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State regulations in groundwater management: they bark but do they bite?

STATE REGULATIONS IN GROUNDWATER MANAGEMENT: THEY BARK BUT DO THEY BITE?**LA REGULATION DES EAUX SOUTERRAINES PAR L'ETAT : DES MESURES STRICTES MAIS POUR QUELS RESULTATS?**François Molle¹ ; Alvar Closas²**ABSTRACT**

Because of the logics of both colonization or de-colonization, the need to counter the anarchy of groundwater use, or the dissemination of global 'best practices' of IWRM, states have often assumed full ownership or custody of groundwater. Regulating groundwater use includes giving drilling and abstraction authorizations/licenses, establishing an inventory of wells and reducing use in existing wells. Although laws and regulations look neat and straightforward on paper, registration, regularization, and metering have been bedeviled by a host of logistical nightmares, policy contradictions, legal challenges, and vested private interests. The overall outlook is bleak and questions the overstating of state power in reordering groundwater use. Co-management with users, while in itself not sufficient to ensure success, often arises as a possible way out of the failure of state control.

RÉSUMÉ

A cause des logiques et des objectifs propres à la fois à la colonisation et à la décolonisation, ou du besoin de combattre l'anarchie de l'usage des eaux souterraines, ou de l'influence des bonnes pratiques globales associées à la gestion intégrée des ressources en eau, les états ont souvent affirmé leur rôle de propriétaire ou de gardien des eaux souterraines. La régulation de cette ressource comprend en particulier les autorisations/licenses pour le forage de puits et l'utilisation de l'eau, la mise en place d'inventaires de puits, et la réduction des volumes pompés par les puits existants. Bien que les lois et les régulations semblent, sur le papier, adaptées et rationnelles, la régularisation, l'enregistrement, et la pose de compteurs au niveau des puits se sont heurtés à un éventail de cauchemars logistiques, de contradictions en termes de politiques publiques, de contestations légales, et d'intérêts privés. Le bilan global est décourageant et pose la question de la surestimation du pouvoir de l'État à réguler le secteur. Une cogestion avec les usagers, bien qu'en soi-même pas suffisante pour assurer une gestion durable, apparaît souvent comme une alternative à l'échec d'une régulation par les seuls états.

Keywords: Groundwater management, governance, regulation, pricing, licensing, water rights, state power

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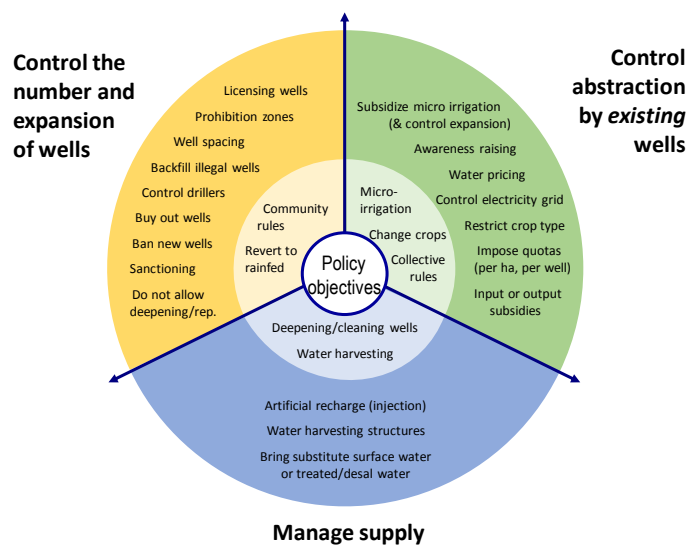
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1. Introduction

The 'control' of groundwater use, understood here as the intent to keep abstraction in line with the potential of the aquifer (we do not directly address here issues of groundwater contamination), is one of the most vexing issues in water management. Because it is hard to control the expansion and the magnitude of such a diffuse use of an invisible resource, often involving a large number of users and unclear water rights, the state has commonly ended up asserting its control over this resource. This had also been the case with colonial powers (e.g., in eastern or western Africa) which attempted to dispossess local users to the benefits of colons, or after de-colonization, when newly-independent states reasserted control over the nation's resources. More generally, conventional IWRM 'best-practices' have also promoted "enabling environments [that] include establishing government as the "owner" of all water resources and a selected ministry as a water resources management authority and regulatory agency" (Cap-Net, 2010). Even in legal contexts, such as the Anglo-Saxon Common Law (e.g. UK, eastern US, Australia), where private rights are in general attached to land ownership, the state has in general been gradually led to impose rules of 'reasonable use', 'correlative rights' (reduced proportionally in case of shortage), or the definition of quantitative 'desired future conditions' that effectively restrict use (Texas). Our focus here is on countries where the state is the "owner" of the resource or its "custodian" (it manages it in the name of the people) and assumes full responsibility for its management.

The importance of groundwater resources for domestic water supply and industries, but also in some places for agriculture, on the one hand, and the widespread negative impacts of their dramatic overexploitation on the other, have led governments to implement a panoply of measures and regulations. Policy objectives, wherever the resource is overexploited, typically include 1) preventing the drilling of *new* wells and therefore the increase in the depletion of the aquifer, 2) controlling or reducing the water abstracted by *existing* wells, 3) increasing supply through water transfers and/or recharge (artificial or water harvesting) (Figure 1). We limit ourselves here to the first two policy objectives.

Figure 1: Main groundwater policy objectives (and local adaptation – inner circle)



2. Establishing a licensing/water right system

Any kind of state-centered groundwater management obviously begins with knowing who is abstracting how much, where and for what, prompting inventories, registration campaigns, authorizing and licensing of wells. State regulations are often quite demanding and distinguish between drilling authorizations and use/exploitation licenses. Requesters must provide information on depth, intended use and volumes, maps of well location (drawn by a certified engineer), drilling technique used, etc., and must pay fees. The request has to go through several administrations/ministries, requires field visits and checks, and sometimes is published in public places to allow for possible contestation. Licensing wells means that bureaucratic processes must also be established for requests of well deepening, cleaning, or replacement (well clogged up or dried up). More crucially it also means that existing uses must be regularized, including both legal (declared) and illegal wells. In general well owners are given a certain time (typically from 3 months to 3 years) to declare their wells but the expectation that people are ready to comply is always proved wrong. Reluctance comes from various reasons, including the fear to be taxed or see one's use restricted, the fees to be paid, the imposition of a water meter, or the contestation of state ownership and intrusion. As a result, registration processes are lengthy, partial, and give way to renewed and successive deadlines fraught with false declarations, corruption, litigation... and what turns out to be a logistical nightmare. In Spain, the 1985-1988 regularization period was extended until 2001 but only 17,000 out of the nearly 40,000 wells existing in the Western Mancha aquifer, to take an example, had been registered at the Guadiana

River Basin Authority in 2008 (Martinez-Santos et al.). In South-Africa regularization period started in 1998 but only 20% of applications had been processed in 2012, with permits distributed in only two basins. In Morocco, a regularization period for wells dug before 1995 was open in 1998; in 2009, wells dug until 2009 could be registered within 3 years, a period later extended to 2015. The total of existing wells is unknown, but there are more unregistered wells than registered ones. In the south of France, in the Roussillon Aquifer, only 10-20% of the wells are officially registered (Montginoul and Rinaudeau 2009).

Registration and licensing processes are bedeviled by the cost and time needed to process files, by the lack of capacity to check reality on the ground, by the lack of budget and staff of agencies, by political pressures and the capacity of influential people to circumvent the rules and get authorizations, by the lack of knowledge of the hydrology, which invariably results in the over-allocation of rights. This applies to both surface and groundwater rights/licenses, and to countries as diverse as US, Australia, South Africa, Mexico or Spain. All this speaks to the incapacity of the state to effectively monitor and control what happens on the ground.

It is all too common to hear officials saying "in our country we have all the best laws and regulation, but the problem is implementation and enforcement". The implicit suggestion is that it is costly and strenuous to apply regulations (and that with more means, funding and capacity building this could be possible). But there are also recurrent mentions of the infamous "lack of political will", which is a shorthand for the antagonistic private interests of those in power. First it is often the case that high-ranking government officials and political leaders applying or voting regulations are the first beneficiaries of the groundwater industry. Nowhere is this clearer than in Yemen, where sheikhs and landlords command considerable power in the Parliament and the government. It has been reported (Alhamdi 2012) that on the very day some regulations were passed to ban wells in the Sanaa basin, the minister of interior was drilling an illegal well in his property... In Jordan or Morocco too, investors in the groundwater-based agriculture are often powerful figures or corporations, sometimes close to the King.

Second, controlling wells and/or abstraction potentially means affecting the livelihoods of numerous and often poor peasants, which is politically unpalatable. Politicians have therefore consistently preferred to sweep the problem under the carpet rather than addressing it before the next election. The fate of smallholder agriculture is however often raised as a convenient justification to continued lax enforcement and/or low taxation. In practice, in the long run the *status quo* benefits users who are able to drill deeper (and illegal) wells and extract water at a higher cost, and gradually displace those who cannot. It usually takes the convergence of a crisis (e.g. California these past years) and strong leadership (e.g. Jordan at present) to enhance enforcement.

Controlling wells may also include buying them back (where licenses/rights have been over-allocated) or cracking down on illegal wells. The Spanish case shows that making sure that decommissioned wells are not used is hard and would require them to be back-filled. This is what mandate many laws, which specify that this should be done at the expense of the violators, but in practice such a drastic measure is extremely rare. Jordan claims to have recently back-filled several hundred illegal wells but those wells were actually unused. A productive plantation that would have to be abandoned after the well has been destroyed by the state is yet to be seen.

3. Reducing groundwater abstraction

Reducing abstraction in existing wells is the next uphill battle. It is important to understand that little can be done on that front if the number of wells is not *first* put under control. It is indeed very hard to obtain reduction in abstraction levels by, say 0-30%, but it is illusory to imagine achieving this if one user from whom this effort is demanded has a neighbor who is drilling new illegal wells at the same time. Reducing use means that there is some benchmark against which a reduction will be envisaged. This means that enforcement has to go through quantitative estimates of water use, which can be made through metering or indirect estimates of consumption through energy consumption or area irrigated (+ crop type and irrigation technology). Groundwater metering has been promoted as a 'best practice' despite the fact that it seldom works on the ground, at least when associated with a sheer constraint. If pricing or another kind of negative incentive starts to 'bite', meters are invariably found broken, by-passed, or tampered with in increasing numbers, field staff corrupted and self-reporting distorted. In Jordan, one of the countries with a long history of groundwater policies, recent field surveys and studies through remote sensing have shown that actual water use was anywhere between 2 and 3 times the official amount, itself already much higher than what is considered as the recharge. Sanctions also become hard to apply, especially when they have been made excessively harsh to the point they have become un-credible.

Positive incentives to reducing water use include the use of subsidies distributed to those who respect fixed quotas, change cropping patterns, adopt micro-irrigation or discontinue cultivation (for one season or permanently). This may work (e.g. Spain) when subsidies more than offset corresponding financial losses but is hard to sustain because of the outlays of public or European funds needed. Micro-irrigation hardly reduces evapotranspiration (water depletion), and sometimes even increases it. Its net impact on the aquifer is often neutral, or even negative, when the efficiency gains are used to expand cultivation (this is common in arid areas where land is available).

Other indirect means may be more effective. Controlling (rationing) electricity supply, like in Gujarat, India, is attractive but this requires a dedicated grid parallel to the domestic one, which is uncommon and costly. It is also possible to promote crops that are less water-intensive through various input and output factor subsidies and taxes. But market logics integrate all production factors and what is gained on one side is often lost on others. On balance, although attention to policy

contradictions is warranted no silver bullet has been found that would drastically reduce water use, everything else being equal.

4. Discussion and conclusions

For strategic and other reasons states have often assumed total power over groundwater resources. Confronted with deviant individual behaviours that threaten the sustainability and quality of groundwater, their first, and often knee-jerk reaction, is to enact strict regulations and/or to stiffen the (theoretical) punishments defined for each type of violation. Just like wider public goods such as security, the state counts on the dissuasive power of sanctions and on its perceived authority to enforce its regulation. Regulations address the conditions under which drilling rigs can be owned and used, wells can be dug or drilled, and water can be abstracted. Although all these approaches are in general sound and straightforward on paper, they are, in practice, bedeviled by a number of practical, logistical, financial and political difficulties. There is a need to acknowledge that *the capacity* of the state to control and reorder the use of groundwater is overstated, which speaks to both its *ability* to deploy regulatory power on the ground (with often unexpected logistical nightmares) and its *willingness* to do so ('state-of-the-art policies' often remaining 'without teeth' because they go against the vested financial and political interests of people with influence or in power). This echoes Elinor Ostrom's (2000) warning that "the worst of all worlds may be one where external authorities impose rules but are only able to achieve weak monitoring and sanctioning". The severity of the sanctions to violations is often proportional to the helplessness of the state in front of the problem it wants to solve. But raising this severity to non-credible levels actually further undermines the efficacy of the regulations. It also has the unintended effect of raising the level of bribing, since the money given to evade or avoid a threat can now be increased proportionally to that threat.

Although groundwater rights/licenses seem, at face value, to be easier to establish and control than surface water (the points of use and users are potentially easier to identify), this assumption proves to be wrong. Yet, the pervasiveness of the licensing approach, narrowly associated with state ownership or custodianship of groundwater as well as with the conventional framework's of IWRM and water governance conceptions, clearly pertain to the "instrumental myth [which] assumes that the intended changes in water management can be made only by formulating and legislating official rules" (Boelens et al. 2002). Even in India, by far the world leader in terms of number of wells, and a political economy which has produced free-electricity policies for rural areas rather than strict regulations, most states officially embraced licensing policies.

But reforms and regulations do not only fail. They severely dent the trust between citizens and state agencies and expose the weakness of the state. Strong declarations and regulations are undermined by shifting deadlines and the evidence to all that nothing happens when wells are not regularized or new illegal wells are dug. As Thomas and Grindle (1990) have observed, "reforms have been attempted when the administrative or political resources to implement them did not exist. The result has generally been misallocated resources, wasted political capital, and frustration". Although well inventories and quantitative regulation of use are probably necessary, it is all too clear that they are not sufficient. A review of groundwater management in the world shows that state-only management of groundwater is unlikely to succeed. Whether out of necessity or conviction, a degree of co-management with users appears to be also necessary. This will increase the likelihood of success but it is rare that substantial changes can be achieved without a combination of crisis situation (e.g. severe drought) and political leadership.

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