allocating local lands by local governments and customary land authorities.[15]

4. Experiences from Mauritania

4.1. Country context

[12] Dio, A. (2007). Adapting to climate variability in the Senegal River basin in West Africa. Final Project Report for 2007 START/ PACOM African Global Change Research Grants

[13] World Bank (2011). Vulnerability, Risk Reduction, and Adaptation to Climate Change Climate Risk and Adaptation Country Profile: Senegal.

[14] Newton, J. (2007). Case Study of Transboundary Dispute Resolution: Organization for the Development of the Senegal River. http://www.transboundarywaters.orst.edu/research/case_studies/OMVS_New.htm Accessed on 23 February 2017.

[15] Elbow, K. & Diouf, A. (2013). Achieving Fair and Transparent Land Allocation of High-Value Agricultural Lands in the Senegal River Valley: The Delicate. Question of Selecting Project Beneficiaries. Millennium Challenge Corporation, Washington DC.

With extremely advanced desertification, the country is particularly vulnerable to the impact of climate change and other external shocks. The main sources of income in Mauritania are agriculture, which is either irrigated or rain-fed, and livestock. This is especially the case in the Senegal River Valley, where people make their living farming, raising livestock, and fishing, while mining is prevalent in the north. Arable land is therefore one of the country's main resources, but it is also a major source of contention due to increasing urbanization and the limited availability of arable land.

The majority of Mauritanians are living in insecurity in terms of being unable to register for their individual and collectively owned land. This is even more pronounced for women. In practice, furthermore, national laws are often ignored in rural villages in favour of customary law. In many of these communities, land is viewed as someone's property, regardless of official titles, and previous governments did not see the need to formalize the registration process in a transparent and inclusive manner. Consequently, land rights in these communities are not recognized by the state, and there is little recourse for achieving formal recognition of land ownership except through cooperatives and associations. Furthermore, the vast majority of the population lives according to a common system of customary land law that is not recognized by the state, which, in practice, makes the system more problematic and opaque. Tenure arrangements within the traditional system have always been inclusive of both men and women, where male landowners with large land holdings take responsibility for ensuring that all members of the community, including vulnerable groups, have access to land. These arrangements, however, have not been formalized, making the situation more precarious—even for powerful landowners.

4.2. Land agreement in Maghama

Context

The interventions of the IFAD-supported Maghama Improved Flood Recession Farming Project (French acronym: PACDM) covered the Maghama Department, some communities in M'Bout and Selibaby Departments and the Atef range areas in Kaédi Department (southern Mauritania). The project area is characterized by a semi-arid Sahelian climate and low, but highly variable rainfall. Three major agro-ecological zones can be distinguished. The *Walo* – the flood recession farming area – offers the highest potential for increasing farm incomes. Rain-fed farming predominates in the *Diéri* areas, where the

poorest farm communities are to be found. The *Atef* range constitutes a grazing area for transhumant camels and cattle converging from other parts of the country and Mali. Some classified and non-classified forests are also to be found in the project area. Communities living in the area were isolated from one another due to the lack of functional roads. The area also lacked a number of other critical economic infrastructures, especially drinking-water facilities and markets. Many of the existing educational and health infrastructures were non-functional and/or inaccessible. Production levels were low because of the farmers' rudimentary know-how, high post-harvest losses due to ineffective pest management practices, and low value due to limited market opportunities. The strong social stratification lead to women and young people being excluded from community decisions, and from access to land, information, know-how and financial services.

When PACDM was being designed, it was noted that families with "a weak status", having no secure rights on *walo* lands, would not have been able to benefit of the water infrastructure works that were foreseen by the project and that would have secured access to 9 000 hectares of land. According to a survey carried out in 1993, the "weak status" category included 70% of the farmers and 60% of the *walo* area. Based on these findings IFAD made its financial support conditional on the signing and implementation of a land distribution agreement or "*entente foncière"*.

Approach

Preparatory phase

The adoption of the land agreement in 1995 marked the process that led the PACDM from a more initial top-down approach inspired by a model of individual distribution of irrigated perimeters to a more participatory, bottom-up approach, through negotiations with elites representing traditional communities. The agreement was based on three key principles: (i) justice (recognising the right holders), (ii) solidarity (promoting access to land for vulnerable groups, such as landless, women and youth) and (iii) efficiency (making sure that all land is effectively being used). The process was long and difficult and consisted of the following steps:

An informal body gathering personalities representing the villages, but residing in the capital, the "National Coordination", was set up in 1993. It played a dual role: (i) facilitating the negotiation phase,

and (ii) defending the interests of the beneficiaries at the time of the drafting and signing the protocols of the land agreement with the State. The National Coordination played a major role throughout the development of the agreement as representative of the village interests.

Awareness-raising and information dissemination sessions were organised in all the villages with land that would benefit from the water infrastructure works. The National Coordination developed a draft land agreement that was to serve as a basis for negotiations with the people living in the villages. This draft agreement, which was translated into national languages, was disseminated and explained by the National Coordination during village assemblies meetings. This awareness-raising and information dissemination effort continued until the majority of the villages concerned approved the proposed draft agreement and expressed their willingness to participate.

Village development committees, chosen by the village general assembly, were created. Each village had to designate a village development committee which was mandated to sign, on behalf of the village, the land agreements proposed by the Government. These committees were to: (i) work out arrangements for the distribution of *walo* fields - based on dialogue, the largest possible consensus among communities and following the principles of the agreement, and (ii) undertake any activity likely to promote the achievement of the objectives of the project: promoting the participation of women, ensuring good relationships between farmers and herdsmen and contributing to the protection of the environment.

After about two years of negotiations, the draft land agreement was adopted and signed by government representatives and 25 (out of 28) village development committee presidents in July 1995. The other three villages signed the agreement in 2002.

A committee of wise men was set up by the village development committees in 1996. Their role was: (i) to mediate conflicts within communities and between communities and the PACRM; (Ii) facilitate the implementation of the land tenure agreement and project activities, and (iii) ensure the smooth operation of the village development committees.

A socio-land tenure survey was carried out in each the villages between April and June 1998. This was preceded by the preparation of a scoping note on the socio-land tenure survey process, the setting up of a socio-land tenure survey steering committee, and an information, dissemination and awareness-raising

meeting on the socio-land tenure survey. The survey results were validated each time in public during village assembly meetings.

The socio-land tenure survey allowed to distinguish between "strong statuses" (*dieye* and *diengue*[16]) and "weak statuses" (*loubal*[17], *rempetienne*[18], *ndiouldy*[19]). It clarified that the land tenure situation was not characterized by large landowners, on the one hand, and small farmers or landless, on the other hand: it was characterized by those who had the power to distribute land and the users who were dependent on this power and had more or less secure access to land. The survey also pointed out that the percentage of "weak statuses" was lower than that estimated at the time of the design of PACDM. The survey concluded that the "weak status" consisted of only 20% of the *walo* area (and not 60% as noted during deign). *Rempetienne* was practiced on only one per cent of the plots, while it was estimated at 50% of the areas and 60% of the households at the time of design. Moreover, according to the results of the survey, only 11 of the 25 villages that signed the land agreement were able to share *walo* land with farmers who did not have secure access to land and could actually be "donor villages".

Targeting

The text of the land agreement clearly spells out priorities for access to land for different categories of beneficiaries:

- Priority is given to disadvantaged *autochthonous* populations in the project area. Those who drafted the agreement intend to protect themselves against land attributions to outsiders (article 4).
- The following order of priority is followed: (i) traditional landowners and right holders whose fields have been submerged; (Ii) traditional landowners whose fields have not been flooded; (Iii) traditional *walo* users; (Iv) households whose fields are too small to meet their needs (section 6).

These provisions reaffirm the pre-eminence of autochthonous peoples over outsiders and strong statutes (traditional owners) over weak statuses. Undoubtedly the strong statutes wanted to reserve a margin of

[16] The users of these lands, cleared by others than those who occupy them, have a restrictive use right which they traditionally recognize by paying the assakal to the lineage which owns the property.
[17] The loubal corresponds to a land loan. It gives rise to the payment of the assakal.
[18] It is a sharecropping contract with payment of a part of the crops, which can go up to half of those, in exchange for the use of land of walo.
[19] The user must give an ox to the owner's family after the owner's death.

security for the bad years, not wanting to guarantee land access, nor the weak statutes of their village nor, a fortiori, those from neighbouring villages. The principle of solidarity, affirmed in Article 7 ("whatever the flood level, people will work together to allow access to the *walo* to the largest number of households"), corrects the effects of these privileged priorities .

Implementation phase

The implementation of the land agreement began as soon as it was signed in June 1995. However, it was neither quick nor easy and was not completed in December 2000 when the first phase of PACDM ended. The agreement, in spite of the very lively debates which preceded its signature, has not definitively put an end to all disputes. In an experiment in which the participation of the population is considered essential, the expression of all opinions, favourable and dissenting, is a healthy sign, provided that explanations and discussions make it possible to find a solution to the conflicts. This however is a time-consuming approach.

The implementation of the agreement takes place in three steps; (i) a socio-land tenure survey to gain in-depth knowledge of the land tenure situation in the area; (ii) validation of the survey results by the stakeholders; and (iii) written agreement (*procès verbal d'insertion*) in which all parties commit to securing access to land for vulnerable groups.

The socio-land tenure survey made it possible to know and identify, by village, and by "*gallé*[20]" all right holders, strong and weak, all the land owners and tenants, and all the different categories of lands (walo, falo, fondé, diéri). This knowledge is the result of simple declarations made in public and thus enjoying the "control" of the village assemblies. The survey provides even more precise data: location of plots by *kollengal*[21] and approximate areas of the fields. These indications are declarative and may vary according to the year in view of the fact that the land owners retain the possibility of adapting the land distribution according to the intensity of the flood recession, even if the infrastructure works supported by the project to control flood recession has to a large extent reduced the need to make this "adaptation".

[20] Extended family
[21] Land with certain characteristics that distinguish it from the agro-ecological point of view of the neighbouring areas

A committee for the validation of the socio-land survey data, composed of the head of the project management unit, an IFAD consultant, the President and a member of the Coordination, the monitoring and evaluation officer of SONADER and two researchers spent six weeks (23 April to 6 June 1998) in the project area to validate the survey results with the 25 village development committees. Each village now has a validated register that gathers the records drawn up by each *Mawdo Gallé* of the village (head of extended family) and that contains information on family structures, land rights, concerned *kolladé*, statutes, surface areas, etc. Each *gallé* sheet is signed by the president of the village assembly, *Mawdo Gallé*, and most of the members of the validation committee. The outcome of the validation is always shared publicly during a village assembly. There is therefore a provisional consensus on the rights identified during the survey and validated by the villages.

The last step in the realization of the land agreement is the integration of the landless and the securing access of the tenants. A draft written agreement (*procès verbal d'insertion* or PVI) was proposed to the beneficiaries as an instrument for measuring the application of the land agreement and submitted to the Government and IFAD for approval and amendment. At a meeting on 11 May 2000 the draft written agreement (*procès verbal d'insertion*) was approved and the minutes of this meeting signed by all the participating Ministers.

In each PVI there is the commitment of a single owner to make plots available for a specified duration to landless people, whose names are specifically mentioned. The location (kollengal) and size of the parcels are also indicated Before the closure of the first phase of PACDM, the PVIs were signed by six of the "donor villages": Boguel, Vra Litama, Djeibaba, N'hall, Taga and N'Djiajbini Chorfa.

Copies of the PVI are kept by the Project Coordination Unit and the village development committees. In order for these archives to be lost, it is necessary for the village development committees and the Project Coordination Unit to comply with the conditions for the strict preservation of documents and for the archives to be made available to the beneficiaries of the agreement.

The rural communes are responsible for public infrastructures, but they have been encouraged to transfer responsibilities for operation and maintenance to user associations. In 2005 a Walo Users' Association was created composed of representatives from the different villages. It is responsible for the maintenance

and repair of the water infrastructure, collecting water fees, capacity building of farmers, and avoiding animals roam and damage the fields.

Results

Despite the implementation delays encountered, the first phase resulted in two major achievements: (i) the establishment of flood recession works, which expanded flood recession lands from a yearly average of about 3 000 ha to more than 9 000 ha; and (ii) land tenure arrangements agreed, developed and implemented by beneficiaries, which guarantee secure access of tenure to flood recession lands developed by the project. However, the first phase of the project failed to provide appropriate support services to the farmers, and the organizational, technical and managerial capacity of beneficiary associations promoted during the first phase remained very weak. The second phase of PACDM targeted *walo* farmers that were excluded from the land tenure arrangements established under the first phase. It involved an estimated 500 farm households. The project consolidated land tenure arrangements in all village communities, ensuring that eligible farmers obtain secure access to flood recession land.

Land allocation to vulnerable groups has been entrusted to the "traditional owners", although they are not obliged to do so. However, the public character of the commitments made, the written formalization of the "land distribution" and the transparency of the operations (through the village development committees) clearly indicate the owners as being those responsible for ensuring access to flood recession land for as many people as possible. That has been a significant change. Overall, the integration process has enabled: (i) landless people to access *walo* land, (ii) securitization of land tenure (in terms of area and duration), and (iii) those with strong statutes (*dieye* and *diengue*) to have sufficient access to land.[22] Participation in the agreement has been an important achievement in terms of solidarity between landowners and those with an insecure status, because it eliminated the practices of *ndiouldy* and *rempetien*; It also provided a relief from the *assakal*, which apparently became symbolic, and eliminated the obligation to develop all the allocated *walo* lands. These are therefore significant benefits. In addition,

[22] In Taga, out of 50 farmers included in the PVIs, ten landless people have accessed a plot of between 1.5 and 2 ha, and 27 farmers have had secure access to an exclusive loubal. Of the 27 loubal, 11 received a plot at least equal in size to the one they cultivated before the PVI and 16 received extra land; half doubled the area. In N'hall and Taga, all the strong statutes considered as deficit were consolidated. In Boguel, 57 loubal farmers received plots with areas between 1 and 2.5 ha; 27 of them received parcels for an indefinite period, while the other 30 for a period of 15 years renewable. Six diengué farmers from a landless household received plots of 2.5 ha on average for an indefinite period.

those with a weak status, beneficiaries of the PVI, as well as the land owners feel secure because they have a copy of the PVI which is also signed by the state authorities.

«Ententes foncières» or land distribution agreements between landowners and the landless have been introduced in other IFAD-supported projects as well, as a pre-condition for water infrastructure. They are based on the same three principles (justice, solidarity and efficiency) and involve three steps: (i) land tenure assessment; (ii) negotiations; (iii) written agreement (endorsed by local authorities, prefect, land owners and village chief). Community management structures are created to ensure efficient management of land agreements and to guarantee all stakeholders' interests.

There are however some issues that are threatening the sustainability of the results achieved:

- The institutions created by the projects, namely the Walo Users' Association and the village development committees, remain very weak. It is reported that only five village development committees are collecting water fees. The committee of wise men has not met in a long time.
- To date, the retrocession of infrastructure maintenance to the Walo Users' Association has not taken place. Many of the water infrastructure is not in a good state. The Walo Users' Association does not have the financial means to undertake reparation works.
- The needs of other water and land users in the areas, such as pastoralists and fisher folk, have not been taken into consideration. This has led to conflict with the farmers and cases where the infrastructure has been damaged.

5. Experiences from Senegal

5.1. Country context

Senegal became independent of France in 1960, starting its national life as a relatively prosperous country with an economy based on the exploitation of its rain-fed agricultural resources. Senegal now faces the challenge of recovering from economic reversals experienced in the 1980s and 1990s. Most observers conclude that the agricultural sector's competitiveness has been eroded and needs to be rebuilt if poverty-reducing economic growth is to be realized. While the potential for intensification of agriculture is high, farmers and livestock owners are facing serious challenges: increasing demographic pressure, insecure

land tenure, soil and pasture degradation, increasingly variable rainfall and inadequate irrigation management, and a changing policy environment.

The legal framework of Senegal‘s land regime consists of multiple civil laws, religious law, and a long history of evolving principles of customary law. In the 50 years since independence, Senegal has pursued a decentralized model of governance, granting additional powers to local democratically elected bodies, including rural councils and water user associations. In many communities, rural hierarchies based on family lineage, religion, and political party membership dominate these bodies and control access to natural resources and retention of rights. Veto powers retained by the central government create further challenges to representative local governance of rural land.

The privatization of Senegal‘s system for water supply and distribution has been an African success story, resulting in more than US $400 million in benefits, realized primarily by consumers. Urban areas are close to receiving complete water coverage; rural access has risen significantly and is a government priority and the subject of ongoing programs. The country is expanding irrigation in the Senegal River Valley to take full advantage of the quota allotted by the OMVS. The Senegal River, which has decreased in volume over the last decades, has not supplied the amount of hydroelectric energy anticipated when OMVS constructed two large dams and a power plant.

5.2. Land use and allocation plan and land registration in Diama

Context

The rural community of Diama is located in the region of Saint Louis (north-western Senegal). Agriculture is predominant in the region given its abundance in land and water resources. Three types of agricultural production practices can be found: (i) irrigated agriculture; (ii) flood recession farming; and (iii) rain fed agriculture. Diama is situated in the agro-ecological zone of the delta, where irrigated agriculture has been practiced for decades. Its huge potential has attracted a lot of private investment. Farmers’ organisations are considered to be strong and vocal. Several international development partners have implemented activities in Diama, namely the French Development Agency (French acronym: AFD) and the Millennium Challenge Account (MCA).

Approach – Land use and allocation plan and land information system

In order to complement institutional arrangements and correct shortcomings of the land legislation, land security and spatial planning tools have been developed and tested by government authorities, in particular the National Society for the Development and Exploitation of the land of the Senegal River Delta (French acronym: SAED) and development partners, in particular AFD and MCA. The main tools are: land use and allocation plans (French acronym: POAS), land registers and the land information system (French acronym: SIF).

AFD and MCA had both overlapping intervention zones and overlapping mandates. During their overlapping implementation periods the two agencies worked together to develop registry templates and land planning processes and models for harmonized application across the communes of the Senegal river basin. A step toward sustainability was thus achieved simply by virtue of a single model – rather than multiple models – of fundamental tools for adoption by communes.

French Development Cooperation - Land use and allocation plan and land information system

From 2008 to 2015, the Government of Senegal, with the support of AFD, implemented the Senegal River Valley Rural Communities Support Programme (French acronym: PACR-VFS). Its goal was to promote renewed investment in irrigated agriculture in the Senegal river basin. By linking land tenure security to local development, PACR-VSF aimed at supporting the transfer of responsibility for the operation and maintenance of irrigation schemes to rural communities and fostering their economic development. The objective of its first component - Land Management - was to ensure that rural councils (French acronym: CR) have the tools, procedures and know-how to manage the irrigated area in a more efficient and transparent manner and to implement the various regulatory and technical tools in a coherent manner. The second component - Local Economic and Social Development - focused on supporting economic development and sustainable environmental management. As such, PACR-VSF focused on (i) strengthening the capacities of CRs in the development of their territories; (ii) to create and support, if necessary, the inter-municipal level and consultation between the CRs, through local advisory services to CRs and local actors; (iii) supporting the implementation of economic and environmental activities, infrastructures and equipment through the establishment of an inter-community support fund.

Land use and allocation plans

Introduced during the 1990s in the Senegal river basin, the land use and allocation plan (POAS) is seen as a guiding framework for stakeholders in the analysis, planning and realisation of local organisation and development and a tool for dialogue between people and institutions. The objective of this mechanism was to provide local authorities with an institutional and technical tool to support them in their management and consultation processes. The POAS was created with three objectives: (i) to clarify the land tenure situation, to improve control and management of rural land by elected local authorities and local communities, (ii) to reinforce the complementarity between agriculture and other productive activities aimed at integrated and sustainable rural development, and (iii) encouraging the involvement of people in development actions. From the operational point of view, the POAS consists of three essential elements: (i) rules governing the management of space and natural resources; (ii) an organizational framework for decision-making and monitoring/evaluation; and (iii) mapping tools to guide and inform decision-making processes. These plans provide guidelines for local development programs and initiatives.

The POAS identifies several land use zones where priority is given to a certain activity without excluding others. As such, there are residential zones, agro-pastoral zones with priority given to agricultural activities, agro-pastoral zones with priority given to activities related to livestock rearing, pastoral zones, etc. During the development of the POAS agreements are made on the location of water sources for livestock and stock routes. The following steps are undertaken during the development of a POAS: (i) establishment of partnership framework; (ii) geographic and alphanumeric data collection on the rural community; (iii) data validation by local people; (iv) development of land use maps; (v) agreement by local people on land use regulations; (vi) validation of rules by state administration and lawyers; (vi) adoption of POAS by the CR; (vii) implementation of POAS during two years; and (viii) updating of POAS.

POAS are drawn up at the request of the local authorities, by deliberation of the municipal council. The participatory approach allows the local authority (elected officials, local authority staff, local resource persons) to master in a few months the development and implementation of a POAS. The development of the plan has a cost of about 15 000 000 FCFA per local community. It requires the support of a technical

team (one GIS expert, one geographer and one sociologist), as well as the training of this team in the specific approach. The process takes on average nine months.

Land information system

The land information system (French acronym: SIF), within the scope of the resources and competences of rural communities, was introduced in 2009. The SIF is a set of principles governing the collection, processing, use and storage of data on the occupation of public land, which informs decision-making. It allows to document three dimensions of land tenure: "who? and how? " by carrying out socio-economic land tenure surveys; "where?" by mapping and a plot numbering strategy. The system is made up of registration procedures, a land allocation map, land administration forms, a register with requests for land allocations, a land register[23], and can be managed autonomously by the local authority.

The socio-economic land tenure surveys are carried out at plot level, look at issues of use, means of access, etc., and are done in a participatory manner (public debate). The results of these surveys are validated during a public meetings at CR level. Plot mapping is done using satellite images on which agricultural parcels are identified. For each parcel, the land register contains a parcel sheet which contains the identity of the one the plot is assigned to, the tenure status of the parcel, elements justifying the allocation and any modifications or transactions that take place after the allocation. These plots are linked to a map which facilitates their physical identification.

The SIF can also be computerized ("digitized SIF") and integrated into a central file linked to a geographic information system (GIS). Attention is given to strengthen the capacity of local authorities (elected officials, community agents and state support services) to administer the system autonomously.

SIF facilitates decentralized land management, which is both operational and sustainable, improves transparency, traceability and dialogue, which makes it possible to fight corruption and illegal attributions, It is leading to a sharp reduction in litigation. SIF can help rural communities in managing the inflation of local population demands more effectively in response to their concerns about

[23] The land register is a tool in which all land administration operations that have been carried out by the CR are registered. It is a key land administration tool for CRs. It provides a precise overview of land administration (decisions, names of people to whom the land has been allocated, the plots that have been allocated or deprived, their location, etc.).

agribusiness. Beyond land allocations management, the SIF coupled with the POAS allows a gradual improvement of local territorial and land policy, through a clarification of geographic and land tenure information.

The establishment of a SIF in a local community requires the acquisition of necessary equipment (average cost: 5 000 000 FCFA per local authority) as well as specific training of the community's stakeholders (average cost: 6 000 000 FCFA per local authority).

Millennium Challenge Corporation - Land registration

In September 2009, Senegal signed a six-year Compact with the Millennium Challenge Corporation (MCC; 2009-2015). It includes an Irrigation and Water Resources Management Project (IWRM) through which the MCC funded the construction of roads, bridges and irrigation works to expand the area under irrigated agriculture in the Senegal river valley. A major component of the project was the Land Tenure Security Activity (LTSA), which sought to formalise land rights and reallocate and redistribute lands in the project's target areas of the Delta and Podor. The rural community of Diama is located in Delta. LTSA used a participatory process to formalise land tenure and establish criteria for land allocation. Those selected for the allocation of lands are awarded land certificates (*titres d'affectation*).

The project started with collecting baseline knowledge of the formal and informal land tenure status of current occupants of the IWRM intervention zone based on quantitative and qualitative surveys. Survey results revealed that in the Delta, 1 945 parcels in the intervention zone had been formalized in the past and remained valid within the statutory regime. At the same time, over 3 000 parcels were occupied informally based on customary practices, and 422 land transactions had been conducted that were not authorized by current land laws. The surveys also revealed a large number of parcels that have been abandoned because of overly saline soils, lack of access to credit and other reasons. Many of these parcels needed to be repossessed by the rural councils for reallocation. In addition, the surveys revealed that where formal land management and records existed they appeared in embryonic form, with most parcels insufficiently registered or mapped.

A series of workshops was organized in each of the nine local communities to facilitate discussion, debate and negotiation to achieve local agreements regarding the nature and rules of the land allocation process

and the principles to be applied during land allocation operations. To further encourage local participation, the initial series of workshops took place at a sub-community level, following the division of each community into three or four zones. The composition of workshop participants at both the sub-zone and the subsequent community-wide level was designed to represent all major categories of local stakeholders, including institutional actors (rural and municipal councils, government technical support agencies and administrative officials), women, farmers, herders, and youth. Once a consensus had been achieved at the level of each community's sub-zones, representatives from all zones, including each category of stakeholders, were selected for participation at the level of the entire community.

The rural community of Diama agreed on the following order of priority groups to benefit from allocation of lands developed for irrigated agricultural production: (i) native landless farmers; (ii) resident landless farmers (consisting of landless farmers coming from outside of the community), (iii) use rights title holders, and (iv) private investors. Twenty percent of allocated surface area was reserved for women and vulnerable actors. Of the 20 per cent, 10 was to be reserved exclusively for women's producer groups, with the rest to be apportioned to youth and disabled populations.

While responsibility for the allocation of land certificates rests with the local rural councils and local communal councils, the LTSA also created a new agency, the Technical Committee in Support of Land Tenure Security (French acronym: CTASF), composed of central government officials and private sector representatives, as well as civil society organisations, to act as an advisory agency to local authorities and oversee land allocations. A CTASF was established in each community. Their specific responsibilities included: (i) providing CR with relevant information on land management and development topics and initiatives; (ii) providing expert opinions and recommendations without trespassing on the CR's legal decision-making prerogatives; (iii) assisting the CR in conducting technical and financial assessments of land allocations applications; and, (iv) participating in the implementation and monitoring of all activities related to local land tenure.

The project supported formalization of existing land rights that have been acquired via customary land access or following extra-legal land transactions, and land allocated in extension areas. In each case, formalization required the delivery of a use rights title (*titre d'affectation*) to the legitimate land property rights holder. Beyond the one-time formalization of existing rights and those resulting from land allocations, LTSA embraced a multi-pronged program to achieve a sustainable land management system

that consists of maintaining and updating land records by trained personnel, applying appropriate land planning tools, increasing stakeholder participation in land management, awareness and respect for investment rules, and relying on effective internal land attributions and monitoring by producer groups. More specifically, LTSA also provided support to improve the contents and cartographic aspects of the POAS, as well as to implement the plans. The CTASF supported CRs to coordinate land allocation decisions with POAS..

Results

The inclusive and participatory approaches introduced by PACR-VFS and MCA, based on good local governance, democratic processes and representative decision-making, have been received with enthusiasm by the population and local government. The approaches provide opportunities for different resource users and vulnerable groups to secure their access to land. The emphasis on dialogue and consensus- building also contributes to social stability, accounting for the rights of traditional land occupants and reduced land conflict. It was reported that in the last seven months only three land disputes occurred, which were all settled in an amicable manner. The strong partnership between the communities, local government, technical services of the state has been key to the success.

There are however some issues that still need to be addressed:

- The POAS is not always respected in practice. There are, for example, different cases where stock routes have been encroached by farmers. People are not aware that the POAS is actually legally binding and can be enforced.
- Pastoral resources have not been given adequate attention during the development of the POAS. Stock routes and areas set aside as grazing lands have not been protected or clearly identified on the ground. Several important aspects have not been taking into consideration enough: distances between water points and grazing lands, carrying capacity, etc.
- So far, no discussions have taken place with neighbouring communities to ensure some kind of harmonisation between their respective PAOS. The fact that resources are not confined to community borders is therefore not taken into consideration.
- The POAS should take climate change into consideration: changing land uses, identifying areas under risk and mitigation measures, etc.

- The CTASF that was set up by MCA is no longer effective and the land register are currently not being updated.
- The number of requests for land allocation by women is very low. (less than five per cent). It was reported that this is due to lack of financial resources to put the land into productive use.

5.3. "One household, one hectare" and pastoral units in Matam

Context

The department of Matam, located along the Senegalese frontier with Mauritania, had a population of 215 000 in 1988. The majority of this population consisted of rural households practicing agriculture, livestock production and, less often, river fishing. Over the last decades, a dramatic decline in rainfall (from 496 mm to 250 mm/year) and changes in the flood pattern of the Senegal River caused by the Manantali Dam had pushed the families living in this area into a situation of increasing economic insecurity and poverty. Conditions got even worse following the events of 1989 and the repatriation of 7 000 refugees, who settled in the department.

Although, as originally conceived in 1989, The Agricultural Development Project in Matam (PRODAM) was an emergency intervention aimed at providing support for and facilitating the reintegration of the repatriated and dispossessed population in the area, it evolved into an agricultural development project whose initial activities did not get started until 1995. PRODAM has known three phases: phase one from 1995 to 2000 (supported by; phase two from 2003 – 2012; and phase three from 2013 to 2018. While the first two phases were supported by IFAD and the West African Development Bank (French acronym BOAD), the third one is only supported by BOAD.

Approach - "One household, one hectare" and pastoral units

The objective of PRODAM was to improve the income and living conditions of the repatriated or resident populations in the department of Matam. This objective was to be achieved through the consolidation, promotion and development of food and livestock production based on the integrated village land management. The project's actions were designed to: (i) rehabilitate and construct village irrigation schemes (French acronym: PIV) for rice cultivation and mixed cropping; (ii) improve the use of pastures

through the establishment and support of economic interest groups (French acronym: GIE); (iii) the opening up of new pasture areas through the construction of three boreholes.

PRODAM contributed to improving land tenure security by supporting the "one household, one hectare"-principle for allocation of land in PIVs and the establishment of pastoral units responsible for the management of pastoral resources.

"One household, one hectare"

PRODAM carried out the following step in the construction of the PIVs: (i) basic socio-economic study to determine the number of target families and the areas to be irrigated (on the basis of one hectare per household); (ii) feasibility study for the irrigation scheme; (iii) recruitment of company to carry out the heavy infrastructure work; (iv) engagement of beneficiaries in lighter construction work. Farmers received training on the operation and maintenance of water infrastructure, as well as support in establishing the rules for the use of PIVs. SAED was responsible for providing advisory services to farmers.

In order to guarantee land access in the irrigated areas to returnees and dispossessed people, PRODAM facilitated a regrouping and redistribution of land amongst all families effectively living in the village. Each household could receive only one irrigated plot of up to one hectare, the size of which was calculated on the basis of their operating capacity. It were the inhabitants of the villages themselves who decided on how to distribute the plots in the PIVs, the exact definition of household and the households that fell within this category. By facilitating access to land for returnees and dispossessed people the project hoped to improve their socio-economic situation. Special attention was also given to ensure that also women were recognised as land owners. The process was led by the village chief and facilitated by a committee of elders with support from the project. PRODAM would not go ahead with the irrigation infrastructure works unless an agreement was met at village level.

PRODAM did not seek to create new groups in the PIVs, but strengthened existing GIEs to make them more operational and representative. Subsequently, agreements were signed between the GIE and PRODAM for handing over the irrigation scheme. The GIEs are responsible for the management and

repair of the irrigation infrastructure, but they also take charge of the processing and marketing of their produce.

Pastoral units

PRODAM has also supported "pastoral units" to ensure good rangeland management, improve access to water and reduce pressure on the grazing lands. Pastoral units are resource management units following a borehole and based on pastoral (not agricultural) resource management. In the middle of each pastoral unit is a watering point. The area belonging to a certain pastoral unit is the area closest to that watering point. A pastoral unit is made up of a group of localities that - given their economic interests, historical ties and physical proximity - share the same pastoral and agricultural areas and use the same water points. Hence, even before the pastoral units were made, the pastoralists thought of these areas as different territories from where it was most rational to walk to a certain watering point .

Communities living in the same pastoral unit have priority rights to use the resources that are available, but also responsibilities regarding their management. The establishment of the pastoral units is based on two basic principles: (i) preserving the existing natural resources and restoring degraded areas in order to increase their productivity and (ii) empowering communities to engage effectively with local authorities in the implementation of projects and to manage their natural resources in a sustainable manner.

Projects have included a 'gender observatory' run by community volunteers (men/women/youth). The observatory is aimed at raising awareness on gender equality and allows pastoralists, specifically women and youth, to make their voices heard.

The pastoral units are equipped with boreholes, a water tower, drinking troughs, feed storage and vaccination parks. Measures are also taken to protect the pastures through the construction of firebreaks, land rehabilitation and the promotion of community-based rangeland management. In addition, support is provided for strengthening the capacities of livestock keepers and their organisations, developing participatory land use management plans for each pastoral unit, and establishing management bodies. Collaboration is sought with the district veterinary office to provide advisory services to the livestock keepers and with the regional water department to set up borehole users' associations that are responsible

for managing the water points in a sustainable manner. Finally, the aggregation of different pastoral units at regional level has been promoted to increase the possibility for their voice to be heard.

Results

More than 3 000 hectares of PIVs were rehabilitated by PRODAM, of which 100 hectares have been set aside for women's groups. On average, households managed to quadruplicate the size of the plot they used for agricultural production due to improved access to water. Not only did the project help to improve the land tenure security of more vulnerable groups, namely women and dispossessed people, indirectly it also succeeded in enabling them to participate in broader decision-making processes.

By supporting people to organise themselves in groups, i.e. GIEs, and strengthening their skill, the management of the PIVs has become easier and problems are being addressed more effectively (e.g. mobilising credit to pay for repair works). A federation of GIEs was established in 1998, which today is made up of 104 GIE, 58 women's groups and 10 private enterprises. The federation has provided GIEs with inputs at competitive prices, contracted mechanics in each zone to help out with the maintenance and repair of the motor pumps, facilitated access to finance for GIEs, disseminated information, mediated conflicts and engaged in policy dialogue on behalf of the GIEs.

Nevertheless, some issues remain: (i) the issue of equality arises by allocating a same plot size to each household, as the needs of those with twenty members are different from those with only five members; (ii) the increased land values that irrigation brings about has sometimes led to disputes; (iii) women still remain marginalised in decision-making processes at household and PIV level; (iv) GIEs have faced difficulties in marketing their produce (which also puts credit repayment and new loan requests at risk); (v) maintenance costs and the price of inputs had increased, while the price of rice has stagnated which affects the long-term sustainability of investments; (vi) risk of increased soil salinity; (vii) reduced flood patterns due to the construction of the Manantali dam upstream have impacted the livelihood opportunities of the local population (less flood recession farming and fish, drying of many wells), making more household members interested in irrigated agriculture although the plot size is invariable; and (viii) significant variety in the maturity levels of the GIEs, with a number experiencing difficulties in maintaining the infrastructure, managing the operations, book keeping and ensuring adherence to democratic principles.

Twenty-two pastoral units have been established by PRODAM. Together with other pastoral groups and the local authorities, these institutions played a role in decision-making processes for the management of the Ferlo region, negotiating sustainable access to pastures and regulating the drilling of private wells. This has decreased significantly the number of conflicts between livestock keepers and agricultural producers.

The rangeland management committees, that built on customary use patterns and cooperation between pastoralists and farmers, have proven to increase the sustainable management of the environment, including the prevention of uncontrolled bush fires and tree-cutting. A positive effect has also been witnessed on the animals, with milk production and fertility rates increasing.

Important partnerships have been mobilised with public institutions, local services, producer organizations, NGOs and research institutes. As a results, pastoral units and their management committees, through dialogue with the government, managed to obtain the construction of schools and health posts in their region. Through negotiation with other herder groups and decentralised government offices, they have succeeded in limiting the number of licences for drilling private wells to avoid overgrazing.

6. Conclusion

Land and water rights are closely interdependent – it is not possible to use one resource without the other. Effective land and water governance must address issues as diverse as regulating the creation of water infrastructure (e.g. through permits for digging wells) and its land tenure implications; determining the nature, content and duration of the property rights over land, water and the water infrastructure; establishing systems for recording those rights; creating institutions and processes for resource management; and providing fora for the settlement of disputes.[24]

The development of irrigation systems that serve more than one farm require coordination systems and some form of property rights to at least identify who has what rights to use, manage, and exclude others

[24] Cotula, L. (2006). Land and Water Rights in the Sahel - Tenure Challenges of Improving Access to Water for Agriculture. Issue Paper, 139. International Institute for Environment and Development, London.

from the associated land, infrastructure, and water. Even for individual wells and rainwater harvesting, as more and more people start to irrigate, they impact other users in the water-shed, and some form of coordination and rules governing water use can help prevent conflicts and give users some assurance that their investments in irrigation will be sustainable.

In many cases, water rights become operationalized through user organizations. Ensuring that women, smallholders, livestock keepers, or other poor and marginalized water users are represented in these organizations is an important step to strengthening their water rights, but is often difficult, because of overt resistance from those who do not want to share water rights and decision-making, or because of social challenges of including marginalized groups in local organizations. Nevertheless, the cases discussed in this paper show that it is possible to identify strategies that promote more equitable access to water and irrigated land for women and men, depending on the local situation and in co-ordination with the community. With irrigation becoming an increasingly private investment, access to capital becomes a determining factor for access to water and land for vulnerable groups..

Officially-recognized rights help ensure that their holders have a "seat at the table" in discussions about further water development or land use changes that may impinge on their rights. Joint planning and modelling of water resource development with government agencies and different user groups helps to put this into practice, but it may require strengthening the capacity of both the agencies and the users. There is no single, optimal property right system for irrigations systems—in developing countries or elsewhere. Rather, we need a range of options and the understanding necessary to be able to tailor them to their (ever-changing) physical and institutional context.[25]

[25] Meinzen-Dick, R. (2014). Property rights and sustainable irrigation: A developing country perspective. Agricultural Water Management 145, 23–31.