



AGRICULTURES  
ET DÉFIS DU MONDE  
Collection Cirad-AFD

# Living territories to transform the world

P. Caron, E. Valette,  
T. Wassenaar,  
G. Coppens d'Eeckenbrugge,  
V. Papazian,  
Coordinators



éditions  
Quæ

# Living territories to transform the world

Patrick Caron, Élodie Valette, Tom Wassenaar,  
Geo Coppens d'Eeckenbrugge, Vatché Papazian,  
coordinators

Éditions Quæ

The *Agricultures et défis du monde* (Agriculture and Global Challenges) collection publishes a book every year that showcases Cirad's research into the sustainable development of tropical agricultural systems. It is co-published by Éditions Quæ, AFD and Cirad. The collection is coordinated by Cirad's Patrick Caron.

Cirad (Centre for International Cooperation in Agricultural Research for Development) is a French research centre which, in association with countries of the Global South, tackles international issues of agriculture and development. In partnership with these countries, it generates and disseminates new knowledge to support agricultural development and to inform the debates on the major global issues concerning agriculture, food and rural territories. Cirad has a global network of partners and regional offices from which it conducts joint operations with stakeholders in more than 90 countries.

Cirad  
42 rue Scheffer, 75116 Paris  
[www.cirad.fr](http://www.cirad.fr)

AFD, the French Development Agency, is a public institution that has been working for 70 years to fight poverty and promote development in countries of the Global South and in French overseas departments and territories. AFD implements the French government's development aid policies.

With a presence in more than 50 countries and nine French overseas departments and territories, AFD funds and supports projects that improve the living conditions of local populations, promote economic growth and protect the planet. These projects concern education, maternal health, support for farmers and small businesses, water supply, preservation of tropical forests, the fight against global warming, etc.

Agence française de développement  
5 rue Roland Barthes, 75598 Paris Cedex 12, France  
[www.afd.fr](http://www.afd.fr)

Éditions Quæ  
RD 10, 78026 Versailles Cedex  
[www.quae.com](http://www.quae.com)

© Éditions Quæ, 2017

ISBN: 978-2-7592-2731-0

Version française : « Des territoires vivants pour transformer le monde »

© Éditions Quæ, 2017

ISBN : 978-2-7592-2654-2

This book is published by Creative Commons Attribution 2.0 Licence. You may not use the material for commercial purposes. You may not distribute the modified material 2.0 France.



## CHAPTER 5

# Is the concept of territory miscible in irrigation water?

*Amandine Adamczewski-Hertzog, Jean-Yves Jamin, Marcel Kuper,  
Sylvain Perret and Jean-Philippe Tonneau*

The expansion of irrigated agriculture requires the construction of expensive hydraulic infrastructure (Kuper *et al.*, 2009), which exists in areas as diverse as the North African plains, the flood valleys of West Africa, or the mountains of Southeast Asia. Irrigation schemes, hydraulic infrastructure (dams, canals, drains, etc.), roads, electricity networks are constituent of irrigated areas and lead to changes in landscapes, ways of managing spaces and societies' relationships with these spaces. But do these developments constitute territories?

In wet areas with no water control, the literature notes strong links between territory and water, using the terms 'hydraulic territory' or 'water territory' (Riviere-Honegger, 2008), with uncontrolled water imposing its spatial mark. In contrast, a direct relationship between the territory and irrigation schemes is more rarely established. Is it because the latter are seen as modern objects, destructuring traditional hydraulic societies perceived to be in harmony with their environment? And yet, the development of irrigation facilities, almost always at the behest of and carried out by the State, is a process of territorialization, in the sense of 'all the procedures through which a territory is formed and evolves' (Turco, 1997). These irrigation facilities structure spaces in relation to the water resource (river, groundwater, reservoir, etc.). The activities are organized depending on the distance to water resources (surface or underground), which varies over the course of the seasons if the water resource is not perennial. Each hydraulic space is also a social space dependent not only on geographical rationales but also on political, symbolic and ideological ones (Riviere-Honegger, 2008).

Irrigation schemes, very clearly delimited geographically, reorganize the living environment, agricultural production, and the flow of goods and people. At the same time, they also represent social spaces that evolve, develop or reinvent themselves. Irrigation facilities encourage the concentration of populations in cities within or near the schemes and transform habitats, production systems and consumption patterns. The supply and marketing chains more easily become part of globalization. Human

communities, marked by migratory flows and growing social differences, change their management methods profoundly, according priority to collective water management mechanisms. Managing the irrigated areas and the water that supplies them involves political, societal, and geographical dimensions at different scales, ranging from village plots to production basins, or from the smallest lowland to the river's watershed.

Irrigation facilities do make the territory. This is what we illustrate through case studies that encompass a diversity of situations, forms (geographical, hydraulic, and social), and governance mechanisms.

## THE TERRITORY AND IRRIGATION

In West Africa, the Senegal River and the Niger River have been the subject of concerted international management for decades.

In the 1970s, it was decided to develop infrastructure along the Senegal River – which forms the border between Mauritania and Senegal – with a hydroelectric dimension that was very structuring in economic and political terms. But while traditional village territories were part of a complementarity between the two banks along the meanders – the concave banks being used for cultivating flood-recession crops in the basins and the convex banks being used for dwellings and rainfed crops – the processes of independence of these two countries from colonialism and, then, the violent Senegal-Mauritania conflict in 1989-1991, transformed this river from a link between village territories to an unfordable obstacle. Although the situation has been normalized, different rationales of development and of political and social organization have driven changes on either shore. Cross-border village territories based on flood-recession farming have been replaced by territories polarized by irrigation schemes on each side of the river, which have largely ignored local populations. In order to meet national requirements of rice, priority has been accorded to agribusinesses, to the detriment of more diversified development.

In Mali, the irrigation scheme of the Office du Niger – often described as 'a State within the State' – is a large, irrigated, autonomous territory with its own ministry. It has replaced the various agro-pastoral territories that existed there earlier. Built on the basis of canals, rice fields and populations displaced for irrigation, the infrastructure facilities determined the creation, in each hydraulic block, of a village named after it (N8, KO2, etc.). Following appeals to investors, current scheme extensions are nibbling away at and disrupting non-irrigated areas dedicated to extensive livestock husbandry (Adamczewski *et al.*, 2015). Livestock breeders are turning into irrigating farmers or agricultural labourers. Only the young people now take part in transhumance, modifying the relationship of an entire society to this space that, until recently, was completely open but is today laid out with canals, drains and tracks. Small administrative towns have become centres of communication and economic hubs, connected with diverse markets.

In both Senegal and Mali, irrigation schemes are the new neighbours of old livestock husbandry territories. Even though farmers and livestock breeders have contrasting relationships with space – intensive use *versus* extensive use of resources –, they are

in competition for this space and water use. While other reasons may have been the root cause of the Senegal-Mauritania conflict, the trigger was the disputes between nomadic livestock herders and irrigating farmers for access to the Senegal River (Bélières *et al.*, 2013). By considering this irrigated territory as a geographical space constructed by the actors and their networks, we will be able to analyze the forms of synergy and cooperation that exist between livestock husbandry, peasant agriculture, agro-industry, etc. This could lead to a redefinition of the social and geographical scale of territorial development along a major river on the basis of a better understanding of the dynamics induced by irrigation.

Elsewhere in West Africa, small-scale irrigation facilities aim to improve the use of water in inland valleys. Infrastructure built in the lowlands is managed at a very local level and only affects the use of water and land in one or two village territories. The creation of micro-dams reorganizes the village territories concerned: formerly centred on the higher, drier zone, they shift towards the low, floodable and irrigable zone with high production potential. Agricultural activity is no longer determined solely by the rainfall calendar but also by floods and changes in the water table level. Inter-annual rainfall variations, especially wide in the Sahel, are being exacerbated by climate change and by changes in flows in water courses induced by the clearing of drained areas and the succession of small irrigation facilities in the valleys. These hydrological changes, however, do not mean that the large catchment area can be termed a 'hydraulic territory', mainly because it is not (yet) a common management space and very rarely a space that is a subject of integral planning (Hertzog *et al.*, 2012). The development of floodplains near the Senegal River is a characteristic example of the difficulty of defining management scales. For the sake of the goal of food self-sufficiency, the government wants to transform these basins into small rice-growing areas. Researchers and NGOs propose instead low-cost facilities for supplying water to livestock and market gardening activities that would, above all, guarantee the continued existence of a diversity of production systems.

In Morocco, Kadiri *et al.* (2013) analyzed the impact of the implementation of an irrigation project in a rural area. They show how this territory – the development of which was planned and defined by the government through the creation of an irrigation infrastructure – is evolving through the local actors, with individual and collective dynamics often other than those originally defined or expected. For example, irrigation associations quickly crossed the project's boundaries to irrigate other land. New leaders emerged, in competition with incumbent public figures. Drawing legitimacy from their management of water or agricultural cooperatives, these leaders are now distinguishing themselves in local development projects (drinking water, rural roads) or in local politics.

In South Africa, the policy of apartheid and, in particular, the Tomlinson Commission of 1955 forged a strong link between irrigation and territory because, in an effort to ensure subsistence-based development through a combination of irrigated farming and rainfed livestock husbandry, many small irrigated schemes were developed in areas reserved for black populations. This plan never really worked because the South African black peasantry, its habits, its knowledge and its culture had been completely

dismantled starting at the end of the 19th century and throughout most of the 20th century (land grabbing, massive forced displacements). The territories into which the black population was concentrated (13% of the country) often had poor soils, were lacking infrastructure and services, and were located far from supplies and markets. These populations were, for the most part, displaced, with no local knowledge of resources, climate and crops, and whose main activities had been non-agricultural. Support was offered by government development agencies (called ‘corporations’) in a paternalistic way and was limited to physically operating the irrigation facilities (construction, maintenance). They paid little heed to strengthening the actors’ capacities or to seeking agricultural or commercial alternatives. With the end of apartheid, the dismantling of corporations and the advent of post-1996 liberal politics, the facilities in the irrigated schemes fell into disuse and subsequently became degraded, most of them permanently (Perret and Farolfi, 2005).

Finally, in Brazil, in the São Francisco River valley, public investments (dams, roads, irrigation schemes) have made it possible to create a large expanse of irrigated fruit trees, with a high level of investment and technical expertise, constituting a major fresh fruit exporting area (more than 90% of Brazilian grape and mango exports). Large agribusinesses and medium-sized family enterprises (smaller than 20 ha) coexist (Coudel *et al.*, 2008) in this valley. The location of the irrigation schemes on the outskirts of the Petrolina-Juazeiro conurbation – old towns both – has promoted processing activities and services in support of agriculture. The involvement of Brazilian companies has helped avoid the enclave phenomena observed around rubber and oil palm plantations elsewhere in the country. Even if the term ‘territory’ is little used, this production basin has the characteristics of one: an administrative region intended to link and coordinate projects and initiatives was created in 2001, bringing together eight municipalities from two Brazilian states; an identity around the São Francisco River is being formed; and a project is being set up around the Petrolina-Juazeiro conurbation without, however, succeeding in correcting the environmental and social consequences of what is essentially an economic development.

## CONCLUSION

Even if the word itself is rarely used to designate the spaces covered by irrigation schemes, the notion of territory seems pertinent and even fundamental for analyzing them. No doubt, the initial impetus behind the developments remains technical and the importance of the technical aspects of irrigation schemes makes it possible to ignore the human, social and organizational factors in the management of the schemes. This is one of the reasons for the failures of the initial years. But analyses of developmental dynamics in the case studies highlight the importance of the human, social, organizational and political dimensions. Created on already organized and structured spaces, with differing underlying rationales of use, often of extensive livestock husbandry, irrigation schemes exist only as social constructs based on men, spaces and rules. Hydraulic projects (diking of river deltas, polders, etc.) are intended to be vehicles of strong territorial dynamics of development. Even without irrigation, the hydraulic facilities reconfigure, or even want to create, hydraulic territories, but

these territories cannot be solely hydraulic ones. Tensions along the Senegal River or in South Africa have shown the challenges of integrating irrigation schemes into new territories, where water infrastructure will doubtless be dominant but only when used in the service of diversified activities that promote sustainable territorial development. To be successful, such an approach probably requires better linkages between various scales through an improved consideration of local dynamics in national policymaking and by adapting the technical proposals to the diversity of situations.

## References

- Adamczewski A., Hertzog T., Jamin J.Y., Tonneau J.P., 2015. Competition for irrigated land: Inequitable land management in the Office du Niger (Mali). *International Journal of Sustainable Development*, 18 (3): 161-179. <http://dx.doi.org/10.1504/IJSD.2015.070237>
- Bélières J.F., Jamin J.Y., Seck S.M., Tonneau J.P., Adamczewski A., Le Gal P.Y., 2013. Dynamiques foncières, investissements et modèles de production pour l'irrigation en Afrique de l'Ouest : logiques financières contre cohérences sociales ? *Cahiers Agricultures*, 22 (1): 61-66.
- Coudel E., Rey-Valette H., Tonneau J.P., 2008. Which competencies and learning facilitate the involvement of local actors in territorial governance? The exemple of a Farmer University in Brazil. *International Journal of Sustainable Development*, 11 (2-3-4): 206-225.
- Hertzog T., Adamczewski A., Molle F., Poussin J.C., Jamin J.Y., 2012. Ostrich-like strategies in Sahelian sands? Land and water grabbing in the Office du Niger, Mali. *Water Alternatives*, 5 (2): 304-321. [http://www.water-alternatives.org/index.php?option=com\\_content&task=view&id=200&Itemid=1](http://www.water-alternatives.org/index.php?option=com_content&task=view&id=200&Itemid=1)
- Kadiri Z., Kuper M., Errahj M., 2013. A dual process of learning from an institutional innovation: The case of participatory irrigation management in Morocco. In: Coudel E, Devautour H, Soulard CT, Faure G, Hubert B (eds.). *Renewing innovation systems in agriculture and food: How to go towards more sustainability?* Wageningen: Wageningen Academic Publishers, p. 196-197.
- Kuper M., Bouarfa S., Errahj M., Faysse N., Hammani A., Marlet S., Zaïri A.A., Bahri A., Debbarh A., Garin P., Jamin J.Y., Vincent B., 2009. A crop needs more than a drop: Towards a new praxis in irrigation management in North Africa. *Irrigation and Drainage*, 58 (3) (suppl.): S231-S239. <http://dx.doi.org/10.1002/ird.533>
- Perret S., Farolfi S., 2005. Shaping new policies in the African water sector: The need for research on governance, institutions and the economics of water. In: *Nepad Workshop: Centres of excellence on water science and technology*, Nairobi, 9-12 May 2005. Nairobi (Kenya), Nepad. [http://agritrop.cirad.fr/532498/1/document\\_532498.pdf](http://agritrop.cirad.fr/532498/1/document_532498.pdf)
- Riviere-Honegger A., 2008. Regards sur les paysages de l'eau : évolution des usages de l'eau, dynamiques du territoire et mutations paysagères en Méditerranée occidentale. Habilitation à diriger des recherches, Lyon, Université de Lyon/ENS/LSH.
- Turco A., 1997. Aménagement et processus territoriaux : l'enjeu sémiologique. *Espaces et sociétés*, 90, 231-254.