Chapter 9

Control and Flow: Rethinking the Sociology, Technology and Politics of Water Consumption

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1. Introduction

There is no doubt about it, water is an essential ingredient of everyday life. It is also a subject of increasing environmental and political concern, albeit for very different reasons in different parts of the world. In this chapter we switch back and forth between two contrasting contexts, the West Bank and the United Kingdom, in an effort to extract, compare and sometimes criticise theories and understandings of water that dominate environmental discourse. Water crises are generally conceptualised in terms of resource scarcity. When problems arise it is because there is not enough water to go around: demand exceeds supply. Rather than treating water as an unproblematically homogenous resource, we argue that it is highly malleable and that the details of its organisation, management and meaning are central to an understanding of sustainable consumption.

Environmental commentators are more ready than most to recognise the diversity of water and to acknowledge the inter-linking of shortage and quality. Hence situations of scarcity are not just those in which water consumption exceeds supply, but those in which the balance between useful, clean, dirty and dangerous water is out of kilter. It is sometimes, but not always, possible to respond to shortage by substituting between types of water, hence initiatives to replace clean with grey water or to manage demand through reuse and recycling. In practice, the prospects for reconfiguring water and managing water supplies depend upon a still submerged social and institutional infrastructure of control and flow. As we argue here, systems both of supply and of demand are anchored in an already existing landscape of technologies. They are also embedded in (and constitutive of) attendant regimes of power. Through our focus on the routine structuring of choice and the social meanings of water, we tacitly challenge taken-for-granted assumptions about the nature of choice and the beliefs and actions of individual consumers.

Our broadly sociological orientation allows us to generate new ways of thinking about water shortages and water quality, prompting us to re-open fundamental questions about what water is and how it is channelled, contained and constituted. Resource economists and natural scientists tend to have their own ready-made answers to such questions. Whether referring to the water crisis of the West Bank, or discussing leakage control and new initiatives in demand-side management in England, the reference point is similar:

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water is defined as a resource and described by means of chemical equations. It is H_2O. These definitions are supplemented by a technical language of water management, including baseline flows, distribution losses, and measured or unmeasured consumption. We consider such understandings of water in the first part of this chapter, and suggest that definitions of this kind overlook, or at least under-emphasise, the critical point that water is part of the social fabric and political order of everyday life. The importance of this observation is explored in the remainder of the chapter.

Developing a "sociology" of water is no easy task given the immeasurable variety of social situations through which it flows, is ordered and is in some sense constituted. To simplify our task, we concentrate on three genres of water technology, considering the "barriers", "containers" and "purifiers" which are used to separate wet from dry; to store water; and to create and distinguish between different types. We take these moments and technologies of management as a means of organising our discussion and exploring the social relations of water in two hugely different contexts. As well as using technologies of water management as narrative tools through which to develop accounts of water flow and control, we suggest that such technologies play a fundamental role in "making" water and defining how and when it can be used and consumed. In short, we argue that the systems and devices of control and flow have the central — and often understated — effects of simultaneously constructing the many identities of water as well as all those practices, social relations and human identities associated with its constitution, management and use. In this respect our ambitions are wide ranging.

We nonetheless recognise that such relations are embedded and formed by specific political and institutional histories. In the sections that follow we tread a fine line, examining differences and complementarities in the technological, political and institutional ordering of water in the UK and Palestine[1] as a means of articulating what we believe to be a generally-relevant approach.

2. Conceptualising Water

All expert discourse involves and is founded upon a range of assumptions, and this is as true of discourse on water as on any other subject (Foucault 1970, 1972). We begin by elucidating some of the conceptual foundations on which water-policy discussions are typically based, and then develop our own re-conceptualisation, one that stresses the role of technologies in constituting waters and human subjects.

Peter Gleick's thorough and much-cited compendium on global water issues, *Water in Crisis* (1993), makes a good starting point, not because it is remarkable, but on the contrary, because it is quite typical in its representation of water problems and policies. This is not to suggest that the book presents a single, unified and coherent picture of global

[1]The paper draws on material generated in the course of two quite different research projects. Heather Chappells and Elizabeth Shove have recently completed water-related research as part of a European Union (DGXII) funded study of domestic utilities and consumers titled DOMUS. Jan Selby has just finished doctoral research on the Palestinian water situation in the occupied West Bank. The cases and examples referred to in this chapter are taken from one or another of these two studies.

water issues, but rather that, despite the various disagreements and differences in emphasis between them, the contributors share some basic assumptions about their subject matter. Among these are the following: first, the assumption that water is a pure and purely-physical substance; second, that water is a static "resource"; and third, that social practices and social relations are of marginal importance in understanding water problems and policies.

First, Gleick's volume implicitly conceives of water as H_2O. Nowhere is water explicitly defined in these molecular terms — everyone knows what water is, after all — but it is clear that water is being thought of as something which has self-evident and absolute physical properties. Yet water need not necessarily be thought of in this way. Water could be thought of, even in wholly physical terms, as an essentially *impure* substance, as one that, except within the confines of the laboratory, is always mixed with other chemicals (i.e., irons, chlorides, etc.), and with bits of organic and inorganic matter (i.e., plankton, silt, etc.). Water could also be thought of as having an identity that, far from being purely physical, is intimately bound up with social (and socio-technical) relations, practices and values. From a perspective informed by these two points, we can view water as essentially impure and heterogeneous. From such a perspective, there is not one substance called "water", but many different "waters": sweet water, grey water, soft water, rain water, commodified water and so on.

A second point is highlighted by Gleick's claim, made at the very opening of *Water In Crisis*, that "fresh water is a fundamental *resource*, integral to all environmental and societal processes" (1993:3, our italics). This understanding of water as a "resource" is significant in two regards. First, the designation "resource" carries with it the claim that water is an economic good. Second and more interestingly, this designation implies that the water in question is fixed and finite, that water comes in the form of a "stock" or "body" that is just waiting to be exploited. The word "resource" implies a relatively stable and static conception of water, yet water need not be pictured in such terms. Water could instead be characterised as being in a state of continual instability, as ceaselessly flowing and cycling through natural and social systems, and as constantly changing between gaseous, liquid and solid forms. This is not to suggest that water experts are ignorant of the highly mobile and fluid nature of water, but rather that expert texts, especially those concerned with policy, tend to represent water primarily through the language of "stocks" and "resources", and only secondarily through the language of "flows". Our suggestion is simply that water could be thought of in much more dynamic terms.

Finally, Gleick's volume says very little about social practices, relations or values, seemingly implying that these are of marginal importance in understanding water problems and policies. People do of course appear, but only in the roles of "consumer" or "expert manager" of water resources. Setting experts aside for the moment, nothing is said about the actual practices of consumption, or about how acts of consumption affect and are affected by the fabric of daily life, or about how waters are perceived and valued in different contexts. Yet such sociological issues could be seen as crucial to an understanding of water problems and policies.

Partly because water is viewed as an innocent resource, the technologies of its management are similarly invisible. Like so much expert work on water issues, Gleick's text devotes plenty of space to discussion of economics, but barely any to technologies. Yet material technologies need not be thought of as either peripheral or innocuous. If we view

water not as a stable resource waiting to be exploited, but as an unstable and dynamic fluid, then the central management problem is not one of exploiting available resources, but of controlling chaotic flows. From such a perspective, the key tools of water policy are not, or not simply, the management of economic incentives or institutional arrangements. They also include manipulation of those material systems and devices — the reservoirs, pipes and taps — that do the work of controlling distribution, storage, access and flow.

Technologies are important in one further way, namely that they have productive effects. They control waters, but more than that, they also *constitute* them, transforming both their physical and social identities. And they have similarly productive effects on social practices and relations, transforming people into particular types of subject. In both these senses, technologies are key to understanding water issues: technologies constitute waters and subjects. This is not to suggest that technologies are intentional agents (which have "aims" or "goals"), but merely to highlight the fact that, once in place, technologies have durable productive effects on nature and society. As such, we are not concerned with *intentions*, but with *effects* (and we are not interested in whether these effects are intended or unintended). Neither are we trying to invoke a form of "technological determinism", but simply to observe that expert discourse on water, in common with so much social-scientific discourse, tends to ignore or understate the enormous effects of material things within and upon social and natural systems (Latour 1988; Pfaffenberger 1988). To adopt Winner's (1986) terms, expert discourse on water is, like most sociology, perhaps guilty of "technological somnambulism".

3. Water and the Technologies of Control and Flow

In what follows, we discuss the constitutive effects of three broad genres of technology: "barriers", "containers" and "purifiers". By considering their deployment and operation we are able to say something about the dynamics of constitution and what this means for the production and politics of water. Our opening comments on "barriers" raise questions about how water is "made" and how the generation of wetness is bound up in a pervading culture of staying dry. Discussion of the technological family of "containers" offers most scope for exploring the control and flow of "useful" water. Finally, focusing on "purifiers" reminds us of the social and technical potential for differentiating between and so multiplying types of water. This is important given the potential for managing demand for "pure" water by means of recycling and substitution.

Concentrating on these three classes of technology, we use examples from the UK and the West Bank to show how even simple technological devices and systems regulate social relationships including those of access and control, just as they regulate the flow of water and its abundance, scarcity and quality. Such technologies do not literally determine the terms on which people interact (as our UK examples show, new institutional arrangements can modify the deployment of technologies designed in another era), but they nonetheless embody more or less resistible messages about relations between water consumers and those who influence the details of provision and supply.

By concentrating on these three classes of technology we are able to reveal something of the different political, environmental and institutional logics configuring the social

organisation of water systems in the UK and the West Bank. In the final section we review the implications of these insights for the framing of environmental debates about water and sustainable consumption.

Barriers: Making Water

Roofs, damp-proofing systems, dehumidifiers, sandbags, anoraks, umbrellas and Wellington boots: all of these technologies, and many more besides, have the effect of keeping unwanted waters outside and away from the human environment. These exclusionary technologies define and defend us against the wet. Moreover, they have effects both on social norms and values, and on the physical and social identities of water.

To begin with, they produce and reproduce a "culture of dryness" and an ideal of "comfort" (Shove 1997). They define an essentially modern, urban way of life that is insulated and apart from the volatile whims of nature, and a culture that does its utmost to deter or hide dampness, mud and sweat. In addition, many of these technologies direct and channel water and hence determine its distribution. Roof tiles, gutters, drains and drainage systems have the collective, physical effect of producing "floodwater", and of generating uniquely urban crises as run-off water sweeps across the hard landscapes of modern cities. These barrier technologies confer on water a range of symbolic identities. Our dry culture, and the technologies through which this culture is performed and reproduced, tend to treat ice, rain, dampness and so on as "bads" that must be kept at bay. Such "natural waters", waters which are beyond or which exceed our attempts to control them, are constituted as threats or "risks" to the human environment partly by our obsessive attempts to control them. As Beck (1992) observes, modern society actually produces environmental risks, real physical by-products of our attempts to control nature; or as Lash (1994) argues, slightly differently, our efforts to subdue nature are increasing social *perceptions* of risks. Either way, these and other kinds of barrier technologies embed and engender certain understandings of water.

These observations about bounding and barriers represent the first step in the systematic separation and management of water, and wetness, from dryness. Cultures clearly differ in their valuing of water, being more or less dependent or tolerant in ways that still connect to climatic and seasonal variation. While they make some sense in the UK, grumpy comments about "nice weather for ducks" have no place at all in the vocabulary of those who long for rain of any kind. Wherever they are drawn, lines between welcomed, acceptable, and problematic margins of wet and dry require careful and continuous policing. Taking this analysis a step further, we now focus on the technologies involved in containing and managing a distinctive subset of water that is "useful" water.

Containers: Making Water Useful

Wells, dams, plugs, sinks, swimming baths, buckets, cups and bottles: all these have the effects of collecting, confining and containing waters, and of rendering them accessible for human use. Unlike the genre of barrier technologies, which keep uncontrolled waters

outside the human environment, these devices enable the controlled introduction of water into the human environment. The technologies of containment confine water both spatially and temporally while the related technologies of flow and access (pipes, taps, valves and in a different role, buckets) permit the controlled movement of water through space at given times, and allow its retrieval again at particular points in time and space. Moreover, processes of containment also and simultaneously involve the production of particular types of water, and of human subjects and social relations.

In the subsections that follow we consider the social ordering of containment and access first in the West Bank, and then during the last century or so in the UK. In both cases we take note of infrastructural and domestic[2] systems and reflect on the social and political significance of storage and management strategies.

Containment and Access in the West Bank: Politicised Water

The wells pumping into the Eastern basin of the West Bank's mountain aquifer withdraw water from incredible depths of three to four hundred metres, a technologically complex (and also economically-taxing) feat. Before the advent of powerful drilling and pumping technologies, these waters did not exist as a resource: they are only constituted as such by the technological possibility of their exploitation. Such large-scale technologies of access and containment (i.e., wells and reservoirs) have various social effects, as suggested below.

In the West Bank, water is supplied through an Israeli-dominated network of wells, pipes, valves and reservoirs. This technological network channels water to some places and some users at the expense of others, with the effect of limiting Palestinian water consumption while ensuring that Israelis on either side of the Green Line have regular and plentiful supplies.

The West Bank's water network is one that differentiates between Israelis and Palestinians in a number of respects. First, the dearth of wells on the Western and Northern flanks of the West Bank ensures that the greater part of the territory's groundwater flows into (and is exploited within) Israel. Second, hundreds of Palestinian communities are not connected to mains supplies at all. Third, the fine structure of the water network ensures that, in general, Palestinian communities in the West Bank receive lower and less regular water supplies than Israeli settlements. For instance, a reservoir to the south of Hebron stores and provides water for the Palestinian town, as well as for the nearby settlement of Kiryat Arba. The reservoir has two outflow pipes, one feeding Kiryat Arba exiting from the lowest point of the reservoir, the other feeding Palestinian Hebron exiting from a point two meters higher up. The effect of this structure, a structure of both pipework and politics, is that when the reservoir's water level falls below two meters, as it does for long periods during the summer, all of the remaining supplies go to Kiryat Arba. Similar examples of large-scale containment and management technologies are to be found throughout the West Bank.

[2]We do not make use of agricultural or industrial examples in this discussion.

The West Bank's water network does not simply differentiate between Israelis and Palestinians, however, but also between and within Palestinian communities. Some Palestinian communities, such as the village of Duwarra, near Hebron, are located by and connected to main distribution lines: they thus receive almost continual supply during the summer months. Other communities, such as the village of Quasiba, just five miles to the north, are much further from main lines and are fed by small-diameter pipes and weak pumping systems. These villages can go without piped water for five or more months a year. On an even more microscopic level, the water network often produces differences from one street or one house to the next. For instance, during the height of summer, piped supplies reach the foot of Dheisheh refugee camp for one week in every three. By contrast, the highest areas of the camp go without water for three months each year; in between the foot and top of the camp, supply conditions vary from street to street.

As a result, and in contrast with the situation in most of the developed world, water in the West Bank is both highly conspicuous and highly politicised. Furthermore, water scarcities, as well as people's quotidian responses to these scarcities, are an arena for the exercise of skills, and for the production and affirmation of social relations and identities. Storage again plays an important part, but this time at the level of individual or household response, as illustrated by this example from Quasiba. On the Eastern side of the village lies an enormous cavern, nine-meters deep and almost twelve-metres square, excavated by members of several water-short households in 1994. The cavern is filled every winter by groundwater flowing down through the mountain that rises sharply above, and now meets the domestic-water needs of the six households who manage it. This storage technology has produced a new resource for these households, and has simultaneously created and embedded a new set of social relations (Selby 1999).

Sharp differences in supply regime have productive effects both upon social relations and identities, and upon the identity and significance of water. First, people are forced to engage in a variety of socio-technical practices: searching for water (at local springs, at the local garage, at the houses of friends and family, etc.), collecting it (in canisters, bottles, buckets, etc.), transporting it (by foot, by donkey, by car, in rubber tubing, etc.), storing it (in roof-top tankers, in underground cisterns, etc.) and conserving it (fitting taps with pieces of sponge, washing clothes only when piped water returns, etc.). Second, these practices involve, and in turn constitute, relations of cooperation (sharing waters, sharing the everyday work of collecting and coping, etc.), relations of conflict (between those who have and those who do not have water, between those who steal and those who are stolen from, etc.), and relations of difference (most noticeably, the solidification of the domestic division of labour). Third, shortages and storage-related practices have effects upon identities, and especially upon the experience and idea of being a Palestinian. In one regard and for some people, shortages are tangible, material affirmations of occupation and dispossession, while in another sense and for others, shortages merely lead to conflict and hence threaten communal identities. To sum this up, water shortages and associated systems and technologies of water storage have a heterogeneous array of social and political effects in the West Bank.

As we have seen, macro-level institutions, politics and technologies of access and containment are countered by micro-level strategies developed in response. In this way, both "levels" are woven into the fabric of daily life in ways that influence the experience

and meaning of water. Whatever the precise character of the technical organisation of water and its impact on daily life, one can say that, in the West Bank, water is not simply water, but a conspicuous and politicised form of water, quite different from that which is consumed, so unreflectively, in most of the developed world.

Containment and Access in the UK: Commercialised Water

Although UK water may not be as politicised as its Palestinian counterpart, the history of its containment and supply over the last two centuries nonetheless reveals shifting institutional logics, each of which have produced, confined and constituted water in different ways. In this section we reflect on the commercialisation of water following the privatisation of previously public utilities.

Water consumption in the UK has not always been an unreflective and inconspicuous activity. Rendered redundant by the modern technologies of mains supply (in which private households have private supplies and private taps) the village-water pump once played a central role in the social ordering of everyday life. It was both a powerful symbol of community effort and an important site of local political interaction (Ward 1997).

The transition from local (and locally-variable) water to the standardised, mass-produced form that now issues from the private tap is the result of an heroic effort to tame free-flowing sources and turn them into an ordered, well-managed system of public supply (Guy and Marvin 1996; Porter 1998). Several decades of public investment from the end of the nineteenth century turned British water into an homogenous, relatively well behaved and domesticated resource. The scale of the technological challenge involved in constructing a comprehensive and reliable infrastructure should not be underestimated. All year round, water is pumped from the massive containment systems we know as reservoirs into a vast network of underground pipes, travelling incredible distances before finally emerging in kitchens and bathrooms around the country. This invisible, inaudible, almost incomprehensible system of provision has arguably de-politicised both water and the practice of its consumption (Foucault 1977).

Over the last two decades the once-unifying institutions of UK water supply have been subject to a mixture of social, organisational and technical strains. Concerns over decaying infrastructures, environmental degradation from over-abstraction and drought, and (most significant of all) the privatisation of public utilities have undoubtedly changed perceptions and practices and have, in the process, created a more differentiated landscape of water, water management and water consumption (Cryer 1995). Previously invisible aspects of the water system ("fat-cat" managers, shrinking reservoir capacities, leaking pipes and water-poor consumers) have become the focus of public and private scrutiny. As with the West Bank, a discussion of the technologies of containment illuminates (some of) the social relations assumed and constituted by the contemporary organisation of water supply.

In the summer of 1995, water shortages hit the headlines in the UK bringing scarcity and storage to the top of the public agenda (Durham 1995). The sight of tankers being used to transfer water from the Kielder reservoir in Northumbria to water-short villages in neighbouring Yorkshire revealed the centrality of storage technology in the newly

commercialised landscape of water supply (Bannister and Wainwright 1995). As the "owner" of the 200,000 million litres of water contained in the Kielder reservoir, Northumbria Water was in a powerful position. As well as extracting water for its own customers, Northumbria was able to trade and negotiate with other less fortunate regions.[3] Throughout this "dry" period, Yorkshire Water found itself in the embarrassing situation of having nothing to sell. Water was suddenly and dramatically conspicuous by its absence, a fact that severely damaged the company's commercial credibility and challenged the public's long-standing perception of water as a tamed and reliably available resource. Moral appeals to the collective good — that had underpinned previous (public) campaigns for water conservation — echoed hollowly when repeated in this straightforwardly commercial environment. Why should consumers use less of what they had paid for? It made no sense.

As this episode revealed, privatisation has changed the constitution of water. No longer something to be saved and managed for the benefit of all, it is explicitly and evidently a commodity, bought, sold, stored and distributed, like any other. This re-orientation transforms the perception and the management of the infrastructure itself. Reservoirs are not simply locations in which water lingers in its circulating journey, nor should they be seen as triumphs of engineering over nature in the cause of public health and welfare. They have become the warehouses of an industry and are now subject to appropriately commercial management.

The 1995 drought momentarily laid bare the bones of commercial and technical interdependence that constitute the UK water system. It showed, with instant clarity, that water had been thoroughly commodified. Supply chains of provision were thrown into sharp relief, as were the stores, stockpiles and strategies of competing corporate enterprises. Relationships between householders and water suppliers were those of captive customer and dominant provider, no more than that.

While reservoirs are significant and revealing storage technologies, there are other smaller scale but still important points at which water is collected, organised and managed. As the following account of an admittedly atypical initiative suggests, UK consumers are not entirely at the mercy of the mass producers of standardised water. Before exploring this case of "off grid" water self-management, we first acknowledge more conventional patterns of infrastructural inter-dependence within the UK system.

A vast amount of the UK's water is stored in peoples' homes. Added together, the capacity of the nation's toilet cisterns, and its hot and cold water-storage tanks is considerable. These localised "reservoirs" form part of the total water system and are integral to its effective operation. Moreover, they too have a part to play in conditioning the use and management of water and the relations and obligations between those involved. To give just one example, gravity-fed plumbing systems protect mains water from accidental contamination. Such arrangements complement and support rather than challenge the commercialised provision of mains supply, but there are exceptions to this general rule.

[3]Water distribution depends upon an infrastructure of storage combined with long-distance pipelines. The physical landscape and the arrangement of natural watersheds influence the form of the distribution network. Such features make rather less difference to other infrastructures, for example, the national electricity grid or the telephone system.

Some households have, for instance, sought to break free of standard systems of water provision and their associated regimes of control and access. As in Quasiba, where the villagers developed their own mini-reservoir, a handful of families in the UK have taken it upon themselves to manage their own infrastructure of water supply and containment. Motivations clearly differ from those of their Palestinian counterparts. Nonetheless, the strategies described below also represent a response and a form of resistance to the prevailing social order.

In an effort to "keep everything in their own valley" three Yorkshire households decided to group together in the early 1990s to construct an autonomous water-supply system for their self-built homes. The households collect rainwater for drinking and use recycled grey water for other domestic purposes. Since rainwater is subject to wide seasonal variation the water self-managers have installed large tanks in a specially designed basement area which acts as the heart of the household storage and treatment plant. Rainwater falling on the roof is channelled through a series of pipes into these basement reservoirs. Having been treated and filtered, it is turned into "useful" water for normal consumption. Symbolically at least, these localised arrangements represent a significant challenge to the institutions that provide and police mains water storage and distribution. Perhaps not surprisingly, these "deviantly self-sufficient" householders have faced considerable resistance from water regulators and environmental health officers who have insisted on intensive monitoring of this "risky" form of water management.

At a socio-political level in the UK, as in the West Bank, power over containment, management and flow is the subject of negotiation and conflict between a range of actors. While water in the UK may not be as unstable and unpredictable as it is in the West Bank, in both cases we observe the development of large-scale storage infrastructures linked to sometimes complementary, sometimes contradictory systems of cisterns, butts and buckets. The interface between the two reveals the constant overlapping of the political, institutional and technological and reminds us of the extent to which the histories of these and other societies are quite literally inscribed in their plumbing.

So far we have talked of water as a more or less undifferentiated substance. In what follows we reflect on the heterogeneity of water and on the uses to which it can be put, both of which depend on technologies of purification.

Purifiers: Making Water Different

We now turn our attention to technologies for treating and managing water by means of filters, chemical dosing, biological treatment, desalination[4] and so on. Large-scale treatment and purification plants ensure that water companies produce and deliver a standard

[4]Israel has recently decided to embark on the construction of its first major desalination plant. Although the exact details are still unclear, the development of this form of large-scale "purifier" technology promises to reframe the organisation of water control and flow between Israeli and Palestinian territories and to redefine issues of water quality and scarcity. While not pursuing this case here, we acknowledge that exploring the changing organisational and technical arrangements of desalination would provide a useful contrast to the UK initiated grey-water schemes we describe, revealing further differences and similarities in relations of water purification.

grade of water to all their customers. Such systems enable the UK water industry to make the confident claim that mains water is one of the purest and most thoroughly tested products households are ever likely to consume (Essex and Suffolk Water Guide 2000). While the industry is committed to the mass production of (apparently) uniform tap water, the profusion of filtering technologies, not only in water-treatment plants, but also in households, gives some indication of a further, endlessly rich vocabulary of purity, propriety and purpose. For example, specialist companies sell water-softening devices that promise to banish unnecessary levels of scum, scale, and unsightly staining suffered, they claim, by 60 percent of UK households (Aqua Dial 1997). Though "soft" water is good for towels, clothes and hair washing, it is not so good for arteries, hence the advice to keep a separate supply of "hard water" for drinking. There are two points to make here. First, distinctions between hard and soft water are drawn within a regime of uniformly "pure" supply. Second, such distinctions — and those that lie behind rapidly escalating sales of bottled drinking water — do nothing to disturb the established institutions of "normal" water provision.

Other qualitative distinctions present more of a threat to the conceptual uniformity of tap water. Environmentally inspired experiments with grey-water technologies involve treating and recycling contaminated water (e.g., from baths and showers) for use in situations where mains-quality drinking water is not required (e.g., for flushing the toilet or watering the garden). The goal is to use grey water in place of purer varieties and hence conserve the latter. At first sight, this is a simple enough ambition, but as these experiments have shown, the relationship between quantity and quality demands careful management. In addition, the production of new types of water requires close attention to the technologies and practices of purification.

Making "good" grey water involves a process of addition (chemicals, chlorine, bleach and colouring) and subtraction (filtering, cleaning and unblocking) which together contribute to the production of a water which, though grey and "dirty", does not appear to be so and does not smell as if it is. Filters prove to be critical "purifying" technologies throughout this process, since the production of "useful" grey water involves separating potentially problematic waste from that which can be safely retained. Working back towards the plug-hole, households with grey-water systems have found themselves changing showering and bathing routines (to avoid clogging filters or introducing inappropriate additives) and taking other steps to improve the "quality" of their wastewater.

Should grey-water systems take hold, householders, not water companies, would be the makers and producers, as well as the users, of this new grade of water. Likewise, social conventions of grey-water usage would have to become established. As one UK water company discovered when it tried to introduce a communal grey-water tank, households may not mind using their own waste water to flush the toilet, but they are not prepared to use other people's. Social norms regarding the management and sharing of water are deep rooted and, from a cross-cultural perspective, immensely varied. The challenge of injecting parallel types of water into more and less established classificatory systems raises the spectre of localised, household level, technologies of filtration and extraction (from baths and sinks as well as rivers and reservoirs); and of a more conscious appreciation, and perhaps even a new moral order, of water qualities and water uses. In the UK at least, this implies a rather radical reconfiguration of a currently centralised system grounded in an

ideology of uniform purity and sustained by an intersecting network of cultural as well as technological arrangements.

This brief discussion of purifying technologies reveals the social and institutional structuring not just of water supply, but also of water quality. Households using grey-water systems still rely on mains supply and, as we saw above, domestic practices of purification and storage have to be understood alongside those of the water industries with which they intersect. Multiple systems can and do co-exist yet the point remains — the effective introduction of parallel systems of grey-water management requires more than a network of appropriate technologies. Such initiatives also imply a reconfiguration of domestic and water-institutional relationships.

4. Water Consumption in Theory and Practice

Having considered the part that the technologies of exclusion, containment and purification play in managing the control and flow of water, we now reflect on the wider implications of the approach we have sought to develop in this exploratory chapter.

Our first move was to challenge representations of water as a uniform resource subject to more or less sustainable consumption. This theoretical manoeuvre had the immediate effect of redefining the agenda: rather than considering depleting stocks of water we turned our attention to the institutions and infrastructures of flow and control. Instead of viewing water as a mono-dimensional substance we took note of its many forms and meanings. This reorientation in turn required us to reconsider consumption. It no longer made sense to view demand as the expression of individual desires and lifestyle choices, or to expect environmental commitment to engender sustainable consumption. Having recognised the extent to which social, political and technical systems configured both water and those who used it, we had to admit that patterns of consumption were significantly shaped by collective practice and sociotechnical possibility.

The definition, organisation and management of water became our central themes. Abstracting examples from the West Bank and the UK, we showed something of the infrastructural politics at play in these two contrasting situations. But it was not enough to outline formal institutional arrangements. Our methodological strategy of following through the technologies of storage, distribution and access gave further insight into the ways in which such pressures are mediated, translated and made real. As we discovered, close inspection of apparently inert entities like reservoirs provided important clues regarding the day-to-day intersection of macro infrastructures and micro practices. Looking through the "lens" of storage and purification systems we saw how they managed and mediated not just water, but also social relations between consumers and between consumers and the institutions of water supply. In the West Bank these relations are bound up with a broader story about Palestine and Israel; in the UK they are shot through with histories of public health, privatisation and commercial competition. In short, barrier technologies, like those of containment and purification are not innocent instruments of engineering: at every level, they reproduce and inscribe social relations.

Technologies also have a role in configuring meanings and practices of consumption, variously positioning water as a commodity, as a symbol of political status or as a

substance that is scarce, abundant, clean, dirty, hard, soft, white, black, grey, and so on. Efforts to juggle between quantity and quality (as illustrated by environmentally-inspired attempts to introduce domestic grey-water systems) touch on all these themes. Likewise, calls for restraint and conservation are positioned and rendered meaningful or ridiculous depending on the precise social, political and technological context in which they are uttered. Though we have yet to make the point explicit, it is clear that patterns of consumption are strongly determined by infrastructural arrangements, and by the habits, expectations and practices they engender and sustain. Like it or not, water consumers are positioned within what Rip and Kemp (1998) refer to as sociotechnical regimes, that is inter-connected networks of technology and practice that constitute "normality". From this perspective, the notion that sustainable water consumption depends upon the decisions and actions of more or less environmentally committed individuals is patently implausible. As we have tacitly assumed all along, infrastructures and systems of water supply actively create and structure demand. They do not simply meet it.

To conclude, we have moved from a uniformly resource-based view to one that recognises the multiple meanings of water and the dynamics of its flow and control. This has practical and theoretical implications for the representation and analysis of sustainable consumption. To understand the process of ordering and management we have concentrated on the specific technologies involved in channelling and organising water. This has the further advantage of showing how consumption practices are configured and organised. Though we have considered only a handful of cases, we suggest that such an approach offers a means of understanding the part that social and technical infrastructures play in structuring the macro and micro dynamics of sustainable consumption.

This is a potentially significant advance, but one that also has some costs attached. By implication, policy analyses that consider the institutions of water supply without also taking note of the technological and other infrastructures through which actions and practices have effect are severely limited. Generalising more broadly, studies of environmental policy need some material, if not technological, anchoring if they are to capture consequences and implications at the level of practical action. In addition, our analysis presents important challenges for those who subscribe to individualistic models of choice and change. To put it bluntly, efforts to characterise or promote "green" consumption as an expression of individual environmental commitment fail to see the big picture or appreciate the structuring of "choice" itself. As a result, we have to question the relevance of investigating the habits and characteristics of green consumers despite the fact that this has by now become a respectable line of social-environmental enquiry. But perhaps the biggest loss concerns the concept of water as a resource. In abandoning this way of thinking, we drift away from a perspective that is deeply embedded in vast reaches of established research.

Putting these losses aside, and concentrating on the benefits of a fresh approach, we suggest that similar arguments might be made with reference to other environmentally significant issues such as energy or food. In these cases too, there is much to be said for setting simple resource-based accounts aside; for taking due account of the subtle but pervasive part that technologies play in configuring the normal and the possible; for recognising that institutional arrangements and environmental policies do not simply determine everyday practice, and for acknowledging the social construction of demand.

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