

WATER IN INTERNATIONAL SYSTEMS: A RISK SOCIETY ANALYSIS OF REGIONAL PROBLEMSHEDS & GLOBAL HYDROLOGIES

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‘The discourse of risk begins where the unbroken trust in safety (‘progress’) ends and applies so long as the catastrophe has not (yet) occurred. *The perception of threatening risks determines thought and action.*

‘This peculiar reality status of ‘no-longer-and-not-yet – ‘no longer trust/security, not yet destruction/disaster’ – is what *the concept of risk expresses and makes a public frame of reference. The sociology of risk is a science of possibilities.*

‘The sociology of risk reconstructs a tech-social event in potentiality, but in a very concrete sense. Where risks are believed as real, the foundations of business, politics, science and everyday life come into flux. The concept of risk, considered scientifically (risk = accident x probability), accordingly works itself out in the form of the calculus of probability, which we know can never rule out the worst case. This becomes significant in view of *the socially very relevant distinction between risk deciders and those who must clean up the decisions of others.*’

(Beck 1999 p 75)

Abstract

The purpose of this study is to emphasise that while social theory is essential and it often takes a prime place in the analysis of water resource policy making and change it is not sufficient in itself to explain why water management and innovative water policy reforms have evolved as they have. Water sector policy has always to some extent been reflexive within constantly changing national and international political economies. Beck (1999) and Giddens (1990) argue that industrial modernity was a dominating context in the first decades of the twentieth century. The late twentieth century they suggest is characterised by a new phase of modernity substantially determined by factors they have conceptualised as being brought about by new levels of knowledge, by revolutions in communication and by the institutional capacities of the new ‘risk society’. Such theorising is very relevant to water sector policy making. Policy making is driven by perception and in the ‘risk society’ awareness of the risk of negative impacts of water deficit and degraded water quality can be more comprehensive than in the past. Awareness of a ‘new’ risk is informed by science

which captures data on environmental, technical, demographic as well as socio-political circumstances which influence water resource use and policy.

Empirical exemplification of 'risk society' theory in this study will take the form of a review of the experience of water resource use and policy in the first region to run out of water, the Middle East and North Africa (MENA). MENA experience in the water sector shows very clearly that new knowledge on the existence of unprecedented, although not unforeseen, risks can be very effectively de-emphasised in political systems. Societies and consequently decision makers can ignore the intuitively compelling notion of water being part of a potentially catastrophic closed hydrological system. They have found remedies to water deficits in the very operational and efficient global trading system. Since 1970 they have enjoyed the benefits of farm policies of distant Northern water rich regions which deliver food commodities at half the cost of production. Each tonne of grain contains 1000 tonnes of 'embedded' water. These food imports contain all the 'virtual water' needed to meet current and future demographically driven increases in water demand.

Key words: water, water policy, Middle East and North Africa, political economy, social theory, politics of knowledge, risk society

Introduction

This means among other things that risk statements are by nature statements that can be deciphered only in an interdisciplinary (competitive) relationship, *because they assume in equal measure insight into technical know-how and familiarity with cultural perceptions and norms.*

(Beck 1999 p 77)

Some temporal dimensions

Water in the environment, in global and regional and national economies, and in the societies and polities in which these are embedded, is universally regarded as an essential commodity and frequently as an appreciated amenity. Such is water's fundamental place in sustaining life and livelihoods that human societies have devoted political energy and substantial economic resources to ensuring secure supplies, albeit without ensuring equitable access or freedom from the risk of water resource shortages for everyone. During the recent century of the first phase of (industrial) modernity, from the late nineteenth century until the 1970s, water resource discourse and water resource politics and management were dominated by the vision and politics of what has been termed the *hydraulic mission*. (Swyngedouw 1998, Reisner 1984). This mission was first and most fully implemented in the United States (Reisner 1984) and emulated in a very different polity, the former Soviet Union (Brezhnev 1978). A similar mission was integral to the rhetoric and resource allocation politics of many other political economies such as post-imperial Spain. (Del Moral 1996, Swyngedouw 1998)

The Giddens/Beck notion of 'reflexive modernity' (Beck 1992, 1995, 1996a & b, Beck et al. 1996, Giddens 1990) is useful in explaining the shifts in approach to public perceptions of the environment and related 'risks' in the late phase of 'industrial modernity'. They argue that the shifts in awareness and perception have occurred as the result of the impact of reflexive processes. The concept is especially useful in the analysis of socio-political approaches to the environment and especially in understanding the way that water resources have been perceived during and since the 1970s. In the Northern economies thirty year

discourses characterise the protracted contention over water policy (Beck 1995, Carter 1982 p 76, Hajer 1996, Allan 1996b). President Carter, for example, found participation in the transition particularly rough. What he thought was a solution appeared to be a problem to the US legislature:

‘ Had a rough meeting with about 35 members of the Congress on water projects. They are raising Cain because we took those items out of their 1978 budget, but I am determined to push this item as much as possible. A lot of these projects would be ill-advised if they didn’t cost anything, but the total estimated cost of them at this point is more than \$5 billion, and my guess is that the final cost would be more than twice this amount.’ JC Diary, 770310, in Carter 1982, p78

‘I had several serious disagreements with Congress, but the issue of water projects was the one that caused the deepest breach between me and the Democratic leadership. As a governor and during my campaign, I had repeatedly emphasized the need to eliminate waste and pork-barrel projects in the federal government. Some people had heard and understood what I was saying. The members of Congress had not. They were amazed when I moved to cut out the worst examples of this abuse - unnecessary dams and water projects that would cost billions of dollars and often do more harm than good. The problem was that scores of these plans were in progress, from the original conception to the final construction stage. Some of the more senior members had been waiting many years for their particular proposals to get to the top of the list. The projects represented major political plums for each district, tangible symbols of the representative’s influence in Washington. For ten or fifteen years, in every congressional campaign, the promise of a new lake or canal was put forward to create temporary construction jobs, satisfy local pride, and win votes.

‘I understood the importance of these long awaited projects to the legislators, but during the years since their initial conception, circumstances had changed, environmental considerations had increased in importance, costs and interest charges had skyrocketed, other priorities had become much more urgent, and any original justification for some of the construction had been lost forever. *Still the inexorable forces toward legislative approval moved on. Other recent Presidents, graduates of the congressional system, had looked on the procedure as inviolate. I did not, and dove I head first to reform it.*’ JC Diary, 770310, in Carter 1982, p78-80

Explanations of the transition, from water policies dominated by the ‘old water knowledge’ inspired by notions of the hydraulic mission, to the ‘new water knowledge’ - some aspects of which are captured in President Carter’s words above - are diverse. A number of disciplines have contributed to explanations concerning why, how and when transformation in water policy and water management practice occurred.

Economists have made an important contribution by identifying a temporal sequence in approach by natural resource using communities. Karshenas (1994) has suggested that emphasis shifts from natural resource use with attendant degradation in an early phase of socio-economic development, to resource use without degradation and finally to the reconstruction of the natural resource. The economists claim that the lengths of the phases and the pace of change from degradation, to sustainable use and to reconstruction depends on the levels of ‘socio-economic’ development achieved by a political economy. (Karshenas 1994, Allan and Karshenas 1996) The Karshenas concept is much strengthened if it is associated with the social theory which emphasises the importance of the ‘social adaptive capacity’ of communities and national economies in enabling water policy reform and the adoption of measures to improve water use efficiency. (Ohlsson 1998, Turton 1999)

The major contribution of *economists* has, however, been in explaining why water policies are as they are in the most extreme water stressed region, the Middle East and North Africa [MENA] and why water scarcity has not been a serious problem. Economic history and economic geography show that natural resource contexts do not determine economic outcomes. Economic policy options available to natural resource using communities can be numerous and they are especially numerous in diverse and strong economies. Strong and diverse, and even oil enriched, economies have the option to achieve ‘factor equalisation’, for example by substituting capital for labour or for natural resources. In the decades since the MENA region ran out of water in about 1970 the oil enriched economies with about half of the region’s population have been able to mobilise water from other regions via trade in commodities which are water intensive in production. A major example is grain. The MENA region was accessing about 25 per cent of its water in this way by the late 1990s. The MENA region includes both the oil enriched economies and many strengthened, at least in the 1970s and 1980s, by the remittances of professionals and workers working in the Gulf. More water was entering the region as ‘virtual water’ embedded in grain imports annually than flowed in the Nile each year into Egypt’s agricultural sector. (Allan 1997) The Nile is the MENA region’s major water resource.

Political scientists have made their contribution to explanation by showing that policy reform usually only occurs when there has been an attention grabbing shock (Kingdon 1984), for example a drought (Allan 1995 and 1996a). Extreme natural events tend to achieve an exceptional convergence of awareness on the part of major and minor water users, as well as on the part of policy makers, legislators and of influential agents, such as the media. Political scientists also point out that the pace of policy reform is subject to a range of political influences and circumstances. ‘Weak states’ find it very difficult indeed to implement the institutional reforms necessary to achieve water use efficiency and well regulated water use. This is especially the case where there is a strong society. The phenomenon has been analysed and confirmed in the water stressed Middle East. (Migdal 1988, Allan 1996b)

Another political science concept, that of the ‘interests’ of the community or nation in ensuring beneficial outcomes for them of any water management intervention, has proved to be very useful. Finally the concept of discursive analysis (McHoul and Grace 1993) which helps show how users of water contend with those advocating water policy reform. The process of contention and the achievement of ‘consensus’ takes time and outcomes never accord exactly with the goals of any of the contending parties; certainly not those of the alien scientist and consultant. A particularly relevant version of this explanation of discursive analysis in the MENA region is that of the ‘sanctioned discourse’ (Tripp 1996). Such discourse occurs where the beliefs of a society are deeply entrenched. In MENA polities such beliefs can have been almost continuous over six millennia. The fundamental and essential belief is that the water resource will be sufficient for all the economic needs of all users and all strategic needs. No Middle Eastern politician will deploy alien ‘new knowledge’ about the lack of sufficiency of water to confront these deeply held communal beliefs about water. The lock which such discourse puts on water sector policy is especially evident in political economies which have a very long tradition of water management, for example Egypt.

The contribution of *social theorists* to explaining water has only very recently been recognised. Social theory helps explain why the ideas of alien hydrologists, drought specialists and economists have little impact on the national policies of the governments of water scarce political economies. The notion of ‘belief systems’, ‘information gaps’ and ‘mutual knowledge’ (Giddens 1984: 334-343) provide profound insights into the processes which alien innovators and local politicians and communities encounter when new knowledge is being recommended by outside professionals and scientists. ‘Belief systems’ can reflect the experience of five millennia of occasional drought but not of the deliberately de-emphasised systematic permanent deficit.

After 1950 many political economies in the Middle East and the Mediterranean, including Spain, entered a period of progressively more serious national water deficits – defined as insufficient water to meet all needs including that for self-sufficient food production. The communities experiencing this transition into water deficit were not equipped to deal with the new circumstances. Their ideas were based on perceptions that ‘water could be analysed as being a resource that embraces both ‘material’ as well as ‘symbolic’ interests’ (Bourdieu 1977, p182). The idea of ‘mutual knowledge’ (Giddens 1994) is also very useful in analysing the way alien knowledge enters and gains prominence in water short communities. Giddens’ notion captures very well the existence in circumstances encountered by the consulting community and scientists working on for example water and the environment and on related science and resource economics. Their assumption that water is just a ‘material’ resource is not readily accepted by communities which perceive water as a ‘symbolic’ resource. Ideas purveyed by alien scientists may come to be understood and become ‘mutual knowledge’ for part of the population, usually an elite acquainted with Northern science. That a phase of mutual knowledge has been reached does not mean that water policy can at that point be easily reformed. The process of reform is subject to the protracted discourse mentioned above which is in turn subject to the interests of stakeholders other than those enjoying ‘mutual knowledge’ about the material value of water. The attenuation of the adoption of ideas and their incorporation into policy can take 30 years as in the Israeli case of the adoption of the concept of allocative efficiency for water (Allan 1996b). The notion of the importance of high returns to water outside the agricultural sector was recognised in 1962 (Palmer 1962). It was not until 1986 that policies reallocating water were implemented by the Israeli legislature. In less well found economies without the economic capacity (Karshenas 1994) and the social adaptive social capacity (Ohlsson 1998) the process could take much longer.

In the South contention such as that engaged in by President Carter in the United States, or even by the US environmental activists, has scarcely begun. Evidence of the equivalent reflexive process in the MENA region to date have, with the exception of Israel (Lonergan and Brooks 1993, Feitelson 1996) only found expression and involvement in Northern international agencies and in the writing of alien environmental scientists and economists addressing water policy reform. (Brooks 1995, Allan 1996b p100, Serageldin 1995, World Bank 1994, 1995, 1997a, 1997b) This alien construction of knowledge has been accelerating in the post-Cold War circumstances of the 1990s. But with respect to water in the MENA region, the reflexive process is only at the stage where alien advocates of the ‘new water knowledge’ have communicated principles to technical elites in political economies in the MENA region. This very preliminary stage of awareness has been referred to as the phase of ‘mutual knowledge’. (Giddens 1984) The diffusion of awareness of the new ‘sound’ approaches is in progress. (World Bank 1998) In the MENA region the ‘new water knowledge’ has been adopted and policies are being shaped by it. (Feitelson 1996)

Elsewhere in the region it is only in Jordan, Tunisia, Morocco and Cyprus that the phase of ‘mutual knowledge’ has been reached. As a consequence water pricing of municipal water has been adopted. And in Tunisia and Morocco schemes to charge for irrigation water are being discussed and introduced. (World Bank 1998 pp 8-9) Likewise in Cyprus. For the millennium the international prominence of the new ‘vision’ for water is being amplified by an orchestrated global effort by agencies and governments to make water a millennial priority (Global Water Partnership 1999, p1)

Global and local

The approach to managing water resources can be usefully analysed according to an historical sequencing as in the preceding section. Equally helpful insights can be gained from

taking a geographical approach examining issues at the global, the regional and the local levels. The geographical segmentation can be hydrological or political. Years of immersion by the author in the integrated river basin management literature and working in the company of professionals in that field reinforced a natural inclination to believe that hydrological and environmental principles could be prime in the reaching sound conclusions on how to manage water resources. This impression was further reinforced by the apparent adoption of watershed principles by groups convened to seek cooperation over water resource management in major river basins such as the Nile. The series of annual conferences convened under the title of Nile 2002 since 1993 is such an initiative (Nile 2002 1993-99).

International lawyers labouring in conventions coordinated by the International Law Association and by the International Law Commission of the United Nations have also been drawn to hydrological principles. This emphasis was especially the case in their initial analysis of the non-navigational uses of international waterways (Khassawneh 1995, McCaffrey 1995, 1997). In the protracted three decade contention over legal principle and definition it became evident that hydro-politics rather than hydrology were prime (McCaffrey and Sinjela 1998). The pattern of adoption of the 1997 ILC Convention on the Non-navigational Uses of International Waterways by the nations of the global community will reveal further the political nature of shared water resources. Upstream riparians will be slow to sign up to the 1997 Convention, and those in the midst of major civil works affecting river flows, such as Turkey, will be especially slow.

The river basin remains a conceptual icon of immense material and symbolic value to environmental scientists. In cleaving too closely to the concept environmental scientists prevent themselves from contributing effectively to the interdisciplinary discourse in which the explanation of water policy lies. In practice the 'closed' environmental system of the river basin is often a relatively minor influence on water management policy in both Northern and Southern political economies. And this paradoxically can be especially the case when an economy runs out of water. The reason is that the communities and nations that live in the river basins operate in 'open' economic systems. When politicians with communal and national responsibilities encounter water stress in their 'closed' hydrological systems, or in those parts to which they have legitimate or practical access, will seek solutions outside their accessible watersheds. They find readily available and stress free solutions in 'problemsheds' via whatever operational system is to hand. They reach beyond local constraints to regional and global markets. Usually it is the global trading system which provides the most effective alternative resources. Regional systems are less likely to provide solutions, at least for basic commodity shortages, because all the national units in the region tend to endure similar natural resource endowments. Somewhere in the global system there will be providers enjoying comparatively advantageous circumstances. Global players, especially in the food industries, can provide solutions to local water resource deficits via the water, food and trade nexus. (McCalla 1997)

Such alternative water resources are often unconventional. For example the water embedded in grain imports is massive because it requires at least 1000 tonnes (cubic metres) of water to produce a tonne of grain. Each tonne of grain has over 1000 tonnes of water 'virtual water' embedded in it. (Allan 1998)

Virtual water has many political blessings for politicians managing weak political economies with poor social adaptive capacities. It is a solution from outside which for once is not a political problem. The North has made available adequate volumes of 'virtual water' to meet local water deficits at remarkably low prices since the early 1970s. The actual value of 'virtual water' is probably incalculable. Is it the free water which infiltrates the soil profiles of temperate latitudes in the industrialised North; or is it the marginal cost of providing such water in the economy into which the 'virtual water' is imported? If we were to assume the water were to be valued at one, ten or one hundred US cents per cubic metre

the respective values of the water in a tonne of grain would be \$10, \$100 and \$1000. In practice the tonne of grain is currently imported for about \$140 per tonne, about half its production cost in the US or Europe. USDA and European Union subsidies on wheat, for example, make for a very heady economic advantage to the grain importer.

The political advantages of 'virtual water' are substantially greater than their economic ones. The reason is that the importation of 'virtual water' is not a political problem provided that attention is not drawn to the water, food and trade nexus. 'Virtual water' has the immense advantage of being non-stressful provided it remains as politically invisible in the political system as it is economically invisible in national and international economic systems. Water reform policies on the other hand, such as regulatory regimes, water markets and care for the environment, inspired by economic principles and by principles of environmental sustainability, confront overstretched Southern politicians with [political] problems with high associated political prices. The reason that such secure and easily available 'virtual water' is significant to water short economies is that the politicians in these economies can defer dealing with the impacts of their accumulating water deficits because these reserves of accessible 'water' exist. The existence of virtual water dampens the widespread awareness of the extent of national water deficits. The impact of the existence of 'virtual water' on the pace of water policy reform is immense if incalculable.

The volumes of water transferred across the world via trade, embedded in water intensive commodities such as grain, are massive in terms of the occasional and accumulating water deficits experienced in water stressed regions. Such strategic water is relatively easily mobilised; very easily mobilised compared with the problems that engineers would face in shifting such high water volumes.

Water and the risk society: technical know-how and cultural perceptions

'So ... risks are at the same time 'real' and constituted by social perception and construction; their reality springs from the impact of ongoing industrial and scientific production and research routines. On the other hand their knowledge, quite differently, springs out of the history of symbols and one's culture (the understanding of Nature, for example) and the social fabric of knowledge. This is one of the reasons why the same risk is perceived and handled politically so differently throughout Europe and other parts of the globe.' Beck 1999 p 76

The analysis thus far of water in political affairs and in societies and in their economic systems demonstrates that the theoretical approaches of all the disciplines are essential components of a complex interdisciplinary toolbox. Identifying a framework beyond virtuous interdisciplinarity is, however, a challenge.

The rest of the study will attempt to determine the extent to which 'risk society' theory, and especially way that risk statements reflect 'technical' perceptions and contradict 'cultural' perceptions, can provide a useful overarching analytical framework and even some operational tools for policy makers. The discussion so far has established that water policy is driven by perceptions; by informed perceptions and by uninformed perceptions; as well as by enduring perceptions based on old knowledge that have been in place for millennia. These perceptions support deeply held beliefs which it is politically hazardous to contradict. Perceptions of the technical communities bringing new knowledge are based on new and locally untested knowledge.

These new perceptions can be defined as 'risk statements' by the alien agencies and scientists that purvey them in the fields of hydrology, environmental science and economics. Those managing local circumstances on the other hand find the remedies recommended by

alien agencies to be definable as alternative 'risk statements' as they threaten social and economic and livelihood norms. Beck (1999) reflects that:

'Believed risks are the whip used to keep the present-day moving along at a gallop. The more threatening the shadows that fall on the present day from a terrible future looming in the distance, the more compelling are the shocks that can be provoked by dramatising risk today. This can be demonstrated not only with the discourse on the environmental crisis, but also and perhaps even more emphatically, with the example of the discourse on globalisation.' Beck 1999 p 75.

Establishing a perception of risk, whether culturally or technically inspired, is a powerful element in the politics which influence policy, including water policy. Beck makes the useful point that:

Established risk definitions are thus a magic wand with which an immovable society can put the fear of God in itself and thereby activate itself in its political centres and become politicised from within. The public (mass media) dramatisation of risk is in this sense an antidote to current narrow-minded 'more-of-the-same' attitudes. Only a few want to turn the rudder around. Most want both – they want nothing to happen and they want to complain about that very fact, because then everything is possible: enjoying the bad good life and the threats to it as well. Beck 1999 p 76.

It has been shown in the earlier discussion that water policy in the last three decades of the twentieth century has been subject to the influence of many new risk 'constructs' in the North. Risks to the environment have figured most strongly, possibly because they could be articulated in a vital cultural register urging the reconstruction of lost natural virtue. The language of 'wild' rivers and 'clean', ecologically diverse and amenity rich wetlands has been commonplace in the North since the late 1960s. The arguments of water use efficiency lagged by a decade and have proved to have been much less culturally acceptable and much more contested in both North and South.

A problem with risk statements is that they are both factual and value statements at the same time. (Beck 1999 p 76) A statement such as there is a risk of armed conflict over water as the MENA region's demographically driven water deficit worsens is something which can be approximately quantified. The numbers of people and the volumes of water can be approximated. It is at the same time a very partial 'value statement' in that it is based on deterministic environmental assumptions. Out in the interdisciplinary community there are economic geographers and trade economists who would put very different values on the statement based on the additional awareness of the water readily available in global traded commodities. Substantial contention is generated amongst the groups who believe that hazardous water shortages are imminent and will be serious and those who argue that water shortages can be completely ameliorated now, and *probably* completely ameliorated in future, by 'virtual water'. (Allan 1999, Ochet 1999) The existence of 'virtual water' facilitates a classic case of a community wanting 'nothing to happen [despite the perceived risk] and ... to complain about that very fact'. (Beck 1999 p78)

The peoples of the MENA region do not perceive themselves to be part of global water systems. Nor do most scientists perceive that the water resources of the MENA region are subordinate to the global trade in water intensive commodities such as grain. Very few scientists perceive that such global trade is subordinate to the global hydrological system. Subordinate in this case means that the 'subordinate' water dependent activity, first local food production and secondly global trade in food commodities, can only be secure, that is without risk, if the global freshwater resources and global hydrological systems have

sufficient accessible freshwater to sustain the subordinate systems. The differing awareness of risk and remedies has generated a lively discourse. The notion of ‘virtual water’ is a remedy to alien analysts; to those struggling with water deficits and the challenge of negotiating water rights in the distorted politics Palestinian-Israeli politics it is an unhelpful diversion. (Isaac 1999)

The pessimists in the community and the pessimist scientists are not aware of the economic impact of virtual water in ameliorating the resource problem nor are they aware of its political impact in making the risk socially invisible. Beck points out that in the risk society the ‘point of impact is not obviously tied to the[ir] point of origin. At the same time their transmissions and movements are often invisible and untrackable to everyday perceptions. This social invisibility means that, unlike many other political issues, risks must clearly be brought to consciousness, and only then can it be said that they constitute an actual threat, and this includes cultural values and symbols as well as scientific arguments.’ (Beck 1999 p 76)

The MENA region and its water resources are also a useful example of the disjuncture between ‘knowledge’ and ‘impact’. Such disjuncture explains why knowledges of such uncertainties as future demography, future water demand, the volume of unaccounted resource transfers such as those of virtual water, and the invisible impacts of such numbers are not part of the information in local currency. Even when the impact of the MENA population increases and the region’s limited freshwater resources, as estimated by scientists and professionals, should have become evident, such impacts were made invisible by the availability of global solutions. The evidence at the local level was of the impact of the risk of the acknowledged future water deficit being further deferred. At the global level the processes are fathomable.

‘Perception is always and necessarily contextual and locally constituted. This local contextuality is only extendible in the imagination and with the aid of such technologies as television, computers and the mass media. The impact of the industrial way of life, in contrast, is spatially and temporarily open and tends to extend across the globe on the one hand and to the stratosphere and the universe on the other hand – radiation, synthetic chemicals and genetically engineered organisms are pertinent cases.’ (Beck 1999 p 77)

Conclusion: the politics of knowledge

‘Risk may be socially visible or invisible. Bringing risk to consciousness so that it becomes an actual threat is a demanding social and political process with possible associated political prices.’
(Allan 1999)

The first part of this study emphasised that the last three decades of the twentieth century in the North has been a period when perceptions of water resources have been transformed as part of the reflexive response to awareness that water environments were being put at risk (Pearce 1992, McCulley 1996) by policies underpinned by the assumptions of the ‘hydraulic mission’. In the 1960-1980 period environmental activists and activist scientists influenced communities, constituencies and politicians to operationalise a different evaluation of water environments. The reflexive response of Northern water science and the communities and politics which manage water has not been taken up by an equivalent suite of activists, activist scientists and persuadable officials and politicians everywhere in the South. Circumstances in the Middle Eastern and North African [MENA] region are paradoxical. The MENA region is

the first region to encounter what has been argued should be strategically and economically damaging water deficits.

A range of analytical tools from economic, social and political theory were deployed in an interdisciplinary mode to explain why the impact of the anticipated MENA water deficit hazard has not materialised. The complex interplay of unrecognised economic solutions, belief systems and political processes explained the range of perceptions that determine as yet inflexible approaches to water use and allocation. Operationally effective, and water deficit ameliorating, global trading systems were shown to exist but awareness of them was of such destabilising potential that the social and political systems were trapped in a 'sanctioned discourse' of non-awareness.

The second part of the study water and water policy in the MENA region were reviewed as an example of how a significantly water stressed part of the South has reacted in terms of perception and water policy reform to the ideas generated in the transition from industrial to reflexive modernity in the North. Risk society theory was shown to be helpful in providing an overarching interdisciplinary framework providing relevant analytical categories for the technical and the social aspects of knowledge [awareness and non-awareness] and impact. The water stressed MENA communities and political economies have most reason of all the Southern regions to move from water policies of industrial modernity to those of reflexive modernity. In practice the era of industrial modernity is being extended by the manipulation of awareness of risk by politicians' natural inclination to remain in harmony with the belief systems of their peoples. Belief systems about the fundamental place of water in livelihoods are best left uncontested.

The MENA region is possibly an exceptional example of how the perception of risk, in this case the risk of water shortages, can be manipulated if socio-political circumstances are enabling. MENA water resources are perceived as much by cultivated non-knowledge as by knowledge. Silent solutions to the water resource risk are de-emphasised. As a result the disjuncture between knowledge and impact is extreme. There are 'specific rules, institutions and capacities that structure the identification and assessment of risk in a specific cultural context. They are the legal, epistemological and cultural power-matrix in which risk politics is conducted.' (Beck 1999 p 83)

The risk society theory has potential utility in policy making. Risks have causes. Risks have beneficiaries as well as victims. Are these actors the only ones with liability or should public agencies also be involved? What type of politics mediates the knowledge and non-knowledge and are there means of proving the knowledge? What compensation measures administered by what political institutions can be mobilised to compensate those affected by unmitigated extreme events?

The MENA region is a risk society in waiting. It has the major risk of water shortages hanging over it but it does not yet deploy the capacity to interrogate the problem. Even more than risk societies in the North the MENA political economies are 'trapped in a vocabulary that benefits the risks and hazards interrogated by the definition[s] of first industrial modernity. They are singularly inappropriate not only for modern (screening) catastrophes, but also for the challenges of manufactured insecurities. Consequently we face the paradox that at the very time when threats and hazards are seen to become more dangerous and more obvious, they simultaneously slip through the net of proofs, attributions and compensation with which the legal and political systems attempt to capture them.' (Beck 1999 p 83)

Policy makers and those who advise them at local to global levels can be informed by risk society theory. Some axioms of application relevance encountered in the theory and discussed in relation to the MENA region and its water resources in this study are that perceptions are local while the industrial way of life is spatially and temporarily open to extend across the globe and the universe. Risk may be socially visible or invisible. Bringing risk to consciousness so that it becomes an actual threat is a demanding social and political

process with possible associated political prices. The points where risks impact occur are not obviously tied to points where the risk origins are measurable; there is a disjuncture between knowledge and impact.

The MENA case study has been especially powerful in exemplifying how risk, in this case water shortages, are socially invisible in the MENA region's current phase of development and environmental resource management. They are also invisible to the majority of water users and managers at the national level during the early part of the transition to a risk aware society in the area of water policy. Making societies conscious of the risk requires scientific argument and cultural contestation. 'Thus the politics of risk is intrinsically a *politics of knowledge*, expertise and counter-expertise.' (Goldblatt 199x)

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