LES SYNTHÈSES de l'Office International de l'Eau

Management of Collective Irrigation Areas in mainland France and overseas territories (Guadeloupe, Martinique, La Réunion)

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SYNTHESIS

Management of Collective Irrigation Areas in mainland France and overseas territories (Guadeloupe, Martinique, La Réunion)

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RÉSUMÉ

Les périmètres d'irrigation rassemblant différents irrigants autour d'un même réseau collectif assurent l'alimentation exclusive de 280 000 hectares selon le recensement agricole de 2010. Les modes de gestion des périmètres d'irrigation représentent un véritable enjeu car l'irrigation est centrale pour la sécurité alimentaire, mais aussi pour les milieux aquatiques aux vues des prélèvements importants qu'elle implique. C'est d'autant plus vrai dans les zones soumises à de fortes pressions quantitatives. La gestion des périmètres d'irrigation implique et organise différents acteurs depuis la définition des droits d'eau jusqu'à l'acheminant de l'eau à la parcelle, en passant par l'entretien des infrastructures. Ces modes de gestion sont le fruit de l'histoire de leur territoire, de ses spécificités géoclimatiques et socio-économiques mais aussi des interactions locales entre acteurs et de l'évolution du cadre réglementaire et administratif. Ceci explique la multiplicité des modes de gestion existant sur le territoire métropolitain mais aussi dans les DROM ayant des périmètres d'irrigation significatifs (Guadeloupe, Martinique, Réunion). Aussi variées que puissent être les institutions de gestion collective des périmètres d'irrigation, elles sont soumises à de nouveaux enjeux communs (urbanisation, changement climatique et pressions, baisse des moyens et des investissements) les poussant à s'adapter.

MOTS-CLÉS : Irrigation collective, Etat, collectivités territoriales, DROM, ASA, périmètre d'irrigation, modes de gestion.

ABSTRACT

In France, collective networks gathering irrigators provide water for 280 000 hectares according to the last agricultural census of 2010. The management of such areas is a major issue due to the huge withdrawals that it implies, mainly to insure food security. The environment is also heavily impacted by these extractions, especially in areas already suffering from relative scarcity. Management of collective irrigation areas implies numerous stake-holders from volume allocation rights to water transport and infrastructure maintenance. Local management institutions are the product of the history of their territory, its geo-climatic and socio-economical features but also of the local interactions between stake-holders. The evolution of the administrative and regulatory framework has also influenced the shape of such management institutions. This explains the numerous management institutions for collective irrigation areas (Guadeloupe, Martinique, Reunion). Even though these institutions could be very distinct from each other, they are facing common challenges (urbanisation, climate change and scarcity, declining resources and investments), that could eventually lead them to evolve and adapt.

KEYWORDS : Collective irrigation, State, local authorities, French overseas department, irrigation association, management of collective irrigation.

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INTRODUCTION

Irrigation has been a necessity for France's development and food independency. At first irrigation was a technique supporting food productivity, policy makers soon took into account the strategic asset it was for land planning towards development (Ladki and Garin, 2011). Thus, public authorities enhanced collective management of irrigation throughout the construction of major hydraulic infrastructures (canals, weirs...), firstly gravity-fed and then pressurized. It resulted in the organisation of collectively irrigated areas spread around of the territory. These areas are defined as such "all surfaces, cultivated or not, that could receive irrigation water" (Tiercelin, 2006). This simple definition hides a truly complex reality because every collective area is different from one another in size, its network, crops, stakeholders, the quantity and quality of the available resource, and finally, the socio-historical and economical specificities of the territory.

As many philosophical, economical and sociological writings have highlighted, Mankind's capacity to manage together and share a resource is not obvious, especially when the resource is scarce. Nevertheless, it is still creates certain pressure in many French collectively irrigated areas, either in mainland or in oversea territories. The hydraulic infrastructure and the availability of the resource are the two main features defining such areas, but it is extremely vital to take into account the territory's specificities to manage them. This is the reason why in France, a pioneer of water management, there is all sorts of institutions managing such areas, allowing consensus and satisfying different uses upstream and downstream. Overseas territories (DROM) also have different institutions managing their collectively irrigated areas.

This concerns DROM, having significant collectively irrigated areas are Guadeloupe, Martinique and La Réunion. As a legacy, they have a complex history still shaping their agriculture. DROM are also isolated from mainland France, their insularity has consequences regarding transport, markets, access to land due to the lack of space. Neighbour countries are often much poorer and are competing against the DROM, taking advantage from the low labour cost for agriculture as well as for tourism. In addition, climate is disturbing the economy (typhoons, storms). These features are contributing to a strong presence of the public authorities on these territories which lead to a direct implication in the collective irrigation areas management.

Management of these areas may vary but it encounters common issues that can jeopardize collective irrigation.

This synthesis presents the main institutions contributing to collective irrigation area management, then the socio-historical, geographical and economical specificities shaping these institutions and at lastly develops the common challenges pushing these institutions to adapt.

OVERVIEW OF THE MAIN ENTITIES MANAGING COLLECTIVE IRRIGATION AREAS

ASA: IRRIGATOR ASSOCIATIONS

As early as in 1865, it emerged the original legal status of ASA (literally "authorized union"), which became a public entity in 1899 due to the judgement of the Court of Conflicts about the Gignac Canal Association. This status regulated irrigation associations pre-existing for centuries and allowed financial support from the state. These ASA experienced a new boom with the post-war development of gravity-fed networks and then, the advent of pressurized networks in the 1980s. They now manage 52% of collective irrigation areas, 23% of the irrigated agricultural land, mainly in the South of France (Gleyses and Loubier, 2011).

The ASA include landowners in a delimited perimeter, which must ensure a network's maintenance. Because of the laws, irrigation rights are tied to the land and it is almost final, even if the owner lives on a residential plot and made no use of irrigation water. All owners, irrigators or not, must pay a fee to the ASA (Loubier and Garin, 2013).

ASL: FREE IRRIGATION ASSOCIATIONS

Different from the ASA, ASL are not a public entity. Private law applies and they cannot be mandatory (Garin et al., 2013). Administration does not have to give its consent but all associates must give their written consent. They can become ASA through prefectoral agreement according to the decree n°2004-632 of July 1st 2004 relating to the owners' association.

MIXED UNIONS

Mixed unions are a public entity with at least a local public authority within its members (Code général des collectivités territoriales, 2006). They cannot take the shape of inter-communal or interdepartmental unions. They may change in the future in response to the "NOTRe law" (law about the Republic's new territorial organisation of August 7th 2015) modifying the way local authorities organise themselves, including the unions of which they are a member. Pushing toward the gathering of local authorities, some may become members of different unions managing different collective irrigation areas. It will depend on their interest to leave one union in order to be a member of another always searching for administrative coherence (Laffitte, 2015).

SAR: REGIONAL DEVELOPMENT COMPANIES

There are three SAR dealing with water in mainland France: "Société du Canal de Provence" (SCP), the BRL group coming from the "Compagnie nationale d'aménagement de la région du Bas Rhône et du Languedoc" and the "Compagnie d'aménagement des coteaux de Gascogne" (CACG). They played a key role managing irrigation in the South of France before widening their scope of activity and are still working alongside other institutions managing collective irrigation areas. Created during the 1950s and 1960s, they have a public mandate for land-planning and their capital is mainly public.

Their public concession (from the State and from the regional authorities for SCP and BRL), they can do infrastructure works and perform a public service task concerning water through managing great works, water intake structures and pumping station.

They play a key part supplying water to collective irrigation areas and are genuine partners for collective irrigation institutions. They fulfil a "general interest" role (Rollin, 2013). Sometimes they directly manage collective irrigation areas, without irrigation associations as a go-between: the CACG in partnership with the local Chamber of Agriculture manage the withdrawal authorisation and do the follow-up of the quantity abstracted for the Neste zone (Adour-Garonne Water Agency, 2012).

These "original" SAR served as a model for other mixed-company such as the SAPHIR, managing raw water in La Réunion.

SPL: LOCAL PUBLIC COMPANIES

A SPL is a limited company under the regulation of the "Code général des collectivités territoriales". Its capital is detained by local authorities or grouping of local authorities. Despite the fact that it is a public entity, Its employees fall under a private law regime. A SPL only works for its shareholders and contracts do not have to go through competition procedures. However a SPL must respect the rules concerning public procurement. The SAPHIR is going to be a SPL in the next few years (SAPHIR, 2014).

SEM: MIXED-COMPANIES

Local authorities and their grouping can create a mixed-company (SEM) which is a limited company They work within the limit of their public members' competences on specific topics concerning some rural or urban development or operating public services having activities of an industrial or commercial nature. Private partners can join public bodies in these SEM (Laffitte, 2015). It is the case of the SAPHIR in La Réunion. The SEM can partner up with public authorities with private associates (Laffitte, 2015). This is the case of the SAPHIR in la Réunion.

These different institutions have interrelationships in order to manage collective irrigation areas at different scale, from the water intake to the plots. For example, some ASAs are members of mixed unions, like the mixed unions managing water systems for agricultural purposes in the Rhône valley (SMHAR).

GEOGRAPHICAL AND SOCIO-HISTORICAL SPECIFICITIES SHAPING COLLECTIVE IRRIGATION

MAINLAND FRANCE

Irrigation is crucial for food production and is an important stake for France's development. While technical progress arose and irrigation spread, it became a policy matter.

Land-planning and water management are historically linked, even before it was materialised into specific policy. Hydraulic infrastructure and water availability were and are still today an important factor for land-planning. Thus, in order to support the 19th century's demographic transition, irrigation became a target for policies and regulations and helped dealing with rural exodus (Loubier and Gleyses, 2011). As agricultural policy was designed and implemented, the entities dealing with collective irrigation management became real players in land-planning and local development. They are "pillars" that the State contributed to institutionalise (Loubier and Garin, 2013).

Thus there are strong institutions in Languedoc-Roussillon and PACA, where the canals are the most numerous: in 2003 26100 hectares were irrigated from gravity-fed ASA in Languedoc-Roussillon and 55100 hectares in PACA (Gleyses and Loubier, 2011). It constitutes the "hydraulic heritage" (Ladki and Garin, 2011). The ASAs are numerous today, mainly in the Southeast of mainland France, but represent very different realities. While some, such as the Gignac Canal are highly structured, with a team of professional employees, some ASA are managed solely on volunteering basis (Ladki and Garin, 2011). Some partners associate to share costs and coordination like the Union of ASA du Lot.

ASA are not the only player in the collective irrigation management landscape. The SAR embody the State's will to structure the territory according to irrigation. Indeed the State created them during the 1950s and 1960s and they are still today a key player for collective irrigation. Indeed they had state concessions which are nowadays regional concessions due to decentralisation. They can operate on large infrastructures and also directly manage some collective irrigation areas (Rollin, 2013).

In mainland France, collective irrigation is managed by the triad irrigation' associations, SAR and public authorities. These stakeholders have strong interrelationships roughly depicted by the following diagram:





Of course it is a schematic representation not taking into account the diversity on the ground. For example, the public authorities can directly be involved in managing collective irrigation areas through mixed unions, like the SMHAR in the Rhône valley.

THE DROM: LA RÉUNION, GUADELOUPE AND MARTINIQUE

Particular and peculiar status

Since the constitutional reform of 2003, Guadeloupe, Martinique and La Réunion have the status of overseas departments (DROM), defined in Article 73 of the Constitution: national laws and regulations apply to them but, taking into account their "specificities", adaptation is possible. DROM have a Regional Council and a Departmental Council. These local institutions are better able to manage these specificities, within the limit of their competences.

European gave them the status of "remote regions of the Community", with strong concrete impacts on the ground, especially regarding financial matters. As remote regions they are part of the EU but have specific benefits and constraints bound to their situations "which is aggravated due to their remoteness, insularity, small size, difficult topography and climate, economic dependence on a few products" (ECT in Ziller, 2005). These remote regions are eligible to European aid (European regional development fund ERDF and European social fund ESF) under the European convergence policy. It allows them to reach 85% of public funding. For example, Martinique agricultural sector benefits from the POSEI (Program introducing specific measures for the outermost regions agriculture) and the PDRM (Rural development program for Martinique) (POSEI France, 2015).

Colonial legacy: strong public authorities and mono-culture

The agricultural landscape is still shaped today by the slave and colonial past. After the abolition of slavery, the land was organized around large factories, for example sugarcane processing facilities in Guadeloupe (Birota et al, 2011;. Bonniol, 2011). In La Réunion, land reform occurred between the 1960s and the 1980s and counteracted the model of large sugar-cane farms to promote family farming, initiating a shift towards smaller plots (Agreste Réunion, 2010; Paillat-Jarousseau, 2014). This land structure resonates with another colonial legacy: the mono-culture, of bananas (particularly in Martinique) or sugar-cane (La Réunion and Guadeloupe). Mono-culture remains despite recent diversification policies. These crops are particularly dependent on irrigation (POSEI, 2015). The profitability requirement of these cultures are structuring the irrigation demand and thus water infrastructure investments in these territories.

Another legacy of the colonial period is strong public institutions. During this period, the public authorities organized these territories' activities towards mainland France, thus developing strong public institutions on these islands. At first the State was the strongest actor but as a legacy of departmentalisation which was initiated in 1946, the Departmental/Regional Councils are now strong players in these economies including agriculture. Since 1946, endorsing the departmentalisation of the islands, decentralisation continues to deepen through the DROM status and the Region Council's strengthened as a consequence of the constitutional reform of 2003. The Department and the Region are the two most important institutions today regarding agricultural water in these islands, although other actors are involved (private and local enterprises). Public authorities are thus more involved in the management of collective irrigation areas than in mainland France, where irrigation associations and other actors are more developed.



Illustration 2: Schematic interrelationships between stakeholders in the DROM

This diagram emphasizes the absence of irrigators directly involved in collective irrigation management. They are mainly customers, paying a certain amount for water. They are not involved in the withdrawal demand for example. This Top-down approach can have consequences on long-term management. Excluding main users from decisions can be dangerous for a shared-resource management, not encouraging them to be responsible.

Indeed in Martinique, the Departmental Council manages the collective irrigation areas of the Southeast (PISE). It is the largest area of the island with 4500 hectares equipped and 470 subscribers in 2006. 63% of its surface is dedicated to bananas, highlighting the mono-culture legacy. This is representative of the island's agriculture, the banana sector accounted for 60% of the agricultural value in 2015 (POSEI, 2015).

Regarding Guadeloupe, this should be balanced: amongst the six irrigation networks, four of them are managed by the Departmental Council and two are managed by ASA: the Bananier Saint-Sauveur Network and the Saint-Louis à Bailif river, the last one being managed in partnership with local authorities (Guadeloupe Water Office, 2015).

In La Réunion, a regional development company, the SAPHIR (Company for La Réunion's hydroagricultural areas development, formerly SABRAP - Planning Society of Bras de la Plaine) operates and manages the Bras de la Plaine area (5500 hectares equipped) and the Cilaos area (3600 hectares equipped). This mixed-company was created to support the departmentalisation of La Réunion (law enacted in 1946) and to ensure the sugar-cane sector profitability regarding its significant water needs. Main crop of the island, this mono-culture is still strong, despite diversification policies. (Fusillier et al., 2006; Pirot et al., 2007; Agreste Meeting, 2010). The SAPHIR is 85% owned by local authorities or public bodies. A transfer has been considered to the SPL VAQUA where only local authorities are shareholders (SAPHIR, 2014). There is little room left for irrigation grouping, which may be linked to the complex history and the land reform of the 1970s and 1980s. It seems to be more of a Top-down approach, unlike the areas managed by irrigation associations, much more organized in mainland France.

COMMON ISSUES TO COLLECTIVE IRRIGATION AREAS

SAVING WATER

Irrigation in France amounts to 4 billion m3 per year, that is to say between 10 and 15% of total withdrawals. Unlike other water uses, only half of irrigation water returns back to the environment, which mean irrigation can be a great environmental issue. That is especially true given that irrigation demand is at its highest during the low-water period (Loubier and Gleyses, 2011).

Quantitative issues strengthened by climate change

A Quantitative crisis has multiplied for a decade, especially in the south, due to withdrawal increase. Such a recurrence questions the notion of crisis itself (Roy, 2013). The crisis can then be defined as "a discrepancy between a social dynamic and the dynamic of biophysical aspects" (Ghiotti and Rivière-Honegger, 2009). Climate change, despite the many uncertainties surrounding it, is already pressuring the available resource in mainland France and in the DROM. Institutions managing collective irrigation in the south east are feeling this new pressure adding to a resource already scarce. There it manifests itself through the increase of warm days and irregular increasingly intense rainfalls and has important consequences. Besides experiencing similar pressures, the DROM are also particularly affected by extreme events (Jouzel et al., 2014).

Increasingly demanding environmental regulations reinforce these management constraints.

From productivity policies to environmental policies

In the early 1970s, EU food self-sufficiency was the primary goal, but since the 2000 Water framework directive (WFD) and the 2006 French law transposing it (LEMA), the protection of the environment became the prominent aim. Indeed the WFD balances withdrawal efficiency in light of its environmental costs (Loubier et Gleyses, 2011). Low-water target flow reshapes the way withdrawals are managed. Now they have to be considered in balance with the total amount of available water assessed in an area, taking into account environmental minima (MEDDE, 2008). The goal is no longer to satisfy different uses but to share a fixed amount of water within a basin, while regulation gives in a clear signal the priority to drinking water and environmental demand (Ghiotti and Rivière-Honegger, 2009). Indeed the 2010 the Martinique water master-plan (SDAGE) outlines that "the SDAGE philosophy, respecting the WFD spirit cannot sacrifice the environmental use to drinking water or irrigation use".

Consequences on subsidies

The predominance of the environmental objective over the productivity is also reflected in the subsidies distribution. Subsidies for irrigation are present in the Common Agricultural Policy (CAP) first pillar "supporting farm income" and in the second pillar "supporting rural development". Aid decoupling concerns the first pillar: subsidies were allotted depending on the irrigated surface, but it is no longer the case, penalizing irrigation expansion. In addition, to collect these subsidies, irrigators or collective institutions representing them must now have official withdrawal

authorisation. Specifically the CAP subsidies reform has led to a decrease of irrigated surfaces but not of withdrawals (Loubier and Garin, 2013).

The French Rural Development Programme (FRDP) is transposing the second pillar in France and is encouraging less irrigation throughout various measurements. Nevertheless FRDP supports collective irrigation notably through the 125b2 measurement. In Mediterranean regions this measure creates new collective irrigation areas on "secure available resources". Subsidies for investment still exist but they are now linked to measures mitigating irrigation impact on the environmental such as modernization of networks to increase their efficiency (Giry, 2013). The FRDP also exists in each French overseas departments with rural development programs dedicated respectively to La Réunion, Guadeloupe and Martinique.

The CAP reform and the decoupling of irrigation aid show a necessity to adapt and develop new strategies for management institutions in order to finance their activities.

COLLECTIVE IRRIGATION

The decline of collective irrigation

The 2010 agricultural census report was clear: collective irrigation declines in favour of individual irrigation (stagnation of irrigated areas and decline of equipped surfaces) even within collective irrigation areas. That is to say that some irrigators chose to have an individual system even when they are supplied by a collective network. Such a decline raises the question of collective irrigation management which obviously disappoints some users (Garin and al., 2013; Loubier and al., 2013). The uncertainty of water availability and aid reform has pushed irrigators to reduce irrigated areas without decreasing the amounts withdrawn at the basin scale (Garin and Loubier, 2013). Reasons for such a switch from collective to individual irrigation despite the existence of a collective network are numerous: it may be a reaction to an increase of water prices or to look for more water quality, for drip irrigation for example. This trend is possible because of technical change: pumping systems are now affordable (Garin and al., 2013). But the individual withdrawals are more complicated to control, which could led to an increase of the quantitative pressure on the resource (Loubier and Garin, 2013).

Costs increasing and ageing infrastructure

Collective networks were developed during the 1960s (gravity-fed one) and the 1980s (pressurized), they are getting old which leads to new costs. The latter can challenge management institutions, especially when investment and expenses are not anticipated. Sébastien Loubier and Patrick Garin note that ASA dealing with pressurized networks are often adopting "short term strategies, neglecting knowingly any maintenance programme including preventive ones" (2013). Yet irrigation networks have an important physical capital which implies large and continuous maintenance costs (corrective and preventive). Gravity-fed networks are the most concerned by these constraints because of their age and the man-work-hours they require, costs are then even more (Loubier and Garin, 2013). In addition to that, there are less and less irrigators in collective irrigation areas since some areas become residential, which can mean less revenue for the management institution according to the way the water price is set. It is especially true for ASA (Loubier and Garin, 2013). In Guadeloupe, the ASIBSS (irrigators association of Bananier Saint-Sauveur) have encountered deep financial issues and must deal with a decreasing number of active members (Guadeloupe Water office, 2015).

Adding to changes in subsidy allocation as described above, these subsidies are mainly directed toward network installation costs and less on maintenance costs. Public authorities cannot fund an investment at 100%, 20% at least must be supported by irrigators which often mean borrowing. The problem is that these expenses are consistent and can challenge the sustainability of

management institutions when not scheduled right and anticipated (Loubier and Gleyses, 2011).

Public authorities remain the key of investment funding, keeping an important part in collective irrigation management (Loubier and Garin, 2013). It is especially true in the DROM where public authorities are behind every investment for collective irrigation, filling in for the absence of organized groups of irrigators able to participate to network management and costs, through collective borrowing for example. To illustrate, the ILO project in La Réunion is mainly funded by the Departmental Council and the infrastructure supplied by the PISE in Martinique as well.

Agricultural decline and urbanisation

In Mainland France as in the DROM, land pressure is catching up with agricultural activities. For example in Languedoc-Roussillon, 1000 hectares of agricultural land are becoming residential every year (Ghiotti and Rivière-Honegger, 2009). Some of these new constructions are located inside the ASA perimeter and as this perimeter is fixed and ownership of the plot means mandatory membership, new residential inhabitants are now members of the irrigation ASA. The latter have now to reconcile their mission towards irrigators with these new members' conflicting demands. ASA are no longer "socially homogeneous" and are without "a shared objective, i.e. irrigation", making management more complex (Loubier and Garin, 2013). Indeed new members are less invested in the ASA's mission but are funding it just like irrigators, participating sometimes very heavy expenses and investment, without any compensation. Indeed raw water can be a small advantage compared to the constraints associated with ASA membership (Ghiotti and Rivière-Honegger, 2009; Ladki and Garin, 2011).

This can question the sustainability of some irrigation associations and their whole management, the common interest of efficient irrigation being no longer that common between stakeholders (Ostrom in Loubier and Garin, 2013).

In the DROM, the same phenomenon is happening and is even deeper due to these islands small superficies. Numerous agricultural plots are on very coveted land such as littoral coasts (Agreste Réunion, 2010; Temple and al., 2008). Land pressure is impacting prices which constitute an incentive for farmers to sell their plots even when they are still productive. In La Réunion, 30% of the two main collective irrigation areas (Bras de la Plaine and Bras de Cilaos) have presumably become residential since 2010 (Agreste Réunion, 2010). In its water and sanitation master-plan, the Guadeloupe Water Office also states the impact of these increasing land prices on collective irrigation areas.

In addition to that, structural changes are occurring in some agricultural value chains (some fruit and vegetables, viticulture) "which lead to agricultural decline and decreasing revenue for farmers" while other sectors "forbid or limit irrigation (AOC vineyards)" reducing irrigation water demand and thus reducing revenues for irrigation associations (Ladki and Garin, 2011).

This is especially true in the south east of mainland France but demonstrates in general the fragility of the economic balance for collective irrigation management institutions. The whole question of sustainability is at stake for these institutions.

The "unique entity for collective management" (OUGC): dealing with the quantitative constraints through enhancing collective management

Public authorities are still a driving force for collective irrigation management and produce incentives throughout regulation. Indeed, the main purpose of the OUGC, implemented through the 2006 law, is to manage the multi-annual withdrawal demand on behalf of all its users, with the

prefect¹ agreement. In areas recognized for suffering of scarcity (called ZRE), that is to say areas where there is a recurrent water deficit regarding the needs (Eaufrance), the assembling of irrigators in an OUGC can be mandatory. The OUGC centralizes withdrawals demands in order to foster collective irrigation management. However the OUGC's mission is not to manage the necessary network investments (Environmental Code, 2007). As a collective management organisation, the OUGC can limit informational constraints: water intake and amount withdrawn are documented and controlled within the OUGC, contrary of individual withdrawals. Indeed it is more difficult to control and follow individual withdrawals, irrigators can conceal the real amount extracted (Garin and al., 2013). Collective management is seen as part of the response to the quantitative constraint.

In Martinique, the OUGC is viewed as a solution and is part of the SDAGE policy: it will be implemented in 2021, the purpose being to develop collective management of irrigation on the whole territory to face the quantitative pressure. It is already the case for some catchments (Capot, Lorrain, Galion, Lézarde, Roxelane and Carbet) and in the Martinique SDAGE for 2016-2021 it is intended to implement ZRE, meaning OUGC could be mandatory in these areas.

Territories where already strong collective irrigation management institutions exist, the OUGC is just a formality which will not deeply change the core management. For territories were no such organisation exist, the OUGC can be an incentive (even an obligation in the ZRE) fostering collective management.

¹ The State is the guarantor of withdrawal management. As a consequence, the prefect, who is the State's local representative adjudicate withdrawal authorisations exceeding thresholds determined in the Environmental code (Roy, 2013).

CONCLUSION

Collective irrigation areas are organised around the hydraulic network which is heavy to maintain and costly, justifying collective management. This collective management varies from territory to territory. Indeed managements are not the same in mainland France and in overseas territories. Public authorities (formerly the State, local authorities nowadays) are strong stakeholders involved in French collective irrigation management. They can be part of management institutions (syndicate or SEM), contribute to funding other institutions (ASA, irrigator's associations). Public authorities are inescapable actors since they design the regulation and since they are the primary funders for infrastructure investment. They can even directly manage collective irrigation areas in the DROM. This strong public presence shows that collective management of agricultural water is a matter of common interest.

Nevertheless, these collective management entities, public or not, are now facing tremendous financial issues (subsidies cut, decline of agricultural revenue) and environmental issues (availability of water, regulatory constraints), but also social changes (urbanisation).

As a result and for the first time, collective irrigation is declining in favour of individual irrigation as shown in the last agricultural census of 2010, despite the public will to foster collective management through the implementation of the OUGC.

Management institutions have got to adapt to these changes. These changes have no homogenous consequences: some gravity-fed ASA are between decline and reorganisation while pressurised ASA, managing newer networks are now reaching financial maturity. Yet irrigation associations and especially gravity-fed ASA are overall reforming (Garin and Loubier, 2013; Loubier and Gleyses, 2011). Some are gathering in unions of ASA, others are internalising their environmental externalities to ensure subsidies. Another strategy is to integrate new users by adjusting sharing rules (Loubier and al., 2013). However for the DROM where public authorities, suffering from the economic crisis, are almost the primary manager of collective irrigation areas, adaptation options are less obvious.

Bibliography

Agence de l'Eau Adour-Garonne, 2012. Plan de gestion des étiages du périmètre « Neste et rivières de Gascogne. 93 p.

Agreste, 2014. Année de production. Irrigation et drainage. http://agreste.agriculture.gouv.fr/IMG/pdf/Gar14p034-043.pdf [Consulté le 14/10/2015]

Agreste Réunion, 2010. Données agricoles et rurales. Un demi-siècle d'irrigation à la Réunion. (56), 4 p.

Birota F., Domi S., Tanic M., 2011. Mal-être et crise sociale. Les Temps Modernes, (662-663), p. 136-153.

Bonniol J-L., 2011. Janvier-Mars 2009, trois mois de lutte en Guadeloupe. Les Temps Modernes, (662-663), p. 82-113.

Code de l'Environnement, Titre Ier, livre II, section 5 « Organisme unique de gestion collective des prélèvements d'eau pour l'irrigation.

Code général des collectivités territoriales, 5ème partie, Livre VII, Titre II « Syndicat mixte associant des collectivités territoriales, des groupements de collectivités territoriales et d'autres personnes morales de droit public ».

Fusillier J-L., Rieu T., Dumanois J., Ferraris S., 2006. Les systèmes de production agricoles et leurs fonctions de demande en eau sur les périmètres irrigués du sud de la Réunion (Bras de la Plaine et Bras de Cilaos). Approche par la modélisation économique des exploitations. CIRAD, G-eau, 50 p.

Garin P., Loubier S., Campardon M., 2013. Irrigation individuelle – irrigation collective : état des lieux et contraintes. Sciences Eaux et Territoires, (11), pp. 86-89.

Ghiotti S., Rivière-Honegger A., 2009. Eaux sous « pressions » et développement des territoires périurbains en Méditerranée occidentale (Languedoc-Roussillon) La vigne, le Sphaeromide raymondi et les piscines. Norois, (211), pp. 37-52.

Giry E., 2013. L'irrigation : enjeu pour l'agriculture et prise en compte dans la Politique agricole commune. Sciences Eaux & Territoires, (11), pp. 6-7.

Jouzel J., Ouzeau G., Déqué M., Jouini M., Planton S. Vautard R., 2014. Scénarios régionalisés: édition 2014 pour la métropole et les régions d'outre-mer. Direction générale de l'énergie et du climat, MEDDE, 62p, Le climat en France au XXIè siècle, Volume 4.

Laffitte P., 2015. Les services publics de l'eau. Montpellier, AgroParisTech, 145 p. [Diffusé le 08/12/2015].

Ladki M., Garin P., 2011. La rétribution et la gestion collaborative de la multifonctionnalité des systèmes d'irrigation gravitaire : pourquoi, pour qui, et comment? Ch. 8. In : Bouleau G., Des tuyaux et des hommes. Editions Quae « Indisciplines », 200 p.

Loubier S., Campardon M., Morardet S., 2013. L'irrigation diminue-t-elle en France ? Premiers enseignements tirés du recensement agricole de 2010. Sciences Eaux et Territoires, (11), pp. 12-19.

Loubier S., Garin P., 2013. Un avenir incertain pour les associations syndicales autorisées d'irrigation. Sciences Eaux et Territoires, (11), pp. 90-95.

Loubier S., Gleyses G., 2011. Financement et tarification des réseaux d'irrigation gérés par des Associations syndicales autorisées (ASA). Ch. 9. In : Bouleau G., Des tuyaux et des hommes. Editions Quae « Indisciplines », 200 p.

MEDDE, 2008. Circulaire du 30 juin 2008 relative à la résorption des déficits quantitatifs en matière de prélèvement d'eau et gestion collective des prélèvements d'irrigation.

Office de l'Eau de Guadeloupe, 2015. Schéma départemental mixte eau et assainissement. Volet IRRIGATION – Phase 1 : Etat des lieux. 219 p.

Paillat-Jarousseau H., 2014. L'agriculture familiale sur l'île de la Réunion. Le rôle des dynamiques sociales dans la réforme foncière. Revue Tiers Monde, (220), pp. 81-98.

Pirot R., Fusilier J-L., Hoareau M., 2007. Irrigouest : une autre approche du conseil à l'irrigation. Travaux et Innovations, 142, pp. 27-31.

POSEI France, 2015. Programme portant mesures spécifiques dans le domaine de l'agriculture en faveur des régions ultrapériphériques. Tome 2, chapitre 1 et 2, Fonds Européen Agricole de Garantie, 314p.

Rollin D., 2013. Avec leur statut original, quels rôles pour les sociétés d'aménagement régional dans les politiques de l'eau et d'irrigation ? Sciences Eaux et Territoires, 11, pp. 96-98.

Roy L., 2013, Gestion quantitative de l'eau et irrigation en France. Sciences Eaux et Territoires, (11), pp. 86-89.

SAPHIR, 2014. Rapport d'activité. 44 p.

Temple L., Marie P., Bakry F., 2008. Les déterminants de la compétitivité des filières bananes de Martinique et de Guadeloupe. Economie rurale, (308), pp. 36-54.

Tiercelin J-R., 2006, Traité d'irrigation. 2 éd. Paris, Tec & Doc-Lavoisier, 1266 p.

Ziller J., 2005. L'Union européenne et l'outre-mer. Pouvoirs, 2 (113), pp. 125-136.

Other useful references

Caraïbe Environnement, DEAL/MDD. 2011. Milieux et ressources. Ch. 3. In: Caraïbe Environnement, DEAL/MDD, Actualisation de l'Etat de l'Environnement, pp. 47-66.

Chambre d'agriculture de Nouvelle-Calédonie. L'agriculture en Nouvelle-Calédonie. http://www.canc.nc/lagriculture-en-nc.html [Consulté le 15/10/2015]

DAAF de la Réunion, 2014. Données agricoles et rurales. Vue d'ensemble. http://www.daaf974.agriculture.gouv.fr/Vue-d-ensemble [Consulté le 15/10/2015].

DAAF de la Guadeloupe, 2010. Carte des réseaux et périmètres d'irrigation collective. Disponible sur Internet : http://daaf971.agriculture.gouv.fr/Carte-des-reseaux-et-perimetres-d [Consulté le 14/10/2015]

Gleyses G., Rieu T., 2004, L'irrigation en France : Etat des lieux 2000 et évolution. 1 éd. Antony, Cemagref, 60 p.

Garin P., Le Gal P-Y., Ruf T., 2002, La gestion des périmètres irrigués collectifs à l'aube du XXIè siècle. Enjeux, problèmes, démarches. In: Actes de l'atelier du Pcsi, Montpellier, France, 22-23 janvier 2001. Montpellier, Pcsi, Cemagref, Cirad, Ird, 280 p.

Inf'eau, Conseil départemental de la Martinique, 2007. Etude prospective sur l'rrigation en Martinique. http://www.infeau.cg972.fr/spip.php?article24 [Consulté le 14/10/2015]

Ministère des Outre-Mer, Découvrir les Outre-Mer. Disponible sur Internet : http://www.outre-mer.gouv.fr/?-decouvrir-l-outre-mer-.html [Consulté le 14/10/2015]

Office de l'Eau Martinique, DEAL Martinique, Comité de Bassin de la Martinique, 2015. Schéma directeur d'aménagement et de gestion des eaux 2016-2021. District hydrographique de la Martinique. 156 p.

Présidence de la République, 2004. Ordonnance n°2004-632 du 1er juillet 2004 relative aux associations syndicales de propriétaires.

Rieul L., Ruelle P., 2003, Irrigation, 3 éd. Paris, Cemagref Editions, 344 p.

Rollin D., Bouarfa S., 2013. L'irrigation en France. Etat des lieux, enjeux et perspectives. Sciences Eaux et Territoires. (11), 98 p.

Annex 1 : Map of collective irrigation in Guadeloupe



Source : Guadeloupe Water Office, 2010





Source: Departmental Council of La Réunion

Annex 3 : Collective irrigation area of the southeast (PISE) in Martinique



Source : Departmental Council of Martinique, 2006

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