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A new enemy at the gate: Tackling Iran's water super-crisis by way of a transition from government to governance

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Abstract: Iran faces a water crisis so severe that much of its land has ceased to be productive. Since Iran has coped with water shortages for thousands of years, it would seem that something has been lost in the abandonment, over the past half-century or so, of traditional practices in favour of modern ones. A comparison of the socio-technical systems inherent in the traditional practices

with those that accompany the modern ones reveals a striking loss of institutional plurality. It also suggests the remedy: a switch away from 'government' (in which state actors prescribe and firms, farms and households comply) to 'governance' (in which state actors are in two-way and constructive engagement with actors from both the market and civil society).

Key words: Water management, traditional paradigm, modern paradigm, plural rationality, clumsy solutions, governance

I Introduction

The archaeologist Ali Alizadeh (2001: 60) has argued that 'in two periods, Middle Illam and the Sasanian Dynasty, enemies were able to occupy Iran thanks to the sterility of the land' (trans. from Farsi). History, we will argue, is being repeated once more, but this time both the enemy and the method of conquest are different. The new enemy, we contend, is modernity, and the method of conquest is by way of the ever-proliferating social problems that stem from the changes in the quantity and quality of water that have resulted from a development process that has been driven by 'government' rather than 'governance' (we will explain the difference in just a moment).

For more than a decade now, Iran has been facing a water crisis so severe that, in 1999, its government was forced to accept foreign aid for only the second time since the revolution in 1979 (the first being in 1990, in response to the devastating earthquake in the north of the country). The United Nations has estimated the cost to Iran, in 2000 alone, at 3.5 billion US dollars, with the figure for the following year being 2.5 billion by mid-year (as reported in the *Tehran Times*, 16 July 2001, p. 4). Fifty villages in Kerman Province (Foltz, 2002) and 86 in Zabol County in Sistine Baluchistan Province (Beik Mohammadi *et al.*, 2006) were evacuated due to lack of water, and more than a million head of cattle perished across the country. In 2000, an estimated three million tonnes of wheat and barley were lost (12 million tonnes being the amount needed to feed the Iranian population for a year, with somewhat informal statistics indicating that, in

normal years, Iran produces between 13 and 15 million tonnes). And, in 2001, things were even worse, with informal estimates suggesting that production was in the order of just 8–9 million tonnes. In Esfahan Province, 100,000 farm workers lost their jobs, and, in the south of the country, the largest body of freshwater in Iran – Lake Hamoun – ceased to exist. Until then, fishermen from the surrounding villages had taken 12,000 tonnes of fish from the lake every year. On top of that calamitous loss, the strong winds, which used to just ruffle the lake's surface, have created sandstorms across its bare and dried-up bed and this has resulted in increased soil erosion in 94 of the south-eastern villages (Foltz, 2002). This crisis, exacerbated by further severe droughts in 2008 and 2009, has led to a marked loss of productivity.

Though Iran has always had cycles of drought, a major World Bank report (Balali *et al.*, 2009) confirms that this is different. Iran faces, not the familiar periodic dry spells, but a severe water crisis that is made even worse by recent high rates of population growth. Climate change, though not the cause of this crisis, is predicted to make it even worse, with per capita water availability being halved by 2050. The crisis is thus all set to turn into a super-crisis, with ever more land being taken out of production over the coming decades (Balali *et al.*, 2009). For the third time in Iran's long history, the enemy is at the gate.

That Iran now seems unable to cope with such a historically familiar reality suggests that something has been lost by its abandoning of traditional practices for modern ones. What

exactly it is that has been lost, however, is obscured by the wooliness of this traditional/modern distinction that has long been central to the theory and practice of development. This means that we will have to clarify that distinction, and make good its serious deficiencies, before we can come up with any useful recommendations on how best to restore whatever it is that has been lost.

II Getting rid of the wooliness

The founding fathers of social science had a fondness for dualistic distinctions – Sir Henry Maine's (1861) historical transition from 'status' to 'contract', Ferdinand Tönnies' (1887) '*Gemeinschaft*' and '*Gesellschaft*' and Emile Durkheim's (1893) 'mechanical solidarity' and 'organic solidarity', to mention just three. And the habit has persisted to the present day: the 'new institutionalist' contrast between 'hierarchies' and 'markets' (Lindblom, 1977; Williamson, 1975), for instance, and the prevalent assumption, among economists, that if it is not the market that is allocating goods and services, it must be the hierarchy. Keynes and Hayek, for instance, both agreed on that; it is just that Keynes wanted a major role for hierarchy whilst Hayek, seeing that as 'The Road to Serfdom', wanted it to be as minimal as possible. Exactly the same dualistic distinction also lies behind most of the diagnoses of the 2007/08 credit crunch and the subsequent economic turmoil, with all the talk of 'light-touch' and 'heavy-hand' regulation, the former being the Hayek preference, the latter the Keynes one (see Thompson, 2008a).

But there are some serious problems with the dualistic assumption. First, it is impossible to map the various distinctions onto one another. Tönnies' '*Gemeinschaft*', for instance, does not fit Maine's 'status', and Durkheim's 'mechanical solidarity' seems to encompass both '*Gemeinschaft*' and 'status'. Second, each of the dualistic schemes is incomplete when set against the long-established recognition, among both economists and political scientists (for example, Snidal, 1991), that there are four

kinds of goods: 'public' goods, 'private' goods, 'common-pool' goods and 'club' goods. Public goods, clearly, are shaped up by the hierarchical solidarity and private goods by the market solidarity, but the other two kinds of goods are left 'homeless'. Third, many institutionalists have now gone beyond the dualism framing and have recognized a third form of solidarity: 'clans' (Ouichi, 1980), 'clubs' (Williamson, 1975), 'community' (Etzioni, 1988), 'collegiums' (Majone, 1989), 'cliques' (Burt, 1992) and, of course, Weber's (1930) 'charisma'. Indeed, it has recently been claimed that pretty well all institutionalist theorists now recognize three forms of solidarity (Tilly, 2005). And those economists who have persisted with the dualistic scheme – 'Wall Street' (markets) and 'The White House' (hierarchy) have found themselves hit, broadside-on, by something that they had for so long excluded: 'Main Street', as it was quickly dubbed.

Theorists of 'plural rationality' (also called 'cultural theory') have shown that a fourfold scheme: four ways of organizing (or solidarities) – they are called 'hierarchy', 'individualism', 'egalitarianism' and 'fatalism' – resolves all these problems (Figure 1). First, all the dualisms map onto this fourfold scheme, and the different ways in which they map – their different mergings and exclusions – make clear just why it is that they cannot be mapped straight onto one another (see Thompson, 2008b). Second, all four kinds of goods are now accommodated: public goods being shaped up by hierarchy, private by individualism, common-pool by egalitarianism and club by fatalism (in the sense that it is the ease with which fatalistic actors can be excluded that enables club goods to take shape) (Thompson, 2000). Third, this fourfold scheme takes care of all those third forms of solidarity (clans, clubs, and so on) as well as explaining why it is that these theorists have missed the fourth one. Students of 'social capital' (to take yet another set of 'three-folders') now recognize three forms of that mysterious substance – 'linking' (hierarchy), 'bridging' (individualism)

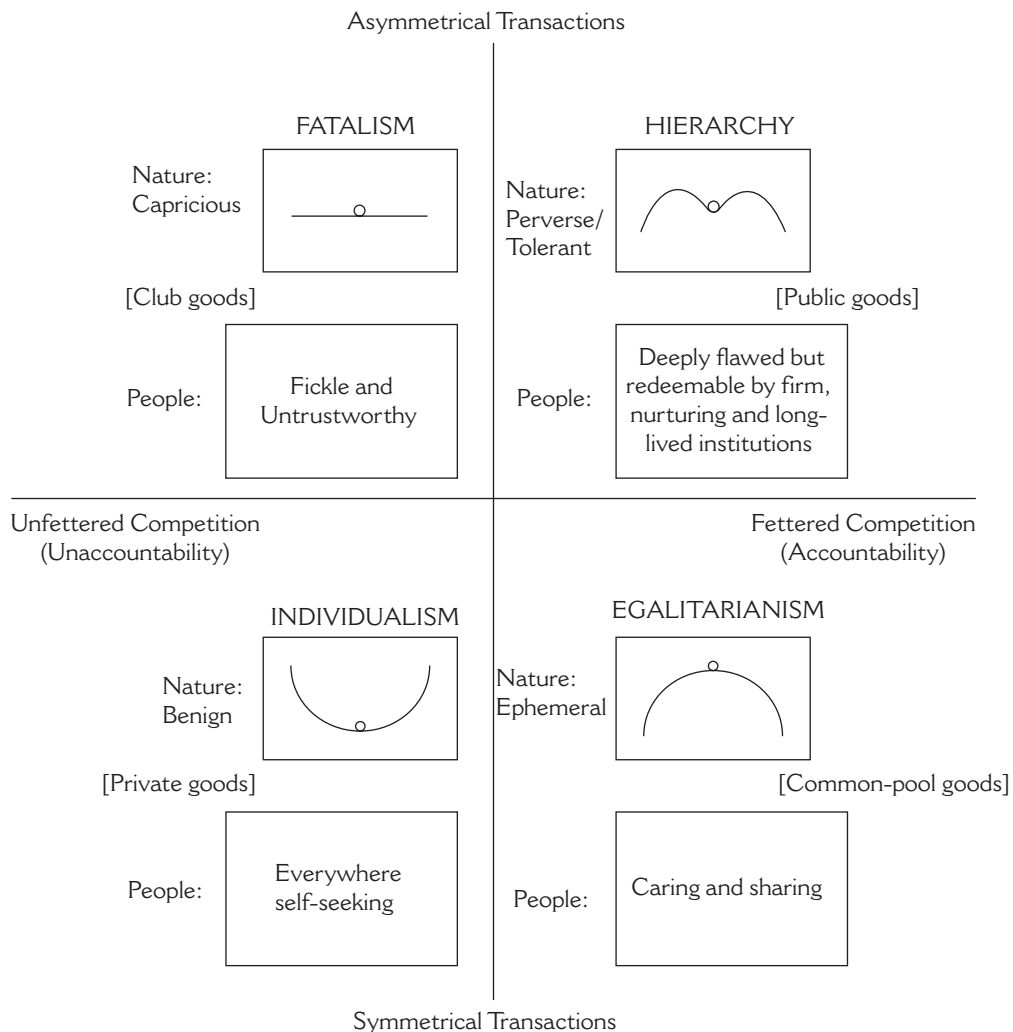


Figure 1 The four ways of organizing that are predicted by the theory of plural rationality

Source: Beck et al. (2011).

and ‘bonding’ (egalitarianism) (Szreter and Woolcock, 2004). Moreover, they also recognize (indeed, it is their starting point) the social situation, so troublesome to those who are concerned with the fostering of development and democracy, in which there is ‘no social capital of any kind’: fatalism (for example, Putnam, 1993).

Finally, the theory predicts the social constructions of nature – physical nature and

human nature – that render each of these four ways of organizing, perceiving and justifying social relations rational; hence the theory’s name. The upholders of each of these ways of organizing, though they will be acting and strategizing in mutually contradictory ways, are all perfectly rational, given their various convictions as to how the world is and people are. These – they are called ‘myths of nature’ – we will explain (together with the other sets of

predictions in Figure 1) as we get to grips with what has been happening, over the centuries, with water in Iran.

If we refer the traditional/modern distinction to this fourfold scheme, we can begin to see just how unsatisfactorily woolly it is. First, like all the dualisms we have looked at, it lacks the requisite variety: it transgresses Occam's razor, not by being multiplied beyond necessity, but by being insufficiently multiplied. Second, the notion of modernity varies as we go from Soviet-style communism (where things are pushed as far as possible towards hierarchy) to Anglo-Saxon-style capitalism (where they are pushed as far as possible towards individualism). But at least these two camps are broadly agreed about 'traditional': to get to 'modern', whether it be communist modern or capitalism modern, we will have to move ourselves away from egalitarianism: away from small-scale and unstratified communality. In other words, 'modern' means collapsing this two-dimensional scheme down onto just one dimension: the diagonal that runs from individualism to hierarchy (and then, like Hayek and Keynes, restricting the argument to just where on that dimension we should aim to be). The one-dimensional scheme is what we mean by 'government', and the two-dimensional scheme (a complex interplay between all four ways of organizing, perceiving and justifying) is what we mean by 'governance'. This characterization, while in line with the general view that governance is somehow broader than government, has the advantage of giving a precise (and testable) specification of what that broadness entails, thereby enabling us to focus on the ways in which the 'complex interplay' can vary and, with it, the quality of the governance that it delivers (see Ney, 2009; Thompson, 2008b; Verweij and Thompson, 2006).

We should pause here to make two points. First, re-conceiving development (and then using that re-conceptualization to clarify the difference between government and governance) is a major undertaking, and the above

is therefore little more than a sketch of what is entailed. Second, what has been lost, we will be arguing, is the institutional plurality that characterized the traditional practices. It is that that needs to be restored: essentially by making it possible for the egalitarian 'voice' to be heard once more. We are not advocating a return to how things were, socially and technologically, in the Middle Ages!

III Iran's traditional water management

Though the climate has varied over the centuries, most of Iran's surface area has always lain within what is now termed a 'semi-arid region'. There has never been much water, but we should be careful not to assume, as so much current discourse does assume, that water is scarce. It can be, and it currently is, but if people exercise shared voluntary restraint then there can be enough for everyone, in which case it is not scarce. Shared voluntary restraint, as we will see, is a characteristic of the egalitarian way of organizing/solidarity, and this means that economics – once it has been defined as the allocation of scarce resources to alternative ends – will be of little help to us. It is too narrow; it lacks the requisite (that is, fourfold) variety.¹

Iran's semi-aridity has resulted in agricultural systems, and their accompanying civilizations, that have depended on irrigation. The inhabitants of this vast plateau have managed their water resources, over thousands of years, in a way that we would nowadays call 'sustainable' (Labfaf Khaneiki, 2007). That is, they have developed technologies and practices that have enabled them to survive and prosper without taking more water each year than is received each year (Foltz, 2002). On the one hand, people have worked ceaselessly at civil works – central among which is the *qanat* (chain-well) that we will explain in a moment – to nurture and enhance this crucial resource. On the other hand, they have put in place ethical, social and cultural systems that work in the same practical direction. Ancient Iran thus had two principal devices for water

management: an accumulation of technical knowledge and a socio-ethical-cultural system. Together, these devices recognized both the ecological realities of the plateau's desert climate and the social imperative of conserving and distributing water in a way that ensured its availability to all. However, the advent of modernity, as we will see, changed all that.

A misplaced faith in the ability of some combination of technological intervention and market mechanisms to transform the ecological reality, by increasing both the supply of water and the efficiency of its use, has done for the first device. And a narrow focus on the provision of public goods (via the state) and private goods (via the market), at the expense of the common-pool goods that were so crucial an ingredient in the age-old mix, has done for the second device. That, in essence, is the governance-to-government transition that, we are arguing, needs to be reversed. Getting common-pool goods, and the sort of social relations and technological competencies that go along with them, back into the currently impoverished state of affairs is the only way to resolve the looming super-crisis.

Islam and, before that, Zoroastrianism have been the dominant religions in Iran, and both have provided support for its water management systems. Iran, of course, is still an Islamic country (indeed, it is an Islamic Republic) which suggests that the belief system has somehow become disengaged from the practical business of water management: another instance, perhaps, of the dysfunctionality inflicted by modernity. A brief survey of how these two religions were engaged with water management may therefore provide some guidance as to how Islam might become re-engaged.²

In Zoroastrianism, water is associated with the goddess Anahita, with another deity, Patet Apam, being the guardian of rivers, springs and the sea. According to the sacred text, the *Avesta*, water must be kept pure and unpolluted, and Zoroastrians, when approaching a stream, waterfall or spring, should recite an invocation – the *Ardivisura Banu* – from the

Avesta. The Zoroastrian ritual calendar marks the harvest, *patishalam*, by commemorating the primordial creation of water, and many of the important annual festivals celebrate seasonal aspects of nature: New Year on the first day of spring, the water festival in summer, and so on (Jafarey, 2005). In Islam, the *Quran* similarly emphasizes ecological understanding and stewardship. Human beings, it insists, though they are at the top of creation, are still members of the community of nature. Humankind is the trustee for the planet, and humans, while entitled to live on the Earth and benefit from it, are not entitled to pollute or otherwise destroy the environment. Any behaviour that jeopardizes the future of natural resources is thus an act against God and his creation (Haleem, 1989, cited in Balali *et al.*, 2009).

Cultural practices (which, of course, are permeated by religion but not synonymous with it) similarly reveal a preoccupation with, and respect for, water (Foltz, 2002). In Esfahan Province some villages still celebrate an annual 'qanat wedding', in which women prepare a special soup and then choose an elderly 'bride' who is dressed up, washed in the qanat and then pours the soup into it. This ritual, which no men are allowed to participate in, is believed to ensure that the qanat will continue to bring water for another year for the sake of its 'bride'. In other villages, a young boy will bring water from one qanat to another so as to perform a similarly auspicious 'marriage' of the two water sources. And in times of drought, in the Shahr-e Kord region, villagers perform a rain dance. Fire is carried by the participants in all these rituals indicating their survival from Zoroastrian times and testifying to the persistence of community-focused concerns for water.

Drawing on a combination of indigenous knowledge and experimental hydrology, the inhabitants of what is now Iran have, over the millennia, developed an impressive technological complex around water management: water mills, underground reservoirs, ice-ditches, dykes, and so on, all of which are dependent

on (or subservient to) the *qanat*. This *qanat*-centred technological complex is thus tied into a whole array of ethical principles, religious beliefs and cultural practices, with neither the technical nor the social making much sense without the other: a 'socio-technical system'.

The *qanat* (or chain-well) is a method of tapping groundwater without the use of lifting devices. By sinking a line of wells and then linking them with a gently sloping tunnel, the groundwater is brought from the higher ground until, after sometimes tens of kilometres, it reaches the surface to create what is, in effect, an artificial oasis (Lambton, 1953). This remarkable invention eventually spread from the Persian Empire to China, Arabia, Syria, Mongolia and North Africa and, from there, to Spain, from where it was later carried to Mexico and South America (English, 1997). In Iran alone, according to current statistics of the Qanat Information Bank, there are some 32,698 *qanats* (Forouzani and Krami, 2010) comprising more than 273,500 kilometres of underground channels. This system was not centrally planned; it grew incrementally, and the fact that it has been growing and functioning for thousands of years is proof that the groundwater that it taps is not being depleted; it must be recharging itself (with, as we will see, some ingenious human help) as quickly as it is being used.

Since the channels were underground, evaporation loss was minimal and the water remained cool through the hot desert summers. With the system designed around the climatic and topographic conditions, the mountain run-off was made available to farms, market gardens and towns, the one crucial proviso being that the flow of water through the *qanats* did not exceed the supply of water into the aquifers. As long as that limit was not exceeded the level of the groundwater remained steady, and this meant that, properly maintained, the *qanats* could provide a reliable and steady supply of water century after century. Supply, however, was enhanced by various human interventions that were also a

part of the socio-technical system. Recharge was augmented by the construction of dams to capture the winter rains and prevent a fraction of them running away as surface water. These dams were constructed in such a way as to constitute a designated area that extended, depending on local conditions, between one and three kilometres on either side of the *qanats*. Since no individual farmer could command either the capital or the manpower needed to construct and then maintain a *qanat*, it could only be done through collective action. The engineering and its accompanying technology thus required a particular kind of social organization, and vice versa. The *qanat* socio-technical system thus required a 'we're all in this together' ethos and a resulting commitment to shared voluntary restraint (something that, contra those who subscribe to the 'tragedy of the commons', is quite easily achieved in the face-to-face setting of a village). The modern socio-technical system, as we will see, dispensed with these crucial institutional features. The *qanat*, therefore, is not just an engineering wonder; it is also a remarkable social phenomenon. And it is the two together – each requiring the other – that constitutes the traditional socio-technical system (Balaili et al., 2009).

The consequence of this energetic, 'cando', small-scale kind of collaboration, repeated again and again in village after village across Iran, has been a high level of local autonomy, community empowerment and public participation: a fine example of what is called 'bonding social capital' (Szreter and Woolcock, 2004). This (referring back to Figure 1) is in contrast to both 'bridging social capital' (which is characterized by market relationships) and 'linking social capital' (which resides in the sort of hierarchical relationships by which the grassroots are connected to higher levels and eventually to the state). Labbaf Khaneiki (2007) argues that most of the socio-political structures of Iran, being rooted in the long history of this pervasive water management system, are still strongly imbued with this particular form

of social capital; far from modernity, in other words. This, if true, is good news for those, like us, who see modernity as the root-cause of the looming super-crisis.

IV How, then, were these three kinds of social capital related?

The Iranian government has always placed a high value on water. The more perfect the distribution and management of water, the more taxes the government could levy (without any concomitant increase in pain). Government has therefore intervened in water management whenever any disorder in the agricultural production system that threatened the prospect of reduced tax revenues has arisen (Yazdi and LabbafKhaneiki, 2007). The state, moreover, had an interest in expanding the *qanat* system, since that would increase its revenue, thereby enabling it to better resist external attack and lessen internal dissent. *Qanat*-builders and their heirs were therefore granted a five-generation 'tax holiday' (Balali *et al.*, 2009) and this incentive resulted in the establishment of thousands of new settlements and the expansion of many of the existing ones. Furthermore, since the villagers themselves were not averse to opportunities for expansion, or to increased prosperity, or to being better protected from conquerors and marauders, there was a considerable mutuality of interest at the receiving end of this policy. At the state level, the ancient water authority took responsibility for adjudicating on water ownership, for recording water shares, and for calculating the amounts of tax that farmers had to pay for these shares. But water management did not end there; the 'dividing of the waters' (according to land ownership, irrigation rights, time shares, and so on) had to be matched with likely changes in the volume of water over the year, and accurate and acceptable judgements on that sort of matching could only be achieved at the local level: among and between the various actors – farmers, landlords, *qanat*-diggers, blacksmiths, carpenters, and so on – whose diverse contributions were

vital to the sustainable functioning of this complex socio-technical system. Key to this grassroots element within the system of water governance was an institution known as *buneh*.

The *buneh* was a multi-family collective, the major function of which was to reconcile the efficient exploitation of productive land with the careful use of the available water (that availability itself being, in large measure, a function of the socio-technical skills inherent in the *buneh*). All the *buneh*'s members, being peasants, were of the same social status (distinct, that is, from landlords, and so on, up to the king himself) but there was a division of labour between them. Each *buneh*, typically, had six members: the *buneh* head (or irrigator), two assistants and three sharecroppers (Lahsaeizadeh, 1993). *Bunehs*, however, were not autonomous; each was tied into a wider network that took in the landlord, other *bunehs* within the village, and a number of crucial specialists: the *qanat*-diggers, blacksmiths, carpenters and village-level service-providers such as barbers and bath-keepers. This sort of network, with all its diversity and mutuality, constituted the production system. Salmanzadeh and Jones (1981) see this as an 'agrarian structure', shaped over many centuries by a complex set of interrelated physical and cultural factors, and replicated again and again across the Iranian landscape. This agrarian structure, thanks to the plurality of ways of organizing and perceiving that it contains, can be seen as constituting an impressive 'learning system':

1. The clear emphasis on the efficient exploitation of productive land (together with the ever-expanding *qanat* system) comports with the notion of 'bridging social capital' and with the conventional social science concept of 'markets' (along with its supportive 'substantive rationality' – the 'bottom line' – and its tendency to see nature as essentially robust and bountiful (as is inherent in the ball-in-a-basin icon in Figure 1) with the

qanat-based expansion proving that to be the case.

2. That efficient exploitation, however, has to be reconciled with the careful use of available water, and this is where the sort of shared voluntary restraint that goes with the equality-enforcing co-operative aspect of the *buneh* comes into its own. This corresponds to what we have been calling 'bonding social capital' and to a form of social solidarity (egalitarianism) within which, and in marked contrast to both markets and hierarchies, the notion of scarcity has no place. Nature, far from being robust and bountiful, is fragile and parsimonious (as is inherent in the ball-on-an-upturned-basin icon in Figure 1). It is therefore up to us to collectively bring our needs down within the limits nature has set. Provided we all do that there will be plenty of water for all (and therefore no scarcity even though there is very little water). And that is what is going on within the co-operative, 'horizontal', caring-and-sharing part of the agrarian structure (and affirmed in all those cultural practices – *qanat* marriages and so on that, as we have seen, go way back to Zoroastrian times).
3. Some components within the agrarian structure, however, fit neither with the exuberance of market individualism nor with the restraint of horizontalizing egalitarianism. The linkages that go from the peasants to the landlords, and eventually all the way up to the king, entail status distinctions – hierarchy, in the conventional social science contrast to the market – and these align with what we have been calling 'linking social capital'. Nature, in this form of solidarity, is robust but only within limits (as is inherent in the ball-in-a-trough-between-two-humps icon in Figure 1); beyond those limits lies catastrophic collapse.
4. Finally, in contrast to the 'can do' exuberance of the market individualist

actors, to the shared voluntary restraint of the egalitarian actors, and to the expert-guided command-and-control of the hierarchical actors, there will always be some who find that nothing they do makes much difference (as is inherent in the 'flatland' icon in Figure 1; push the ball this way or that and the feedback remains the same). 'It is God's will', 'What's the point?', 'Why bother!' are the characteristic responses of those who find themselves fatalized: a situation that exactly matches the sort of setting – southern Italy is the classic example (Putnam, 1993) – where there is no social capital of any kind.

Our hypothesis is that, while fatalism is not absent from this traditional agrarian structure, it becomes more and more widespread and dysfunctional when, as has happened with modernization and the accompanying shift from governance to government, the 'learning system' is impoverished by the exclusion of the egalitarian solidarity and its accompanying bonding social capital.

V Iran's modern water management

In the aftermath of the Second World War, a secular government, dependent on (but peripheral to) world capitalism, and in harmony with the then-current Western ideology and belief system, came to power in Iran. This was the background for the 1960 'White Revolution': an America-inspired transition to the sort of 'Free World' stance that was at that time pitted against the communist ideology of the Soviet bloc in a confrontation – the Cold War – that eventually came to an abrupt halt in 1989 when the Soviet Union collapsed. Progress – by way of industrialization and urbanization – was the main revolutionary goal, but the agricultural and water sectors too were dramatically altered. These dramatic changes, however, were not anticipated, the countryside being viewed as a backward part of the economy: one that had no real

connection with the forward-looking, industrialized and urbanized state of affairs that was about to be put in place (Asaesh, 1994).

Water management, in particular, would have to be transformed, and it was believed that new hydrological technologies, borrowed from the West, would be more than adequate in meeting the country's skyrocketing demand for water. As in the western United States, it was confidently assumed that arid regions could be industrialized by making the necessary water resources available by building dams, pumping groundwater and constructing canals to bring water from remote sources in order to make the entire desert bloom (Allan, 2005). This sort of approach in terms of the technical management of water now goes by a number of labels: the 'prediction-and-control paradigm' (Pahl-Wostl, 2007), 'predictive management' (Termeer, 2009) and 'predict-and-provide' (Lack *et al.*, 2006), all of which are subsumed within the more general concept of the 'hydraulic mission paradigm' (Molle *et al.*, 2008). The assumption in the hydraulic mission paradigm is that nature can be controlled through scientific and technological means: the construction, for instance, of new and large-scale water systems comprised of reservoirs, canals, hydroelectricity stations, and so on. All this, moreover, is planned and determined by state agencies, using state funding. The emphasis is on technical solutions to narrowly defined environmental problems, with regulatory authorities implementing those solutions on the basis of expert advice (Pahl-Wostl, 2007): 'rational management', in other words: the particular style of policy-making that you get when just two of the ways of organizing – hierarchy and individualism are present and egalitarianism is excluded (Ney, 2009). This, in our terminology, is 'government', in contrast to the more plural and responsive (and traditional) 'governance' that it has supplanted.

Though the agricultural sector was marginalized during that era, it did not escape the sort of purposeful planning that characterized

the White Revolution. The main impetus for its transition to modernity came in 1960, with the land reforms that broke up the large estates and redistributed the land to the peasants. This, in our terminology, was a marked weakening, at the village level, of hierarchy, and, when combined with other planned interventions (extension services, subsidized inputs, and improved communications), it drastically changed the agricultural system. More land was brought into cultivation, fertilizer use was significantly increased (Deihimfard *et al.*, 2007), and there was a marked diversification of crops (particularly into cash crops, especially wheat) (Yadghar, 2003).

The dominant agricultural policy, at that time was the productivist, with its emphasis on the high pay-off input model (Rezaei-Moghaddam *et al.*, 2005). So Iran experienced a double whammy, with an industrialized style of agriculture – modern agriculture's package of high-yield varieties, fertilizers, pesticides and heavy irrigation – being piled on top of the White Revolution's land reforms. Inevitably, water demand increased way beyond what the *qanat* system could provide (Yadghar, 2003). The *qanat* system then got the blame for this, with most Iranian scientists and politicians exaggerating its technical deficiencies so as to justify their own modernizing programmes and to persuade farmers to switch over to pump extraction (Balali *et al.*, 2009). Tube wells and pumps, however, simply did not entail the sort of egalitarian collaboration that had characterized the *qanats*. They could be deployed by the individual farmers, each on his own land (ownership having been vested in them by the 1940 Land Reform Act). And, with the wells and pumps private in this way, the water too became perceived as a private good. The result has been a 'race to the bottom': to the bottom of the aquifer in this case, with the competitive advantage going to those who were able to pump the cheapest water (the water nearest the surface) before it could be accessed by the others. As a result, many deep wells were sunk and water was pumped with little concern

about the environmental effects of what is now called 'competitive deepening'.³ Nor was there any entertaining of the alternative: keeping the *qanat* system and opting for demand management instead of 'predict-and-provide'. The romance of this new water management paradigm, moreover, did not end there.

VI Governance out; government in

In the traditional paradigm the cultural, religious and technical aspects of the production system were closely interwoven. In particular, the moral responsibility towards nature ensured that water was valued as much more than a mere commodity. In the modern paradigm, however, we get a new world view: one in which, as Cruickshank (2009) has argued, production is split off from culture. Culture and nature are no longer brought together locally: no *qanat* weddings, no more invocations to ancient gods and goddesses. Or, to be more precise, culture and value-creation are increasingly joined together in a fundamentally non-local way, by means of a universal and instrumental ideology based on the industrialized exploitation of natural resources. Balali et al. (2009) call this a 'mechanistic' world view, the new water management regime, with its reliance on deep wells, fossil energy and large dams, being more in tune with the impersonal workings of some vast machine than with the ethico-religious frameworks of the past and their accompanying *qanat*-based socio-technical systems. This mechanistic world view, in turn, was supported and justified by what is now called a 'totalizing discourse' (Mehta, 2010): one in which all aspects of water are reduced to a single framing in terms of 'water scarcity'. In this discourse, water becomes either a public good or a private good, but no longer a common-pool good (since common-pool goods require both the weaving together of water's multiple aspects and the localization of that weaving together).⁴

1. The Green Revolution's centralized expert approach, in line with the

then-current goal of modernization, opened the way to an industrial style of agriculture. This approach, it has been argued, was both reductionist and positivist, in the sense that it provided the tools that made possible the conquest of nature for the improvement of human welfare and, in the process, separated society from nature (Brunner and Steelman, 2005; Dietz et al., 2003; Nelson et al., 2008). Water management was seen as primarily an engineering problem: one in which the efficient solution lay in technological fixes.

2. Water management thus became the preserve of technical experts working under the auspices of the state (Pahl-Wostl, 2002). The assumption was that water (and natural resources in general) can be predicted and controlled, notably by means of planned and large-scale infrastructural works: Nehru's large dams as India's 'temples of the modern age' being the classic instance.
3. Attention thus shifted away from the traditional *qanat*-based technologies and towards large dams, irrigation canals and deep wells equipped with pumps. This was a shift from living with water to mastering it through science and industry (Allan, 2005).

Water, of course, turned out not to be as controllable as was thought. While the *qanat*-based socio-technical system made it difficult to extract more water than was finding its way into the aquifers, the new socio-technical system pretty well guaranteed the opposite: competitive deepening.

Competitive deepening can be seen as a pathological consequence of the 'totalizing discourse' in which everything is reduced to 'water scarcity'. Scarcity, we can observe, is vital to both markets and hierarchies: the two forms of social solidarity that are recognized by the over-narrow framing we have labelled 'government'. Markets need goods to be

scarce (otherwise people would not have to rank their preferences) and so do hierarchies (so that, when markets fail, they can step in and set prices). But common-pool goods – the water that flows through the traditional *qanats*, for instance – are not scarce, and therefore find themselves excluded by the totalizing discourse: the discourse that has justified and promoted the White and the Green Revolutions.

VII Know your enemy

The Land Reform Act did away with the *Zamindar* – the large landowner – and, with no civil organization to replace it, the state became the big lord: one single actor, and at the national level, where before there had been a multitude of these essentially hierarchical actors, all at the village level. This, especially because the *Zamindar* have had a major role in ensuring that the *qanat*'s water remained a common-pool good (Forouzani and Karami, 2010) was a major institutional shift: away from governance and towards government. It also paved the way for an entirely different type of production system: 'modern' technologies for sinking boreholes and pumping water, capitalistic farm enterprises, rural co-operatives and agribusinesses, all directly guided by policy that was formulated and implemented at the state level. There was a simultaneous loss of plurality (private and public goods but no common-pool ones) and a migration of institutional arrangements from the village to the national level: lots of market and state, you could say, and very little genuine civil (that is, egalitarian) society.

Modernization continued after the Islamic Revolution, but in a modified direction. Increasing solidarity with other Islamic and revolutionary nations, together with a marked antipathy towards the capitalist West ('the great Satan'), led to more rapid population growth, along with a brake on the previous regime's factory-building, and a questioning of that regime's efforts to industrialize the agricultural sector (Foltz, 2001). Agriculture thus became a central focus for Iran's

post-revolutionary policy-makers, and there was a marked expansion of mono-cropping, along with the incentivization of grain-production through such interventions as guaranteed purchase, subsidization, crop insurance, and so on (Deihimfard *et al.*, 2007). The result was a new, and distinctly Iranian, modern agriculture, with more and more land (even land with marginal agricultural potential) being brought into cultivation. Between 1973 and 1998 almost 483,000 hectares went under the plough, and many deep boreholes were sunk so as to provide them with pumped-water irrigation (Balali *et al.*, 2009). The end-result of all this, with the *Zamindar* no longer mediating between the micro and macro-social levels, and with the market's operation distorted by a host of welfarist interventions, was a kind of centralized command-and-control state: prescriptive management, with very little scope for those at the micro-level to communicate with those who were doing the prescribing.

The gulf between what this sort of regime aspires to and what it actually ends up doing has received considerable scholarly attention, often in settings remote from Iran (which is all to the good, since we wish to criticize this general kind of shift away from governance and towards government rather than Iran itself). Some social scientists (for example, Rose, 1993) would characterize this Iranian regime as a 'welfare state'; the welfare state is seen as attempting to foster a nationally inclusive social citizenship through the maintenance of full employment, integrated public service provision, and extensive safety-nets for the vulnerable. In a welfarist regime, the state becomes the 'central brain' of the country and thereby, so this mind-set asserts, makes the best and most rational decisions for all the lesser parts of the social body. Both characterizations seem to fit the Iranian case, especially when we look at its agricultural sector, where policies of subsidization, stabilization and expansion have collectivized the economic risks to farmers and transferred them to the state. The 'central brain's' idea was that all this would ensure

that farmers' productive capacity would be protected from the adverse impacts of both market fluctuations and natural disasters.

These same social scientists then go on to observe that there is a host of inefficiencies and dangers associated with this sort of extensive state involvement in social and economic life. Such involvement, they point out, perpetuates inequalities, stifles economic growth, creates dependency and suppresses individual endeavour. Instead of citizenship constituted in terms of social obligations and collectivized risks, what is needed, so this argument goes, are individualized citizens, all drawing on their capacities to conduct themselves in an entrepreneurial manner (Rose, 1999: 139). The enemy, therefore, is centralization and hierarchy, and it can be overcome by decentralizing and by shifting towards market individualism: the 'Washington consensus', in other words (the hierarchical assertion that markets can, and should, do it all). However, despite appearing to make sense of what is happening in Iran, there is something seriously wrong with this diagnosis and prescription. First, if the diagnosis is valid, it would hold for all welfare states, and it does not. Norway, for instance (to take one of the Scandinavian welfare states), is one of the most equal of countries, as well as being one of the richest (and therefore no slouch when it comes to economic growth). Nor is it easy to discern much passivity or lack of individual endeavour among its citizens. Second, if this prescription – essentially Alan Greenspan's 'self-interest ideology' – is valid, how come it has just plunged the world into the deepest financial crisis since the Great Depression?

The trouble, we would suggest (and we have been arguing along these lines throughout this article), comes from this welfare state framing not being sufficiently varied: just hierarchies and markets, together with the invalid assumption that hierarchy is somehow restricted to the state level and cannot manifest itself at more micro-levels (for example, the village). But if there were only markets and hierarchies, there would only be two kinds

of goods – 'private' and 'public', whilst, as political scientists and economists have long recognized, there are also 'common-pool' goods (the water in the *qanats*, for instance) and 'club' goods (which is what you get in those social settings – 'crony capitalism' – where the suppression of the egalitarian civil society actors permits a too cosy coming-together of hierarchical and market actors; Thompson, 2005). Nor did the hierarchy inherent in the peasant-*Zamindar* status distinction migrate all the way up to the state level and become a remote 'central brain'; it stayed anchored at the village level, closely tied into local realities and tacit knowledge (knowledge, such as how to dig *qanats*, that could never be transferred to the 'central brain').

The enemy, therefore, is not too much state hierarchy, nor is it not enough market individualism. Rather, it is the exclusion of that which is neither of these! This misidentification of the enemy is then compounded by the assumption that hierarchy implies the state level and markets the individual level. Rather, institutional style is independent of social scale. There are centralizing and hierarchical actors at the village level (as we have seen with the *Zamindar*), and vast multinationals (though they may be hierarchical internally) are 'market individuals' in their external transactions. Hence Ronald Coase's famous observation that firms are 'islands of central planning in a sea of market relations'. Indeed, the plural rationality argument is that the four solidarities/ways of organizing have a sort of fractal quality and can therefore be expected (in varying strengths and patterns of interaction) at every scale level: from the global (for example, international negotiations over climate change; Douglas *et al.*, 2003) to the most local (for example, household consumption styles; Dake and Thompson, 1999).

VIII So, if the enemy is not what it used to be, does that make a difference?

We need to proceed carefully here because, as we have already pointed out, the conceptual

framework that gives us the 'mis-identified enemy' 'does' fit the Iranian case quite well. The troubles only show up when we look at other welfare states, and when we start unpacking the institutional dynamics at the various scale levels.

In some villages in Southern Khorasan, which lies at the edge of Iran's central desert, the people had for many years earned their living by camel husbandry. The 'central brain' then decided that they could improve their economic situation by switching to pistachio cultivation. They were to give up their camel husbandry (which was seen as a waste of time and money) and convert their meagre pastures into irrigated orchards, with the water being pumped from the many deep boreholes that were sunk across the arid landscape. The extracted water, however, was saline and, when inadequately drained, left a residue of salt which then built up to the point at which the pistachio trees could no longer survive. The farmers therefore elected to return to camel husbandry, only to find that the environmental conditions were so altered that there was no longer the sparse vegetation that hitherto had provided food for the camels. The pumps, it turned out, had so depleted the aquifer that the roots of the plants (such as *alhaji*) that were the main food for the camels could no longer reach water. In this way, the villagers lost both livelihoods – agriculture and animal husbandry – and were forced to migrate to some of the principal cities, where they became fatalized squatters on the urban margins. Agricultural modernization, when implemented in this centralized and expert-guided way, resulted in many indigenous crops being lost, and many adaptive practices (camel herding, for instance) being abandoned. As the mono-cropping of high-yield varieties spread on a national scale so more and more water and artificial fertilizer were needed and these, in turn, often resulted in the salinization of the land. The entire system was thus locked into a downward spiral.

Clearly, then, there is much more behind this looming super-crisis than just too much

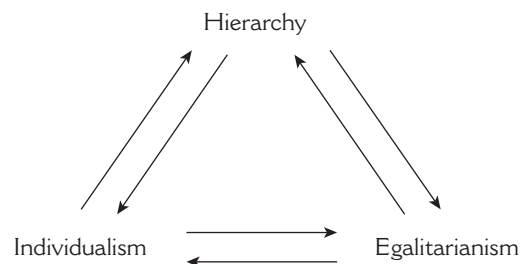


Figure 2 The full triangular interplay of the three 'active' solidarities

Source: Thompson (2008b).

government hierarchy or not enough market individualism, and our plural rationality explanation replaces the linear back-and-forth model (with hierarchy at one extreme and markets at the other) with a two-dimensional model, in which there is a 'triangular interplay' between the three 'active' solidarities/ways of organizing: hierarchy, individualism and egalitarianism (Figure 2).

When all three solidarities are in evidence (when they all have 'access' to the decision-making process, that is) and when all six arrows are in place (when each of the three solidarities is 'responsive' to the other two, that is) then the dynamic plurality is at its richest: a state of affairs that is termed 'clumsy institution'⁵ (Verweij and Thompson, 2006; Thompson, 2008b). At the other extreme, when decision-making is dominated by just one of the solidarities (when access is singular, that is) and just one 'voice' drowns out the others (when responsiveness too is singular) then we have what is termed 'closed hegemony'. And, somewhere in between, we have a range of situations in which two solidarities have access and together exclude the third, and one of these – the linear to-and-fro of hierarchy and individualism (market) – is pretty much what Iran has now shifted to, from a 'traditional' state of affairs that was pretty close to clumsy institution.⁶ A further prediction from the theory of plural rationality is that, as access and/or responsiveness are reduced so more and more actors within the system will

find themselves squeezed out into the fourth (and inherently passive) solidarity: fatalism (Thompson and Gyawali, 2007). This, as our camel-herding example shows, is exactly what has happened in Iran.

In terms of this triangular interplay (Figure 2), we can see that the current situation in Iran (limited access and limited responsiveness) is not nearly as bad as closed hegemony (minimal access, minimal responsiveness) but way short of clumsy institution (maximum access, maximum responsiveness). This is valuable information, since it gives us some crucial guidance on how to improve things: that is, on how to go from government to governance.

1. Avoid any reforms and institutional changes that, by moving from where things are now towards closed hegemony, will actually make things worse. This might seem obvious as to not need saying, but this sort of perversity is precisely what is being urged by those who identify the welfare state as the villain and then advocate a shift to market individualism: the Washington consensus.
2. Design a series of reforms and institutional changes that, by bringing in the currently excluded apex – egalitarianism – and then ensuring that there are two-way arrows between all three apices (maximum access, that is, and maximum responsiveness) will effect a relatively smooth transition to clumsy institution.
3. ‘Radical conservatism’ – revisiting the traditional so as to appreciate the neglected wisdom that it contains and see how it might be re-configured and transferred to the future – is the sort of tentative and experimental approach that is needed. And, of course, there is no chance of doing that if you are defining the future by means of some contrived cut-off point with the past: modern versus traditional, for instance, or postmodern versus modern. This – the ‘chauvinism of periods’,

as it has been called – is a temptation to which social science all too frequently succumbs (Perri 6 and Mars, 2008).

Avoid that temptation, however, and it is abundantly evident that Iran used to have much of what is currently missing. Indeed, if the experience of countries (like Nepal; see Thompson and Gyawali, 2007) that have faced similar crises is anything to go by, these institutional features are not in fact missing; just suppressed. Remove the suppression, and provide the right incentives, and they will be back in no time!

4. The modernizing hierarchical and market actors, we can note, ended up with their attention focused on ‘ecosystem services’ and then drew on global science, rational management and market forces to optimize them. In the process, they neglected ‘ecosystem functions’, which the camel herders and *qanat*-diggers (though they may not have had an explicit theory of it all) did not. And, of course, with all the competitive deepening and unanticipated salinization that modernization has given rise to, it is those ecosystem functions that have collapsed. And, if the ecosystem functions have gone, so too have the ecosystem services. The *qanat*-based sociotechnical system, by contrast, was not scarcity-driven and was pretty well incapable of diminishing eco-system function. Much the same (though we know little about how it was actually implemented or about the tacit knowledge on which it was based) must have held for the institutional arrangements that went with the camel herding.

IX Conclusion

Over the past four decades, Iranian farmers (and others who are close to the land) have watched water tables drop as one well after another has dried up and as formerly fertile lands (and even lands that could support only

camels) have been forced out of productive use. With ecosystem services increasingly undermined by the loss of ecosystem functions, there is a broad consensus that Iran faces a serious and growing water crisis.

The nub of this super-crisis is that water is being taken out faster than it is coming in. The result is that ecosystem services that have been available for thousands of years are fizzling out, thanks to the loss of ecosystem functions as a consequence of competitive deepening.⁷ Competitive deepening, in its turn, is the consequence of the transition from governance to government that was part and parcel of the variously-coloured revolutions that ushered in Iran-style modernity. Switching back – from government to governance – is therefore what is needed. Then, with water scarcity no longer a totalizing discourse, there is the possibility of getting the water table back to where it was before modernity took hold. And then, with the water table back and stabilized, the technical fixes so beloved by the proponents of government (along with others, such as *qanat* restoration, that are beloved by upholders of the egalitarian solidarity) can be put in competition with one another, with the market then deciding which ones merit large-scale adoption, which others are optimal in certain ‘niches’, and which others can be allowed to fall by the wayside.⁸ In this sort of clumsy solution, the egalitarian solidarity (allied with village-level hierarchy) has a major role to play in restoring and stabilizing the water table. But the macro-level hierarchy, too, has its part to play (protecting the niches, for instance, clarifying collective property rights, and directing research and development funding towards promising technological innovations that have little initial appeal to market actors). And, of course, the market too is a crucial component in the clumsy mix.

The above, we hasten to stress, is just a tentative sketch of how an Iranian clumsy solution might pan out. Indeed, to speak of a ‘solution’ is not quite right, since clumsiness is more a process than a destination: a way

of harnessing institutional plurality, and its accompanying and contending discourses, so as to enable the highest possible levels of deliberative quality and social learning.

Notes

1. Economics narrowed itself down, and adopted this definition, in the 1920s; it was not like that. Indeed, Keynes believed that scarcity was just a temporary phenomenon and would soon disappear (see Mehta, 2010). Economics, you could say, has been captured by modernity: narrowed down to the single dimension that runs back and forth between individualism and hierarchy.
2. Some have argued that the moral basis for environmental protection derives from the animistic religions of small traditional cultures that are still closely dependent on the land (among which it might be possible to include Zoroastrianism) but not for the great universalizing religions – Judaism, Christianity and Islam – which, it is claimed, are all anthropocentric and supportive of the view that humanity can transcend and dominate nature. Others have pointed to many instances (Christ’s Sermon on the Mount among them) where these traditions have had no great difficulty in recognizing nature’s intrinsic rights (see Thompson and Rayner, 1998, especially pp. 267–68).
3. ‘Indian farmers’, Specter (2006) tells us, ‘are good capitalists, and, when a good capitalist has a product that everybody wants, he sells it’. ‘Everything is for sale in the grey area between urban India and farmlands’, he continues, and these days ‘water earns more than rice’. There is no longer any sharing in the access to water below the ground, merely a process of ‘competitive deepening’ (for a graphic depiction of this process, see Figure 1 in Beck *et al.*, 2011).
4. As Coca Cola discovered, to its cost, when it unwittingly treated as a private good the groundwater that Indian villagers adjacent to its factory had long shaped up into a common-pool good. The Chipko Movement in northern India is another good example; the common-pool good in that instance being the village forest (see Thompson, 2002).
5. This is a tongue-in-cheek label that thumbs its nose at the hubris of the advocates of single-metric optimization: the ‘elegant’ methods that depend on rationality being singular.
6. A full description of the two extremes and the in-betweens requires a 3×3 matrix (see Ney, 2009; Thompson, 2008b).
7. Climate change, if it impacts Iran as predicted, will make things worse but is not itself a part of the super-crisis. There have been profound climate changes in Iran over the past 6,000 years but (with just the two exceptions with which we stated this article) the

qanat-based socio-technical system has taken them in its stride.

8. Large-scale adoption goes with global markets; 'niche' adoption with more local markets. Globalization, of course, has made more and more markets global. Even so, there is little prospect of a global market in haircuts! And, just because a market 'can' be global it does not have to be (as Keynes was careful to point out; many goods, he felt, should be 'homespun').

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