Water Policy 14 (2012) 21–40

Reflections on the nexus of politics, ethics, religion and contemporary water resources decisions

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Abstract

The ways we discuss water policy decisions often closely mirror broader social and ethical decisions, for example: water as a common good; water and human dignity; water as a facilitator of well being; rights and responsibilities of access to water; justice and water. Water is a symbol of reconciliation, healing and regeneration which appears in virtually all of our known organized faith-based religions. Water decisions truly seem to be at the nexus of ethics, public policies, nature, values, beliefs and rationality. This paper opens windows into this nexus by starting with selected water policy arenas (arenas not generally thought to contain dimensions of ethics and faith) and generalizing about the dilemmas presented by decisions in them. These arenas are: dealing with risk/uncertainty in water and climate change decisions; changing terms of discourse on world water, especially between rich and poor; concepts of nature in water decision making; dealing with water and conflict; and processes of governance and water decisions. The paper concludes with suggestions of how ethics and faith might connect in decisions concerning water.

Keywords: Beliefs; Decision making; Ethics; Nature; Risk; Values; Water policies

Introduction

There are many instances where poets from across millennia refer to water as 'humanity's carrier of collective memory', poets from as long ago as in ancient China and as recently as the 19th century poet Gerard Manley Hopkins (Priscoli & Hassan, 1997; Priscoli & Llamas, 2001). Today we hear scientists speak of that same water recycling through us, in time and space. We also hear of water molecules carrying information. Jung looked at water as the symbol of the unconscious (Jung, 1964). Many who have mediated water conflicts know there's something more at play in water disputes then just water or raw power and interests. Little wonder that water carries the symbolic power it does in our rituals and habits.

doi: 10.2166/wp.2012.002

1. Climate change: risk and uncertainty in water resources

The major reasons repeatedly used in the talking points of international officials, such as the UN Secretary General, or the Head of the IPPC, for why we should deal with climate change are water related.

> *'… melting glaciers will trigger mountain floods and lead to water shortages in South Asia and South America. Rising sea levels could inundate Small Island Developing States. Reduced rainfall will aggravate water and food insecurity in Africa.'* (IPCC, 2007)

Primarily, the reasons given are impacts of extreme hydrological events: increased frequency and intensity of droughts and floods; sea level rise; reduced water access and increased scarcity; water quality and health issues; and others. However, climate change debates seem to focus on long-term globalized mitigation measures, while appeals to the public on why we should be concerned focus on short-term extreme events which will occur no matter what long-term measures are implemented. This raises an important ethical public policy question: are we raising peoples' anxiety without providing means (adaptive water actions) to deal with this anxiety?

Recently, some informed political leaders said, '… the 2010 Indus flood reminds us that climate change is here' (Washington Post, 2010). Commenting on the same event, the U.S. White House stated, 'Every dimension of our relationship – politics, economics and security – … is going to see major shifts as a result of this historic disaster …' (Washington Post, 2010). The Washington Times (2010a) headlined it as a 'Biblical Catastrophe: nuclear nation's future is washed away by flood waters'. However, water experts note that the 2010 Indus flood was not an exceptional hydrologic event. It was probably a flood at the 50 year return rate and there have been larger floods in Pakistan, even during the past several generations. Nevertheless, the flood had huge socio-economic impacts, covering one-fifth of the country, leaving 10 million homeless, and affecting over 21 million people in total.

Over the last two decades, the region's vulnerability has grown as population and economic activity in the region has grown. However, since the 1960s, there has been little investment in storage, a key structural means for managing flood risks in this situation. In fact, softer development planning and even water modeling has not focused issues of water-related disaster mitigations, and social resiliency has thus decreased. Post-2010, Indus flood calculations project that, had planned Indus river water storage been in place, most of the suffering and damage would not have occurred (USACE *et al*., 2010).

Is this same dynamic of socio-economic growth, along with decreasing measures to manage the vulnerabilities of that growth to water-related disasters, becoming true in other parts of the world which are also of great security interest? What does this say about the dialog between climate change, which is introducing more uncertainty to the public, and the water community whose business it is to help that public manage uncertainties around water events?

The trends are not limited to the poor world; they are also evident in the rich countries. Some former officials have reportedly stated that the Brisbane floods and river water of 14 feet (c. 4.27 m) were unprecedented and evidence of climate change and the increase of extreme hydrological events. However, such extreme events are not unprecedented in that part of Australia: in February 1893, continuous rainfall caused the Brisbane River to rise 27 feet (c. 8.23 m) with homes destroyed and lives and livestock lost. In 1893, the population in Queensland was 400,000, whilst it is 4.5 million today, meaning that the per capita loss of life in 1893 was much greater then what happened in 2010 (Washington Times, 2010b). The pattern and public discussions about the Brisbane event are similar to that of the

Indus. We must look at growing socio-economic activity in uncertain environments and at macro social risk-reduction strategies and projects necessary to sustain social system functioning.

Recently, a prominent environmental NGO, advocating long-term climate change mitigation measures, publicly noted: 'If we do not do anything about climate change the people of Bangladesh will continue to be flooded … and … we can no longer engineer our way out of the crisis of climate change …' (Pope, 2009). One must ask whether this is accurate and, if yes, what does it say to policymakers?

What is the best strategy for dealing with climate uncertainty and water resources: hard engineering structures or soft behavioral changes (which themselves are often social engineering)? The answers are not obvious. Some answer by saying that the 'soft path' (or behavioral management) is the best approach and even the most democratic. Early UN IPCC reports suggested that water demand management and institutional adaptation are the primary components for increasing system flexibility to meet the uncertainties of climate change. Other mainstream water associations in the world were not so sure and emphasized changing operating rules and looking at hard infrastructure (Sykes *et al*., 2009).

However, a primary reliance on demand management, or social behavior, can be dangerous and carry major ethical implications, especially where there is little water availability. What happens when our primary means to adapt is to order people how to behave? This is unlikely to produce more democracy. In fact one can argue that investment in water infrastructure provides social resiliency, as it buys time and space for people to continue living and coping with and recouping from water-related disasters.

The impacts and damages of water related disasters are growing. Rich and poor countries have sustained huge losses from floods in the 20th century. However, the rich countries suffer far less human loss then poorer countries and most of the losses suffered are reimbursed in some way. In the poorer and transitional countries there is virtually no reimbursement for losses sustained (Kron, 2008).

All wealthier countries, east and west, have found ways to manage the uncertainties and risks of the extreme events of droughts and floods cycles such that water-related disaster events do not crack or debilitate the capacity of social and economic systems to function. Managing this cycle of losses and reimbursement is critical to creating a platform for socio-economic growth and transformation, to bring a shared sense of stability to situations which are inherently uncertain. In this regard, we might ask whether the rich countries are protected because they are rich, or are they rich because they have invested in their protection which has allowed socio-economic creativity and economic activity to occur with minimum disruption?

To put this in perspective, Figure 1 shows the large impact of disasters. The percentage of losses for the rich countries is very low. The poorest nations lose much less financially, but that loss as a percentage of their wealth is astoundingly high – in fact so high that it probably debilitates their ability to do much of anything.

In the past decade, the World Bank and others have been examining how poorer countries in Africa and other parts of the world manage these basic uncertainties in hydrologic cycles (Grey & Sardoff, 2007). The graphs in Figure 2 show how precipitation flows fluctuate in conjunction with fluctuations in GDP in selected poor countries. Variability in GDP appears related to variability in precipitation. Inability to deal with the highs and lows of precipitation is a major factor in their ability to grow economically. For example, Ethiopia's limited ability to cope with droughts and floods are estimated to cost the economy one-third of its growth potential (IWMI, 2009). Historically, in the rich countries, large water infrastructure investment along with a variety of policies to manage the uncertainties in the hydrologic cycle has effectively reduced the percentage of damage to GDP to about 4%.

It is not simply the number of disasters: it is the relationship of those disasters to the capacity of society to function, and that capacity is itself critically dependent upon a significant water infrastructure. It is the impairment of human activity and creativity that really is the key, not just the number of extreme

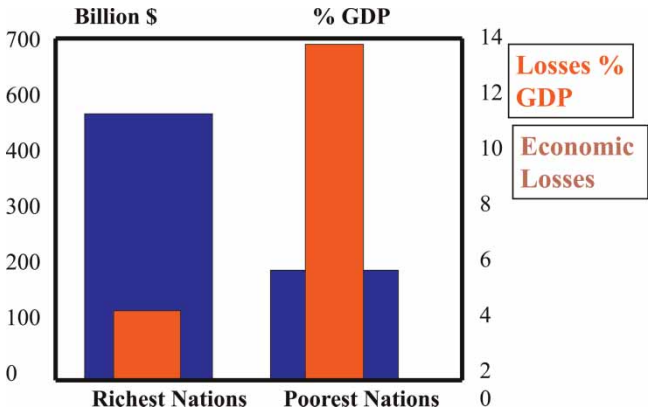

Fig. 1. Disaster losses, as a total and as a share of GDP, in the richest and poorest nations (1985–99). (*Source:* Brown *et al.*, 2001.)

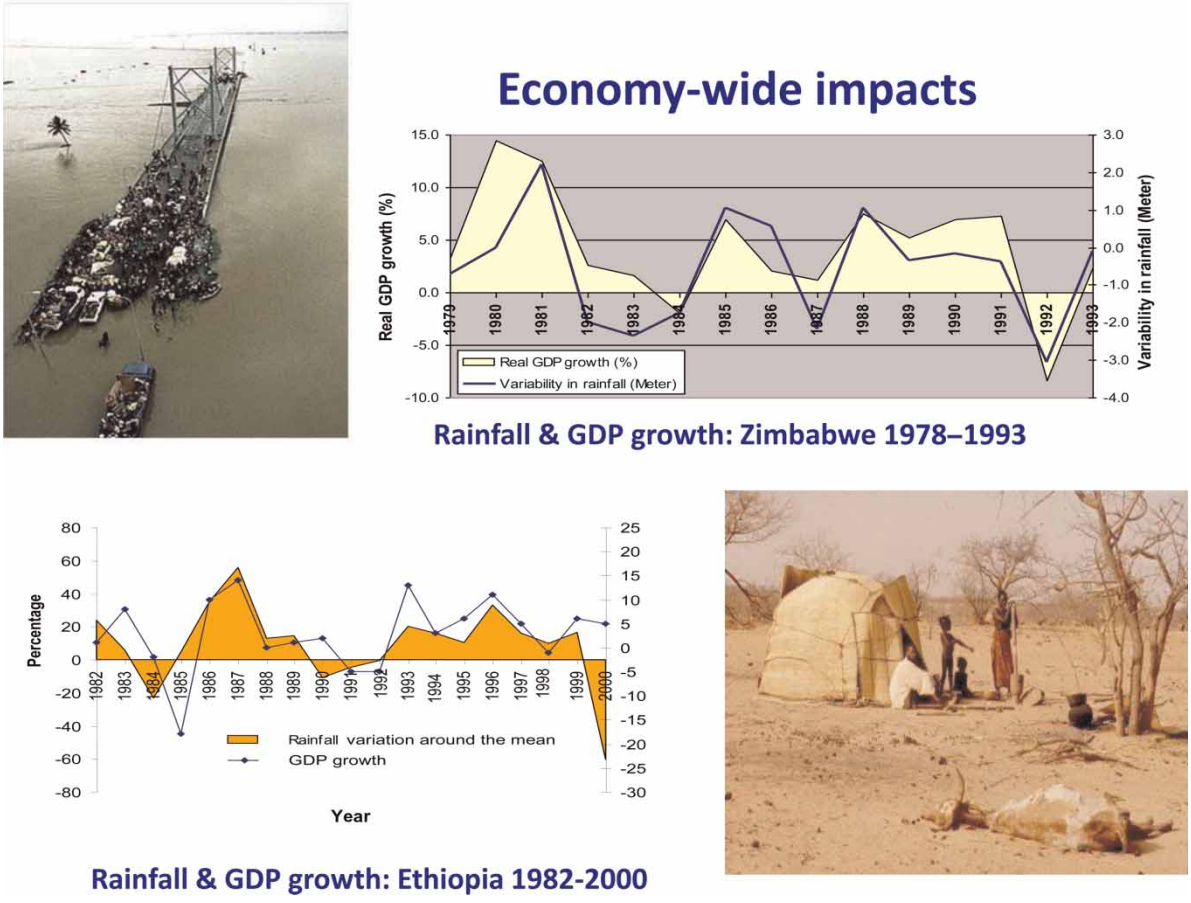

Fig. 2. Relations of fluctuations in GDP and precipitation.

events. Water infrastructure investment to manage risk and uncertainty relate directly to possibilities for social health and a stable political culture.

The water manager's traditional role is to minimize risks and the costs of hazards to society by working at watershed levels using probabilistic models and methods. Their probabilistic designs are based on how extremes of floods and droughts are defined over time. Currently, global circulation models (GCMs), by and large, do not yet help water managers deal with the very phenomena that are so prominent in public concerns about climate changes. They are being advocated for purposes they were not designed for (Stakhiv, 2011). Information from GCMs do not offer adequate reliability for precipitation and run off. Nevertheless, climate models leave water managers to contend with 23 GCMs generating hundreds of scenarios (USCCSP, 2008; Stakhiv, 2011). This is juxtaposed with over 100 years of peer-reviewed analytical approaches to the risk and uncertainty of extreme events within the hydrological community.

Thus we need to ask whether, if the uncertainties introduced to the water policy debate are so large (and water managers in many parts of the world are already characterizing risk and return rates upwards of 500 years), is it rational or even ethical to be telling decision-makers to change? Once again, are climate change and water debates raising public anxiety about climate changes while inadvertently denying adaptive means to cope with projected hydrologic events that will occur due to those changes, thus raising questions about the ethics of adaptation versus mitigation?

2. Changing the terms of discourse in world water debates: the rich–poor dialog

Often, the water resources prescriptions brought from wealthy countries to poor countries are born from unconscious assumptions embedded in the contemporary water experiences gained in rich countries. What one rich country sees as obviously correct may not be what others in different cultures and situations need. Rich countries need to understand what they did with their water in situations when they were poor. These stories, both good and bad, can be remarkable.

Figure 3 (generated by the World Bank) shows that Type I countries (poor/developing) are much higher on infrastructure investment then on management investments. Type III countries (wealthy) are the opposite. Instead of immediately talking to Type I countries about the conservation or other

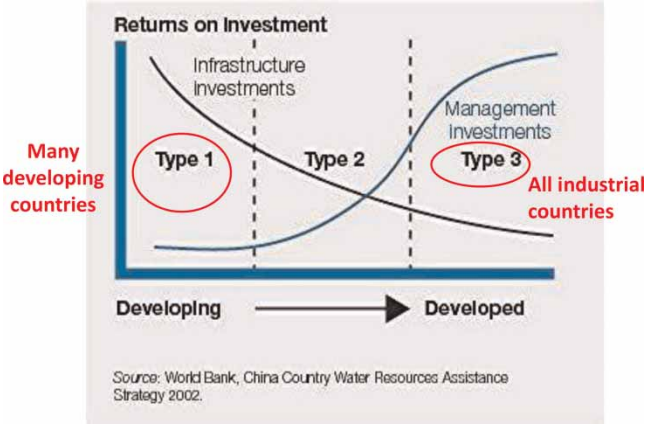

Fig. 3. Water governance and the relationship between the developed and developing worlds.

measures that we find currently work best in wealthy countries, the wealthy may do better to talk of how they invested and used water when they were poorer (Grey & Sardoff, 2007). They could outline their experiences of unanticipated costs over time and help design measures that allow investment but also mitigate or avoid unwanted effects through good design. Such a dialog is rare but arguably is now ethically imperative for current aid policies. We need to create new rhetoric to assure it becomes routine.

Figure 3 reflects a reality that water uses/roles differ with peoples' different socio-economic circumstances. Recent social science research notes that no one can be happy when living in terror and fear for their livelihoods. In such circumstances, economic social development is the priority. But where basic necessities are met, and economic and physical security satisfied, happiness is prevalent and not as dependent on further economic growth (Bok, 2010).

So when the rich bring their solutions, complete with unexamined underlying assumptions, they often look as though they are prescribing their values to others' cultures. These prescriptions may be good for them and well-meaning in their countries; however, the rich need to be clearer and more transparent about such values and normative prescriptions, as they may conflict with the values of those they seek to help.

To illustrate this point, before the Istanbul Water Forum in 2009, at a World Water Council (WWC) meeting including people from type I, II and III countries to discuss water and climate change, there was an almost exact mirror image between the developed and less developed countries as to whether the focus should be on 'best practices', 'no regret strategies' or 'climate proofing' (IWA & WWW, 2008). Developed countries are more likely to think of environment and security in terms of global environmental changes, and developing countries to approach them in terms of the human security implications of local and regional problems. This is not just about politics. It is about values and what hundreds of millions of people actually need.

In this context, Pope John Paul's reflection in 1987 provides illustrative guidance to those seeking to understand the nexus of ethics, faith and science which we find in world water policies. In it he warns of:

> *'… subjecting poor nations to the imperialist structures of sin that deny them the freedom in development, and that … new forms of technology transfer must be found because today there are frequent cases of developing countries being denied these'* (John Paul II, 1987)

One might ask whether this papal caution describes what our water resources aid policies look like to many of those whom we would help today. Are our policies subjecting the poor to 'imperialist structures of sin'? The transition from structuring water resources, based on needs when poor, to structuring water resources when physical security and when basic needs are met, is politically difficult. Using prescriptions for structuring water based on the experiences of one stage for another stage is dangerous, and is likely to provoke resentment or violence, and not likely to be productive. Thus the rich–poor dialog over water is an important part of achieving security and ethical challenge. I believe the lesson is to exercise caution: imposing moral judgments of past water resource decisions and their motivations onto today's water resources decisions, on the basis of today's values, can be dangerous.

3. Changing the terms of discourse in world water debates: rhetoric

Our water and environmental policy worlds are dominated by certain concepts and rhetoric, such as sustainable development, the precautionary principle and nonstationarity. Do these help us or impede our abilities to deal with water and climate change, and if so, how?

3.1. Sustainable development

Sustainable development has increased the potential for dialog among interests not prone to talking or cooperating. To this degree it has helped water policy dialogs. However, as an analytical tool, sustainable development can look vague or even like a contradictory term. For example, in 2010 I was helping stakeholders and directors of a major world river organization working to achieve 'sustainability' and 'integration' of water resources with many uses along this major waterway. The directors gave me a mandate. Since most of the persons along the river depended on subsistence fishing, we must be careful that projects do not harm this livelihood.

This was a genuine, caring and reasonable mandate. However, the reason one undertakes large water investment is to help transform the social fabric so that those who live on subsistence fishing, and whose fathers before them lived on subsistence fishing, do not have to see their children doing the same. So the question becomes: what are we sustaining? A form of predictable, perpetual poverty and subsistence living? This is an important ethical policy question.

If we promise, and those we help expect, a transformed life as a result of our aid projects but design water projects to minimize fundamental change, whose growth or ends are we really serving? Do our nobly inspired efforts once again bring us into the paternalistic trap of knowing better what the other should do? We might ask what sustainability really means. Certainly it means more than preservation or restoration and status quo, but whose dreams are we trying to sustain?

3.2. Precautionary principle

Since water management and governance, everywhere, is moving toward more risk-based decision making, the 'precautionary principle' is becoming more important. But what does it really mean? Not to decide is a decision in itself with impacts, since nature itself is change. What are the likely impacts or consequences without any action? Too often, the ethics of water investment and governance are portrayed as revolving around costs of doing something rather than weighing them against the likely cost of not doing something, as well as its benefits.

What are the ethics of no decision in the face of needing to decide? How much must we know to decide: 100, 90, 80% …? If the precautionary principle essentially holds 100% certainty as some absolute or asymptotic optimal, then the principle would defeat the very basis for risk-based water governance. But more importantly, if we believe that we never know all the complex interactions, can such exercise of the precautionary principle itself be ethical? Or, is the precautionary principle actually a norm for no action, for minimum action, stasis, or no risk? These are important ethical questions for water resources decision makers if we are to strive for better water management and governance. Pope Benedict's words on World Peace Day, 1 January 2008, are useful here:

> *'Prudence does not mean failing to accept responsibilities and postponing decisions; it means being committed to making joint decisions after pondering responsibly the road to be taken'* (Pope Benedict, 2008a)

In the mid 1970s, US engineers proposed a tidal energy project in Maine which would also include a dam in one of the poorest counties of the US. This project was rejected for a variety of reasons concerning questions of sustainability. Today that cold north-east region of the US and Boston reel under

increasing prices for heating and many are calling for subsidies for the poor who cannot afford to heat their homes. One can speculate what might have been had not the status quo been sustained. At the same time, tidal power is now being proposed in many places across the country as 'green' and sustainable.

How do we share moral responsibilities for today's situations based on yesterday's water actions? The answers to questions of water-related cross-generational ethics (to say nothing of cross-cultural) which are prominent in our discussion on environmental ethics are not obvious and the moral reasoning they spawn needs much fuller development.

Stopping potential 'sins' of commission does not automatically absolve us from responsibility for 'sins' of omission. Lately, in our public water policies we seem to do well on the first but are mixed on the second part of this balance.

3.3. Stationarity versus nonstationarity

How often do we hear that the climate is changing and there are more floods, more droughts or higher temperatures then before? How many different versions of assumed or articulated 'befores' do we hear? We speak as if there is some immutable baseline against which we measure events and argue about policy options; after all we can see nature – it is all around us. However, natural baselines are not so self evident. How to establish a baseline against which to measure water management strategies is one of the more important but not easily accessible scientific debates, a debate which has now become central to the ability of the world insurance industry, government regulators, policymakers, politicians and others to make rational calculations and trade-off decisions on water investments. Its rhetoric may be among the most important aspects of current water and environment policy debates of our time.

The baseline of the debate is really what we should use as the natural condition or 'nature' – the norm. Hydrologists look at recorded floods which have usually, in rich countries, been recorded over a period of 100–150 years. From these records they establish a norm and speculate on what may be a probable maximum event or flood. However, we all know that a period of 100, 200 or even 300 years does not necessarily represent a norm for the history of earth.

The climate debate asks whether the old method, called stationarity, is appropriate. Do not the statistical methods of stationarity assume that we will repeat events of the past? Many professionals define it this way. Many scientists now call for non-stationarity statistical methods to overcome the flaws of stationarity's too limited time periods. But in doing so, do we inadvertently take away our ability to establish concepts such as probable maximum flood?

If we cannot define a norm then we cannot define the level of risk and uncertainty we face, traditionally called a 100, 200, 500 year (or other year) event (these are events which statistically speaking occur only once in 100, 200 or 500 years, or however long). Of course, we have no idea when those events will occur in the periods considered. If we cannot define the norm, we cannot establish a rational probabilistic water management as there is no norm to compare with. We are left with models created by scientists that claim things will be different from the past. Not only are those models incapable of predicting the future but they also are not really able to establish a baseline for the past. So we are talking about scenarios, or, possible answers to possible assumed causes, and these are dangerous to be interpreted as predictions.

There are significant ethical and public policy implications from these questions of data. Once models are able to convince us that the past is irrelevant because the future will be different, they run the danger of denying the only independent public verification means we have for public projects: historical

observation. This could lead back to the old non-participatory and paternalistic ethic of 'we know best and will protect you', which past public engineers have been accused of having.

When people must depend on outside elites to interpret their history and to use interpretations to define policy directions, based simply on being different from the past, they become vulnerable to serious manipulation, even if well intended. For example, much of the warming debate revolves around the 'hockey stick' curve. Is the curve correct, or is it a statistical manipulation? Where is the data? Does it show new warming or recovery from a previous ice age? (McIntyre, 2011). This statistical debate is really about how and who has access to define our history. The debates such as those over stationarity and non-stationarity are the heart of water policy management, and they raise serious issues of political culture and public policy ethics.

If citizens are to have a say in decisions that impact them, such as designing their ecology or home, democratic political cultures must find ways to engage publics to actively choose risk versus passively accepting definitions from elites. They can only do this if there is a legitimate and accountable way to define the baseline natural norms (or what we call natural). In studying the long history of water flow and its interaction with social systems on the Nile, archaeologist and hydrologist Professor Fekri A. Hassan notes that, in the long run, the only constant is change. However, shorter periods of changes demand measures of adaptation since violent and tragic human events can occur due to inattention to water resources during these periods (Hassan, 2009).

4. Concepts of nature in water decision making

During the 2006 Kyoto World Water Forum, one of the local Japanese newspapers ran an interview with an American, extolling her wonderful experiencing of nature in a local Japanese garden. The experience was clearly real and moving; but is it nature? After all, the park was totally constructed, I suspect, to elicit just such important experiences. So maybe this is nature with human help in design.

At the same time, newspapers in Pennsylvania reported that illegal damming violated regulatory rules for stream flow. Regulatory inspectors reviewed the permit action levied against a landowner only to discover that the illegal diversions were built by local beavers and there was no way to fine the beavers.

During past eruptions in Iceland, the Atlanta Constitution newspaper ran a cartoon (Figure 4) showing people carrying signs to save the earth, at the same time that the earth was endangering their lives. This begs the questions: is this nature's destruction of nature, or is it creation? Who gave God and/or nature the permit for this? Are we humans allowed to protect ourselves?

Confusion over nature, natural processes and humans abound even in the more analytical policy world. A recent report from the respected International Water Resources Management Institute (IWMI) stated, 'Natural variability in rainfall and temperature means that in many places access to freshwater is already unpredictable. How climate change will alter this 'natural' variability is the subject of considerable study …' (IWMI, 2009). So the natural phenomena of climate change will alter the natural phenomena of natural variability. Even the report has to put the word 'natural' in quotes to set it apart from other uses of the word natural, as if there are really different types of natural. Confusions abound.

Are we conceiving of nature as evolving and/or changing, or as something immutable at stasis? Or is it a balancing process of some type? Different world views or beliefs, often unconscious and driven by faith and spirituality, will clearly lead to different advocacy in policy here. Introducing the human adds

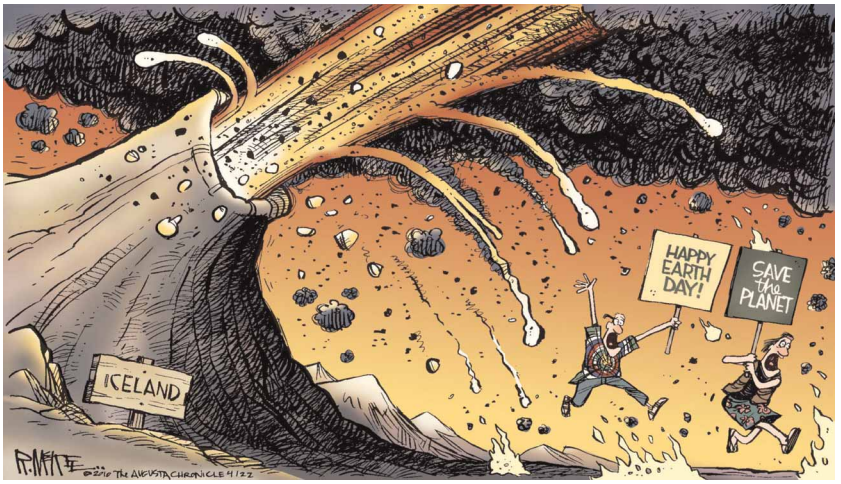

Fig. 4. Eruptions and Earth Day protests. Concepts of nature: humans, disasters, impacts.

more confusion to what we may mean by nature. If humans are seen as separate from nature, as in many water policies, then why not the beaver? If 'pure' nature experiences (such as the Japanese garden) can be created by humans, are humans not part of the same processes? Are we confusing creation as process with creation as material world? This is a profoundly important theological question. We might do well to re-clarify our notions of nature versus the western tradition of natural law as we seek to create new water policy.

Preservation and conservation/utilitarian approaches have long histories in water policy debates and they are important for today's water debate, especially to the water dialog between the north and south. Each approach is built on different assumptions of nature. Preservationist notions have come to portray human actions as reducing nature or using up limited resources, often at alarming rates. Utilitarian approaches have essentially assumed that nature is changing and human efforts need to use resources in beneficial ways that do not disrupt the viability of the resources. Water is very amenable to this second approach, since water can be used in many ways that actually create benefits and value, both in the water and beyond the water.

In *Living Justice*, T. Massaro (S.J.) offers a matrix of four models or possible ways that Christians might approach nature: a dominion model where humans rightfully exploit the natural environment; a stewardship model where humans care for creation for their needs; a creation-centered approach where humans are full partners with nature; and a deep ecology model where the boundaries between human and nature are being revised (Massaro, 2008). Each of these can often be found in water policy debates. They are rarely articulated and usually buried under different stakeholder interests and positions in conflicts over water resources. We are in the process of forging a new understanding of humans and nature as we create our new water policies. Pope Benedict, in his recent encyclical *Caritas in Veritate*, lends some light to the Christian world in this endeavor, stating that:

> *'Nature expresses a design of love and truth … but it should also be stressed that it is contrary to authentic development to view nature as something more important than the human person. This*

position leads to attitudes of neo paganism or a new pantheism – human salvation cannot come from nature alone understood in a purely naturalistic sense.'(Pope Benedict, 2009)

Many of our water policies tell us to reduce, to as close to zero as possible, our human footprint. Many actually imply an optimizing function of what appears to be a 'no humans' scenario, unless you have humans with no physical impact of humans on the planet. We might be cautioned to avoid the temptation that, in the name of the material, places humans as the problem to eliminate by building policies and regulations with the optimizing function of no human trace. *Is* 'no humans' the optimal? It is hard to imagine a more important theological or ethical public policy question.

Since nature is change, what do preservation and restoration mean? What does stopping climate change mean? Are we acting, unconsciously, as if humans are at the end of evolution; or are we still changing and evolving? Are we acting as if we seek to create heaven on earth? We must avoid the materialist temptation as an animating ethic in water policy debates.

In his book, *When Jesus came to Harvard*, Harvard theologian Harvey Cox reflects that he always struggled to find the best way to help the well-meaning students who wanted to be part of saving the earth:

'… care must be taken when linking the resurrection with ecology; the Christian view of the future, initiated in the resurrections includes both the earth worms and black holes …

… many students … looked to her (mother earth) not just as our mother but also as our savior, a role for which the earth is plainly not suited ….

… exalting the earth into a goddess Gaia … is … ill advised … and fails to appreciate that she shares our finitude and our mortality … and will eventually burn to ash … also.' (Cox, 2004)

We cannot both separate and combine humans and nature for convenience of policy advocacy. We are part of nature. So who are we? Further to the point, I think that Teilhard de Chardin's admonition holds well here, and fits within the Creation-centered aspect of the Massaro matrix:

'*… the earth is the altar on which the mass of life is constantly celebrated.*' (Teilhard de Chardin, 2004)

Our beliefs of nature are deeply rooted, even if unconscious; of what drive values and interests toward water policies. Policymakers would do well to avoid the temptation, in the name of saving creation, to destroy the co-creative–co design process God set in motion. As Cardinal Ratzinger wrote:

'*Only when creation and covenant come together can either creation or covenant be realistically discussed – the one presumes the other …*' (Ratzinger, 1986)

If we cannot both separate and combine humans and nature (for convenience of policy advocacy and if we are part of nature) how do we define who we are? Maybe as Teilhard suggests, we are nature becoming conscious of its own design (Teilhard de Chardin, 2004). In this light a new understanding of western-Christian creation myths might be very helpful to find ways out of the quagmire of water policy debates. Georgetown theologian John Haught notes:

'The futurist understanding of creation has been all but lost during the long centuries of platonically shaped theology … which pictures God as vertically and hierarchically above … and outside the

world of becoming … after Darwin the created world seems more at home in a biblical setting … attuned to the Abrahamic and early Christian intuition that ultimate reality comes into the present as an ever renewing future …' (Haught, 2010)

5. Water, conflict, symbolism: the sacred and utilitarian in water through history

The water crisis is primarily one of distribution of water, knowledge and resources and not one of absolute scarcity. However, the water and conflict/security debate is often driven by notions of physical scarcity. Water is rarely the cause of war and large-scale social violence (Oregon State University, 2011). Consequently, security and water debates often pass over some of the most salient aspects of water. These are water's powerful role in: building social community; generating wealth through provision of preconditions of economic activities; convening adversaries and providing common language for joint and creative dialogue; integrating, in a practical way, diverse interests and values; and providing a principal tool for preventive diplomacy and for building cultures of cooperation, if not peace (Delli Priscoli & Wolf, 2009). These aspects of water are embedded in the symbols and rituals of humanity's major faith traditions, and attest to the complex role water actually plays in our lives.

Much of the history of water management has centered on periods of too much (flood) or periods of too little (drought). Dealing with this uncertainty has been a dialogue between humanity and nature, geography and human jurisdictions. This dialogue has taken us from the sacred to secular and scientific as ways of dealing with uncertainty. The root of classical humanity's respect for water lay in its sense of water's sanctity. Ancient men found mystery in the origins of springs. Hippocratic studies of the medicinal properties of waters and Thales' notions of water as the basic substance and source of life reflect this sense of sanctity of water. Tertullian, one of the fathers of the early Christian church, in *De Baptismo*, says that:

'… water was the first seat of the divine spirit, who then preferred it to all other elements. It was water that was first commanded to produce living creatures … It was water which, first of all, produced that which is life.' (Eliade, 1991)

These and other such notions supported a value system underlying Roman water supply practice that tried to provide a free-flowing supply of water to its citizens (Tanner, 1987). Herodotus (1972) notes the origins of geometry being in attempts to predict flooding on the Nile. Myths, rituals and symbols evolved around these situations. The priestly caste which manipulated these symbols was powerful and central to society. In the Mayan state, priests presumably determined annual planting schedules, receiving a customary tribute from the harvest (Gyuk, 1977). In the Khmer empire, temples were associated with reservoirs, as the spiritual abode of the god king (Gyuk, 1977: 7). Links from early priestly castes to modern Western civilization can be found in ancient Rome. In a direct reference to Osiris, Vitruvius notes, in *De Architectura* of 27 BC:

'Hence also those who fill priesthoods of the Egyptian tradition show that all things arise from the principle of water … therefore, in as much as physicists, philosophers and the clergy judge that everything consists of the principle of water, I thought fit that … I should write … about … water' (Vitruvius, 1985)

Similar linkages are also found at the base of the West's own Period of Enlightenment. Schama notes that this period witnessed all the elements of new sacred hydraulics coming together. It included the

Christianized memory of the Nile and cult of fertility, the mystique of the source of creation made visible through mechanics, and the renewal of the Roman tradition of flowing water (Schama, 1995). The title of 'superintendent of rivers and waters' in Renaissance Italy was awarded to some of the most famous of the fontanieri (the designers of fountains), which title meant more than engineering and included a knowledge of 'hydro mythology' as well as hydraulics, physics and science.

Rulers hoped that their fontanieri would outdo other rivals in their water spectacles but also that their art would reveal the deep and occult principles of creation. These men, who worked on urban water as well as fountains, defined themselves by their mission of transforming the stagnant into the flowing, the pond into the fountain, and mortality into vitality.

Ultimately, like the fontanieri Palissy, they saw themselves as magi – wise men who were to discover universal principles (Schama, 1995: 277–279). After the discovery of Frontinus's book, *The Aqueducts of Rome*, in 1425, the Pope inaugurated a papal reform program which saw the renewing of pure and flowing water as a sacred and civic duty (Frontinus, 1925; Vitruvius, 1912).

Clearly, our Western history teaches us over and over that ethics are related to water policies. But, there is a balance between sanctity and the utilitarian aspects of water. This balance point will differ throughout the world. If left unexamined, the value assumptions embedded in models of water institutions in humid areas could be disruptive for arid areas, whilst value assumptions embedded in the rich's prescriptions for the poor could be devastating to the prospects of the poor they seek to help.

One could see the last 2000 years as a progression from the dominance of sanctity to that of utilitarian technologists, engineers and scientists. Schama detects this progression in Western literature and art as water loses its feminine associations and gains a masculine identity. Today's engineers have their own rituals and symbols, such as models of 100 year flood probabilities (as mentioned earlier) and other rational analytical methods to achieve what the priestly class of old sought: a reduced fear of uncertainty, more efficient and productive use of water, and a better life for those they serve. Goubert traces such progression in the provision of sanitation and water supply in 18th and 19th century France, calling it the 'conquest of water' (Goubert, 1989). This conquest through the use of technology, markets and other utilitarian devices has facilitated the democratization of water, that is, the increased access to water and sanitation.

Despite our technology's clear message that scientific and systemic multi-purpose cooperation can service emerging needs, our collective behavior seems to change little. Something more is needed in this search for new means of cooperation. One missing element for cooperative dialog is what negotiation experts refer to as superordinate values, which competing parties can identify with beyond immediate utilitarian values. Rekindling the sense of the sanctity of water, a superordinate value, is one way to facilitate the escalation of debate on water cooperation to higher levels and thus impact the capacity to reach cooperation and to manage conflict.

Such symbolism occurs throughout history. For example, in the 17th century, when the Jesuit Pais visited the source of the Nile with the Coptic King of Ethiopia, the river was taken as a symbol of an 'ecumenical cosmology', a symbol that all comes from an undivided source and a unity of a world of faith (Schama, 1995: 300). After the building of the flood defenses in Dagenham on the Thames, in 18th century England, a ritual of hydraulic thanksgiving was established. A gathering of all politicians with the people to feast on common food in a celebration of community, among many who were adversaries, it was actually put on the parliamentary calendar (Schama, 1995: 254). Chomchai (1993) notes the building of a 'cultural affinity' that crosses the Mekong river; he describes a 'Mekong' spirit that evolved over the years of collaboration which continued even during the periods of conflict in 20th century south-east Asia.

One author finds parables in the molecular behavior of water which reflect these ideas. Warshall (1995) states:

> *'Despite science's continual attempt to rid itself of subjective metaphor and myth, the contemporary creation story and our images of molecular water do not truly break with ethical tone and more ancient human perceptions of water. Molecular water is still an arbiter of creativity and danger, purity and pollution, integrity and freedom, coherence and looseness, gathering and dissolving, rectitude and passive acceptance, benevolence and murder. Water remains one model for love, memory, and the needs of the soul.'*

Some modern writers have already hinted at the process of rekindling notions of the sanctity of water by calling for a new water ethic (Postel, 1992).

The multiple uses and purposes for water allow humans to create benefits together, both off and on water, rather than simply fighting over the allocation of flows. This has been a key to water acting as a venue for dialog even among parties that otherwise may be in conflict. Water has many uses and these multiple uses can expand options or the pie of potential benefits from water. As such, this opens possibilities to see beyond simply reallocating the limited pie of benefits and consequently opens paths to more collaboration. As the management of water uncertainty and risk improves, social prosperity, growth and social transformation are enhanced. This enhanced growth brings a changing sense of priority and highest value uses of water to society, which in turn offers new opportunities for ways to combine its uses.

But through it all, the same water is recycling; only the configurations of human use and needs change. In this sense it is easy to understand the enduring central role of water in humanity's symbols and rituals and, indeed, water as the carrier of collective memory of humanity. When mediators and/or negotiators sense something more about water, somehow it is this perpetual connection that comes through. It is a link to the spiritual dimensions of the process of building agreement among people that many often seem to sense.

Every day, water tangibly demonstrates a great truth which we find in many spiritual traditions: that we can find strength in accepting and communicating our vulnerabilities. Every day, water in its movement upstream and down, through the lands of the rich and the poor, displays its connectedness and our shared vulnerabilities. Counter-intuitively, the reality of water's connectedness brings strength and may be what provides its mysterious and enduring ability to be a meeting place or a venue for dialog among people, even when those people might otherwise be in conflict.

The critical water issues for security are those at the cusp of social transitions in patterns of multiple use, not in absolute scarcity: in situations of relative deprivation, not absolute deprivation. Water is at the center of both the process of negotiating these transitions as well as in articulating substantive goals for rearranging its changing uses.

Water is the centerpiece of communities and its symbolism is also central to rituals of humanity's faith traditions and religions, which themselves are central to community. It is far more humanity's learning ground for building community then a generator of war.

6. Governance and water decisions

Today, there are many realities that those who seek to understand the ethical dimension of water policy must confront; four of the most important of these follow here. First, we must confront the reality

that most people live in places where water comes only a few months of the year, sometimes with too little and other times with too much. For example, more than two-thirds of people in Asia live in areas where 80% of their rainfall arrives in 25% of the year. Overall, roughly 70% of water is used for agriculture, 20% for industry and 10% for municipal use. Most of the world is struggling with how to realign these uses to fit changing needs stemming from changing demographics and development. And they must do it within uncertainties of fluctuating precipitation rates. Do we move water to people, or people to water? Each has different ethical and political implications. If we move billions of people who are at risk of extreme water events, do we use the same international relocation rules which have effectively blocked large infrastructure projects that may have led to the relocation of hundreds of thousands?

Second, we must deal with the notion that the poor cannot pay. The truth is that the poor do pay, and pay a far higher percentage of income or wealth and treasure than almost anyone in the developed world would stand for. They pay \$1.00–2.50/m^3 on average. In the US, the average paid is \$0.30–0.80/m^3. In many cases around the world, the poor who are connected often pay \$1.00/m^3 and those who are unconnected can pay \$5.50–16.50/m^3. Our problem is not willingness or ability to pay as much as it is how to align access of resources to the poor.

Third, little reform or equitable integration of water uses can be achieved without defined rights. A world debate has emerged on establishing a human right to water. Whether or not such a right is immutable and exists or is subsumed under other fundamental human rights is unclear. However, it is clear that humans will not increase access to and use of water without some system of water rights to set stable social expectations. And much of the world lives in situations of arbitrary power delegation of water rights, usually based on political power.

From a governance perspective, the debate around water rights illuminates an important aspect of building viable political cultures. Are we creating water consumers or water citizens? Citizens who passively sit back and accept (or protest against) what experts tell them versus citizens who are actively engaged in defining how the water is managed? For the 2008 Zaragoza Water Forum, Pope Benedict said:

> *'This right to water is founded on the dignity of the Human person; … it is necessary … to examine attentively the approach … of those who treat water merely as an economic commodity …. Its use must be rational and solidarity, fruit of a balanced synergy between the public and private sector.'* (Pope Benedict, 2008b)

Answers to such challenges carry profoundly different political, cultural and ethical results. However, the awareness of the critical relation between political culture and water policy is not new. In the 1930s, Karl Wittfogel, a student of Max Weber, drew systematic attention to this in his 'Theory of Oriental Despotism' (Wittfogel, 1955). He attempted to explain the political authoritarianism he found in many Asiatic systems by the drive to centralization caused by continued imperatives and rationalization in the water sector.

More modern experiences have continued to reveal a linkage between political culture and water sector management. For example, one of the oldest continuous western democratic institutions is the Valencia water tribunal. It operates on a rotating basis of water owners and operators resolving conflicts among other owners and operators. Variations of this system, mostly likely from Arab North Africa via medieval Spain, were actually transported to the early southwestern part of North America in the form of

the aeseqia water rights systems (Glick, 1970). The Dutch water boards have operated since the Middle Ages and are widely acknowledged to have provided a model for modern Dutch democracy.

Fourth, how we make decisions about risk and uncertainty in water resources management is central to the health of democratic political culture and individual freedom. We know that managing risk and the uncertainties of the extreme events of floods and drought is critical to achieving social stability, breaking fatalism, and facilitating growth and social transformation. Democratic political cultures are built on a classical premise that citizens should actively participate in decisions that affect their lives. Making water management decisions has become more clearly part of building political culture. Today our publics need to be actively involved in defining and then actively choosing (rather than passively accepting) management levels of risks given to them by experts.

The approaches taken by the 2010 California State Water Plan may be one procedural way to better portray risk and uncertainty in ways that are accessible to both technical communities and to the public (Figure 5). The plan used three water supply management scenarios to generate alternative water supply futures. Each of these scenarios was depicted for the critical regions of California, and climate change uncertainty was factored into each region and each scenario. In the critical central valley, climate change uncertainties overwhelmed each of the three scenarios. This suggests that the traditional methods of looking at social resiliency through the lenses of the long-established peer reviewed methods of hydrologic risk and uncertainty analysis may be the best way to advise decisions in this sub-region. On the other hand, in parts of Southern California, uncertainty seems to play a limited role in all of the scenarios. This suggests that other issues, such as social issues, are far more important determinants regarding water and climate changes in that region (California Waterplan Update, 2009).

Several years ago Taft Broome, in the Washington Post, noted:

'… engineering is always an experiment involving the public as human subjects. This new view suggests that engineering always oversteps the limits of science. Decisions are always made

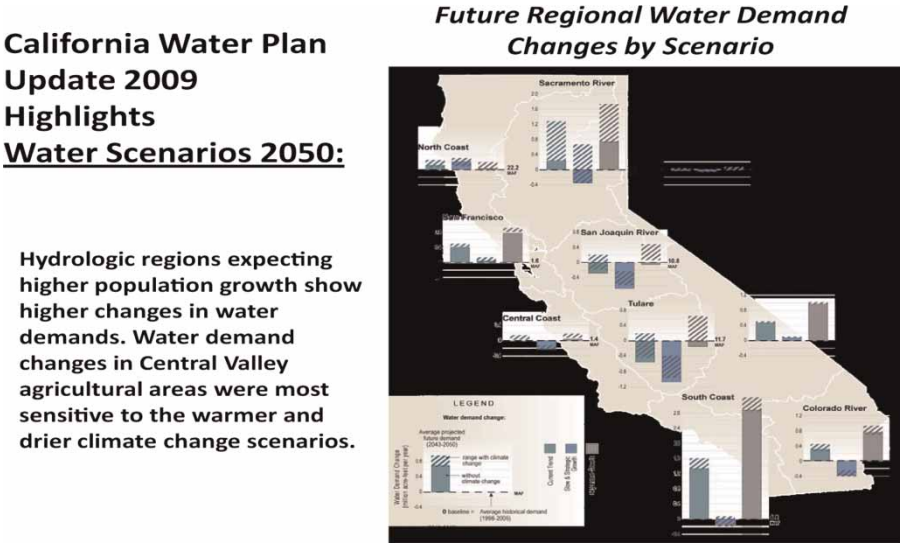

Fig. 5. Climate change uncertainties and water supply in California.

with insufficient information. In this view, risks taken by people who depend on engineers are not really the risks over some error of scientific principle. More important and inevitable is the risk that the engineer, confronted with a totally novel technological problem, will incorrectly intuit which precedent that worked in the past can be successfully applied this time. … Interestingly these new moral dimensions are not being created primarily by philosophers. They are the works of engineers themselves' (Broome, 1986)

Broome's summary suggests that water management should move from paternalism to an informed consent basis for professional ethics, that societies must overcome the phenomena of dueling experts and adversarial science, and that we must clarify the confusion of science and normative ethics[1].

7. Concluding suggestions for water–ethics–faith

Yes, we must respect our ecology. Yes, we must be good stewards. But there is more:

(i) In our water policies, we should adopt a preference for the poor and ask what our water policy prescriptions mean to the poor. At the United Nations' first environmental conference in 1972, Gandhi said that poverty is the biggest polluter. In 2008, Pope Benedict offered useful guidance here when he said:

'… if protection of the environment involves costs … they should be justly distributed taking into account different levels of development of various countries and the need for solidarity with future generations …' (Pope Benedict, 2008a)

The Anglican Book of Common Prayer further admonishes us:

'Give us all a reverence for the earth as your own creation, that we may use its resources rightly in the service of others and to your honor and glory …' (Anglican Book of Common Prayer, 1979)

(ii) We must reconnect water as the vital tool for economic and social development. This means building a new ideological and ethical consensus around water that focuses on the common grounds of engineering means and environmental ends. It must be a consensus that goes beyond equilibrium, status quo and preservation notions of ecology towards co-designing and choosing desired future ecologies. The ethic we require is not simply preservation; it must be built teleologically, on purpose and by active co-designing with nature.

(iii) The water policy ethics we require, even in our advanced technological era, should be based on finding a new balance of the sacred and utilitarian in water. This balance is not new, although our balance point is. From the ancients' respect for the sanctity of water to 19th century technology's 'conquest' and democratization of water, humans have been constantly rebalancing the sanctity and utilitarian in water.

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[1] The epistemological underpinnings of this problem are brought out well in the classic debate between Karl Popper and Thomas Kuhn over how paradigms of science change; see Fuller (2004).

(iv) We must find a new understanding of humans and nature, an understanding that goes beyond engendering fear of the future based on observed changes with limited understanding of their historical contexts. Tielhard's observation many years ago sheds light for us:

'For my part, I do not believe in the supreme effectiveness of the instinct of preservation and fear. It is not the fear of perishing but the ambition to live which has thrown man into the exploration of nature, the conquest of the atmosphere and the heavens' (Teilhard de Chardin, 1965)

We need to form a new understanding of how the human and natural fit. Perhaps we should see ourselves as nature becoming conscious of our own design.

(v) The idea, adopted by the UN World Water Assessment, that water is everyone's business, as it constantly recycles through us all, is more than abstract philosophy. It carries practical policy implications. This too is not new; note Lao Tze's observation on this notion, from many hundreds of years ago in ancient China:

'The sage's transformation of the world arises from solving the problem of water. If water is united, the human heart will be corrected. If water is pure and clean, the heart of the people will readily be unified and desirous of cleanliness. Even when the citizenry's heart is changed, their conduct will not be depraved. So the sage's government …. consists of talking to people and persuading them, family by family. The pivot (of work) is water' (quoted in Warshall, 1995)

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These comments are personal reflections and opinions of the author alone and are not made in any official capacity.

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