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Has Morocco's Groundwater Policy Changed? Lessons from the Institutional Approach

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ABSTRACT: Morocco's Water Act of 1995 created River Basin Agencies (RBAs) designed to implement water policy according to the international standard of Integrated Water Resources Management (IWRM). This institutional development was accompanied by new claims regarding the management and preservation of natural resources, including groundwater resources. Aquifer contracts were introduced for this purpose. This article aims to analyse their implementation and seeks to explain both the change and continuity in groundwater policy. Through a neo-institutional approach it highlights the historical and long-term processes and institutional factors behind groundwater policy outputs. It stresses the influence of bureaucratic interests and sectoral competition on the development and implementation of groundwater policy in Morocco. Finally, this article shows that, while the main policy objectives have changed very little as supply-side mechanisms remain dominant, the process of implementation is neither linear nor guided by a single, central rationale.

KEYWORDS: Groundwater, public policy, administration, neo-institutionalism, Morocco

INTRODUCTION

There has been long-standing public concern about water in Morocco. The country's semi-arid climate helps to explain the importance of water resources, which have long been used for irrigation purposes (Pascon, 1978). A 'dam policy' introduced during the period of the French Protectorate was reinforced following independence with the aims of increasing water supply in the country (Jouve, 2006) and encouraging agricultural development, driven by a national objective of food independence. Thus, Moroccan water policy was guided by planning and supply-side concerns, which were reassessed in the 1995 water policy reform.

The Moroccan water law of 1995 created river basin agencies (RBA)¹ responsible for the management of every watershed in the country.² Eventually established in the early 2000s they replaced the regional Directorates of Hydraulics but differed in that they were granted financial autonomy. Following the principles of Integrated Water Resources Management (IWRM)³ their

¹ *Agence Hydraulique de Bassin* in French.

² Dahir n°1-95-154 of 16 August 1995 enacting the water law n°10-95, Official Bulletin n°4325, 20 September 1995.

³ This policy model has been widely discussed and criticised (Allan, 2003; Molle, 2008), in particular because it contributes to an over-technicalisation and even de-politicisation of water management issues (Graefe, 2011). Molle (2008) mentions a 'nirvana concept' that would suggest the resolution of all problems, without specifically defining priorities. This plasticity ensures consensus between the various users and allows political players (international cooperation organisations and

philosophy rests on an 'integrated' and localised vision of water management, oriented, among other priorities, towards the preservation of natural resources. The objectives are laid out in the Integrated Water Resources Development Plans⁴ adopted by each RBA⁵ in accordance with the law of 1995. These plans include a participatory mechanism in the area of groundwater management: the agencies support the implementation of 'aquifer contracts', inviting all users to participate in the management of their aquifer.⁶ International organisations and donors strongly encourage the implementation of such contracts by providing financial and technical support to the relevant national institutions. Finally, the implementation of aquifer contracts nationwide was confirmed by their inclusion in the water act of 2016,⁷ which enjoined RBAs to set up 'participatory aquifer management contracts'.⁸

Such innovations in the water management discourse and associated policy tools suggest a change in Moroccan water policy. However, no major changes can be observed in the policy objectives as implemented, since they remain supply-side oriented without providing demand-side management measures. In comparative terms, we should point out that Morocco's policy objectives are not an exception but reflect those generally adopted within the Mediterranean basin (Ghiotti and Molle, 2008). Our paper aims to explain the discrepancies between the new discourse and institutional framework and the policies as implemented (Ruf and Valony, 2007). To this end we open the 'black box' of institutions and analyse the implementation of public policy.

OPENING THE 'BLACK BOX' OF INSTITUTIONS AND THE IMPLEMENTATION OF PUBLIC POLICY

First, we review the existing literature in political science concerning Morocco in order to clarify the objectives of the article. We then present public policy analysis approaches, and more specifically the contributions of neo-institutionalist approaches on which our analysis is largely based. Finally, we introduce the two main case studies on which our analysis relies and outline the methodology used in the research.

Previous research on political institutions and public policy in Morocco

Although Morocco's semi-authoritarian politics have hampered the development of critical social sciences, political sciences have addressed various issues. Much of the existing literature focuses on the macro level, analysing historic political events (Vermeren, 2010; Abitbol, 2014), the construction of the political system following independence (Leveau, 1985) and the evolution of power configurations within the political regime (Waterbury, 1975; Hammoudi, 2001; Catusse and Vairel, 2003; Willis, 2012). These historical studies are complemented by analyses of the country's social and political elites (Santucci, 1992; Benhaddou, 2009; Vermeren, 2011a; Gobe, 2015) and the more recent growth of the economic elite, some of whom have moved into the field of politics (Catusse, 2008).

The literature also covers micro-level politics, including studies of social movements and protests (Catusse and Vairel, 2010; Allal and Bennafla, 2011; Benidir, 2011; Hibou, 2011), and how this is

development banks, states, water basin agencies, local water managers, engineering firms) to legitimise any policy or project stamped with an IWRM label.

⁴ In French: *Plan Directeur d'Aménagement Intégré des Ressources en Eau* (PDAIRE).

⁵ Water Resources Integrated Layout and Development Plans, *RBA of Sebou*, Fez, September 2011.

⁶ Aquifer Contract of the Fez-Meknes Groundwater Table, *RBA of Sebou*, Workshop on Groundwater Management in Morocco, organised by the French Cooperation Agency (AFD), Skhirat, March 2014; Workshop on groundwater governance and the project of Tadla aquifer contract, organised by the World Bank, RBA of Oum Errabia, Beni Mellal, 25 February 2016.

⁷ Dahir n°1-16-113 of 10 August 2016 enacting the water law n°15-36, Official Bulletin n°6506, 6 October 2016

⁸ Our study was conducted between 2013 and 2016, prior to the enactment of this law. As a consequence, our paper does not concern the implementation of the 2016 water law reform.

generally 'neutralised' by the central power (Vairel, 2014). The role of elected representatives in the development of public policy is fairly limited and often linked to vote-grabbing rather than participation in the policy process (Zaki, 2007). Indeed, Morocco's political system is dominated by the monarchy, which has more power over the government and the administration than the elected representatives. Nonetheless, rather than functioning through the king alone the monarchy is based on complex social arrangements.

In analysing the nation's power configurations, studies concerning public policy and state intervention tend to emphasise the dominance of the central state and its control of the population (Hibou and Tozy, 2000; Bono et al., 2015). They generally seek to explain the logic of state intervention (Hibou, 1998, 1999; Hibou and Tozy, 2015) rather than looking at the day-to-day functioning of the state apparatus and administration. Here we echo a key criticism of the prevailing Africanist political sociology studies undertaken before 2000, wherein certain authors saw them to be analysing the 'state without the civil servants' (Copans, 2001). This was accompanied by calls for sociological analyses of African public administrations (Darbon, 2004; Olivier de Sardan, 2007) to help understand the day-to-day functioning of the state (Blundo, 2011; Labzaé, 2015). In response to this criticism we aim to contribute to a (re)sociologisation of Moroccan policy analysis. Moreover, some studies directly analyse the implementation of public policy in Morocco, in particular that of international standards. These include studies of reform in the telecommunications sector (Hibou and Tozy, 2002) and higher education system (Kohstall, 2014), whose main observations are the partial implementation of reforms and a reinforcement of central state domination. Others examine policy outputs as the result of a complex process that can reveal political configurations and explain the arrangements that brought them about (Hibou and Bono, 2016). These studies look at economic regulations (Schehl, 2016), urban transport policies (Hachimi Alaoui, 2016) and social policies targeting single mothers (Capelli, 2016). The last two are not priorities on the Moroccan policy agenda; neither are they strongly institutionalised. Our analysis deals with a historically strong and institutionalised policy field in Morocco: water, more specifically, groundwater policy.

Morocco's semi-arid climate means water is a highly valuable resource. This has given rise to a large number of studies on water management. In the field of groundwater, some focus on water allocation and the conflicts linked to unequal distribution (Houdret, 2012), sometimes focusing on their effect on natural resources using political ecology approaches (Tanouti and Molle, 2013). A political analysis reveals links between irrigation user associations and rural political leadership (Kadiri et al., 2010), showing that 'water control' is a crucial electoral resource, particularly in rural areas. A further set of studies looks at the socioeconomic impact of water resource distribution (Kuper et al., 2016; Kooij et al., 2017) and considers water-use efficiency (Kuper et al., 2017) using the theoretical approaches of common-pool resource management (Ostrom, 1990). These approaches pay particular attention to inequality in the distribution of and access to water resources, which is largely linked to inequality in the actors' economic, social and technical resources (Benouniche et al., 2014).

These approaches do not exhaust the subject and leave a particular blind spot with regard to policy implementation at a meso-level. Indeed, we neither address macro level decision-making processes in groundwater policy nor their implementation or translation at the micro-level. Rather, we look at the processes of the institutionalisation of groundwater policy at the meso-level, that is to say regionally, where RBAs implement groundwater policy.

Nevertheless, it is important to take into account the context of this implementation process, which is characterised by an historically strong water development strategy, known as the 'dam policy', introduced during the French Protectorate and reinforced following independence (Benhadi, 1976; Popp, 1984; Perennes, 1992). As already noted, this started to change during the 1990s with the Water Act of 1995, which introduced new water management institutions and attempted to reorient water policy objectives towards demand management. This period also saw a continuous increase in the exploitation of groundwater resources (Gana and El Amrani, 2006), leading to calls for their

conservation, and more specifically the introduction of aquifer contracts. The analysis of the implementation of groundwater policy is therefore a highly relevant way to question and describe change in water policy in Morocco.

Public policy analysis and the neo-institutionalist approach

Our paper aims to analyse the Moroccan groundwater management policy – in particular, the implementation of aquifer contracts. We examine changes in policy, seeing public policy as a 'collective production of actors in interaction' (Hassenteufel, 2011). Thus, the implementation of a public policy does not result from political will alone, and the outcome can be quite different from the initial decision (Pressman and Wildavsky, 1984). Policy design begins with the framing of the issue (Gusfield, 1984; Neveu, 2015) to be put on the political agenda (Kingdon, 1984), which is important as it involves various actors with conflicting interests and promoting different values. Each actor has specific perceptions and resources that influence and contribute to a (re)defining of their identity and role in the process. Moreover, the framing of the issue significantly influences the content of the resulting policy. At the same time the implementation of a policy is largely determined by the ways local actors translate and appropriate it.

Institutions are highly influential in the development of public policies. The conceptual approach adopted in this paper is largely inspired by neo-institutionalism, which emerged in the United States in the 1970s as a response to behaviourism and influenced fields as diverse as political science, economics and the sociology of organisations (Goodin, 1996; Lowndes, 1996). This extremely heterogeneous theoretical trend (Hall and Taylor, 1996) originally held a shared desire to reintroduce institutions into the explanation of behaviour and into the fabric of public policy. It distinguished itself from classical institutionalism, which is historical-descriptive, by focusing on the study of the organisation and the functioning of political institutions. For neo-institutionalists, the dependence of institutions vis-à-vis social forces should be seen as relative. Institutions are presented as having their own logic. They allow collective action by providing the 'rules of the game' and stabilising the modes of cooperation among actors. At the same time, they constrain collective action by limiting choice and shaping the attitudes and behaviour of actors. According to the logic of appropriateness (March and Olsen, 1984), individuals adopt the behaviour which is most appropriate based on the institution to which they refer. There are three main trends within the most classic typology of neo-institutionalism (Hall and Taylor, 1996): *rational-choice*, *historical* and *sociological*.

Rational choice neo-institutionalism emphasises the role of institutions in limiting actors' choices, while allowing them to produce and express their preferences (Ostrom, 1991). Institutions are rules that guide actors' calculations and make their behaviour predictable. Institutions only endure when the cost of maintaining them is lower than the benefits derived by actors. Similarly, "institutional changes only occur when actors feel that such change maximises their utility" (Gorges, 2001). Rational choice neo-institutionalists postulate that individuals have a precise and ordered knowledge of their preferences. As far as natural resources such as water are concerned many studies led by rational choice neo-institutionalists belong to the *Common Pool Resources (CPR)* school of thought and use Ostrom's *Institutional Analysis and Development Framework* (Ostrom, 2011). Some studies based on the CPR methodology analyse the institutional arrangements specifically dedicated to water use and management in Morocco (Bekkar et al., 2009; Fofack et al., 2015; Kooij et al., 2015).

Historical neo-institutionalism emphasises macro-institutions and asymmetric power relations from a perspective that is both diachronic and comparative. Historical neo-institutionalists posit that in order to understand the emergence of an institution one must analyse its history and path-dependence (North, 1990; Pierson, 2000). They argue that, although actors may behave strategically and change the course of a policy, past choices influence current decisions. Historical neo-institutionalists believe that one cause of major institutional change is ideas (Hall, 1993; Steinmo, 2001), but path-dependent

incremental change may occur and "cause ever greater change down the path by means of positive feedback" (Vijge, 2013). Some authors propose taking a long-term institutional perspective with regard to water policy (Ingram and Fraser, 2006; Bukowski, 2007) but they are significantly outnumbered by those espousing rational-choice neo-institutionalism.

Sociological neo-institutionalism explores the cognitive processes and cultural dimensions of institutions (Hall and Taylor, 1996). Here, institutions are cognitive rules that produce meaning, while aggregating representations and behaviours, beliefs, myths, paradigms, codes, cultures and knowledge. There are also normative rules, which produce order, frame collective action and define appropriate behaviours, procedures, conventions and strategies. They envelop, support, interpret or contradict routines and roles (March and Olsen, 1994). Some works on water governance belong to or borrow from this sociological trend (although these too are far less numerous than those adhering to rational choice neo-institutionalism). One example is Molle's work (2008) on IWRM, while that of Ingram and Fraser (2006) on the cultural conditions for the emergence of new organisational forms and a corpus of water professionals, echoes works on 'institutional isomorphism'. Initiated by a search for organisational legitimacy, isomorphism involves convergence processes between organisations belonging to the same institutional field (DiMaggio and Powell, 1983).⁹

The existing research into water management in Morocco very rarely takes an institutional approach. Of those that do, the CPR methodology is more common than historical or sociological neo-institutionalist approaches. It usually views the state as a monolithic entity (Baron et al., 2011) – exogenous, without real links to communities or social groups and seeking, above all, to dominate the population. Moreover, many advocates of CPR approaches have a relatively simplistic view of institutions: the rules apply or do not apply. Beyond this binary vision, however, other approaches show that the rules are interpreted and appropriated, and that they can also be subverted or strategically used. For our part, we make the assumption that the historical and sociological neo-institutionalist approaches are able to bring to light some fundamental mechanisms occurring within the Moroccan water policy process.

Institutions are defined in this paper as normative and cognitive frames, either formal or informal, that influence those engaged in collective action. Normative frames include rules, norms and procedures. Cognitive frames include identity, culture, representations and beliefs. They survive and are replicated without particular effort, through social and political, self-maintained and routinised, mechanisms. We refer to 'institutionalisation' as the process of creating or perpetuating institutions. When a particular organisation is set in such a process it provides cognitive resources to the actors along with more material means, which constitute strategic resources.

Finally, the neo-institutional approach is relevant not only because it is helpful in analysing the implementation of public policy but because it enables us to consider the question of policy change. Our central hypothesis is that the persistence of supply-side water policy objectives is tied to the very weak institutionalisation of environmental concerns, particularly the preservation of groundwater resources, compared to the strong institutionalisation of water-supply and agricultural development policies, whose primary objectives are largely incompatible with environmental protection.

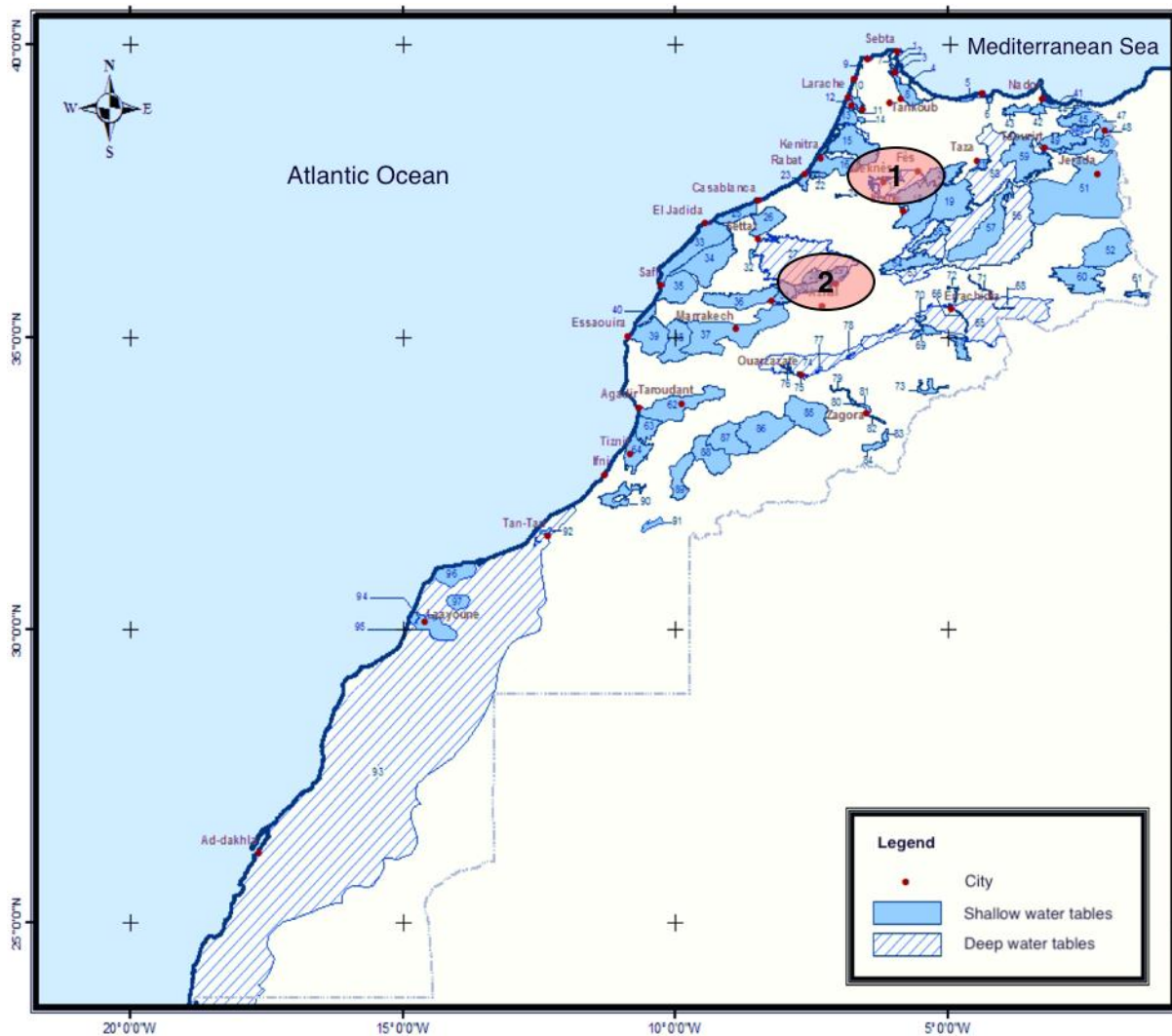
The empirical case studies: The Saïss and Tadla Plains

We have chosen to analyse Morocco's groundwater policy through the implementation of aquifer contracts in two specific areas. The first Moroccan aquifer contract was approved in 2007 and concerns

⁹ DiMaggio and Powell (1983) identify three main types of institutional isomorphism: 'coercive isomorphism' describes a situation of pressure to implement specific organisational tools or processes; 'mimetic isomorphism' emerges in a context of high uncertainty, within which actors seek to implement proven and pre-existing solutions; 'normative isomorphism' refers to the adoption of professional standards of the field to which the organisation belongs.

the Souss region in the south of the country. However, we chose not to analyse this contract specifically since it has already been studied (Houdret, 2008, 2012) and was established over a decade ago, whereas we preferred to analyse an on-going implementation process. Moreover, the Souss aquifer is used predominantly for agriculture, and we believed we could learn more from aquifers serving a variety of sectors (drinking water production, agricultural irrigation and others). We therefore chose to analyse two aquifer contract projects in the two semi-arid plains of Saïss (1) and Tadla (2), as shown on the following map of the country's aquifers.

Figure 1. Map of Moroccan aquifers (shallow and deep groundwater tables).



Source: Ministry of Water, Morocco, 2014.

The Saïss region is located between the cities of Fez and Meknes. The Tadla Plain is located around the cities of Beni Mellal and Fquih Ben Salah. In each region more than 75% of the groundwater resources are used for irrigation, while the rest are used to produce drinking water to supply the cities and, to a

lesser extent, industry.¹⁰ The water for agricultural use generally comes from shallow water tables, while the other uses exploit deep water tables. However, the deep water tables are increasingly being used for agricultural irrigation purposes in both our study areas, which exacerbates groundwater overexploitation. Despite their similarities, the research fields differ from each other on at least two counts. Firstly, their organisational structures for irrigation are different. The Tadla Plain contains a large-scale irrigation scheme managed by a public office, while no such infrastructure exists on the Saïss Plain, as access to water resources is mainly on an individual basis or shared by relatively small, private groups of farmers. Secondly, while both research fields are involved in aquifer contract projects run by their local RBA, in the Saïss the Sebou agency has been working on a draft agreement since 2013, which has yet to be ratified by the stakeholders. The Tadla region's project, on the other hand, was launched in 2015 thanks to financial support from the World Bank.

Following a classical approach in public policy analysis (Fischer, 2003; Pinson and Pala, 2007), our methodology first included semi-structured interviews with both local and national civil servants from the various sectors involved in groundwater management policy (RBA, agriculture, industry), as well as with the resource users (farmers, a cooperative supervisor, representatives of public offices for the irrigated scheme and drinking water production, and public bodies involved in water distribution). The following table summarises the 56 interviews conducted between March 2013 and October 2016 within our two research fields.

Table 1. Interviews conducted for this research.

	Saïss	Tadla
Water basin agencies	5	3
Department of Agriculture	7	1
National Office for Drinking Water	3	2
Irrigated perimeter public office	-	2
Farmers	10	5
Private consultants	4	5
Ministry of the Interior	6	0
Chamber of Agriculture	3	0

In addition to semi-structured interviews with the organisations mentioned in Table 1, we also relied on a qualitative analysis of ministerial discourses and communications, and administrative documentation (both official and internal reports). This provided an important basis of information on the structure, discourse and actions of the organisations concerned. It also helped us construct the grid for the semi-structured interviews.

Turning to our results, we first deal with the context of the implementation of groundwater policy in Morocco. We consider the institutionalisation of environmental issues in Morocco, with a particular focus on the organisation of ministries and departments. We then analyse the material resources of those responsible for groundwater management, before examining the problem of groundwater overexploitation from an economic standpoint. We go on to explain the power and resources of the agricultural sector, which resists any restriction on its use of water. In a second section we specifically focus on the practical implementation process of groundwater policy. We explore the definition framing process of the issue of groundwater overexploitation before turning to the solutions suggested

¹⁰ Planning and management process of groundwater in Morocco: situation and prospect, Department for Water, *National Groundwater Management Workshop*, Skhirat, 26-27 March 2014.

by the relevant actors. Finally, we analyse the content and the implementation of the Saïss and Tadra aquifer contracts, emphasising their role in the perpetuation of supply-side strategies. In conclusion, we highlight the contribution of an institutional approach in understanding of the implementation of Moroccan groundwater policy.

GROUNDWATER MANAGEMENT POLICY: THE MANY OBSTACLES TO IMPLEMENTATION

Despite resulting in part from a policy transfer, the implementation of aquifer contracts in Morocco takes place within a specific context that we should first describe and analyse.

The institutionalisation of environmental issues: a department without authority

Morocco's policy of groundwater conservation is linked to environmental concerns that are weakly represented in the country. This is not only true from a political point of view but also from an administrative and governmental perspective. We argue that the weak representation of environmental interests within the governmental and administrative system tells us a lot about the political will in this particular sector and has concrete consequences in terms of the financial and human resources available to develop an environmental policy.

Moroccan society is broadly characterised by the weak representation of environmental interests. No major, or even medium-scale, political party has environmental protection as a priority in its manifesto. The country's first environmental party, the Green Left Party¹¹ (PGV) obtained 0.23% of the vote in the 2016 general election, meaning a single member was elected to the parliament's lower house, representing the southern province of Errachidia. While a notable result, it demonstrated that environmental concerns were not a critical topic of the elections. With regard to civil society, only some small and very local environmental associations exist, concerned, for example, with waste management or water preservation. Nonetheless, it is important to note the creation in 2015 of the Moroccan Alliance for Climate and Sustainable Development, which appears to be the first attempt to unify environmental associations in the country.¹²

At an administrative level, although every government since 1992 has had a ministry portfolio dedicated to environmental issues, the Ministry of the Environment existed in its own right for only two years (1995-1997). It was later tacked on to the Ministry of Public Works (1997-2002), then to the Ministry for Regional Planning and Water (2002-2007) and thereafter to the Ministry of Energy, Mines, Environment and Water (2007 until the present). We should note that in 2017 the term 'environment' was replaced by 'sustainable development'. Meanwhile the Department for Water had been part of the Ministry of Public Works until 2002, when a specific Secretary of State for Water was created and attached to the same ministries as the environment until 2017. In 2017 it was then reattached to the Ministry of Public Works, Transport, Logistics and Water. The post of Secretary of State for Water was finally dissolved in August 2018¹³ and the portfolio absorbed into the Department for Public Works.

The inclusion of environmental issues on the Moroccan political agenda began in the early 1990s – a time when awareness of these issues was growing internationally, particularly following the Rio de Janeiro Earth Summit in 1992. It should also be noted that the inaugural World Water Forum of 1997, which was specifically devoted to water management experiences and recommendations, was held in

¹¹ The Green Left Party ('Parti de la Gauche Verte', or PGV, in French) was created in May 2010 after splitting from the Unified Socialist Party ('Parti Socialiste Unifié', or PSU, in French).

¹² Website of the *Moroccan Alliance for Climate and Sustainable Development* (Alliance Marocaine pour le Climat et le Développement Durable, in French), online, accessed 14 March 2018, www.amcdd.com.

¹³ King Mohammed VI dissolves State Secretariat for Water, Morocco World News, online, accessed 30 August 2018, www.morocccoworldnews.com/2018/08/252433/mohammed-vi-dissolves-secretariat-water/

Marrakech in Morocco. The COP22¹⁴ held in Marrakech in November 2016 further confirmed Morocco's participation in international environmental policy development. Thus, environmental, and particularly water management, issues emerged as a window of opportunity for the Moroccan government to demonstrate its 'exemplary image' in these fields on the international stage.

The way successive governments have organised ministries and departments shows that they have not always conceived of environmental issues and water management as interrelated. It is telling that environmental issues in general and water management in particular were for a long time handled by the Ministry of Public Works, suggesting they are subordinate to infrastructural matters. Moreover, we must remember the historic importance of supply-side water policies conducted by the Department of Public Works, as demonstrated by the dam projects that resulted from the prioritising of agriculture. Both strategies led to the development of administrative institutions fully designed for these goals, which in turn limits the possibility of reorienting existing policies.

The Environment Department, meanwhile, has limited scope. Its role is mainly advisory, as it aims to influence sectoral public policy towards environmental considerations more than undertaking direct action,¹⁵ and its budget is small; indeed, that of the entire Ministry of Energy, Mines and the Environment represented only 0.6% of the total state budget in 2017.¹⁶ The primary functions of the Environment Department are to analyse the environmental situation nationally, and also locally through its Regional Observatories for the Environment, and to issue general recommendations. As the department has no local administration, its role is limited to the national level. The fact that the Environment Department has no regulatory power or enforcement officers prevents the development of an active administration specifically concerned with environmental issues.

Moreover, the main engineering school, where most public sector managers are educated, the Hassania School of Public Works (EHTP), has only recently introduced courses covering environmental issues, and these remain limited. The Hydraulic Engineering course was modified in 2008 to become Hydraulic and Environmental Engineering.¹⁷ A similar change took place at the Mohammadia School of Engineering (EMI) with its civil engineering course.¹⁸ Such developments are recent, which explains why there have been so few state engineers trained in environmental issues. Furthermore, environmental issues and management are not the focus of these courses but merely modules within broader hydraulic or classic civil engineering syllabuses, thereby limiting the scope of the environmental training. This can be a source of frustration, as illustrated by a question put by a student from the Hassania School of Public Works directly to the then-Minister of the Environment at a conference in May 2016:

Everyone is speaking about environmental protection, and what we should do, what we should improve in this field. That is correct; but in our engineering schools we are still learning the other way. In my

¹⁴ The 22nd Conference of the Parties (COP), also known as the 'Marrakech Conference', was held in Marrakech 7-18 November 2016.

¹⁵ Les missions, website of the *State Secretariat for Sustainable Development*, online, accessed 13 March 2018, www.environnement.gov.ma/fr/secretariat-etat/2015-03-05-11-53-51/missions.

¹⁶ Budget de l'État en 2018 : les secteurs bien dotés et ceux qui auraient mérité plus, *TelQuel*, 27 October 2017, online, accessed 13 March 2018, http://telquel.ma/2017/10/27/budget-letat-en-2018-les-secteurs-bien-dotes-ceux-auraient-merite_1565882

¹⁷ Ingénierie de l'Hydraulique et de l'Environnement, website of the *Hassania School of Public Works*, online, accessed 14 March 2018, <http://www.ehtp.ac.ma/page/ingenierie-de-l-hydraulique-et-de-lenvironnement>

¹⁸ Génie Civil, website of the *Mohammadia School of Engineering*, online, accessed 14 March 2018, <http://emi.um5.ac.ma/formation/formation-d-ingenieur/genie-civil>.

hydraulics courses, professors are still teaching us about dam construction, increasing water supply and so on. Why is that so?¹⁹

Therefore, despite the government's discourses around the protection of the environment, especially on the international stage, the institutionalisation of environmental issues clearly remains weak. Indeed, rather than implementing new environmental policies, we observe a phenomenon of 'greenwashing' (Berny, 2011; Biros, 2014) of the existent sectoral policies with insignificant changes. We will now look more closely at the implementation of groundwater management policies, as coordinated by the Department for Water rather than the Department of the Environment.

Groundwater conservation: Secondary mission of the RBAs

The legislative changes introduced by the 1995 Water Act led to institutional changes within the administrative department responsible for water. Inspired by IRWM principles, the institutional shifts resulted from isomorphisms that were both mimetic (implementing pre-existing solutions to manage uncertainty) and normative (implementing international professional standards) (DiMaggio and Powell, 1991). Nonetheless, we should note that the creation of Moroccan RBAs was not a 'copy-and-paste' from the IRWM model, nor entirely innovative. Neo-institutionalists have shown that institutional change could be produced by gradual and incremental shifts rather than a sudden transformation. Most have focused on the stability and the resistance to change (Pierson, 2000), but more recent works highlight the change mechanisms. We view Morocco's water management institutions not as 'new' but rather the result of an institutional 'conversion', having entailed "the changed enactment of existing rules due to their strategic redeployment" (Streeck and Thelen, 2005). The implementation of water management policies in Morocco is the responsibility of the RBAs created by the 1995 Water Act. While these agencies were new from a legislative point of view, in practice they were the result of the conversion from older institutions – the regional hydraulic directorates – that were already dividing the country into river basins. A senior officer at the Oum Errabia RBA lived through the transition and explained:

In fact, the offices [of Hydraulics] were in the same premises. We are in the same building, with the same people; we just put the name 'agency'.²⁰

Yet, once the directorates' staff had transferred to the agencies, the 1995 Water Act meant that the RBAs were now public institutions endowed with legal personality and financial autonomy. The previous hydraulic directorates had been principally devoted to the regional implementation of centrally devised policies and regulatory measures.²¹ The new agencies not only retained that role but also took on water policy planning at the basin scale, meaning that their role expanded beyond the means at their disposal, as explained by the same officer:

We inherited many responsibilities from the former regional directorates of Hydraulics, and these, particularly managing the public hydraulic domain, waste a lot of our time.²²

These words reflect an ambiguity in the responsibilities of the 'new' RBAs. Indeed, their main role consists of the regulatory aspects of public hydraulic domain, but they also manage raw water supply

¹⁹ Question asked to the Minister of the Environment by a student from the Hassania School of Public Works, 'Youth and Climate Change' conference, School of Governance and Economics, Rabat, 2 May 2016.

²⁰ Interview with a senior official at the Oum Errabia RBA, Beni Mellal, 21 September 2015.

²¹ Interview with a senior consultant in water management and former official at the Department for Water, Rabat, 15 September 2015.

²² Interview with a senior official at the Oum Errabia RBA, Beni Mellal, 21 September 2015.

and the construction of the hydraulic infrastructure necessary to increase supply or prevent flooding. Thus, in terms of both human and financial resources,²³ strategic planning, including the protection of groundwater resources, appears to be a secondary function. For example, the investment budget of the Sebou RBA for the year 2012 was broken down into 34% for flood prevention, 26% for the development of water supply and 20% for resource conservation.²⁴ In the Oum Errabia RBA groundwater conservation responsibilities take up less than 5% of a single staff member's workload.²⁵ This clearly suggests that groundwater management policies are devised and implemented by actors whose primary concern is the supply of water. RBA officials are therefore guided by a developmental vision, just as civil servants lack training in environmental protection from the engineering schools. This demonstrates that while institutional conversion can lead to a (limited) degree of organisational change, it remains subject to 'path dependency' (Pierson, 2000).

The Water Act of 1995 introduced the principle of regularising all (ground)water extraction points. These have to be declared to the local RBA, which then collects a water user fee. However, such measures concerning the protection of groundwater resources are less politically rewarding than the construction of dams to increase water supply or dykes to protect populations from flooding. As a private consultant to RBAs explains:

When a dam is constructed there is an inauguration with great fanfare, with a lot of politicians and so on. You won't see anything like that when it comes to the preservation of groundwater.²⁶

This example should be linked with two specific observations on the context within which the RBAs operate. First, the agencies are seeking to build legitimacy in the eyes of water users, as they do not want to appear as enforcement authorities alone, simply imposing regulations and penalties. Secondly, Morocco does not have strong or well-organised civil society organisations promoting environmental protection, which means that the agencies are not socially or politically answerable to such actors. On the contrary, various irrigator associations are directly represented on their executive boards, as we will see later.

Notwithstanding the provisions of the 1995 Act, more than 15 years after their creation the RBAs are dramatically lacking in financial autonomy. They still rely on state subsidies for between 40 and 60% of their budget, depending on the agency and year.²⁷ Their independent financing comes from various sources, one of which is a bulk water usage fee for the extraction and use of surface or groundwater. The ministry sets this fee in accordance with the use made of the water,²⁸ thereby limiting the power of the agencies in favour of the central administration. For most uses the fee is fixed at 2 dirham cents²⁹ per cubic metre, which is very low. Moreover, these fees are not always collected. Indeed, the agencies collect the fees payable by institutions (drinking water producers, hydroelectric producers, irrigated scheme offices or industrial operators) but lack the human resources to collect individual fees from the farmers located outside public irrigated schemes. Above all, the low level of the fee leads to a situation where the cost of recovery would be higher than the sum collected. Moreover, the Sebou RBA believes

²³ Interview with a senior official at the Bouregreg-Chaouia RBA, Benslimane, 15 June 2015.

²⁴ Interview with a senior manager at the Sebou RBA, Fez, June 2013.

²⁵ Interview with a senior official at the Oum Errabia RBA, Beni Mellal, 18 April 2016.

²⁶ Interview with a senior consultant in rural engineering, former official of the Department of Agriculture, Salé, 13 March 2016.

²⁷ Interview with a senior official at the Sebou RBA, Fez, 31 May 2016.

²⁸ See for example ministerial order n° 520-98, 12 March 1998 or n° 548-98, 21 August 1998.

²⁹ Approximately US\$0.002.

it is only aware, officially, of 30 to 40 % of the existing groundwater extraction points (wells or tube wells) on the Saïss Plain.³⁰

In terms of strategy, the agencies have the additional legislative obligation of implementing the Integrated Water Resources Development Plans (basin master plans). These are not coordinated exclusively by the agencies as they are obliged to follow the National Water Strategy as set out by the Department for Water. Finally, the preservation of groundwater resources is managed by relatively weak actors within their institutional environment. Their weakness is exacerbated by competition with a much more powerful sector, as we shall see in the next section.

The dominance of the agricultural sector in water issues

Given that it represents over 80% of the country's groundwater consumption, the agricultural sector appears to be central in groundwater management policies. It is more broadly a significant sector from a macroeconomic point of view. In 2013 it represented around 14% of the national GDP³¹ and 43% of the total employment in the country.³² This is the result of a long-term policy that has benefited greatly from the 'dam policy' launched after the country gained independence in 1956 (Perennes, 1992). Indeed, more than half of the water in the dams is allocated to agriculture (Akesbi, 2006), allowing it to reach a target of a million irrigated hectares by 1968 (Bouderbala, 1999). The 1990s saw the beginning of the 'time of strategies' – the state's new thinking on strategic investment in the agricultural sector (Akesbi, 2006, 2013). Indeed, agriculture has been a key preoccupation of the state since independence, and developing the sector means developing irrigation, initially from surface water resources. From the late 1980s the decrease in technology costs led to the democratisation of groundwater access. This offered new perspectives for the development of irrigation and led to an increase in groundwater abstraction (Bouarfa and Kuper, 2012; Kuper et al., 2016).

In more recent years a major agricultural development plan has been implemented that largely reinforced the country's objectives in this sector. Launched in 2008, the Green Morocco Plan provided huge investment³³ in agriculture, particularly in new irrigation techniques. The plan aims to increase agricultural production by encouraging economic investment in the sector through subsidies to private investors. One of the key measures consists in massively subsidising drip irrigation equipment – as much as 80 to 100% of the cost of installation³⁴ – and in some cases new wells. The recent development of irrigation has thus been based on the continuing exploitation of groundwater resources.

The prioritising of agricultural development policies in Morocco is not new, but their recent strengthening is specifically connected to the Minister of Agriculture, Aziz Akhannouch. His appointment in 2007 brought a significant strengthening of agricultural policy with the introduction of the Green Morocco Plan:

In my opinion the [groundwater] governance issue is linked to the minister, Akhannouch, who is very powerful. He has been in the position for more than eight years. This is someone who is so well connected that he could open the floodgates of the Ministry of Finance. He can do anything! It was a different situation before, when the Department of Public Works was the dominant one. But now the Department of

³⁰ Interview with a senior official at the Sebou RBA, Fez, 31 May 2016.

³¹ Gross Domestic Product.

³² Moroccan agriculture in numbers (*L'Agriculture marocaine en chiffres*), Department of Agriculture and Marine Fisheries, 2015, online, accessed 30 March 2018, www.agriculture.gov.ma/sites/default/files/agriculture-en-chiffres-2012.pdf.

³³ The total volume of investment is estimated to be around 147 billion dirhams over ten years (more than US\$15 billion).

³⁴ The subsidies can be up to 100% for landowners with a surface area of less than five hectares.

Agriculture has the upper hand. When Akhannouch arrived he turned the situation around. Now, money for subsidies flows at the Department of Agriculture.³⁵

This official describes the current dominance of the Department of Agriculture over other departments, such as Public Works, Environment and Water. In accordance with the Constitution, a new government is appointed after every general election. Nevertheless, only a certain number of members come from the ranks of the parliamentary majority. The remaining members are directly appointed by the king without necessarily having been elected. Aziz Akhannouch has been both alternatively. Indeed, his initial appointment was as a locally elected representative of the National Rally of Independents (RNI) – one of the parties forming the then-governing coalition. Following the general election of 2012, the RNI was not part of the new coalition, but Akhannouch remained Minister of Agriculture, quitting his party³⁶ and not rejoining it until it rejoined the government in 2013.

Aziz Akhannouch does not belong to the well-established and powerful group of technocrats who have all studied engineering at the French *École des Ponts et Chaussées* and which is considered to be a "state within the state" (Vermeren, 2011b: 78). Rather, he belongs to another category of Moroccan elite known as 'entrepreneurs', who have become very wealthy from private business and whose entry into politics has been charted by Myriam Catusse (2008). As the king's faithful allies within the government, technocrats and personalities such as Akhannouch represent his indirect intervention in his country's politics. Aside from their competence, or the election results, the technocrats' legitimacy stems above all from the close relations they maintain with the king. Indeed, Aziz Akhannouch's power is visible not only because he is able to enter or avoid the political arena as he chooses but also because he has come to be known publicly as a friend of King Mohammed VI – a rarefied status in Morocco's monarchy where everyone remains first and foremost a royal subject.³⁷

This may seem at odds with the institutional approach, but not if we consider two crucial elements. First, the choice made by the king and his entourage to appoint Akhannouch to his position demonstrates political will at the highest level to strengthen agricultural development policy. Therefore the minister himself represents the political leverage of this policy as well as the policy's reorientation. Secondly, one should keep in mind the semi-authoritarian nature of the Moroccan regime. Slater (2003: 82) explains that within authoritarian contexts personalised forms of power can coexist with institutionalised authority: "personalization and institutionalization are thus not as antithetical in authoritarian regimes as in democracies. Despotic power (the power to decide) can become highly personalized, even as infrastructural power (the power to implement) remains highly institutionalized".

Thus the current dominance of the agricultural sector in Morocco is the result of a combination of a highly institutionalised sector characterised by historical and long-term policies of agricultural development and the fact that the current minister has strategic resources that strengthen the sector's position. But sectors always vie with each other for resources, and the current domination of agriculture should not be considered definitive. Indeed, the water department has previously been dominant over the agricultural sector, including during the 1990s when the Minister of Public Works,

³⁵ Interview with an expert consultant in rural engineering and former official of the Department of Agriculture, Salé, 13 March 2016.

³⁶ Akhannouch, les leçons d'une démission, *L'Economiste*, 3 January 2012, online, accessed 20 March 2018 www.leconomiste.com/article/890100-akhannouch-les-lecons-d-une-demission.

³⁷ What is exceptional about Akhannouch's friendship with the king is not its existence – the king obviously has friends – but its public nature. This was demonstrated clearly when the king and his family visited Akhannouch on the occasions of the breaking of the fast during the holy month of Ramadan in 2013 and 2016 – an invitation that was officially made public (Le roi Mohammed VI prend le f'tour chez Akhannouch', *TelQuel*, 23 June 2016, online, accessed 20 March 2018, http://telquel.ma/2016/06/23/le-roi-mohammed-vi-prend-le-ftour-chez-akhannouch_1503381)

Abdelaziz Meziane Belfikh, was close to King Hassan II. This period led to the adoption of the Water Act in 1995.

Today's prioritising of agriculture is perfectly illustrated by the negotiations over the use of the water to be stored in the M'dez River, currently under construction. The dam was initially planned to supply a new irrigated scheme on the Saïss Plain and, to a lesser extent, to produce hydroelectricity. Following discussions between the two departments involved – Agriculture and Water – it was decided that irrigation water would be sourced directly from the M'dez Dam, so that it would supply this alone,³⁸ meaning that the Department of Agriculture's interests had prevailed over the water and energy sectors.

The Green Morocco Plan embodies the agricultural sector. It has a huge budget of over 20 billion dirhams³⁹ aimed at subsidising agricultural investment, while the Department of Agriculture's own budget has continued to rise. In 2018 it represented 5.7% of the total state budget – an increase of around 20% on the previous year, while the total budget had increased by just 5%.⁴⁰ The Department of Agriculture enjoys the fifth largest budget of all ministries, taking its place behind the departments of the economy (25%), education (22.4%), defence (13%) and the interior (9.5%) and ahead of the departments of health (5.6%), public works (4.6%) and foreign affairs (1.6%).

The enormous emphasis on agriculture helps to explain the weak institutionalisation of resource conservation in Morocco. Rather than introducing policies for preservation, discourses on groundwater overexploitation have led to measures to increase water supply. This involves the construction of new infrastructure to capture more surface water and the development of non-conventional water resources, such as wastewater re-use or desalination processes. As we explain in the next section, the actors of both the agriculture and water departments have an interest in the implementation of such policies.

THE IMPLEMENTATION OF AQUIFER CONTRACTS: INCREASED WATER SUPPLY IN RESPONSE TO GROUNDWATER OVEREXPLOITATION

Analysing the administrative and institutional contexts of groundwater management policy in Morocco was informative regarding the constraints on its implementation. We could then turn to the factors that led to the implementation of aquifer contracts. Previously we saw how financial pressure (from international organisations, for example) could not entirely explain the adoption of such policy tools. However, we highlighted the importance of mimetic and normative isomorphisms through the diffusion and appropriation of policy models and discourses, such as IRWM and professional institutional standards, and tools, such as RBAs and aquifer contracts. In this section we focus on the implementation of aquifer contracts, beginning with an analysis of the specific framing of groundwater overexploitation by water management policy actors. This is critical to the design of solutions to the issue, which, as we will see, are mainly based on technical mechanisms, such as drip irrigation, and persevering with supply-side policies. Finally, we will show that aquifer contracts result from ambiguous intersectoral agreements.

³⁸ Interview with a civil servant at the Department of Agriculture, Meknes, 2 December 2015.

³⁹ About US\$2.1 billion, cf. 20 milliards de DH pour le Plan Maroc Vert, *L'Économiste*, 3 novembre 2018, online, accessed 2 August 2018, <http://www.leconomiste.com/article/20-milliards-de-dh-pour-le-plan-maroc-vert>.

⁴⁰ Budget de l'État en 2018 : les secteurs bien dotés et ceux qui auraient mérité plus, *TelQuel*, 27 October 2017, online, accessed 13 March 2018, http://telquel.ma/2017/10/27/budget-letat-en-2018-les-secteurs-bien-dotes-ceux-auraient-merite_1565882.

An economic framing of the issue of groundwater overexploitation

Despite an unfavourable institutional framework for the protection of groundwater, the RBAs disseminate information and produce discourses about the aquifers they manage. Thus, they participate in the construction and definition of a specific public issue – that of groundwater overexploitation. Building a public issue is anything but neutral, in the sense that the actors are not defining a supposedly objective reality but, on the contrary, an issue in a specific framing (Gusfield, 1984). The process is not one-sided, irreversible or definitive but, rather, the result of 'definitional struggles' (Gilbert and Henry, 2012: 39). For this reason, it is important to analyse how the issue of groundwater overexploitation came to be framed, firstly within the state administration.

The overexploitation of groundwater tables has been considered a public issue since the 1995 Water Act reaffirmed the state's ownership of groundwater. Although both our case-study areas frame the issue as a problem of 'groundwater overexploitation', they do so differently. In the Saïss region the Sebou RBA provides a particularly alarmist vision of the situation. The agency asserts that the aquifer is losing 100 Mm³ of its stock each year, representing an annual decrease in the groundwater table of 2 metres.⁴¹ While these figures may not represent the complexity of the Saïss Aquifer as a whole (Kuper et al., 2017), they constitute the basis of the agency's communications concerning the overexploitation of the Saïss aquifer system. In the Tadla region the discourse used by the Oum Errabia RBA is less alarmist and more consensual. The overexploitation of the groundwater table is expressed more as an issue that could become important in the future. Despite the differences, the two cases are similar in that the public authorities in each are producing a narrative based on the idea that the aquifer is overexploited in the sense that the actual use is exceeding the annual naturally renewable rate, as defined by the water agencies.

In both cases it is clear that the framing of the issue of groundwater overexploitation occurs essentially within the public administrative sphere. Its central actors are the RBAs, which are constructing a discourse to justify action to address this public issue. However, the agencies are not entirely independent in this process, as they are constrained by directives from other actors and other levels of government: the Department for Water (national level) and donors and foreign cooperation agencies (international level). The Oum Errabia agency is involved in two cooperation programmes directly linked to groundwater management, which provide technical assistance as well as important financial contributions.⁴² Hence, the process of defining the issue is not solely initiated by the agency but is influenced by ministry directives, international cooperation and the granting of funds.

Throughout the process of issue framing we can observe that the actors conceive of groundwater resources in strictly economic terms. Indeed, they view groundwater as any other basic economic resource. A former Department of Water official, who had been at the head of the Sebou agency, mentioned overexploitation thus:

In the Saïss region the piezometric levels are falling. That is not normal. The groundwater table gets dry. The economic consequences could be catastrophic! We estimated them at the agency. The economic impact could be dramatic!⁴³

⁴¹ Aquifer Contract of the Fez-Meknes Groundwater Table, Sebou RBA, Workshop on Groundwater Management in Morocco, organised by the French Cooperation Agency (AFD), Skhirat, March 2014.

⁴² The German Cooperation Agency (GIZ) is involved in a cooperation programme on 'integrated water management' in Morocco with the Department for Water and three water basin agencies (Oum Errabia, Tensift and Souss-Massa). Furthermore, the World Bank donated nearly five million dirhams (about US\$500,000) to the Oum Errabia agency to implement an aquifer contract for the management of the Tadla water tables (2015-2017).

⁴³ Interview with a former official of the Department of Water and former director of a RBA, Rabat, 11 February 2016.

Indeed, groundwater management officials tend to view resources in terms of their sectoral use, whether agricultural or for hydropower, drinking water or even industrial consumption. We observe no conception of groundwater in environmental terms. This contradicts the IWRM model to which the country's public water officials so often refer.

Finding solutions: The 'impossible' control of groundwater use

Looking more closely at how the issue evolves when it comes to the practical implementation of possible solutions, one of the first points to consider is the regulation of access to groundwater resources. The importance of this lies in the variety of groundwater uses and the related categories of users. It must be remembered that more than 80% of Morocco's groundwater resources are used by the agricultural sector. The remaining 20% are used by industry and to produce drinking water and hydroelectricity. This second group are essentially institutional actors, who declare their consumption to the RBAs and pay fees in accordance with the law. The agricultural users, on the other hand, are mainly private individuals, particularly farmers, who have installed wells and tube-wells in their fields to use groundwater for agricultural production. Forming a significant majority of groundwater users, these actors are considered 'uncontrollable' by RBA managers, despite a provision in the 1995 Water Act that requires every groundwater user to request authorisation from the agency, which in turn must enforce the law with the support of water police officers. In practice the situation is quite different. Although the water police officers are mainly sworn officials of the RBAs,⁴⁴ their work is not exclusively, or even mostly, dedicated to such activities, meaning that not all groundwater users have the necessary authorisation.⁴⁵ Further, the water police is not a priority for the agencies, as explained by a manager at the Sebou agency:

Control – this is the weak point in the chain. We have some logistical problems, and a lack of resources. Within the agency the water police achieve their aims... when they have the opportunity!⁴⁶

It is clear that the RBAs' lack of financial and human resources means that regulation is not effectively carried out. It is a failing pointed out not only by the state authorities but also by the international organisations and consultants involved in project studies of aquifer contracts.⁴⁷ Such observations on regulation help the actors in groundwater management to frame the issue and potential solutions. In this feedback mechanism, the lack of resources is key. While their discourses refer to 'groundwater overexploitation', the actors do not envisage a solution that would involve a concrete reduction in groundwater consumption. Instead they see a need to increase the supply of surface water to replace the actual use of groundwater resources.⁴⁸ Yet, with no possibility of controlling access to groundwater, it is very difficult to see how such a measure could lead to a decrease in water consumption. By taking this kind of approach the agency managers are reframing the issue of 'groundwater overexploitation' as a 'lack of water resources'. Supply augmentation options are paralleled by the conversion to micro-irrigation techniques and their promise of 'water savings'.

⁴⁴ Water police officers could also be sworn officials of the Ministry of Water, or from irrigation scheme offices, to the extent that the office is directly in charge of the water police missions within the irrigation scheme it manages.

⁴⁵ In the Saïss Plain the Sebou RBA believes that only 40% of the wells are authorised. Interview with a manager at the Sebou RBA, Fez, May 2016.

⁴⁶ Interview with a senior manager at the Sebou RBA, Fez, June 2013.

⁴⁷ Workshop on groundwater governance and the Tadra aquifer contract project organised by the World Bank, Oum Errabia RBA, Beni Mellal, 25 February 2016.

⁴⁸ Interview with a senior manager at the Sebou RBA, Fez, 9 December 2015.

Drip irrigation and the appeal of water saving

With their framing of the issue of groundwater management Morocco's policy-makers clearly reject the idea of 'command-and-control' policies and proposed incentive-based solutions. Hence, in their demand management component, aquifer contract projects include the Department of Agriculture's programme of subsidies for drip irrigation, which forms a consensus between the sectors. The department, and RBAs, claim that the subsidies decrease groundwater consumption. The official discourse states that introducing such techniques in place of traditional, gravity-fed irrigation will lead to an overall reduction in agricultural water consumption.

In reality, however, the consensus is ambiguous, since the objectives of each sectoral policies are very different. On one hand the RBAs are seeking to reduce groundwater consumption, while on the other the Department of Agriculture is pushing agricultural productivity. The conflict between the agendas was highlighted by a Department of Agriculture official responsible for the distribution of subsidies, who criticised the policy:

We are subsidising the disaster. The Green Morocco Plan is having a huge impact on groundwater overexploitation. We are exploiting our water resources in exchange for a bit of foreign currency.⁴⁹

The official points to the contradiction within the consensus by establishing a direct link between the promotion of drip irrigation and the increase in groundwater consumption, which in turn decreases the availability of resources. The technical complexity of drip irrigation allows this ambiguity that leads each sector to have its own self-serving discourse.

Public officials view drip irrigation as a means to reduce groundwater consumption and save water. Yet the latter is controversial, as, theoretically, it could only save water if total evapotranspiration were reduced, which is not the case in practice (Molle and Tanouti, 2017). The conversion to drip irrigation generally allows farmers to reduce the amount of water applied to the plot (although this is often not the case for small farmers). Even if they maintain the same production, the better and more frequent application of water tends to increase evapotranspiration (and yields). In addition, farmers often adopt drip along with more water-intensive crops (typically vegetables and fruit trees) or practices (e.g. densification of tree plantations or inter-cropping). Moreover, the volume of water saved by the technique is commonly used to expand the irrigated area (Benouniche et al., 2014; Kuper et al., 2017) or reallocated to other uses (Kooij et al., 2017).

These processes serve the overall goal of the current agricultural development policy, which chiefly consists in increasing the productivity of the agricultural sector through investment.⁵⁰ Yet, their systems result in increased overall evapotranspiration, thereby worsening the status of local aquifers where groundwater is used for irrigation. The Green Morocco Plan directly contributes to an increase in groundwater consumption by subsidising the digging of boreholes to supply water for new drip-irrigated farms. Drip is also subsidised, but, initially, the money was not granted until the applicant had obtained authorisation from the RBA to abstract groundwater. The Department of Agriculture cancelled this condition in 2016, demonstrating that it did not want its projects being restricted by groundwater preservation policies to which it is wholly opposed.

The increase in groundwater consumption resulting from these policies is never officially mentioned by the Department of Agriculture since it completely contradicts official water policy⁵¹ and, more broadly, the discourse of environmental preservation adopted by public official nationally and on the international stage, where Morocco is often seen as a model to be emulated. The agricultural sector co-

⁴⁹ Interview with a civil servant at the Department of Agriculture, Meknes, 2 December 2015.

⁵⁰ Interview with a senior manager at the Tadra irrigation office, Fquih Ben Salah, 21 September 2015.

⁵¹ Interview with a manager at the Sebou RBA, Fez, 31 May 2016.

opts a discourse of environmental preservation to justify production-oriented policies, which are totally bereft of environmental objectives. Furthermore, they use this discourse to justify supply-side measures contained in aquifer contracts, which aim to increase overall water supply.

Aquifer contracts: A new panacea?

The supply-side component of aquifer contracts is illustrated by a new irrigation scheme on the Saïss Plain to be supplied by the M'dez Dam. It is presented by the Sebou RBA as a direct solution to groundwater overexploitation. Indeed, in 2013 the agency drafted an aquifer contract to manage the Saïss Aquifer with the proclaimed goal of "saving the Fez-Meknes groundwater aquifer".⁵² The agency presented the contract to the signatories,⁵³ but it is yet to be ratified. The contract's objectives, as stated in its introduction, are cloaked in a sustainability discourse. They include restoring the level of the groundwater table, integrating the different uses of water and even conserving groundwater in order to maintain socioeconomic development. Despite the claims, however, the content of the contract is clearly supply oriented and does not provide guarantees with regard to an effective reduction in the consumption of groundwater resources. Indeed, the contract's key measure is to substitute groundwater use with surface water.

With the aim of increasing supply, the aquifer contract includes various infrastructure projects. Firstly, it plans to construct the M'dez Dam, whose waters will be transferred over more than 80 km to reach the Saïss Plain and supply a new irrigated scheme of around 30,000 ha. It is important to note that the contract remains silent on the issue of access to groundwater and includes no measures related to the regulation of wells. Secondly, notwithstanding the water agency's claims to the contrary, initial studies on the project commissioned by the Ministry of Agriculture show that only half the 30,000 ha are currently irrigated. In other words, the plan is to extend the irrigated area on the plain, and there is no guarantee that the project or its long-term consequences will help to reduce the consumption of groundwater for irrigation purposes, even though the need to counter groundwater overexploitation is used to justify it. Moreover, the aquifer contracts' stated goal of conserving groundwater resources led the United Nations' 'Green Climate Fund'⁵⁴ to support the Saïss irrigation project⁵⁵ with a donation of €32 million.⁵⁶ It is clear that, with their declared aim of environmental protection, the contracts are useful for obtaining international funding for new hydraulic installations. Regarding demand-side management, the contract contains no innovations and only replicates the measures already included in the Green Morocco Plan. It reaffirms a commitment to the policy of subsidies to encourage conversion to drip irrigation, arguing that this technique leads to water savings – a highly controversial assertion, as we have seen.

A second part of the aquifer contract deals with drinking water production. Currently just over half the drinking water comes from groundwater, the rest coming from surface water. The contract aims to end the use of groundwater resources for drinking water and convert to surface water alone. It calls for the construction of a surface water treatment plant on the Saïss Plain to supply Fez and Meknes, the

⁵² Project of framework convention for the preservation of the Fez-Meknes groundwater table (in Arabic, the translation is ours), Sebou RBA, Fez, May 2013.

⁵³ In the Saïss and the Tadla projects the expected signatories of the contracts are exclusively administrative actors concerned with the use and management of groundwater resources: the Department of Water, the Ministry of Agriculture, the Ministry of the Interior, the RBA, the National Office of Drinking Water Production and the Chamber of Agriculture.

⁵⁴ The Green Climate Fund (GCF) is an international fund of the United Nations Framework Convention on Climate Change (UNFCCC), which provides financial assistance to developing countries to adapt and mitigate climate change.

⁵⁵ Eau et agriculture : Deux projets financés à Saïss et Souss, Les Écos, online, accessed 13 August 2018, www.leseco.ma/economie/58579-eau-et-agriculture-deux-projets-finances-a-saïss-et-souss.html

⁵⁶ About US\$36 million.

plain's two main cities.⁵⁷ This is criticised by some at the National Office for Drinking Water⁵⁸ who claim it would increase production costs and produce water of reduced quality.⁵⁹ Moreover, as the drinking water sector accounts for less than 20% of total groundwater consumption, they do not see it as having a significant impact, given that agricultural consumption is increasing and unregulated, as we are reminded by a senior manager at the National Office for Drinking Water:

That's absurd: 80% of the water is used for agriculture, and they come to us and say: "you have the 20%; you are going to halve it". Try tackling the 80% first! Reduce it, and then we'll see! But the agricultural sector employs a lot of people, which is vital for the country. OK, it is vital, but we could still impose some water-saving measures.⁶⁰

A degree of conflict is revealed between the domestic water and agricultural sectors. However, although the former's actors are not in favour of the solutions proposed in the aquifer contract, they are inclined to accept them for two related reasons. Firstly, it is hard for them to oppose the financing earmarked for the construction of the treatment station. Secondly, since they believe the agricultural use of groundwater cannot be regulated, they see no guarantee that this resource will continue to be available, whether in terms of quantity or quality, given the dramatic increase in contamination with fertilisers and pesticides that comes with agricultural development and leads to a significant decline in groundwater quality.⁶¹

Likewise, the other projects of aquifer contracts in Morocco comprise the same elements: the development of drip irrigation and the installation of new infrastructure to substitute groundwater use with surface water, with no guarantee of an actual decrease in the consumption of groundwater resources. This is also the case in the Tadla region, where the main projects consist of conversion to drip irrigation and the construction of a new drinking water treatment plant to substitute the current use of groundwater with surface water. The environmental protection argument continues to be used to justify the construction of these new hydraulic works, which are partly supported by international funds or organisations, as is the case for irrigation water in the Souss region.⁶² The aquifer contract projects we analysed are substantially orientated towards increasing overall water supply. The institutional approach led us to understand that any change in groundwater policy direction would come at a high political cost, as it would affect the policy producers (civil servants), its receivers (groundwater users) and the rules governing their interactions.

One could posit that the implementation of aquifer contracts is merely following international recommendations for groundwater management in order to access the relevant funding. But we have also shown how the policy is seen by national actors who are deeply split between sectors and therefore prone to conflict. The negotiation of aquifer contracts, therefore, is a forum for these actors not only to disagree but also to find compromises. Indeed, the agreement that results from the negotiation enables the agricultural sector to sustain its development policy, and secures the use of surface water for drinking water. Ultimately, aquifer contracts could be considered a 'new panacea', appeasing all the various interests.

⁵⁷ Project of framework convention for preservation of the Fez-Meknes groundwater table (in Arabic, the translation is ours), Sebou RBA, Fez, May 2013.

⁵⁸ In French: *Office National de l'Eau Potable* (ONEP).

⁵⁹ Interview with Farid, senior manager at the National Office for Drinking Water, Fez, 8 December 2015.

⁶⁰ Interview with Redouane, senior manager at the National Office for Drinking Water, Rabat, 14 March 2016.

⁶¹ Interview with Idriss, senior official at the Bouregreg-Chaouia RBA, Benslimane, 15 June 2015.

⁶² As in the Saïss region, the conservation of groundwater resources is used to justify the construction of a desalination plant in the Sebou Basin.

CONCLUSIONS

The main objective of this paper was to analyse change in groundwater policy in Morocco, and we have been able to draw both empirical and theoretical lessons.

On the empirical side, the question is whether groundwater management policy has undergone any real change. Indeed, Morocco's water policy objectives are still largely oriented towards increasing the supply of water – whether surface water or groundwater – although the implementation is couched in discourses based on the preservation of resources. This is partly due to the loose nature of IWRM, which allows various interpretations and appropriations of a policy standard. The implementation of aquifer contracts follows the recommendations of international organisations but the discourse on groundwater conservation is also used to justify the implementation of supply-side policies through the construction of hydraulic infrastructure that satisfies the agricultural sector as the best solution and the domestic water sector as the 'least-worst' solution. We could also explain the discrepancy between a discourse of groundwater conservation on the one hand and the practical implementation of water-supply policies on the other by a form of 'organisational hypocrisy' (Brunsson, 1989). However, the processes we analysed are more complex than that.

All sectors are largely oriented towards production and economic development, meaning that the protection of natural resources ends up being in nobody's interest. The supply-side measures that are taken follow from the attitudes and routines of organisations which are historically dedicated to the enhancement of water supply (Molle et al., 2009; Swyngedouw, 1999; Reisner, 1993). Nonetheless, the implementation is quite different from that of the 'dam policy' period. Current policy tools no longer focus on the collective organisation of farmers but promotes individual access to resources, just as agricultural policies focus more on individual investments than the collective organisation of production.

It must be noted that, although the policy objectives remain largely unchanged, the discourse around groundwater overexploitation allows the issue to be officially recognised. It also led to the designation of actors responsible for handling the issue: the RBAs, whose role is recognised by the other actors. However, we have shown that, since the RBAs result from a conversion of older institutions devoted to supply-side policies, any change towards demand-management policies is significantly hampered. It means that those responsible for the management of groundwater see it strictly as an economic resource, and assume that any regulation of access to groundwater, or move towards demand-management policies, would be impossible. In addition, the RBAs have limited resources, which restricts their possibilities to act – particularly while the agricultural sector dominates. Indeed, we have shown that agricultural development remains the priority, regardless of the cost to the environment. Finally, our analysis demonstrated how the weak institutional representation of environmental interests means that groundwater resources continue to be seen in economic terms rather than as valuable natural resources to be preserved.

At a more theoretical level, the various neo-institutionalist approaches have differing viewpoints. Regarding Morocco, and many other countries, the approaches based on Ostrom's work remain the most common within neo-institutionalism, while the historical and sociological neo-institutionalist approaches are more rarely adopted for the analysis of water policy. Yet, as we have seen, they can be particularly useful in studying policy process. They have allowed us to understand more fully the changes and inertia affecting the implementation of groundwater policy, which are broadly related to the institutional context. They have helped us explain the evolution of organisations, such as the RBAs, which are largely the result of institutional conversion. We have highlighted path-dependency phenomena within the production of public action, as with supply-side water policy objectives and agricultural development policies. We have also exposed the appropriation processes of international professional standards regarding policy frameworks, such as IRWM, policy tools, such as aquifer contracts, and technical tools, such as drip irrigation.

Ultimately, the (neo-)institutional approach has led us to develop a more precise sociology of the institutions involved in the policy process, while reintegrating long-term perspectives on actors' perceptions, cultures and organisational identities. It allowed us to address the issue of power in Morocco from a perspective that differed from macro-level political analyses of the regime and from those based on the study of micro-powers within society, analysing instead the concrete functioning of the state and public policy.

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