Contemporary Water Management Issues in Thailand in Comparative Perspective

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Abstract: Water management is a complex and multifarious issue that joins together a wide range of different problems and approaches. Since water is essential to human life, governments must make efforts to ensure that everyone receives the water necessary but, at the same time, they have to wrestle with the fact that water is a scarce resource that must be priced for consumption under conditions of constantly increasing demand from cities, industry, agriculture and tourism. Examination of three case studies, Australia, Singapore and Japan, indicates that contemporary water management issue may be considered in a number of categories and analysis has taken place on four such categories. These are global climate change, disaster mitigation, political and legal modernization and allocation of water resources. The case studies inform the discussion of water management practices and prospects for Thailand and it is shown that the country is progressing towards the examples represented by the more developed and advanced countries insofar as it is ever possible to import a water management solution into the very specific geographical, hydrological, social, political and cultural conditions in effect in a specific location.

Keywords: *Australia, Japan, Singapore, Thailand, water management*

1. Introduction

Water management will increasingly become one of the most critical issues of that next century. Indeed, if the management of water is not conducted successfully in that time period then it may be the case that human society will not be able to survive in a recognizable form, owing to the problems of global climate change. Global climate change will lead to increased unpredictability in the distribution of water through rainfall and intensification of disasters caused by extreme weather events, including storms, flooding and drought. This is taking place during a period of rapid economic change and industrialization around the world which has led both to increased pressure on the allocation of scarce water resources and on the need for emerging states to revamp their political and legal processes to meet with the exigencies of dealing with the contemporary international relations situation. This situation, with respect to water management, has been described as the World Bank's hegemony achieved through the Water for All discourse (Goldman, 2007; Zeitoun & Warner, 2006). This hegemony is exerted, in the Mekong Region in particular, on an environment in which different states and communities confront each other in an essentially realist paradigm of international relations (Sneddon & Fox, 2006). The work of the World Bank has been supplemented at the local or regional level by the support of the Asian Development Bank (ADB), which is largely supported by Japanese capital (Sisowath, 2006). This has led to the concept of the "... modernist belief in progress as mastery over nature, concerns of global and national environmental movements over dams and their impacts, and a galvanized Mekong environmentalism (Hirsch, 2010)." Hegemonic control over water management has led to prioritization of national and even trans-national over local scales as appropriate for solution development, technocratic approaches to water management and the integration of private and public sector actors, regulations and processes to manage provision of water services and allocation decisions.

This is true in the case of Thailand, which is an upper middle-income country located in a tropical monsoon region with abundant water resources that are coming under increasing pressure as a result of rapid modernization, industrialization and urbanization. The impacts of these pressures in the context of global climate change were brought into sharp focus during the floods of 2011, as a result of which more than 700 people were killed and the closure of factories and industrial estates contributed to the global production slowdown. The response of the Pheu Thai government to the need to prevent future flood events causing a similar level of damage was to set up the Strategic Committee for Water Resources Management as a top-level government agency charged with creating an infrastructure plan which turned out to have a budget of 350 billion baht (approximately US\$11.7 billion) and to require a variety of different projects which will be made open to a transparent international bidding process (Theparat,

2012; Ruangdit, 2013). Creating a new, superior level of government to supersede all the other fragmented and conflicted levels of government is a rational response to a complex situation beyond the ability of a democratically-elected government to control (Chintraruck & Walsh, 2013). It does not, however, solve contradictions at lower levels of government and these are likely to re-emerge at a later date. This paper investigates the ways in which various countries have tackled contemporary issues of water management and derived useful and usable solutions for the specific problems faced. The lessons that might be drawn from these case studies are evaluated for the help they might present for the Thai government. The paper now continues with an examination of the four areas of problems that apply to contemporary water management issues, then there is a brief discussion of the methodology employed to generate and analyze data, the case studies themselves and an analysis of the lessons that can be applied to the case of Thailand before a concluding section ends the paper.

2. Literature Review

Four areas have been identified as generative of water management problems in the contemporary era: global climate change; disaster mitigation; legal and political modernization and water allocation issues in an era of intensified competition for scarce resources. In each of these cases, under the conditions of hegemonic political-economic control of the discourse of water management, human needs take precedence over ecosystems, which is detrimental to environmental sustainability (Richter *et al.*, 2003).

Climate Change: The increasingly obvious evidence of global climate change has led to concern about the impact of human activities on the environment, specifically through the release of greenhouse gases into the atmosphere (Justus & Fletcher, 2006). Climate change is having a considerable impact on regional weather systems, causing some events to become more intense and adding more uncertainty to already only partly understood systems (Patz *et al.*, 2005). Sea levels will continue to rise for many years into the future owing to melting of glacial ice and there will be additional feedback mechanisms resulting from water in different phases (Karl & Trenberth, 2003). Current emission levels, if prolonged into the future, are projected to lead increased average temperature increases of between 2-4°C (estimates vary according to assumptions (IPCC, 2012)). Such a change will exacerbate already emergent weather-related problems, including heatwaves and forest fires, drought and water insecurity. These problems will be more dangerous in those areas where people are already vulnerable, where of course most of the population is poor. The 2003 heatwave, for example, is believed to have caused 20,000 deaths in Europe and 1,500 in India. Mortalities are likely to increase as temperatures rise and those most vulnerable include the elderly, those with low education or suffering from social isolation, those with pre-existing medical conditions, respiratory diseases, diabetes and chronic mental disorders. Urban areas will face particular problems in part because of the high level of concentration of vulnerable people within them (Huang *et al.*, 2011).

In terms of urban development and planning, Satterthwaite *et al.* (2009) note that: "Much of the physical growth and economic expansion in most cities in low- or middle-income nations takes place outside any official plan and outside official rules and regulations ... [in part] ... because of a very large mismatch between the growth of urban centres' economic bases and populations and the competence, capacity and accountability of local government structures (*ibid.*).". Climate change will, therefore, have impacts on all aspects of water resources and their distribution to people, industry, agriculture and cities. It will strengthen the pressure on government to deal with complex and trans-border issues. It is this background that has contributed to the rise of the integrated water resources management (IWRM) approach. This has been described as "...a process which promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment (GWP, 2012)." Achieving this at the national level has proven to be a challenge for those governments which have attempted it, as the case studies below indicate.

Disaster Mitigation: Global climate change will require both adaptation to the new conditions and disaster mitigation. The former is considered below in political, economic and social aspects. There is necessarily some overlap with the latter and the IPCC (2012:6) identifies six basic strategies that will help to structure a holistic or integrated approach to disaster mitigation: reduce exposure; increase resilience to changing risks; transformation; reduce vulnerability; prepare, respond and recover and transfer and share risks. The mitigation aspect of this approach involves repairing damage to life and property, while adaptation seeks to prevent changed circumstances from causing damage. To some extent, it is necessary

to divide available resources between the two areas and, in general, more have been made available to the mitigation side than the adaptation side (Muller, 2007; Tol, 2005). Water disasters in recent years include the Indian Ocean tsunami (2004), Cyclone Nargis (2008), Hurricane Katrina (2005) and the Mekong region floods of 2011. These disasters are large and overwhelming events which can make governments despair of being able to cope with what is required. However, it is possible to conceptualize disasters as being socially constructed and, therefore, to assess risk and vulnerability from a human perspective (Weichselgartner, 2001). Currently, as Hurricane Katrina indicated, insufficient attention has been paid to reducing vulnerability in even the most advanced societies and the effort to promote safe development has had the undesirable effect of actually increasing vulnerability (Burby, 2006). That disaster also demonstrated race- and class-based variations within cities that make some sections of the population more vulnerable to potential disasters and others, generally the wealthier, concomitantly less vulnerable (Elliott & Pais, 2006).

Modernization of Political and Legal Systems: As societies develop, their political systems also develop and change by incorporating more actors, more institutions and wider definitions of the source and meaning of power. Armstrong & Bernstein (2008) argue that politics moves from being defined as related to governance in a formal political arena to one in which politics is related to power as it manifests itself in the state, other institutions or culture. Culture, in other words, is constitutive of power in society. For Gramsci, the double definition of the state included civil society along with government which, together, rules by hegemony protected by the armor of coercion (Alonso, 1994). That is, the ideological state apparatus and the repressive state apparatus theorized by Althusser (2001) act together to create a series of symbolic and actual forms of power and also the means to enforce them. However, these different forces do not always appear in the same way and at the same time in different societies (Hall, 1985). However, states do not act in isolation from each other but instead in a world system structured by international law and in which non-state actors are influential in affecting the relationships between states and the individuals and institutions that constitute them (Slaughter, 1995). What happens in the external environment, therefore, affects what happens within a state. This is true whether it relates either to the political environment or the natural environment. Consequently, states have been affected by the zeitgeist of neoliberalism and by the impact of global climate change (Giddens, 2008) and must adapt their legal and political systems to meet these external changes and requirements. According to Van Tatenhove & Leroy (2003), these processes have been most strongly affected in the case of environmental policy by the societalisation of policy formation and by its marketization. This is perhaps best seen in the case of the prioritization of water resources among different constituencies, which is the subject of the next section.

Prioritization of Water Resources: Although it may not have been so obvious in the past, it has become increasingly obvious that natural resources are finite or scarce in nature and, with unregulated exploitation, will be depleted with perhaps catastrophic consequences. The concept of the Tragedy of the Commons indicates that unregulated use of 'natural resources; will lead to resource depletion even though every individual acts consistently and rationally (Hardin, 1968). This is evident from the collapse of fish stocks, for example, and the deforestation of large parts of the rainforests of the Mekong Region (Usher, 2009). Since the loss of resources such as potable water would be disastrous to any ecosystem, therefore, it is necessary to create some regulatory framework to ensure that sufficient of the resource remains to pass on in an intergenerational manner, which is at the heart of the definition of sustainable development (WCED, 1987:43). Resource allocation on a sustainable basis takes place in parallel with the efficient use of these resources. Economists have argued that growth may take place in a situation of exhaustible natural resources but there is a need to adjust the rate of exploitation to the optimum rate of exploitation that balances both the highest level of growth with the resilience of the resource in the future (Stiglitz, 1974). Yet within this basic formulation of combining efficiency with sustainability, there are various ideological issues that should be examined.

As a result of being located in a region that has a series of river basins passing through several countries, Mekong region countries must deal with each other as potential rivals for access to water resources. As Lebel, Garden & Imamura (2005) argue, in such situations, it is possible to identify three levels of the politics of space: scale, position and place. These political conflicts may be considered at the national or domestic level or the international level. At the national level, the contestation has, it has been argued, depended to a large extent on the supply of institutional capacities, which are not only limited overall but subject to decisions as to which capacities to be permitted to develop. Such decisions are subject to systemic background factors: external security threats, popular pressure and resource constraints

(Doner, 2009: 18-20). In the case of water resources and hydroelectricity, the Thai state has out-sourced security threats and popular pressure to non-democratic regimes in Myanmar and Laos, where the dams are being built and the electricity generated (Lebel, Garden & Imamura, 2005). It is the reiteration of inter-institutional conflict over a period of decades that has been instrumental in the creation of so many overlapping mandates and responsibilities in the management of water in Thailand (Chintraruck & Walsh, 2013). To some extent, the ability of a democratically-elected government in Thailand to enforce its will and its mandate over the bureaucracy is limited, as was seen during the 2011 floods, during which there was plenty of evidence of fragmentation between important institutions. This is partly because of ideological political differences that are to some extent class-based and partly because of the technocratic nature of much of the leadership of the civil service in the country that results from the educational system (which also, of course, has a class component). The division between technocratic solutions and populist responses, which is an important aspect of contemporary political discourse – was stimulated by the 1997 Asian Financial Crisis and the intervention of the International Monetary Fund (IMF), which required a return for its funding a range of policies in line with the neoliberal agenda (e.g. closing down factories and companies deemed unsustainable, privatization of government services and reductions in welfare provision) that were deeply unpopular but embraced by technocrats as necessary to cure the ills of the country and its economy (MacIntyre, 1998). Consequently, if a democratically-elected government wishes to change policies with respect to water distribution, in part to reward its regionally-segregated voters, it can be challenged on the grounds that this is a populist approach that is not rationally based and is akin to the concept of 'policy corruption,' which has been used as a legal means to counter government policies (Connors, 2008).

3. Methodology

This paper uses a case study approach to examine different IWRM regimes in Australia, Singapore and Japan as a means of investigating the application of an IWRM system and other water management issues in Thailand. The case study approach is a commonly used one in management studies because they are epistemologically in harmony with people's experience and, hence, a meaningful basis for generalizability (Stake, 1978). Case studies also unite propositional (i.e. lived and discussed) and tacit knowledge (i.e. experienced) through describing real life situations to which people can relate (Polanyi, 1958). Since three case studies are used, this research may be considered part of the collective case study approach (Stake, 1995). For this to be successful, it must use multiple sources of data to reveal issues that would otherwise be hidden and to ensure the data are properly triangulated (Yin, 1984). This has been approached by a combination of secondary data collection and redaction, combined with some personal interviewing with experts in the field. Research findings were entered into a database for interrogation according to a recognized content analysis approach, known as conventional content analysis (Hsieh & Shannon, 2005).

4. Case Studies

Three case studies in water management are presented in this section: Australia, Singapore and Japan. These three countries offer sophisticated and well integrated water management systems which are approaches to which Thailand might aspire. However, they offer different types and scales of issue which are not easy to replicate and, indeed, it is possible that water management regimes in a particular geographical location cannot be replicated in detail at all in another location other than in the form of general principles.

Australia: Australians consume more than 24,000 giganlitres of water per year, more than 70% of which is used for irrigation, while a further 21% is used for urban and industrial purposes (Australian Government, 2009) and the remainder goes to other rural activities. Since Australia is the driest continent after Antarctica, the country must use its limited water resources wisely. Many of Australia's rivers have highly variable flows so that droughts and floods are common. This variability of flow has led to the extensive development of rivers and groundwater resources for the irrigation of agriculture and for domestic water supplies. Inefficient water use has been significant and led to national level problems, including salinity in rivers and soil. Consequently, the Council of the Australian Government agreed in 1994 to implement a strategic framework designed to achieve efficient and sustainable water use. Important reforms included: 1) identification of stressed rivers and allocation of water for the environment; 2) institutional reform; 3) volumetric pricing of water for full cost recovery; 4) ecologically sustainable water trading; 5) protection of groundwater; 6) water quality management; and 7) public

consultation and community education (*ibid.*). This framework has resulted in a more sustainable approach to water resource management and caused the government to realize that there is a need to integrate water resource management at national level. Consequently, the Council of the Australian Government reaffirmed its commitment to implementing the 1994 Water Reform Framework and to develop a National Water Initiative that aims to: 1) increase the security of water access entitlements; 2) encourage the expansion of water markets; 3) enable best practice water pricing; 4) ensure ecosystem health and protect environmental assets; 5) improve monitoring information; and 6) encourage water conservation in cities. The Council further consulted and coordinated views with stakeholders and all government agencies to develop a draft agreement that focuses on implementation of the plan at all levels of administration (*ibid.*). Australia has started to appreciate the value of the lessons learnt from this reform process and the creation of a more integrated approach. It also moved to create the National Water Quality Management Strategy (NWQMS) as a means of protecting and enhancing the country's water resources while also maintaining economic and social development through a nationally consistent approach to water management.

The strategy currently consists of 21 guideline documents, which outline the principles to be used for managing important elements of the water cycle, quality of potable water, monitoring groundwater resources and rural water use, urban storm water management, sewerage systems and efficiency of water management in specific industries. There are also guidelines for water recycling, for environmental risk management at the national level and quality of coastal water. The most significant instance of successful IWRM has been in the case of the Murray-Darling Basin. In this case, the Murray-Darling Basin Authority acted under the Water Act to conduct public consultations concerning the creation of implementation guidelines for basin management and related environmental and socioeconomic issues. Australians have also become aware of the importance of public participation in lake management by developing, for example, the Lake Eyre Basin Agreement to implement cross-border river basin management and community engagement in the Lake Eyre Basin (Kildea & Williams, 2011). This is particularly important because state membership and identity is strong in Australia and this has been manifested in differences between reporting and monitoring standards across borders in that country (Lynch, 2010). There is certainly an important need to coordinate local, state and national-level responses and interventions (Curtis & Lockwood, 2000). Much of Australia is vulnerable to the negative effects of global climate change and observations in recent years have indicated the increased prevalence of drought, extremely high temperatures and related phenomena such as wildfires (Murphy & Tinbal, 2008). Potential future threats from continued climate change include the arrival of invasive alien species (Kriticos *et al.*, 2003), greater incidence of diseases such as dengue fever (Russell *et al.*, 2009) and the threat of more severe tropical cyclones (Walsh & Ryan, 2000). These changes indicate the pressure that will be placed on water resources in the country, as there is a need to monitor existing and future supply and demand for water, as well as aiming to minimize inefficiencies which might intensify environmental and human risks.

Singapore: Singapore is a small island country with limited land and water and so resource management has to be carefully balanced with the requirements for socio-economic development. As water is a scarce resource, Singapore needs to ensure its long-term sustainability through efficient water resource management with forward planning, careful management of water resources and mobilizing adequate investment in infrastructure and effective technology (EDMS, 2007). There are five key challenges in water resource management in Singapore: protecting water resources, processing safe drinking water in a cost-effective manner, minimizing wastage in the water supply system, water conservation and closing the water loop (UNEP, 2011). Singapore manages water successfully through these five challenges by applying a comprehensive IWRM program and has also achieved 100% access to basic sanitation as well as safe drinking water for the population (*ibid.*). The GWP (2006) observed that Singapore has successfully achieved gains from the IWRM program thanks to the efforts of all sectors of the population, from policy-makers to implementers and general citizens. The key success factors include political will, infrastructure provided by the government, the collective commitment of the community, technological expertise and innovation from the private sector. The Singapore government has initiated the Singapore Green Plan (SGP), released in 1992, to promote strategic planning and means of preserving, protecting and enhancing the environment. The revised SGP (SGP2012) was created to be a blueprint for environmental sustainability in the next decade, with the vision of "Water for all: Conserve, Value, Enjoy" (EDMS, 2007). Singapore believes that urbanization and industrialization do not necessarily create water pollution if pollution is tackled at source and if all industries adhere to stringent requirements. The country has been able to turn two thirds of its limited land area into water catchment and water storage

areas. For storage, Singapore created a reservoir in the city centre which not only serves as a water supply but also has a role in flood control, as well as being a lifestyle attraction (PUB, 2009).

Singapore has processed safe drinking water in a cost effective manner through necessarily efficient water treatment because there is very little land for traditional natural sedimentation and purification methods. Consequently, Singapore has leveraged rapid technological advances to develop new and sustainable sources of supply called NEWater (utilizing advanced membrane technology to aid in water reclamation) and desalinated water to help diversify Singapore's water resources. With these two sources of water, it has been possible to enhance the sustainability of Singapore's water supply. As a result, Singapore's water supply is now derived from four sources: 1) national taps (main source), which is water from local water catchments; 2) imported water from Malaysia through water agreements with Johor, Malaysia; 3) water from NEWater (reclaimed water) with the capacity to meet 30% of Singapore's water needs by 2011 and 4) water from the sea via desalination (Tortajida, 2006). Singapore has also achieved success in minimizing wastage in the water supply system, through efficient management of the transmission and distribution system from source to consumer. It has also achieved a low level of unaccounted-for-water by implementing leakage control, full and accurate metering policy, proper accounting of water used and strict legislation (*ibid.*). Water conservation requires the collective commitment of the community and Singapore constantly undertakes educational initiatives to nurture a culture and environment where members of the public understand the need for the efficient use of water. Singaporeans have become very aware of the conservation slogan "putting every drop of water to good use." The state has also recognized the importance of demand management and created a comprehensive program to manage and monitor household water demand, which is accomplished through a community-driven program called Water Efficient Homes. This program helps every home to conserve water through use of water saving devices that can be easily fitted into taps (UNEP, 2011).

Despite having a very low percentage of unaccounted-for-water (5%), Singapore is continuing with efforts to reduce this further. Other programs include the ABC Water Program. A stands for Active: providing new community space, bringing people closer to water and developing a sense of ownership of water. B stands for Beautiful: integrating reservoirs and waterways with the urban landscape, going beyond flood control and water storage and creating aesthetically pleasing lifestyle attractions. C is for Clean: improving water quality, public education and building people-water relationships (PUB, 2009). Finally, instead of discharging treated used water into the sea, authorities attempt to close the water loop by looking for ways to harness the water for further use. Singapore achieves this through water reclamation, in the project known as NEWater Initiative, which uses the Deep Tunnel Sewerage System to ensure long-term sustainability of water resources (Tortajida, 2006). In this way, the water loop is closed and loss of resources minimized. Singapore's economic and social development has been facilitated by the strength of the state and its willingness to lead development processes with high levels of technocratic competency (Huff, 1995). The pervasiveness of the state has a negative connotation too, since it has led to a perhaps too-close relationship between elites in both the public and private sectors (Hamilton-Hart, 2000) and there is reason to believe that the use of state entitlements to stifle political dissent leads to a veiled form of repression (George, 2007).

Japan: Historically, Japanese people fought each other for access to water and it was not until the aftermath of the Second World War that water rights were established for the people, while the occupying US authorities developed water management reforms focusing on empowering the various prefectures to manage their own water resources. It is apparent that being able to learn from the USA in this context represented an important advantage for Japan, although the Japanese state subsequently developed the management system much more. The country's hydrology is characterized by a narrow surface area with rapid run-off of precipitation that means it is not a water-abundant country. The population density is high and the quantity of annual natural water resources (about 3,372 m³ per capita) is only about half of the global average. Moreover, the country experiences high fluctuations in both seasonal and annual rainfall and, consequently, Japan has recently suffered several times from serious water shortages (World Bank, 2006). To address this problem, the national government has formulated an overall plan for natural resources development and environmental conservation and has implemented various water resources policies at the national level. The Comprehensive National Water Resources Plan is the basic national plan for water resources, dams and systems development. Additionally, the Environment Plan clarifies long-term and comprehensive environmental policies related to water quality and quantity, including water conservation (EDMS, 2007). With diverse natural environment regionally, Japan has developed a region-specific IWRM system tailored to the varied climatic and social conditions. This IWRM system promotes

sustainable water use and sound water cycle governance through appropriate policy and frameworks involving the relevant water agencies and stakeholders. This requires integrating all hydrological and environmental elements, such as groundwater and surface water, water quantity and quality and upstream and downstream issues, while also promoting water efficiency and environmental conservation (MLITT, 2011). There is a Japanese national integrated water resources management plan (Water Plan 21), which identifies long-term water supply and demand prospects and improves water use stability through water efficiency measures and the effective use of existing infrastructure with three basic objectives: 1) to establish sustainable water use system; 2) conservation and improvement of the water environment and 3) fostering water-related culture (World Bank, 2006).

IWRM plans have been developed by the national government for Japan's seven designated major river basins, which serve about 50% of the country's population and industrial activity. The plans were prepared in consultation with the ministers of the relevant ministries and heads of other relevant administrative agencies and were approved by the cabinet. The plans have incorporated the opinions of various prefectural governors and experts and aim to provide efficient water utilization and comprehensive water resource development. The Japan Water Agency is responsible for construction and operation of all relevant systems, while evolving national plans are complemented by regional plans crafted at the appropriate level (*ibid.*). It is considered that the principal factors involved in this are: (1) Integration and coordination of water related sectors, (2) Stakeholder participation in water resources management, (3) Integrated surface water and groundwater management, (4) Integrated management of water and lake quality, (5) Upstream-downstream Coordination, and (6) Utilization of rainwater and recycled wastewater (*ibid.*). The Department of Water Resources, which is part of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) is responsible for coordinating the implementation of policy and liaises between different ministries and departments to ensure smooth operations and implementation of regulations. In 1998, a Coordination Committee for the Promotion of a Sound Water Cycle was established involving MLIT and Ministries of Health, Labor and Welfare, Agriculture, Forestry and Fisheries, Economy and Trade and Industry. The committee is charged with examining water policies on a comprehensive basis, promoting sound water cycle management and revitalizing rivers. Every river requires an improvement plan by virtue of the River Law, which was amended in 1997. Public participation must be included in the planning process.

An example of this is the Tama River Basin Round-table, which deals with care for the river which passes through Tokyo and is intensively used for a variety of purposes, including agriculture, industry, power generation and water supply. A total of 26,600 people have been involved in consultations aimed at balancing the demand for river resources and the desire to maintain the natural environment (*ibid.*). Other problems that have required attention have included subsidence in various cities and industrial areas owing to extensive extraction of natural resources and the need to manage large lake basins, such as Lake Biwa. In the capital Tokyo, advanced membrane technology purifies wastewater as part of the recycling effort which returns water to the system at various stages and categories. Public awareness of the need to conserve water resources includes recycling and also rainwater conservation. Together, as much as 280 million m³ per year of rainwater and recycled water is used and schemes are spreading throughout the country. Strong public awareness programs have been considered to be successful. These plans and systems project an image of Japan and of Japanese government as being a unified, like-minded and consensual set of processes in which conflict is muted or absent. This is not entirely true, as closer investigation suggests. For example, as Lesbirel (1998) has observed, conflict in Japanese politics is common and the impression of consensus is manufactured to some extent by the use of compensation and noneconomic dispute resolution mechanisms. As each case is dependent on such negotiations, this leads to inconsistency in social choice outcomes and diversity and policy processes and outcomes (*ibid.*).

In recent decades, Japan has had a lengthy and unfortunate need to deal with disasters of different sorts. Chemical terrorist attacks in Tokyo, for example, have given rise to sophisticated and interlocking agencies and responsibilities aimed at preventing altogether or minimizing as much as possible the impact of future events (Okumura, Ninomiya & Ohta, 2003). The same is true of earthquake disaster management in the wake of the Kobe earthquake but, as the Daiichi Fukushima disaster showed, there is a limit to what even the best-organized and resourced state agencies can achieve in the face of overwhelming force (Dauer *et al.*, 2011). When events took place, transparency and public participation were soon sacrificed as technocratic responses took precedence, with negative effects on public confidence. Learning IWRM from other countries' experience is acceptable. However, since there are unique and complex characteristics of water resources in each country, as well as diverse social and

economic issues, countries must be careful about the extent to which they can learn from each other's experiences.

Discussion of Case Studies with Respect to Thailand's Issues: Taken together, the case studies represent diversity within the initial conditions and circumstances which the different states face when designing and seeking to administer water management systems. Although all three countries have embraced the IWRM approach, the issues that they face are dissimilar and solutions cannot be imported wholesale. However, principles can safely cross borders.

Climate Change Issues: As a medium-sized state, Thailand must respond to global climate change at both the urban and the regional levels. The Singapore example gives some indications of what might be achieved through the application of technology in terms of the efficiency of water management and closing the water loop to ensure that water resources do not leak out of the system. The Japanese approach indicates the need to create a co-ordinated and harmonious approach to environmental risk and, also, the need to create means by which conflicts might be resolved. Within Thai politics, there are numerous problems resulting from overlapping mandates and responsibilities between different agencies; there are also numerous problems based on regional conflicts between different sets of embedded interests, which are only partly governed by the state. As long as means of resolving these conflicts peacefully are absent, there will be compromises and lapses in the coverage of any coherent national climate change mitigation plan. One lesson to be drawn from all three case studies is the importance that each state has placed on public awareness campaigns as a means of fostering social solidarity and instructing people in how to behave in the desired manner. What appears to be crucial in such campaigns is the promotion of the understanding that everyone will be affected equally and in which each person will contribute according to her or his ability so to do. Unfortunately, Thailand's culture of impunity and structural inequalities significantly compromise the possible success of any such campaign.

Disaster Mitigation: Environmental disasters that have affected both Japan and Australia have revealed that, no matter how much planning takes place, the sheer power of some disasters mean they cannot be satisfactorily suppressed but must be managed after the event as best as is possible. To some extent, therefore, all governments are planning to deal with the last disaster to have occurred. This certainly appears to be the case in Thailand, where many billions of baht are being devoted to creating the kind of physical infrastructure that would have dealt with the floods of 2011, reduced the numbers of deaths and kept open the factories and industrial estates. It seems to be an unavoidable issue for government to focus on what has already occurred and to manage what can be managed rather than what currently unforeseen problems might occur in the future. If government has only limited capacity and resources to deal with disaster mitigation, then it seems logical to incorporate the private sector to provide more capital and ideas. Thailand has already incorporated the private sector into its water management system and electricity generating grid. In terms of water management, the partial privatization of water provision and distribution to the East Water Group company has proved to be successful, since the scope of operations put up for contract has been carefully limited and measures put into place to ensure that profiteering is not possible and management must extend provision of services to groups such as the urban poor who previously had not had access to this system (Zaki & Amin, 2009). Finally, one implication that is indicated in absentia from all three case studies, which focused on states which are islands of one form or another, is the importance of good neighborly relations and cross-border functionalities to deal with the kind of disaster that might be imagined, since these seem certain to be transboundary in nature.

Political and Legal Issues: Transparency is not essential at every level of political and social organization but it is essential for stakeholders directly affected by a decision involving scarce resources (including security). Both Singapore and Japan prefer to keep many of their conflict resolution mechanisms opaque to the outside world but sufficiently open to those affected by them. This results in an appearance of unified serenity to the outside world that is not really justified by the internal machinations. In the case of Thailand, the results of opaque machinations are all too evident in the incidences of violence, crime, political persecutions and the like. Much would need to change before such problems could be eradicated. In terms of the law, more has been achieved than might be expected through the writing, most notably, of the 1997 Constitution that became known as the People's Constitution and was abolished by the military coup of 2006. Other laws and institutions created in that era also place emphasis on such issues as public participation and the involvement of communities in the management of natural resources and the husbanding of locally-specific knowledge or wisdom. The

problems that continue in these cases are not so much the laws per se but the ways they are policed and adjudicated. There is also the issue that law and custom based on location-specific knowledge and privileged access to resources sets up conflicts with different scales of governance and of power. In such cases, as has been mentioned previously, it is the national level that will almost inevitably emerge triumphant with what might prove to be a Pyrrhic victory.

Water Allocation Issues: Water is becoming increasingly recognized as a physical requirement of humanity that has the characteristics both of a human right and of a commodity. In its aspect of human right, water is a necessity for human life and so must be made available to all people on as equitable a basis as is practical. In its aspect of commodity, water should be regarded as a finite and scarce resource with particular characteristics with respect to marginal utility. That is, people without access to water would pay any price to obtain what they need but as soon as they have what is sufficient they very soon start to treat water as if it has very little value by using it to fill up bathtubs, swimming pools and fountains. As a result, it is necessary to cause people to pay for water but not to charge so much for it that people cannot afford it or that the cost leads to personal rationing to the extent that it contributes to public health problems. In all three case studies, therefore, the governments involved have implemented semi-market-based systems in which the much of the costs of water services are met by the government in the form of sunk costs or of future repayment from existing infrastructure. In some cases, as also happens to some extent in Thailand, there are cross-subsidies such that poor groups pay less than large industrial users of water. To this system has been integrated the now widely-accepted Polluter Pays Principle, which requires that whoever is responsible for causing any form of pollution or other negative externality must also pay for the problem to be rectified. This kind of partial marketization backed by the state as provider of last resort appears to be the best available solution currently available to well-developed nations and Thailand, too, is progressing along these lines. This is a system that, given a stable or even declining amount of usable water (since flows and stores are becoming less predictable because of global climate change) indicates that, without significant technological breakthroughs, continual economic growth is unsustainable.

5. Conclusion

Water management is a complex issue not just because of its importance and technical requirements but because there are so many different understandings of what would constitute good management. As this paper has attempted to show, technical competence is necessary and will be increasingly necessary in the future to harness water resources and to create an efficient looped system that maintains the quality of water as much as possible and ensures that degraded water is reconditioned and returned to general use. However, that technical competency must be subordinate to political and societal institutions that determine the distribution of water services to all people and communities almost irrespective of their ability to pay for those services. More research is, of course, necessary to follow the case studies on a longitudinal basis and to monitor the extent to which Thailand has been able to identify international best practice and to be willing and able to implement similar policies and approaches in the country.

References

- Alonso, A. M. (1994). The Politics of Space, Time and Substance: State, Formation, Nationalism and Ethnicity. *Annual Review of Anthropology*, 23, 379-405.
- Althusser, L. (2001). Ideology and Ideological State Apparatus (Notes toward an Investigation), in Althusser, L., *Lenin and Philosophy and Other Essays*, New York: Monthly Review Press, 85-127.
- Armstrong, E. A. & Bernstein, M. (2008). Culture, Power, and Institutions: A Multi-Institutional Politics Approach to Social Movements, *Sociological Theory*, 26(1), 74-99.
- Australian Government, Department of Sustainability, Environment, Water, Population, and Communities (2009). Integrated Water Resources Management in Australia: Water for the Future, available at: <http://www.environment.gov.au/water/publications/action/case-studies/water-reforms.html>.
- Burby, R. J. (2006). Hurricane Katrina and the Paradoxes of Government Disaster Policy: Bringing about Wise Governmental Decisions for Hazardous Areas. *The Annals of the American Academy of Political and Social Sciences*, 604(1), 171-91.
- Chintraruck, A. & Walsh, J. (2013). The Allocation of Water Resources to Competing Interests: The Case of Thailand, in Walsh, J. (ed.), *Proceedings of the 1st SIU International Conference*, Bangkok: SIU Press, 116-23.

- Connors, M. K. (2008). Thailand – Four Elections and a Coup. *Australian Journal of International Affairs*, 62(4), 478-96.
- Curtis, A. & Lockwood, M. (2000). Landcare and Catchment Management in Australia: Lessons for State-Sponsored Community Participation. *Society and Natural Resources: An International Journal*, 13(1), 61-73.
- Dauer, L. T., Zanzonico, P., Tuttle, M. R., Quinn, D. M. & Strauss, W. H. (2011). The Japanese Tsunami and Resulting Nuclear Emergency at the Fukushima Daiichi Power Facility: Technical, Radiologic, and Response Perspectives. *The Journal of Nuclear Medicine*, 52(9), 1423-32.
- Doner, R. F. (2009). *The Politics of Uneven Development: Thailand's Economic Growth in Comparative Perspective*, New York, NY: Cambridge University Press.
- EDMS Ltd., (2007). *Final Report: Review of the International Water Resources Management Policies and Actions and the Latest Practice in Their Environmental Evaluation and Strategic Environmental Assessment*, Hong Kong: Environmental Protection Department.
- Elliott, J. R. & Pais, J. (2006). Race, Class, and Hurricane Katrina: Social Differences in Human Responses to Disaster. *Social Science Research*, 35(2), 295-321.
- George, C. (2007). Consolidating Authoritarian Rule: Calibrated Coercion in Singapore. *The Pacific Review*, 20(2), 127-45.
- Giddens, A. (2008). *The Politics of Climate Change: National Responses to the Challenge of Global Warming, Policy Network Paper*, available at: [http://www.fcampalans.cat/images/noticias/The_politics_of_climate_change_Anthony_Giddens\(2\).pdf](http://www.fcampalans.cat/images/noticias/The_politics_of_climate_change_Anthony_Giddens(2).pdf).
- Global Water Partnership (GWP). (2012). What Is IWRM? available at: <http://www.gwp.org/The-Challenge/What-is-IWRM/>.
- Goldman, M. (2007). How Water for All' Policy became Hegemonic: The Power of the World Bank and Its Transnational Policy Networks. *Geoforum*, 38(5), 786-800.
- Hall, S. (1985). Signification, Representation, Ideology: Althusser and the Post-Structuralist Debates. *Critical Studies in Mass Communication*, 2(2), 91-114.
- Hamilton-Hart, N. (2000). The Singapore State Revisited. *The Pacific Review*, 13(2), 195-216.
- Hardin, G. (1968). The Tragedy of the Commons. *Science*, 162, 1243-8.
- Hirsch, P. (2010). The Changing Political Dynamics of Dam Building on the Mekong. *Water Alternatives*, 3(2), 312-23.
- Hsieh, H. F. & Shannon, S. E. (2005). Three Approaches to Qualitative Content Analysis. *Qualitative Health Research*, 15(9), 1277-88.
- Huang, C., Barnett, A. G., Wang, X., Vaneckova, P., FitzGerald, P. & Tong, S. (2011). Projecting Future Heat-Related Mortality under Climate Change Scenarios: A Systematic Review. *Environmental Health Perspectives*, 119(12), 1681-90.
- Huff, W. G. (1995). The Developmental State, Government, and Singapore's Economic Development since 1960. *World Development*, 23(8), 1421-38.
- Intergovernmental Panel on Climate Change (IPCC). (2012). *Managing the Risks to Extreme Events and Disasters to Advance Climate Change Adaptation*, Cambridge: Cambridge University Press.
- Justus, J. R. & Fletcher, S. R. (2006). Global Climate Change, CRS Issue Brief for Congress, available at: <http://www.earth-news.org/NLE/CRSreports/06apr/IB89005.pdf>.
- Karl, T. R. & Trenberth, K. E. (2003). Modern Global Climate Change. *Science*, 302, 1719-23.
- Kildea, P. & Williams, G. (2011). The Water Act and the Murray-Darling Basin Plan. *Public Law Review*, 22, 9-14.
- Kriticos, D. J., Sutherst, R. W., Brown, J. R., Adkins, S. W. & Maywald, G. F. (2003). Climate Change and the Potential Distribution of an Invasive Alien Plant: *Acacia nilotica* spp. *indica* in Australia. *Journal of Applied Ecology*, 40(1).
- Lebel, L., Garden, P. & Imamura, M. (2005). The Politics of Scale, Position, and Place in the Governance of Water Resources in the Mekong Region. *Ecology and Society*, 10(2).
- Lesbirel, H. S. (1998). *NIMBY Politics: Energy Sitting and the Management of Environment Conflict*, Ithaca, NY: Cornell University Press.
- Lynch, B. (2010). An Examination of Environmental Reporting by Australian State Government Departments. *Accounting Forum*, 34(1), 32-45.
- MacIntyre, A. (1998). Political Institutions and the Economic Crisis in Thailand and Indonesia. *ASEAN Economic Bulletin*, 15(3), 362-72.
- Ministry of Land, Infrastructure, Transport, and Tourism (MLITT). (2011). *Achieving Water Resources Security in Japan and Worldwide*, Tokyo: MLITT.

- Muller, M. (2007). Adapting to Climate Change: Water Management for Urban Resilience. *Environment and Urbanization*, 19, 99-113.
- Murphy, B. F. & Timbal, B. (2008). A Review of Recent Climate Variability and Climate Change in Southeastern Australia. *International Journal of Climatology*, 28(7), 859-79.
- Okumura, T., Ninomiya, N. & Ohta, M. (2003). The Chemical Disaster Response System in Japan. *Prehospital and Disaster Medicine*, 18(S3), 189-92.
- Patz, J. A., Campbell-Lendrum, D., Holloway, T. & Foley, J. A. (2005). Impact of Regional Climate Change on Human Health. *Nature*, 438, 310-7.
- Polanyi, M. (1958). *Personal Knowledge*, New York, NY: Harper & Row.
- Public Utilities Board (PUB). (2009). *Water Works: Annual Report, 2009*, Singapore: PUB.
- Richter, B. D., Mathews, R., Harrison, D. L. & Wigington, R. (2003). Ecologically Sustainable Water Management: Managing River Flows for Ecological Integrity. *Ecological Applications*, 13, 206-24.
- Ruangdit, P. (2013). S. Korean Firm Leads the Pack, Bangkok Post (February 6th), 1.
- Russell, R. C., Currie, B. J., Lindsay, M. F., McKenzie, J. S., Ritchie, S. A. & Whelan, P. I. (2009). Dengue and Climate Change in Australia: Predictions for the Future Should Incorporate Knowledge from the Past. *The Medical Journal of Australia*, 190(5), 265-8.
- Satterthwaite, D., Huq, S., Reid, H., Pelling, M. & Lankao, R. (2009). Adapting to Climate Change in Urban Areas: The Possibilities and Constraints in Low- and Middle-Income Nations, in Bicknell, J., Dodman, D. & Satterthwaite, D. (eds.), *Adapting Cities to Climate Change: Understanding and Addressing the Development Challenges*, Abingdon & New York, NY: EarthScan, 3-50.
- Sisowath, D. C. (2006). Region within a Region: The Mekong and ASEAN, in Diokno, M.S.I. & Chinh, N.V. (eds.), *The Mekong Arranged and Rearranged*, Chiang Mai: Mekong Press, 121-40.
- Slaughter, A. M. (1985). International Law in a World of Liberal States. *European Journal of International Law*, 6, 1-39.
- Sneddon, C. & Fox, C. (2006). Rethinking Transboundary Waters: A Critical Hydropolitics of the Mekong Region. *Political Geography*, 25, 181-202.
- Stake, R. E. (1978). The Case Study Method in Social Inquiry. *Educational Researcher*, 7(2), 5-8.
- Stake, R. E. (1995). *The Art of Case Research*, Newbury Park, CA: Sage Publications.
- Stiglitz, J. E. (1974). Growth with Exhaustible Natural Resources: The Competitive Economy. *The Review of Economic Studies*, 41, 139-52.
- Theparat, C. (2012). Floodways Project Envisioned as Permanent Solution, Bangkok Post (May 14th), B1.
- Tol, R. S. J. (2005). Adaptation and Mitigation: Trade-offs in Substance and Methods. *Environmental Science and Policy*, 8, 572-8.
- Tortajida, C. (2006). *Singapore: An Exemplary Case for Urban Water Management*, Singapore: PUB.
- United Nations Environment Program (UNEP). (2011). *Singapore's Integrated Water Resources Management (IWRM) Program*, available at: www.unep.org/gc/gcss-viii/Singapore.IWRM.pdf.
- Usher, A. D. (2009). *Thai Forestry: A Critical History*, Chiang Mai: Silkworm Books.
- Van Tatenhowe, J. P. M. & Leroy, P. (2003). Environment and Participation in a Context of Political Modernization. *Environmental Values*, 12, 155-74.
- Walsh, K. J. E. & Ryan, B. F. (2000). Tropical Cyclone Intensity Increase near Australia as a Result of Climate Change. *Journal of Climate*, 13(16), 3029-36.
- Weichselgartner, J. (2001). Disaster Mitigation: The Concept of Vulnerability Revisited. *Disaster Prevention and Management*, 10(2), 85-95.
- World Bank. (2006). *Water Resources Management in Japan: Policy, Institutional and Legal Issues*, Washington, DC: World Bank.
- World Commission on Environment and Development (WCED). (1987). *Our Common Future*, Oxford: Oxford University Press.
- Yin, R. (1984). *Case Study Research: Design and Methods*, Beverly Hills, CA: Sage Publications.
- Zaki, S. & Amin, A. T. M. N. (2009). Does Basic Services Privatization Benefit the Urban Poor? Some Evidence from Water Supply Privatization in Thailand. *Urban Studies*, 46(11), 2301-27.
- Zeitoun, M. & Warner, J. (2006). Hydro-Hegemony – a Framework for Analysis of Trans-Boundary Water Conflicts. *Water Policy*, 8, 435-60.