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**Infrastructural Relations: water, political power
and the rise of new "despotic regimes"**

Veronica Strang

Professor Veronica Strang
Executive Director
Institute of Advanced Study
Durham University
Cosin's Hall
Palace Green
Durham DH1 3RL
veronica.strang@durham.ac.uk

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Abstract

It is 60 years since Karl Wittfogel pointed to a key relationship between political power and the ownership and control of water. Subsequent studies have suggested, commensurately, that exclusion from the ownership of essential resources represents a fundamental form of disenfranchisement – a loss of democratic involvement in societal direction. Several areas of theoretical development have illuminated these issues. Anthropologists have further elaborated theories suggesting a recursive relationship between political arrangements and cosmological belief systems. Narrow legal definitions of property have been challenged through the consideration of more diverse ways of owning and controlling resources. Analyses of material culture have shown how it extends human agency, as well as having agentive capacities itself, and explorations of infrastructures have highlighted their role in composing socio-technical and political relations. Such approaches are readily applied to water and the material culture through which it is controlled and used. Drawing on historical and ethnographic case studies, this paper therefore considers the anthropology of water infrastructure. Tracing changing relationships between water, cosmological beliefs, infrastructure and political arrangements over time, it suggests that we are witnessing the emergence of new “despotic regimes”.

KEYWORDS: water privatisation, water governance, transnational water ownership, human-non-human relations; UK, Australia

INTRODUCTION

In 1957, when Karl Wittfogel proposed, via a study of water and governance in Asia, that there was an intrinsic relationship between the control of water and political power, and that such a relationship underpinned “despotic regimes”, he had little difficulty in persuading the academy that this was a reasonable supposition. Every human society, throughout history and across diverse cultures, has valorised and often worshipped water as the most essential element and as the generative source of health and wealth. Against a historical backdrop in which cultural groups, religions, larger societies and states, have vied – often with extreme measures – for the control of water, and major irrigation schemes and centralised forms of governance seem to have emerged simultaneously, Wittfogel’s proposition rang true. How could it not be empowering to control the stuff of life itself? How could major infrastructural developments be managed without some form of centralisation?

In the decades since, many scholars have built on his analysis, usefully articulating the ways in which water intersects with social and political relations. However, while there remains general agreement with his fundamental proposition, what has emerged is a more complex picture in which it can be seen that many kinds of power – not just despotic regimes – are enabled through the control and management of water. And, other studies have shown centralised governance is by no means the only way of managing substantial water infrastructures (Lansing 1991, Glick 1996).

This paper examines the relationship between water and power through an anthropological lens, addressing in particular the role of infrastructure. It draws on

several areas of anthropological theory, most specifically work on the relationships between political structures and cosmological beliefs; emergent concepts of human-environmental relations, and theories concerned with agency and materiality. It makes use of recent work on property, which has drawn attention to the many different ways in which water can be owned. And, stepping beyond anthropology, it considers some of the long-term historical dimensions of water control; interdisciplinary theories about socio-technological systems and assemblages, and recent philosophical debates about bioethics and non-human rights.

The paper offers several propositions. It observes that there is wide historical and cultural diversity in the ways that water control and management have been socially and politically negotiated, with and without sophisticated infrastructural schemes. These range from democratic, collective systems, to those characterised by extreme hierarchy and exclusivity. It argues that much depends on the ways in which ownership and rights are distributed, and suggests that a crucial element – often neglected in analyses of water and power – are the underlying cosmological beliefs and values (religious or secular) which both define and affirm societal arrangements. With regard to this latter issue, it suggests that there may be a direct relationship between the development of large-scale water infrastructures and the euhemerisation of religious deities (Strang 2014??).

Distributions of property and rights are the clearest measure of social and political equality (Widlok and Tadesse 2005). While the ownership of essential resources and related material systems is plainly part of what constitutes political power, there are multiple ways in which both ownership and power can be distributed. Even when the latter does take the form of centralised government, as Alexander points out, the State may adopt quite different roles. It may (as Wittfogel argued) act as “other” to the people and enforce a despotic regime; it may take on a paternal role as a representative “of” the people; or – underpinned by collective ownership arrangements – it may act more directly “as” the people (Alexander 2004). There is also a question about whether centralised managerial control and responsibility leads, inevitably, to forms of empowerment that alienate those “in charge” from the rest, and this potential is nicely illustrated by Herzfeld’s work on how bureaucracies become “indifferent” to the populations they are putatively intended to serve (1991).

A process of hierarchy creation and the emergence of governing elites is certainly evident in a long-term global trend towards the enclosure and privatisation of water and indeed other resources which, as Hann observed, has brought about a critical shift in property and social relations (1998). This trend has often subsumed more egalitarian and collective arrangements, and I would argue that in so doing it has systematically disenfranchised the majority of human, as well as non-human, beings, effectively placing the control of water and power in fewer and fewer hands. There are some notable gender issues too: dispossession has tended not only to replace common water ownership with that of elites, but has also favoured male control of water and power. In recent decades, the ownership and control of much of the world’s freshwater water has passed into the hands of unregulated and largely unaccountable transnational corporations. On this basis, I suggest that we are witnessing, at a global level, the emergence of an entirely new form of “despotic regime”.

Material Properties

The link between water and power is, most fundamentally, an expression of material relations. No exercise of power is possible unless it can be expressed in material form, in this instance through the physical control of water bodies; or through the capacity to determine (from whatever distance) whose interests will benefit from the flow of water. However, material relations are not just between persons, and water is a far from passive participant in this relationship. All regimes of water control are influenced by the material properties of water and its specific physical behaviours. The fluidity of water, the

difficulty of capturing and containing it, and variability in hydrological flows inevitably challenge certainties of ownership and control (Strang and Busse 2011). Every water regime, however technically proficient, has to balance assumptions about control with the reality that water exerts forms of material agency that cannot always be directed, and which may at times override human efforts (Edgeworth 2011). Each managerial regime is therefore a negotiation between political arrangements; the material forms of infrastructure that contain and direct water; and the vagaries of wider hydrological processes.

This usefully highlights a theoretical perspective, encapsulated by Actor Network Theory (Latour 2005), that material relations, and human-environmental relations more generally, involve multiple human and non-human actors, including water. As these theories and related work on social and technical systems (STS) have made clear, all of these actors are engaged in fluid processes in which they, and their relations, interact dynamically (Harvey 2012). Just as water flows demonstrate major fluctuations and changes over time, water infrastructures undergo constant change and development, as do the various social groups engaging with these at local, regional, national and now international levels. So, in considering any regime of water governance and control, and its infrastructural expressions, there is a need to recognise that all parties – the people, the material culture, the water and the wider environment and its other inhabitants and materials – are involved in volatile and transformational processes.

However, as I have argued elsewhere (Strang 2014), neither social nor material relations are absolutely fluid. The flow of water itself is subject to physical laws and seasonal cycles which, though they may be difficult to predict precisely, demonstrate consistent patterns. Although anthropology has moved away from rigidly structural approaches, there remains an appreciation that social, spatial and political arrangements often have strong momentum and continuity over time. These continuities are of course supported by their expression in material form: all such arrangements are upheld through the composition of a material environment which serves as a recursive source of affirmation of specific beliefs, values and practices.

Here the work of material culture specialists is useful in underlining how artefacts concretise ideas and agency. Gell's depiction of material culture as a "prosthetic" extension of human agency (1998) is readily applied to water infrastructure to illuminate the relationship between how it forms and is formed by prevailing ideas about social, political and environmental relations (as well as by the properties of water itself). As I have noted elsewhere, the control of water is integral to people's capacities to exert agency in the world, and to compose particular identities. The conflicts between, for example, farmers, conservation groups, recreational water users and indigenous communities, are in essence a product of different ways of striving to enact specific group (or individual) identities and values (Strang 2009).

More broadly, at a societal level, there is a continuum of possibilities in the exertion of human agency, ranging from the low-key managerial methods of hunter-gatherer societies, which leave a considerable directive role with non-human species and things; through subtle but more distinctive forms of environmental control; to more extreme impositions of technologies with major capacities to override non-human ecosystem processes (Strang 2005). As this implies, increasingly sophisticated developments in water infrastructure have "prosthetically" enabled new distributions of power and agency, new human-environmental relations, and new kinds of propertisation. A series of (necessarily) very brief vignettes suggests a discernible pattern of development.

Historical and Cultural Diversities

a) Common Properties

In considering the political effects of water infrastructure, it may be useful to ask how water and power were distributed before such large-scale material culture was developed. For most of human history, societies' engagements with water involved only subtle, low-key methods of manipulating water flows, and the control of water has been acquired more straightforwardly through territorial ownership of water sources. However, archaeological and ethnographic evidence relating to hunter-gather societies shows that, even without material infrastructures, the ownership of key water sites was (and often continues to be) a vital underpinning to social, spatial, economic, religious and political organisation. In Australian Aboriginal societies, for example, such research shows a strong coincidence between water sources and sacred sites. According to Ancestral Law, inalienable land and water ownership, and thus social and economic power, are conferred by membership of the clans in whose estates such sites are located. As well as emplacing people spatially and socially, such membership also assures access to and the use of water and other resources.

This demonstrates that relationships between the control of water and political power considerably precede infrastructural developments. It also draws useful attention to the way that rights to water and power were distributed in such contexts. As is typical with hunter-gatherer societies, indigenous Australians maintained highly egalitarian communities: land and water were held collectively by clans – and by women and men alike – in classic common property regimes (Ostrom 1990, Goddens and Tehan 2010). Governance was gerontocratic in form, and communities were led by both female and male elders (albeit with distinct areas of religious and ritual responsibility). Water management was materially minimal but – based on intensive levels of local ecological knowledge – it was also highly precise. People built temporary fish traps and weirs to maximise the benefit of water flows; they made use of a wide range of aquatic resources; and in some parts of the country they built small channels to provide supplementary irrigation to particularly useful species of aquatic flora and fauna.

Considerable attention was given to ritual management, which involved regular engagement with sacred water places and the powerful ancestral beings believed to inhabit these. Human groups had a reciprocal responsibility to "care for country", as Aboriginal elders put it, ensuring that it was kept "clean" and that all resources were protected and used sustainably (Strang 1997). In a Durkheimian sense,¹ the flat organisational structure that pertained politically was reflected in a classic "nature religion" which envisioned multiple ancestral deities inhabiting a sentient landscape and most particularly its water places. These highly localised totemic beings represented non-human kinds and (in the form of rainbow serpents and suchlike) water and all of its potentialities (Merlan 1998, Strang 2002). Their agentive powers were seen to produce seasonal and cyclical movements of water; plant and animal resources; and human spirit beings – in other words to generate life itself. Thus the control of water was not seen as being confined to humankind: in effect, this system extended both control and rights over water beyond humankind, creating a quintessentially egalitarian distribution of rights and interests. This was reflected in the subtle forms of material culture which, rather than overriding ecosystem processes or the activities of non-human species, simply aimed to enhance these.

Such lifeways continue to provide a useful contrast to the changes that have occurred in water and power regimes elsewhere, which – as the following historical overview elucidates – involved a discernible pattern of articulation between infrastructural developments, intensification of water use, and related changes in cosmological and socio-political arrangements.

b) Early impoundments

¹ Durkheim classically theorised that societies made their religions in their own image (1961).

With the advent of agriculture in the Neolithic period, new forms of water control began to appear which led many societies, step by step (though by no means in a unilinear form), towards greater impositions of human agency in relation to the material environment. Archaeological records suggest that in about 8000 BCE, there was low-key irrigation of taro and rice in SE Asia, based simply on the building of low bunds to retain floodwaters (Boomgaard 2007). Similar methods characterized flood irrigation in Mesopotamia (Biswas 1970). Populations, now settled in small agricultural communities, coordinated their economic activities with seasonal hydrological cycles. Fairly flat political structures pertained, as did the worship of powerful nature beings, but the emphasis shifted away from highly localized deities towards larger-scale rain-making gods (such as Osiris), whose role was to deliver the crucial annual floodwaters; and towards sun deities and the other celestial beings presiding over a calendar of seasonal agricultural activities.

c) Gaining power

Agricultural development tended to weaken previously strict limitations on growth in population and resource use. And the technical power to control water – as a form of control over life itself – has undeniable allure (Krause and Strang 2013, Strang 2013). Early success in retaining floodwaters encouraged more sophisticated infrastructural developments: intricate systems of wells (such as qanats and their intricate irrigation tunnels); tanks (for example, the major tanks storages that enabled irrigation in India); water-lifting technologies, and – perhaps more critically – major irrigation canals. The form of this material culture was therefore more directive, imposing greater degrees of human agency and subsuming that of the non-human.

Although these technological developments supported more intensive food production and population growth, they also demanded regular and considerable investments of labour. As Wittfogel suggested, this required coordination and the centralised forms of management that are often cited as a key component in the emergence of more centralised and hierarchical forms of governance (Hocart 1970). For instance, although Wittfogel focused on Asia, the rich archaeological and historical records of early irrigation societies in areas such as Mesopotamia also suggest a key relationship between the rise of Pharaoh-led political hierarchies and the development of new irrigation technologies (Butzer 1976).

[Fig?? The Scorpion King illustration]

Moves away from flat political structures and partnership with non-human agencies were reflected in religious shifts away from classic “nature religions” towards gods that, while retaining some animal and multiple gendered (including androgynous) forms, did not reflect such egalitarian human-non-human relations. The elevation of Pharaohs to the status of gods, responsible both for the coming of the rain and for the management of irrigation, is clearly indicative of new expectations about human agency in relation to water and the non-human world (Biswas 1970). A similar coincidence of religious development is evident in the Americas, where, in Aztec, Toltec, Inca and Mayan societies, God-Kings responsible for rainfall emerged alongside the development of irrigation technologies and agricultural intensification (Ferguson 2000).

d) The Euhemerisation of Power

From about 600 BCE, the building of Greek and Roman aqueducts in the Mediterranean region provided water supplies to new urban areas, supplying water as well as political power and status to emergent upper classes. This shift in lifeways coincided with the establishment of imperial rule. Providing for the enclosure of land and the introduction of more individuated forms of property rights, Roman Law brought with it rights to abstract water based on riparian land ownership although, spurred by respect for deities seen as responsible for parts of nature, it retained clear views that the flows of water should not be compromised in the process (*aqua profluens*) (Bruun 2010).

I would suggest it is not coincidental that, at the same time, the non-human beings inhabiting Greco-Roman religious pantheons euhemerised and took up residence in more distant Olympian heights. Greek forays into science, which drew on ideas already burgeoning in the Levant, hinted at an increasingly "disenchanted" and in consequence disempowered non-human world (Tuan 1998, Linton 2010). A similar point can be made about subsequent shifts towards monotheistic religions, in which male and now thoroughly humanized Gods inhabited far away Heavens. According to Durkheimian logic, this reflected the creation of intensely centralised, hierarchical and patriarchal political structures and, both separating and demoting non-human beings into a subservient position, provided God-given "dominion" over Nature (Plumwood 1993, 2002).

Such dominion went hand in hand with the development of more directive forms of environmental management. The Christianization of Europe was accompanied by a rapid takeover of previously "pagan" holy wells and their generative powers, and the spiritual authority of their resident (usually female) deities was appropriated by primarily male Christian saints (Strang 2004). While the wells were at first regarded as still having some miraculous powers (though with the Saints now receiving the credit), such beliefs, and their intimations of a sentient and agentive land and waterscape were rapidly repressed, becoming at first outright heresy and then – as such ideas faded to the point where they ceased to challenge religious authority – being described as mere "superstition". Beliefs about water's healing and generative powers were, over time, translated into more "rational" ideas about its mineral content and potential medical qualities (Anderson and Tabb 2002).

The exercise of political and social power through the control of water was further illustrated by medieval Abbeys, the building of which led to much canalization to enable major movements of stone and timber. The Abbeys' political authority and their resident monks' expertise in impounding and managing water allowed them to take up a position of disbursing vital water supplies to local communities. Such a beneficent provision of the stuff of life (neatly echoing Biblical themes about God's provision of water for productive purposes), helped to uphold the authority of the Church, at that stage still closely entwined with the power of the emerging State. The scientific thinking that began to gain ground during the late medieval period further disenchanted water, reframing it (and other materials) as passive "matter" subject to human action, thus affirming the conceptual bifurcation between Nature and Culture that monotheism had established (Plumwood 1993, 2002).

Nevertheless, moral views about the shared human ownership of water and access to its flows persisted. The Domesday Book, describing socio-spatial and economic arrangements in 11th century Britain, includes myriad details about the water mills dotted with great frequency along English rivers. As well as impounding water at regular stages, these required considerable social cooperation up and downstream to manage the river's flows so that all millers, villages and parishes could benefit. Systems of water meadows, reliant upon channels, sluice gates and weirs to flood waterside meadows (in order to achieve a longer grass-growing season), similarly required major coordination. These arrangements relied primarily on negotiation between water users, and on the expertise of local "watermen".² Water management was overseen, ultimately, by local authorities, whose major role was to resolve any disputes. Similar systems flourished in Europe, some of which have survived until today – for example, the well-known traditional irrigation schemes of Valencia, in which locally elected community judges continue to disburse water allocations and resolve disputes over water flows (Glick

² A nice comparative example is provided by Lansing's classic work on Balinese water temples (1991), in which priests, imbued with the authority of local water goddesses and well versed in hydrological and technical knowledge, have for centuries mediated the flow of water through villages and rice terraces. In so doing, they have maintained both political and religious authority, even as, in more recent decades, water and environmental management has increasingly been seen as the purview of the state government.

1996). It is reasonable to infer from these and the earlier examples, then, that major infrastructures are not intrinsically reliant upon centralised forms of governance.

However, while these changes were unfolding in Medieval Europe, the major canal building programme in Imperial China achieved its apogee, with the completion of an 1800 km Great Canal built from south of China (Hangzhou) to Beijing in the north. This programme had begun much earlier, between 2207-1766 BCE, with channels in the Huai, Yellow and Yangtze rivers and the related establishment of the Han Dynasty (Pietz 2006). Such ambitious infrastructural development also brought forward a new cosmological figure, Yü the Great, descriptions of whom suggest a process of euhemerisation. In a cosmos (still) dominated by water serpent beings responsible for rain and springs, and for the movements of water between earth and sky, visual and textual representations of this legendary canal-maker and water controller segued over time from describing a somewhat vague mythological figure into accounts in which he appears more as a human ancestor or historical being (Pietz 2006). Each phase of canal and dam building in China enabled powerfully hierarchical dynastic governance, including the first Ministry of Water Conservancy, established by the Qin dynasty between 300 and 200 BCE, at which time the term *shuili* ("taking advantage of water") began to appear in texts (Padovani 2006).

e) Early Modern Infrastructures

Chinese canal programmes continued to form a central part of this region's social, economic and religious activities until about 1850, when the siltation and decay of the canal systems reached a point where the Qing government could no longer address the country's irrigation problems (Halsema and Vincent 2006). The dynasty collapsed in 1911, providing a stark illustration of how the loss of control over water can reverse political fortunes – even, as Wittfogel described them, "despotic regimes" (1957).

The collapse of Chinese water infrastructure and its co-dependent system of governance echoed earlier societal implosions. Siltation, decay and the disruption of maintenance in politically unstable periods had led to the demise of the Mesopotamian irrigation societies, major dynasties in the Indus region, and other such schemes across Asia. Nevertheless, in each case there was a clear demonstration of the capacity of major water infrastructure to uphold political power and large-scale forms of governance, and to encourage related euhemerisation in religious belief systems.

In the early modern period, industrialisation placed other societies, such as those in Europe, on a developmental track. With new scientific and engineering capacities, water infrastructure burgeoned rapidly. The building of canals, intense reliance on water power, and the development of major water storage and supply systems enabled rapid urban expansion and industrial growth. There followed, first in European countries and their colonies and then in other parts of the world, a massive programme of dam building for the purposes of irrigation and the generation of physical power. This served to affirm and expand Statehood. It brought into being more diverse forms of water ownership and management: by nations, states, municipalities and landowners, and it was accompanied by societal fragmentation and multiple levels and forms of inequality.

In cosmological terms, while patriarchal monotheism continued to provide a backdrop to matching socio-political structures, intellectual authority shifted away from the Church and into Science, providing a new and quite different basis for all kinds of governance, including that of water. A view of the material world as both object and subject of human pre-eminence was reflected in infrastructural systems – canals and diversions, pumps and reservoirs – that, by this time, were able to impose human agency to the extent that normal ecological processes could be almost completely overridden.

This series of historical vignettes suggests a persistent recursive relationship between water infrastructure and political power, and a distinct pattern of social and religious change, in which rights and interests previously shared fairly equally between humans,

and between human and non-human beings, were considerably rearranged and redistributed. This redistribution of power and agency introduced critical inequalities within human societies, and between humans and non-human species. With human agency and interests firmly established as superior, it was perhaps an inevitable step towards the logic of current neo-liberal ideas, in which water and other “resources”, as well as non-human species, are seen to exist primarily to provide “ecosystem services” to humankind, or more specifically, to some human groups. These ideas have been further entrenched by a combination of ever more directive forms of water infrastructure and new forms of water ownership and governance.

Fluid Forms of Governance

a) Public and Private Water in the UK

An account of 19th-20th century conflicts over water in the UK highlights the perennial tensions that many nation states have experienced in trying to reconcile different views of who should own and control water, while also trying to manage major differences in social, political and material scales. How should water infrastructure be funded and owned?

Should infrastructure and supply management be the responsibility of local landowners, parishes, municipalities, counties, regions or the State itself? How should conflicting demands for water be prioritized and according to what criteria?

Until the early 19th century in the UK, agricultural landowners maintained their riparian rights over water, though by this stage most of the land was held by a very small segment of society. Industries had gained access to water by clustering along rivers and abstracting water from them directly. But the mechanisation of agriculture and burgeoning new forms of production brought most of the population and increasing industrial activities into the cities. Pressing needs for piped water supplies to urban domestic households and to new industrial activities led to literal ownership rivalry.³

On one side of the river were the Victorian industrialists who invested in private water supply companies and sometimes reservoirs, partly to support their productive activities and partly to fulfil a role (like the earlier Christian Abbeys) as beneficent philanthropists, taking paternal responsibility for (and of) a vital common good. In a staunchly Christian country, water was still seen not only as an economic good, but also as the substance of the spirit and the essence of life. On the other side of the river were the municipalities: local government bodies (to some extent also populated by land-owning elites and wealthy industrialists) who – with the same vision of water – saw its supply as a public political and social responsibility. In both cases, although the water itself was still formally regarded as a commons, the financial and managerial control of water sources and the infrastructure of water supply conferred *de facto* ownership, and the question as to whether this should be public or private therefore carried considerable political weight. In the first decades of the 20th century there was considerable argumentation over this question, with ownership of water supply infrastructure passing back and forth between private companies and municipalities.

Debates over the “common good” provided by water were inevitably entangled with those concerned with democratic rights. The first World War had created major pressures for broader democratic enfranchisement. Prior to the conflict only 58% of the male population was eligible to vote (based on property and residence restrictions). The *Representation of the People Act* in 1918, while still excluding women under the age of 30, provided suffrage for about 40% of women and for all British men over 21 (British Government 1918). Following continued activism demanding equal suffrage, all women over 21 gained the right to vote with the *Representation of the People (Equal Franchise) Act 1928* (British Government 1928).

³ The etymological root of “rival” is of course “river”.

The Second World War further strengthened notions of nationhood, supporting both a common national identity and State levels of governance. It increased the pressure for democratic inclusion and, with a post-war Labor Government, provided sufficient impetus for the nationalisation of water supply companies as well as other essential utilities. This was further encouraged by a desire to see the State drive economic growth by supporting infrastructural developments. During the post-war period, therefore, water supply became (primarily) the responsibility of regional water authorities supported by the State government. Those responsible for water infrastructure were public servants, and enjoyed a largely positive relationship with the populace to whom they provided water supplies.

This democratisation also meant, however, that the centralised government became responsible for charges for water supplies. Unsurprisingly, there was reluctance to attract political recrimination by raising the costs of an essential "common good". Although the water flows and quality were now seen as being within the purview of science and engineering, a new biophysical idiom merely affirmed rather than undermined water's status as the basis of economic, spiritual and physical health and well-being. Proposals to raise water charges were therefore met with deep resistance, as were any limitations on levels of use. Perhaps echoing some of the problems of previous governments assuming responsibility for major water infrastructures, it proved difficult for the State to gain support for investing in the necessary infrastructural maintenance and development. This difficulty enabled the Thatcher Government, in 1989, to argue that only privatising the water industry would permit the raising of capital for sufficient investment in new infrastructure and provide a more "efficient" system of water delivery (Bakker 2003, 2005).

Despite furious public protests, water privatisation was pushed through, and other key utilities were similarly sold off, with shares in theory democratically available to all, but in practice captured largely by corporate interests. In the quarter century since, water charges have risen dramatically, though largely without the promised investment in infrastructure. The installation of household meters measuring supply and usage has reframed water in more commoditising terms (Kopytoff 1986). Water users are now called "consumers" or more recently "customers", suggesting that water is now wholly the cultural product of the water companies. And, until the practice was outlawed by a Labour Government elected in 1997, water companies were permitted to cut off supplies if households or businesses failed to pay their bills.

Since Thatcher's privatisation, most of the former regional water companies have been bought out by transnational corporations. While water governance is now enmeshed in a complex network of public and private players, the ownership and control of key resources and infrastructure is once again the privilege of a small elite. This differs in a crucial respect from that composed of industrialists and landed gentry in the pre-War period: for the first time, the most power and agency lie not with people occupying the top layer of a specific society within a shared material environment, but with a transnational network composed of international corporations whose shares are often held by non-resident companies and individuals. National governments and the other parties involved in water governance have limited capacities to regulate the behaviour of these corporations with regard to the management of the most essential of resources, and even less to require their acceptance of broader social or environmental responsibilities.

In consequence, although new technologies have made some real improvements to drinking water quality and urban water delivery, there has been little investment in major infrastructural improvements such as limiting leaks, or moving away from fiscally cheap but ecologically expensive upriver abstraction. River water quality has improved considerably, largely because of the demise of many polluting industries, but maintaining

ecologically healthy flows remains problematic. Water companies have proved reluctant to make investments in major water storages now that these are seen as risky and – if only maintaining reliable supplies to human communities – only rarely needed. Though they have necessarily responded to EU environmental directives with new treatment plants⁴ and pipe renovations to reduce leaks, they have focused heavily on “end of pipe” solutions rather than major changes in abstraction and supply practices. In the early 2000s, some efforts were made to address environmental issues with the 2003 Water Act, which returned some responsibility to the Government to ensure sustainable water use (HM Government, 2003).⁵ Independent bodies were established: Waterwise to encourage more ecologically responsible industry practices in the water industry, and a Water Saving Group to persuade water users to reduce household consumption (DEFRA, 2005). The Environment Agency was given greater powers to demand more sustainable industry practices. However, with a view to driving market reform (see Castree 2010) many of these mechanisms were dismantled or sidelined by the coalition Government, and will surely not be re-introduced following the recent election.

While some gains have been made through the development of water efficient appliances, domestic patterns of water use have remained relatively inelastic. Concerned about revenue loss, water companies continue to push against demand management, bulk water trading and reform of abstraction licences. While major changes in infrastructure and practice has stalled, there are some increasingly sophisticated technologies, not only in treating and transporting water, but in measuring and monitoring volumes and flows. Today, water supply companies in Britain can make precise estimates about water flows and availability. They can read individual household and business water meters from centralised computers and, though not permitted to halt provision entirely, can punish non-payment of water bills by reducing supplies to an agonising trickle. The technology also allows them to trace leaks, vandalism, and a common form of protest when water shortages require the installation of local standpipes, in which people deliberately open public taps and leave them running.

Such individual expressions of resentment, though plainly futile, make a notable contrast with earlier responses to water shortages in the UK, such as the “Save It” campaign of the 1970s when, under public ownership, water companies were able to encourage over 90 per cent of households and businesses to reduce their levels of water use by at least 30 and sometimes 40 per cent. But by 1995, “the climate had changed. The public blamed the water companies and the companies blamed the public” (Ward 1997: 95). Another drought, in 2012, produced similarly vituperative exchanges. Neither the water companies nor their deeply resentful “customers” appear willing to collaborate in a collective effort to manage water sustainably. Walker describes this as a failure of “meta-governance” caused by the nature of capitalist exchange and its resulting production of nature:

The internalisation of social and environmental externalities into capitalist modes of exchange is presented as a reflexive process, achieved via institutional and technological innovation. Multilateral agreements now promote the designation of an economic value to water... and endorse its economically efficient allocation and consumption in light of competing economic uses (European Parliament, 2000). Water’s economic status is increasingly recast from a public to a private good, its scarcity articulated as naturalised and absolute, and its management prescribed in terms of economic efficiency. (Walker 2014: 390)

This suggests that the abdication of water governance to the market cannot produce the kinds of water use practices or the infrastructure that will protect human and non-human interests in the longer term.

⁴ These deal primarily with effluent, nitrates and pesticides.

⁵ This was further supported by new building codes and campaigns aimed at inducing behavioural changes in water consumption.

b) The Abstraction of Water in Australia

Though shaped by a very different context, a broadly similar direction of travel is evident in Australia. In the two centuries since Europeans colonised the continent, water infrastructure and governance has moved a long way away from the low-key forms of management and egalitarian ownership and control of water that Aboriginal people maintained prior to their arrival. The first actions of the European settlers entailed the seizure of key (that is reliable) water sources, and the displacement or domination of local indigenous communities. Refusing to acknowledge (or indeed recognise) indigenous ownership of land or resources, graziers, farmers and miners established their own forms of territorial land ownership which, at that time, included riparian rights to abstract water freely, either from rivers or by boring into artesian groundwaters.

Colonial records reveal a worldview in which it was plain that the settlers had also imported an immutably dualistic view of nature and culture. Although water held its meaning as a generative source of life, this was channeled into a view of reproductive capacity as being primarily concerned with material and economic growth. Seeing this unfamiliar and physically challenging environment as "hostile" and "untamed" nature, and determined to establish a new nation, the settlers embarked upon an aggressive programme to exert dominion. Land clearance was rewarded with land ownership. Fences imposed territorial authority, and station housing provided a bulwark against the wilderness (see Schaffer 1998). Although affective attachments to place developed, both land and resources were regarded as alienable commodities, and the sentient landscape of Aboriginal Australians was overlaid with a cultural landscape focused intently on material opportunities and obstacles. Its waters were there to be directed into the settlers' economic activities, and its non-human inhabitants were seen as dangerous or destructive; as game; or as expendable competition for grazing.

The introduction of an economic mode formed within temperate climes had significant ecological effects. The introduction of hard-hooved cattle onto delicate soil systems had major impacts on freshwater and marine ecosystems. Mining was (and continues to be)⁶ detrimental to water quality. Farming intensified rapidly, most especially in areas such as the Murray Darling Basin and around other major rivers, and farmers and miners alike struggled to gain control of water. Thousands of bores were drilled into the Artesian Basin, but the wide fluctuations in the water flows of an arid environment remained challenging.

In the late 1800s and early 1900s, hoping to achieve both water security and fulfil a zealous (and indeed semi-religious) desire to "green the desert", Australia embarked on the construction of massive irrigation schemes, for example in the Snowy River area, and in northern Queensland (see Hill 1965). Under a Federal system, water was constitutionally owned by subsidiary States, and there was much competition between them to build the biggest irrigation schemes. These were intended, primarily, to serve the interests of a landed "squattocracy" whose members largely composed both State and Federal governments. The States disbursed water allocations to farmers based on their ownership of the land, and for much of the 20th century allowed unlimited abstraction. They also carried responsibility for water supply to urban areas with this being devolved, in various ways, to local authorities.

This *status quo* pertained until the 1980s, by which time the over-use of limited water resources (mostly by farmers but increasingly by other industries as well), was creating significant problems. Farming production had intensified to such an extent that rivers could no longer support unlimited abstraction, and there were other major issues as

⁶ Many old mines continue to leach poisonous chemicals into the environment, and although major mining companies now claim to have prevented such problems, on-going alluvial mining and widespread quarrying also continue to pollute waterways.

irrigation began to salinate and thus render useless vast tracts of land.⁷ There were growing conflicts between upstream and downstream water users. Population growth and urban expansion had created a competing set of demands for water, and urban voters not only wanted reliable household supplies, they also generated new democratic demands for recreational access to water, and supported conservation groups in raising concerns about environmental well-being. For the first time – in the face of fierce protests – farmers were required to submit water management plans. The States began to impose volumetric limits on allocations for abstraction and made moves to install meters on bores and abstraction pumps.

There was also a growing call to recognise indigenous rights. The civil rights movement in the 1960s had sparked a constitutional referendum in 1967 enfranchising Aboriginal Australians and Torres Strait Islanders. The ensuing Land Rights movement of the 1970s initiated efforts to bring Aboriginal Law and that of the Australian settlers together (see Attwood and Markus 1999, Reynolds 1987). The debates culminated in *The Native Title Act (1993)* which, after 200 years of denial, acknowledged that indigenous Australians had a prior form of land and resource ownership (Toussaint 2004). Seeing this Act into law brought down Paul Keating's relatively liberal regime, however, and the subsequent right-wing government, led by John Howard, shored up non-Aboriginal water ownership and control. Still, indigenous claims continue to move slowly through the legal system and some have been semi-successful, including a significant water rights claim in Arnhem Land (see Morphy and Morphy 2006).⁸ With the leverage of the Native Title Act behind them, Aboriginal groups have also managed to regain some limited rights of (traditional) use via Indigenous Land Use Agreements.

Indigenous communities' efforts to regain water rights have been driven in part by a concern to reestablish their own environmental values and forms of management. Indigenous communities in Australia, as elsewhere, have made substantial critiques of settler societies' water and land use practices and their ecological costs, which often conflict not only with Aboriginal cultural values about "caring for country", but with very specific beliefs about the proper maintenance of flows in material and spiritual worlds. In Australia, one of the most common concerns expressed by Aboriginal people in relation to infrastructural developments, and dams in particular, is that they disrupt proper water flows (Krause and Strang 2013). This is not merely a matter altering seasonal flow patterns and depriving aquatic ecosystems of sufficient water to support their non-human species: it is also seen to have a deeper impact on ancestral land and waterscapes.

Despite some minor advances in regaining rights in relation to marine areas, the restoration of any indigenous control over freshwater has proved to be extremely elusive (Altman 2004). This is not readily apparent, as the Howard government, and various State governments have established "democratic" forms of water management via regional and local catchment management groups which include indigenous people, as well as representatives from conservation organisations. However, these have been effectively captured by farming and industry interests who, on the basis of their economic centrality, have resisted calls from subaltern voices to make any major changes to "business as usual" (see Lawrence 2005). This highlights a critical (and common) separation in water governance. Attempts to achieve environmental sustainability have been devolved to these "democratic" – in fact unelected – regional groups in what could be described as an abdication of governmental responsibility, while the ownership and governance of water has remained firmly with State and Federal agencies and, increasingly, with private corporations.

⁷ Salination occurs when the irrigation of shallow rooted crops raises salts to the surface, leaving the soils unable to support any – even native – vegetation. About 2 million hectares of land in Australia were categorised as saline in 2002 and it is thought that this may increase to 17 million hectares by 2050 (Australian Bureau of Statistics 2015).

⁸ This was a significant case in that it was the first addressing water rights - albeit marine rights – directly.

The political realities are evident in the ownership and management of water treatment and supply infrastructure, for which Australian States have retained responsibility. The operational aspects of water supply are controlled by Government Owned Corporations (GOCs), which have been restructured to look and act like private companies – some suggest in preparation for full privatisation (Strang 2009). They have continued to invest public money in major water retention schemes, which are also meant to provide some capacity for flood mitigation.⁹

More recently major investments have been made in recycling and desalination schemes which, though presented in terms of water security and ecological responsibility, are in part a response to a highly effective farming lobby. For example, at a cost of over 2.5 billion dollars, Queensland recently built a “Western Corridor Recycling Scheme”. This supplies much of the water needed for energy generation around Brisbane, thus reducing the use of water from the Wivenhoe Dam upriver, which provides irrigation supplies to the farmers in the catchment area (Water Technology.Net 2015). Such major infrastructural developments now tend to rely on transnational corporations. Thus the Queensland scheme’s infrastructural development was carried out by Veolia, which continues to have responsibility for the operation of the plants and pipelines. Veolia (originally Vivendi) has operations in over 60 countries and recently posted €23.8 billion in revenues for 2014 (Veolia 2015).

State governments in Australia have continued to disburse water allocations to farmers, and in particular to powerful irrigation companies wealthy enough to fund representatives to lobby National and State government representatives on their behalf. With some regulatory limitations on dam height, farmers are permitted to build their own impoundment and storage infrastructures. This has given major irrigation companies considerable infrastructural power. For example, in the early 2000s, the notorious Cubbie Station on the Queensland-New South Wales border was permitted to buy up over 50 water allocation licenses and to build a vast diversion channel from the Culgoa River. 28 miles of giant dams now divert into the company’s vast cotton and wheat growing enterprise about a quarter of the water that would otherwise flow into the already radically compromised Murray-Darling Basin. In 2012, like many major irrigation companies around the world, Cubbie Station was purchased by a transnational consortium (Strang 2013, Wagner 2013).

In protecting their interests, farmers and other industries have consistently underlined their central role as “primary producers” in the national economy, as well as elaborating a long-running discourse about the “common good” achieved by their productive capacities. They have also claimed simultaneously to be protecting ecological well-being as the “Guardians of the Land”, but the ongoing intensification of their economic activities and Australia’s lack of progress in rehabilitating struggling ecosystems suggests that this guardianship is primarily directed towards human interests.

The most recent development in Australian water and power relations has been the introduction of water trading, described by Caldecott as “privatisation by stealth” (2008: 10). This allows farmers to sell off allocations of water formerly distributed by the State from a common pool. As well as reframing and commoditising water as an “asset”, this has detached water from land, so that in theory (and increasingly in practice) a hard-up farmer can sell water away from his or her land, leaving a “dry block”. It relies upon a virtual rather than physical market, thus wholly detaching economic activity from its social and material environment, with predictable ecological impacts (Ladson and Finlayson 2004, Young and McColl 2004).¹⁰ Predictably, many such allocations, like the major irrigation companies, have been bought up by transnational corporations who have

⁹ As demonstrated by regular major flood events in south-east Queensland, flood mitigation infrastructure has dubious value in a landscape prone to flash flooding.

¹⁰ Similar virtual markets have been created in fish quotas, with not dissimilar effects (Minnegal and Dwyer 2010).

no local social base, or cause to be concerned for local ecological well-being. The agency of local human and non-human communities has thus been lost in abstraction.

Conflicting Flows of Water and Power

These case studies highlight a pattern of transnational water acquisition and absentee ownership that is being repeated around the world. Across the Tasman Sea, privatised water trading has also been introduced in New Zealand, and in 2012 Maori lost a lengthy legal battle to achieve recognition of their rights in water, and to prevent the government from selling off shares (and thus water allocations) in major hydro-power companies (Strang 2014). Despite equally impassioned protests in many parts of Asia and South America, dam building and the displacement of local riparian communities continue, in general replacing traditional forms of water control with corporate ownership and management (Shiva 2002). Following a period of disillusionment with dam-building, plans for further such infrastructural developments are currently being revived in Europe, and the ownership of these, like that of water companies, seems unlikely to remain in public hands.

Successful opposition to the enclosure and privatisation of water resources is rare, and requires extreme measures. In the early 2000s only violent resistance in Bolivia fended off the purchase of the water supply industry by the American corporation, Bechtel, who demanded such a monopoly over water that they proposed preventing even the poorest people from collecting rainwater from their shanty roofs (see Albro 2005). But rallying coherent resistance requires not only a considerable level of desperation and social cohesion but also a clear focus. This is easier to discern when the threat is a total takeover by a single company, than when multiple water “trades” are purchased by multiple buyers in a complex and invisible water market.

Nevertheless, there are some increasingly vocal counter-movements. Water’s essentiality, and the extreme issues around access, ownership, management and use, have given rise to a multiplicity of organisations, at local, national and international levels, who see water rights as a core social justice issue.¹¹ More generally, longstanding ideas about water as a “common good” have proved persistent, as illustrated by the rejection, in the UK, of water companies’ freedom to cut off water supplies to households failing to pay their bills. These ideas surface regularly in conflicts over water ownership and remain conceptually linked with broader debates about collectivity and political enfranchisement. They are also implicit in the United Nation’s 2010 declaration, that all humans have the right to “clean and safe drinking water and basic sanitation” (UN General Assembly 2010). However, despite some improvements, 663 million humans still lack access to reliably clean drinking water, and over 30% of the world’s population is without basic sanitation facilities (UNICEF 2015).¹²

Proposed solutions to this problem have tended to ignore its complex and intractable causes, which include the pressures of intense development and resource exploitation on populations and ecosystems; consequent strife and the displacement of local communities; environmental change and of course the overuse of water. The solutions generally promoted are not to reduce any of these underlying pressures, but instead to achieve more “economic growth”, more “efficient” resource use and management, including new and better methods of water capture and control. In this equation, water infrastructure has a central role as a “driver” of the envisioned growth and prosperity.

Because water infrastructure supplies the generative “stuff of life” it is, like food production, difficult to see it in anything other than positive terms. The representational efforts of organizations such as Water Aid are full of images of new wells and happy

¹¹ For example, the Freshwater Action Network, Care International, UNICEF, The Water Project.

¹² “In 2015, 663 million people still lack improved drinking water sources, 2.4 billion lack improved sanitation facilities and 946 million still practice open defecation” (UNICEF 2015).

smiling children dousing themselves in sprays of sparkling clean water. Invisible in these images is an underlying reality that Water Aid – while undeniably providing very real and immediate benefits to some communities – is funded by the UK water industry, via its collective organization Water UK. One of this industry’s most profitable activities is the international marketing of its expertise in water privatisation. Their aim is not merely to ensure a profitable sideline in selling water industry expertise, but more broadly to enlarge international water markets. For example, Wessex Water, bought by Asurix (owned by Enron) in 1998, then sold to a Malaysian energy group YTL in 2010, has sent multiple experts to Central America. Thames Water has provided the Australian Government with a number of advisers. Purchased by German company RWE shortly after being privatised, it was sold in 2006 to a consortium led by Australian bank Macquarie which has interests in about 80 companies worldwide.

As anthropologists studying aid and development have plain, these activities are deeply entangled with the creation of new markets and sources of supply, underpinned by neoliberal visions in which economic growth is the desired outcome. Their analyses have elucidated the potential for both altruistic and self-serving development activities to compose new forms of economic colonialism (Arce and Long 1999). The water infrastructures being funded and constructed by water companies and development organisations in many parts of the world carry not only water but also ideas, values and practices. Critically, it enables the forging of links between industry experts and powerful political actors, and this serves to encourage and enable specific regimes of water and governance. (Mosse and Lewis 2005).

Bioethical issues

The lack of water available to some human populations raises particular difficulties for the counter-movements attempting to uphold the rights of non-human species and the material environment.¹³ Although both ecological and social justice activists frame their concerns in terms of rights, their claims are not always compatible. Even the most altruistic groups concerned with the provision of water to disadvantaged human communities may seek infrastructural developments that will take water away from ecosystems and their dependent non-human species.¹⁴

The difficulty in taking a negative view of water infrastructure providing supplies to the most disadvantaged human communities is obvious. But just such a difficulty also discourages more ecologically oriented practices in the most affluent societies. Because water holds such powerfully positive meanings in terms of generative capacity, health and well-being cross-culturally, generous flows of water are invariably linked with images of wealth and status, security and of course power and agency (Strang 2004, 2009). But clearly such assumptions have to discount the costs of such infrastructure to the non-human world, and thus override concerns about the rights and interests of non-human species.

Such concerns have been with us for a long time: they emerged in early Romantic anxieties about the well-being of Nature, and gained major momentum in the 1960s and 70s as part of powerful social justice movements in which feminists and other social activists also noted widening human and non-human inequalities. Friends of the Earth, for example, in its early years, focused on both social and ecological justice issues. Since that time, the conservation movement has fragmented and become increasingly

¹³ For example People for the Ethical Treatment of Animals, the [Animal Defense League](#), the Humanitarian League, the Farm Animal Rights Movement.

¹⁴ A parallel could readily be drawn with the many – and equally difficult to reconcile – conflicts over conservation, where animal rights (and/or the rights of a few people to benefit from tourism) frequently conflict with the rights and interests of traditional landowners (Homewood 2015).

detached from organisations concerned with human rights. It has been “adopted” by governments and corporate interests, brought under the purview of scientific authority, and thus largely deradicalised. With the exception of specific strands of activism concerned with animal rights, and some outliers such as Greenpeace, few conservation organisations articulate explicit discourses about non-human rights or the politics of overriding these. Most prefer, instead, to frame the issues in anodyne terms: as a matter of achieving sustainability, maintaining biodiversity, and now, of course, ensuring the ongoing provision of “ecosystem services”.

So let us be clear. All water infrastructures have direct impacts upon non-human species and the material environment upon which they depend. The extent to which such infrastructures override non-human interests and divert water to support human communities, or aim to protect and support non-human well-being, is a direct measure of the social, environmental and political relations between human and non-human worlds.

It will be plain from the preceding case studies that societal engagements with water which fully accommodate the needs and interests of non-human beings, or accord them agentive positions and some degree of social and political equality, are now extremely rare. As the overview of patterns of change in water ownership and control amply demonstrates, the direction of travel has largely been in the opposite direction, towards more dualistic division between humans and others; towards hierarchical social and political arrangements, affirmed by infrastructures assertive of human agency; and towards cosmologies reflective of these ideas and practices. After centuries of human “dominion”, culminating in the successful global promotion of short-termist and plainly unsustainable modes of environmental engagement, alternate approaches are generally presented as romantic, quixotic, and above all unrealistic.

But is it actually more realistic to persist with growth-oriented practices that have produced existentially threatening levels of environmental change; a mass species extinction rate previously matched only by major planetary crises; rising levels of human deprivation; and ensuing social and political conflicts? Obviously not, but an acknowledgement that current practices are unsustainable also requires recognition that change cannot occur unless it takes place conceptually, socially and materially, and this means dealing with the challenges of long-term historical momentum in each of these areas.

a) Cosmological Change

In anthropology, efforts to articulate new ways of conceptualising human-environmental relations have led to a useful ongoing dialogue with philosophy about bioethics. This builds on earlier ethnographic research examining human-animal interactions (Haraway 2008, Serpell 1996) and research with social and environmental counter-movements (Berglund 1998, Milton 1993). Also relevant have been developing theories about material culture (Boivin 2008, Knappett and Malafouris 2008, Tilley *et al* 2006) and material relations more generally (Bennett 2009, Coole and Frost 2010). This confluence of ideas has helped to encourage new theories comprehensively encompassing human and non-human beings as well as material agents and processes (Strang in press, Tsing 2004).

Anthropologists also have the advantage of long experience in working with diverse cultural communities whose cosmological belief systems do not conform to predominant views of human-non-human relations. Indigenous communities’ worldviews and relations with “the other” have not merely been the inspiration for many environmental groups, they have made a substantial contribution to the development of anthropological theory, adding greatly to its capacity to imagine multiple lifeways and alternatives to prevailing norms (Hirsch and Strathern 2004). Indigenous and anthropological theories therefore combine usefully to highlight the need for a reconsideration of human assumptions of dominion and the commoditising reduction of the non-human world to a set of material

assets. Perhaps most critically, they open up ways to reintegrate disastrously fragmented thinking about social, economic and ecological processes, and provide a bridge across the intellectual gulf between the social and natural sciences.

b) Social and Political Change

If societies adopted ways of thinking that do not separate economic activity from social and ecological processes, such conceptual reintegration would demand expression in political and material arrangements. It would tackle, for example, the crucial structural separation between agencies responsible for supporting economic activities, and those focused on protecting ecosystemic well-being, which allows the costs of economic activities to be externalised to non-human beings. It would produce similarly integrative legislation and regulatory mechanisms, and it would reveal the separation between (human) economic and social interests and (non-human) ecological systems and their inhabitants as a specific prioritisation of rights and interests.

It is difficult to imagine such changes being made without radical political action. At the moment there is much polarisation between mainstream political life and the various counter-movements calling for greater emphasis on social and ecological well-being. The *status quo* is upheld, to some extent, by widespread (and much encouraged) fears about extremism, with demonisation readily overriding discourses about the causes of inequalities, including – of course – exclusion from the ownership and control of water and other essential resources.

c) Owning and controlling water

Water infrastructures can express multiple forms of agency, including that of far-off transnational corporations and non-resident shareholders. As noted earlier, in a world of virtual water markets and non-resident water and irrigation company ownership, the elite networks benefiting most from the control of the Earth's freshwater are often geographically distant from the ecosystems from which it is abstracted.¹⁵ They are thus well able to avoid paying tax in countries from which they are making considerable profits. For example, there was widespread outrage when Thames Water (now owned by an international consortium), avoided paying any UK corporation tax in 2013, despite a rise in water charges of 6.7%, revenues of £1.6 billion and operating profits of £549 million (BBC 2013). Perhaps more critically, in the longer term, the lack of shared location makes it difficult for international consortia to see or feel the need to accommodate the interests of local human and non-human residents. Like generals far behind the battle lines, they can exercise power without personal consequences. Yet they are able to make decisions about where and how water flows are directed, and about who (or what) benefits or pays the price for these choices. Empowered by water, they may therefore be described as a new "despotic regime".

This poses a related question about water and power, which I have raised elsewhere (2004, 2010). If the ownership of water and other essential material resources, and the infrastructural wherewithal to manage these, are not held democratically by the State, who owns the State? How does it exercise power? Does it even exist? As Walker reminds us: "the state, as coordinator of collective action and as an intermediary between the public and private spheres, has significantly changed in nature" (2014: 390). He describes this as a shift from *government* to *governance* (see also Tortajada 2010).

Such governance is enacted through international legislation, which theoretically protects people's most basic rights to water and through national regulatory bodies such as the UK's Office of Water Services (OFWAT) which attempts to restrain companies from imposing high charges for water supply, and its Environment Agency, which tries to

¹⁵ In this sense, virtual water markets and absentee ownership challenge Godelier's claim that property is not real unless it is concrete (1986).

enforce legislation aimed at environmental protection. However, both international and national regulatory efforts have proved largely ineffectual in achieving any of these aims. As noted above, millions of people lack basic access to water supply and sanitation; water charges in countries where the industry has been privatised have uniformly experienced major increases in water charges (in the UK these rose by 60% in the first five years of privatised delivery); and fewer than 1% of Europe's rivers meet the standards of the EU Water Framework Directive (2000).

It is unsurprising, therefore, that the acquisition of water supply or irrigation companies by transnational corporations, and in particular those regarded as "foreign", continues to generate widespread concern and resentment about water privatisation and its social and ecological effects. And the handing over of power to transnational corporations, and more generally to "the market" has undoubtedly contributed to rising cynicism about the extent to which governments (of any hue) are representative "of" the people or able to protect human or non-human interests.

Conclusion

What emerges, then, is a rather alarming picture of water and power moving upwards and outwards to the extent that both are held by a largely untouchable and unaccountable despotic regime. Holding water and other key resources, this network, linked by economic and social relations and common ideology, is well placed to pull the strings of national governments and render them impotent, and to have major impacts on the lives of local communities and ecosystems while remaining out of reach of any protests that might ensue. Meanwhile cynicism, and a sense of powerlessness to effect change, has radically reduced people's willingness to limit their own resource use in order to protect the commons.

Yet water infrastructures themselves are ineluctably local and material. On the one hand they concretise and perpetuate specific beliefs and values and enable the practices that express these. They are not readily deconstructed, and are therefore intrinsic to historical momentum. But like any form of material culture, they – and water itself – also have a social life in which their meanings and usages can change (Wagner 2013). Carrying the stuff of life itself, they provide an ideal focus for social and political action. Pressure to change water infrastructures and their fluid outcomes can enact, simultaneously, a pressure to change political arrangements and the human and non-human relationships that they compose.

As noted at the outset, there are many ways to own and appropriate water. River catchment management groups and local communities can work directly on the physical environment as well as campaigning for better water management. Experts with the authority of specialised knowledge can participate in decision-making about infrastructural developments. Counter-movements and water users can lobby for new political and material arrangements.

There is also a great, untapped well of consumer power. In the broadest sense, having control over water is partly a matter of having the purchasing power to acquire food and other products containing it. While debates about water ownership focus on infrastructure and supply, it is important to remember that wealthy societies depend heavily on imported goods and thus embodied water from poorer countries (Allan 2011). Water in arid areas is used to produce goods that require major amounts of water, to be shipped to markets in more temperate climes. Meissner notes, for example, that German water users have an international water footprint extending across 400 different countries (2012). Consumers are thus fully implicated in a process that moves water around the world to their advantage, and which – by providing the market – underpins specific regimes of water ownership and supply. But this also suggests considerable capacity for them to influence such regimes through making different choices about their patterns of consumption.

There are, therefore multiple subaltern ways of owning and controlling places and resources which have some potential to change the direction of water. Whether such subaltern forms can effect real political and material change, and thus a change in human-non-human relations, remains to be seen. But, in the end, the environment itself, impartially and inexorably, will continue to respond to human expressions of agency and power through water: if these are unsustainable they will, quite simply, cease to be sustained.

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