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**A COMPARATIVE LEGAL STUDY ON WATER GOVERNANCE
IN JAPAN AND TAIWAN**

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Abstract

In this paper, the adoption of Integrated Water Resource Management (IWRM) concepts and its implementation in river basin management context in Japan and Taiwan are highlighted and critically discussed. The discussion argues that adopting a climate change adaptive watershed-based governance mechanism, focussing on lessons from the Yodo and Kaoping river basin experience, is an ideal model to achieve the goal of sustainable use of water resources. However, legal reform and institutional arrangements are needed to support the effective implementation of IWRM approaches that could tackle the problematic issues of institutional and legal fragmentation. Moreover, cooperative action among government, local residents, and NGOs to disseminate knowledge and create awareness inclusive of government and private agencies involved should also be implemented immediately.

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Keywords: Integrated water resource management, climate change, sustainable water management, river basin management, water law.



1. Introduction

In accordance with the Fifth Inter-governmental Panel on Climate Change Report (IPCC, 2016), it is *extremely likely* that human influence has been the dominant cause of observed warming since 1950. The report also predicts that the global surface temperature is *likely* to exceed 2.0 °C for many scenarios by the end of the 21st century. The climate change is projected to pose great risks impacting the water supply and increasing the degree and frequency of water related disasters. It is thus critical for policy-makers to develop proper climate adaptive law and policy that aim at preventing and reducing the adverse effects of living environment as a result of extreme weather events (Arnold, 2010).

This article attempts to focus on the discussion of establishing sustainable water governance mechanisms in response to climate change challenges. There is an international trend led by many international distinguished water experts and NGOs that call for a widespread use of Integrated Water Resource Management (IWRM) that aims at managing water resource in sustainable, ecological, and cost-effective ways to tackle challenges to water environment as a result of climate change (De Loë, & Patterson, 2017). Recognizing the river basin has been acknowledged as an appropriate hydrological unit to implement IWRM, this article conducts a comparative case study on the implementation experience of two major river basins in western Japan (Yodo River Basins) and southern Taiwan (Kaoping River Basin) to assess the improvement of water governance and to identify legal hurdles as well practical obstacles in implementing IWRM measures in both jurisdictions. This article further provides recommendations and suggestions for developing a comprehensive framework legislation to facilitate the concept of IWRM and institutional rearrangement for future water policy-makers.

2. Problem Statement

There is an urgent need to adopt innovative approaches in response to frequent and severe floods and droughts in many countries vulnerable to climate change in East Asia. This paper discusses Japan and Taiwan's watershed management experience because both countries suffer from frequent typhoons and torrential rains that result in serious flood and landslides disasters in recent years. In addition, the mountainous landscape, as well as short and tricky rivers courses make it difficult for both countries to store sufficient water resources that meet the demands from various water users. In response, IWRM has been highlighted and suggested internationally to be an ideal policy framework to achieve the goal of sustainable, equal and economic effective use of available water resources and reductions of flood risks in this era of climate change.

3. Research Questions

3.1. Does the traditional policy and legal framework in the context of water resource management properly address climate risks?

3.2 Are there any potential solutions to implement IWRM by legal development and institutional arrangement?

4. Purpose of the Study

In response to climate change impact on the water environment, there is a global trend to adopt “Integrated Water Resource Management” (IWRM) approaches. The purpose of this study is to identify implementation problems in two instances of river basin management in Japan and Taiwan, and to propose legal development in incorporating IWRM at an integrated river basin level.

5. Research Methods

An extensive collaborative study was conducted between the main investigator and the Japanese counterpart. The researchers collected and analysed related policy documents, scholarly works and legal documents. In addition, the researchers interviewed the government officials of responsible authorities such as the Japanese Ministry of Infrastructure, Transportation and Tourism Regional Development Bureau and the Taiwanese Water Resource Management Administration. The methodology of this research is by way of literature review. In short, an extensive review literature as conducted with respect to the IWRM conceptual framework to identify and assess the practicing experience of applying IWRM concepts at river basin level in Japan and Taiwan.

6. Findings

6.1. The Concept of IWRM and its Basic Principles

The concept of IWRM was first introduced in the first global water conference in Mar del Plata in 1977 and was operationalized through policy guidelines incorporated in the Dublin Conference on Water and the Environment (ICWE 1992) and Agenda 21 at the World Summit on Sustainable Development in 1992 in Rio (UNCED 1992). The World Summit on Sustainable Development (WSSD) in 2002 also called for all countries to develop IWRM and water efficiency strategies by the end of 2005 (Global Water Partnership (GWP), 2005) The concept of IWRM has been embraced and promoted as the core water management approach by the Global Water Partnership for decades. Although there are several versions in defining the concept of IWRM, the Global Water Partnership's definition of IWRM is most widely accepted. It states that “IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (GWP, 2003)

Global climate change and demographic changes have threatened the supply-demand balance of water resources in many vulnerable areas and countries. It is thus critical to adopt IWRM approaches to adapt to the impact on water security as a result of climate change. Three basic principles rest upon the IWRM conceptual framework: 1) *Equity*: ensuring equal access and fair distribution among all users (including agriculture, industrial and domestic uses) to an adequate quantity and quality of water necessary; 2) *Efficiency*: ensuring that all water related investment creates upmost benefits for the greatest number of water users; 3) *Sustainability*: ensuring adequate allocation among all users to sustain the ecological function for aquatic environment (UNSECO, 2009). In practice, the core concept for IWRM is not a step-by-step process and one size fits all solution, but rather a cross-sector, on-going, and mixture of water

management tools that seek to achieve the goal of improving water governance by integrating water resource management and socio-economic development framework (GWP, 2005).

The observed and projected increase in temperature has altered the intensity and frequency of precipitation and thus resulted in extreme events such as flash floods and prolonged droughts that directly impact on availability and quality of water in certain regions worldwide. IWRM has been accepted internationally as an ideal governance approach for adapting to impact to water resources as a result of climate variability and climate change since they share the identical elements such as public participation and sustainable management of water resources (CAP-Net, 2009). Some commentators have thus advocated that climate information and impact analysis needs be incorporated in the context of IWRM planning process (Bates, Kundzewicz, Wu, & Palutikof, 2009). Climate change and climate variability impacts on water resources need to be identified and further coherent water policies need to be proposed through innovative governance and institutional arrangement that aims at enhancing adaptive capacity to climate changes impacts within the context of developing IWRM plans (Giupponi & Animesh, 2017).

It is also notable that the most suitable spatial unit in implementing IWRM is river basin rather than a single water course and has been increasingly accepted worldwide due to its potential to enhance cooperated and coordinated actions to execute equitable distributions among various water users, maintain ecological functions of aquatic environment, and reduce flood risks (UNESCO, 2009).

6.2. Incorporating IWRM in a Comprehensive Legal Framework: EU as Examples

As discussed earlier, the international society has promoted the idea that the implementation of IWRM shall be based on a comprehensive legal framework that empowers river managers to effectively and fairly serve livelihood, ecological, agriculture, and industrial purposes. The most profound example for establishing a comprehensive legal framework facilitating IWRM principles is the EU Water Framework Directive (WFD). Since the establishment of WFD in 2000, EU member states are called to identify river basin authority and further to integrate national water law and policy by proposing and implementing integrated water management plan within the designated river basin districts (Kallis & Butler, 2001). In response to the frequency of severe flood events due to climate change in recent years, EU established Directive on the Assessment and Management of Flood Risks in 2007 (FD). It is notable that the FD is designed as an integral part of integrated river basin management which plays a key role in implementing WFD. The FD requires Member States to first identify flood-prone areas, providing flood hazard maps, and finally to prepare flood risk management plans (FRMPs) in six-year cycles. The preparation of FRMPs should be coordinated with the River Basin Management Plans (RBMPs) under the WFD. For instance, the adoption of natural water retention measures aimed at reducing or delaying the flood peaks downstream under the FRMPs could simultaneously contribute to the achievement of objectives in strengthening and preserving the natural retention and storage capacity of aquifers, soils and ecosystems set in RBMPs (EU Commission, 2015).

It is also notable that EU launched a 4 year long large research project since 2011, namely the REFORM (REstoring rivers FOR effective catchment Management), which intends to provide tools in supporting cost-effective restoration measures and monitoring process in order to achieve ecological objectives for rivers required by the EU Water Framework Directive. Restoring rivers for effective

catchment management [REFORM] has developed river restoration measures that are capable to achieve improvement of ecological status of rivers and flood risk reduction objectives, such as improving retention capacity in wetlands, storage capacity in large floodplains and discharge overflow water via side channels. In short, the project has provided water managers a holistic approach of integrating river restoration measures and flood risks reduction measures in the context of IWRM planning (REFORM, 2015).

The EU's experience in incorporating the core elements of IWRM provide valuable lessons for some emerging economic states in South East Asia, Africa and America which have also started to establish law and policy for implementing IWRM concepts at river basin level (UN Water, 2008) Despite some progress made in the context of water governance, some commentaries argue that the implementation of WFD by EU member states have been focusing too much on maintaining good water status (both quality and quantity) at river basin level rather than seriously ensuring the coordinated water development and management measures integrating economic, socio-cultural, and ecological interests (Rahaman, Varis, & Kajander, 2004).

6.3. Overview of Japan's Water Management Legal Framework

The incorporation of IWRM in Japan's legal framework is mainly incorporated in existing law, mainly in the River Act. The main objective of IWRM that aims at addressing the issue of both substantive fragmentation (separate agencies responsible for different but closely related to substantive issues) and geographic fragmentation (with a single watershed often crossed by multiple administrative boundaries) is not specifically incorporated in the River Act (Thompson, 2013). However, the recent amendment of Article 16 of the River Act in 1997 expands Class A river administrators' (rivers designated by the Ministry of Land, Infrastructure, Transport and Tourism) regulation and enforcement powers to "maintenance of sustainable fluvial environment" as its third legal task in addition to existing legal authority of water resource management and flood control. The amendment has further divided the former Construction Implementation Plan required by pre-1997 River Act into the Basic Policy for the River Maintenance (BPRM) and the River Maintenance Plan (RMP). The BPRM sets framework policies based on science by considering the conditions of flood damage frequency, present water usage, and development of fluvial environment. (Art. 16-1) During the drafting period of RMPs, the river administrators shall consult and take into account the opinions gathered from community members and experts when it is necessary (Art. 16-2-3). It also requires river administrators to consider opinions from concerned prefectural governors and mayors before finalizing the plan (Art. 16-2-5).

The new legal mandate of "maintenance of sustainable fluvial environment" has provided a potential forum for incorporating IWRM concepts to adopt more flexible, cross-sectors water resource management measures. In addition, the amendment adopts the participatory decision-making which requires river administrators to consult with all concerned stakeholders before finalizing RMPs. In implementing the requirement, many river basins have thus established Watershed Committees to facilitate stakeholders' participatory decision-making required by law. Although the amendment of the River Act has incorporated local autonomy and citizen participatory mechanism and required river administrators to maintain the balance among multiple water usage demands while preparing RMPs, the implementation of RMPs

nevertheless heavily depends on man-made structures such as building dams and levees to store surface water and flood damage mitigation (Matsumoto, 2015).

As discussed earlier, the ideal unit to facilitate IWRM is the river basin. The legal authorities that deal with river basin management in Japan are vested within several legislations. The legal authority for upstream management of a river basin is vested in the Forestry Basic Act and aims at preserving forests and preventing measures against soil erosion. As for streamflow management, water resource facility construction and flood damage mitigation fall into the legal authority mandated by the River Act. As for flood control measures in downstream areas, countermeasures against Flood Damage of Specified Rivers Running across Cities Act empowers responsible government agencies to adopt flood risk prevention measures. As these legislations have authorized regulation and enforcement powers to different government agencies, the implementation of IWRM at river basin level has thus been compromised due to fragmentation of legislation powers among various government agencies.

6.4. Overview of Taiwan's Water Management Legal Framework

Taiwan has adopted watershed based water management measures in several important river basins in Taiwan since 1990s. The implementation of IWRM in Taiwan, however, has encountered many challenges such as lacks of stability of financing, political will, and state-of-art water technology. In response to climate risks in water sector due to climatic variables and increasing sensitivity of overdeveloped adjacent lands to water courses such as flood or drought disasters, water policymakers shall take into account various social, economic and ecological interests and thus requires the widespread adoption of IWRM programs which is based on an integrated and cross-sectors decision-making framework. Similar to the previous discussion of the Japanese experience in implementing IWRM under the existing legal framework, the effectiveness of implementing IWRM in Taiwan is somehow limited because of the lack of stable financing and overlapping agency powers authorized by different legislations, namely the Forest Act, Soil and Water Protection Act, Water Act, and Regional Planning Act ranging from upstream's forest and soil preservation, water rights allocation, to hydro projects planning at downstream within a specific river basin. Recognizing these longstanding legal and practical obstacles to effectively implement IWRM programs in a river basin context, the Taiwanese government promulgated the "Special Statute for the Comprehensive Management of River Basins" in January, 2014. The Statute is established mainly in empowering Executive Yuan to expedite funding for integrated river basin management plans proposed by the Ministry of Economic Affairs that focusing on the implementation of regional drainage improvement projects to mitigate flood damages in downstream urban areas. (Taiwan Water Resource Agency, 2018)

The Statue while addressing some of practical obstacles such as lacking of stable financing support and superseding existing laws such as Environmental Impact Assessment Act in order to streamline the approval process in implementing hydro projects, nevertheless, fails to address overlapping legal authority issues and to provide a clear legal mandate and obligations for river administrators to establish IWRM plans at river basin level.

6.5. Problems and Difficulties found in implementing IWRM in Japan and Taiwan

6.5.1. Japan and Taiwan's Experience in Comparison

The following section will compare and evaluate the implementation experience of river basin management in Yodo and Kaoping River Basins. In comparison to Taiwan's experience, Japan lacks a single framework legislation facilitating IWRM but rather provides legal basis implementing IWRM programs within the existing legal framework such as the River Act. The legal mandate for financing the IWRM program in Japan is thus weaker than found in Taiwan's *Special Statute for the Comprehensive Management of River Basins*. It is also notable that river basin planning in Taiwan remains a top-down decision-making process regardless the establishment of said Special Statute. The amendment of the River Act in Japan, on the other hand, mandates the establishment of a bottom-up, participatory decision-making framework while preparing the River Maintenance Plan. Japan's experience is considered more effective in meeting the key components of IWRM, namely the promotion of stakeholders' participatory decision-making (Global Water Partnership & International Network Basin Organizations [GWP & INBO], 2009). Moreover, the 1997 River Act Amendment in Japan specifically addresses the issue of protecting ecological status while preparing the River Maintenance Plan. Taiwan's Special Statute focuses only on flood control but is silent on water quality issues. Taiwan's Special Statute, however, specifically mandates the competent authority to prepare the flood risk management plan taking into account authorized climate variability and climate change information (Art. 11) whereas Japan's relevant law does not specifically address climate hazards issues in the context of river basin planning.

6.5.2. The limited effectiveness river basin management in Japan and Taiwan due to lack of a comprehensive basic framework legislation facilitating IWRM

This article finds that both Japan and Taiwan suffer from a lack of a single, basic, and comprehensive framework legislation capable of facilitating IWRM principles. After an initial examination of the effectiveness of water resource management measures adopted in Yodo and Kaoping river basins, this article finds that there are still many challenges to overcome such as the appropriate responses to adverse impacts as a result of climate change, lack of a sustainable financial support to implement IWRM programs in the context of river basins, and longstanding issues of overdevelopment in forestlands and flood-plains that may result in debris flow and flood disasters.

As discussed earlier, there is a lack of a sound and comprehensive legal framework to effectively implement IWRM components both in Japan and Taiwan. The River Act of Japan is perhaps the most proper legislation empowering IWRM programs. The Act nevertheless reveals its limitation in addressing overlapping legal authority problems in the context of existing legal framework related to water governance. On the other hand, Taiwan has promulgated the Statute for the Comprehensive Management of River Basins that specifically empowers the competent authority to implement river basin management plans since January, 2014. The Special Statute nevertheless mandates the financial spending to construction-based projects that mainly aims at mitigating flood damages, such as building regional drainages, storm water detention ponds, rainwater sewers, and upstream slope soil and water conservation. The Statute does not intend in any way to establish a collaboration scheme that integrating sustainable usage of water, flood control and ecological management measures.

It is notable that the Kaoping river basin has established the first and only River Basin Management Commission in Taiwan since 2000. The Kaoping River Basin Management Commission comprises the heads of river management related government agencies, the Deputy Mayor of Kaohsiung City, the Deputy Governor of Pingtung Prefecture, academic experts, and three representatives from NGOs. In practice, the Kaoping River Basin Management Commission serves as an information sharing platform allowing river administration dealing with water resource management, flood prevention, pollution control, and forestry management legal tasks to discuss important issues with major water related policy and planning that needs to be coordinated among government agencies and between central and local governments. The Kaoping River Basin Management Commission, however, lacks delegation of oversight and enforcement authority from Ministry of Economic Affairs to oversee river basin plans. It is not capable of effectively implementing IWRM programs at a river basin level due to the lack of a clear legal mandate to function effectively as those success stories found in International Commission for the Protection of Danube River in EU and Delaware River Basin Commission in the U.S (Larson, 2015).

6.5.3. Growing concerns regarding water governance in the Yodo and Kaoping River Basins to enhance public participation and a shift of using non-structure measures

It is notable that IWRM particularly emphasizes the enhancement of public participation in water policy decision-making. This article finds that both Yodo and Kaoping River Basin Management seek to establish multi-stakeholders participatory model, though in different ways. In the Yodo River Basin, the implementation of flood damage mitigation policies was an issue; especially the necessity of redevelopment of the Amagese Dam and the construction of three new dams including the Daido-gawa Dam. The river administrator consulted with the Yodo Watershed Committee (YWC) on this issue required by the River Act. (Art.16-2-4) In 2003, the Yodo Watershed Committee (YWC) made an official recommendation to the government proposing that the river conservation should rely on sustainable measures rather than relying on dam construction. Despite the advice given by the YWC, the river administrator, namely the Director General of the Kiki Regional Maintenance Bureau, nevertheless incorporated the Daido-kawa Dam construction project in the context of finalized Yodo River Maintenance Plan in 2009. In response, members of YWC, scholars, local community residents, and several NGOs strongly contested the dam construction plan. The construction project of Daido-kawa Dam has thus been halted since 2009 due to opposition from Governors of riparian local governments, including Kyoto, Osaka, Hyogo, and Shiga based on concerns related to the heavy financial burden and great ecological depletion.

Although the water governance policies implemented in the Yodo River Basin are primary man-made structures, this paper finds growing concerns have risen with respect to non-structure measures complying with the IWRM principles. YWC and NGOs have suggested the development of policies on mitigation of flood damages through conversion of storage dams from hydropower generation, land-use changes, on supply-demand management of water resources through introducing water transfer and sustainable use of groundwater, and decommissioning of retired dams to serve ecological purposes (Lindsey, 2015).

On the other hand, Kaoping Watershed Management in Taiwan (which is classified as National Governing River) is a top-down water governance model controlled by the Water Resource Agency under

the Ministry of Economic Affairs. Unlike the participatory model adopted in Yodo River which comprise government at all levels, NGOs, and experts, the Kaoping Watershed Management provides limited information and public participation while proposing watershed management plan and thus resulted in an intensely difficult relationship between the water authority and general public (including experts and NGOs). This is partially because the related legislation does not require the river administrator to consult with experts and listen to public opinion while preparing for mid-term or long-term water resource management plans. For instance, Meinung town has shown great interest in organizing a residents' participation mechanism in supervising supply-side infrastructure measures proposed by the Ministry of Economic Affairs, especially contesting the proposed plan for building the Meinung Dam in the upper-stream of Kaoping River due to construction site security and ecological concerns since 2001. Although the project has been postponed due to strong opposition from local residents and NGOs, institutional public consultation has been very weak throughout the project proposing process.

Although there is a lack of intensive public participation in watershed management decision-making, adopting non-structure measures as alternative water resource measures to mitigate flood damages has also gained importance in the context of recent Kaoping Watershed Management Basic Plan development. These measures include the establishment of overflow or detention water areas through land use adjustment, construction of excessive water detention ponds, safeguarding of green and open lands, and enhancement of flood warning system and appropriate flood evacuation planning (Taiwan Water Resource Agency, 2018).

6.5.4. The influence of the Local Ordinance of Shiga Prefecture on Watershed Management

Although the incorporation of IWRM requires national legislation to achieve its goal of bridging institutional and legal fragmentation (Thomson, 2013), local authorities have proved to be capable of playing a significant role in implementing IWRM plans. This is illustrated by the Shiga Prefecture's local ordinance that aims at tackling issues of flood risk prevention through land use changes and building regulation. Shiga Prefecture is located next to Lake Biwa, the upstream of Yodo River Basin. The catchment of Lake Biwa is 670km², occupying one-sixth of the entire prefecture. In response to frequent flood disasters, Shiga Prefecture has promulgated the Shiga Watershed Flood Mitigation Ordinance since 2014. The Ordinance provides the following legal mandate in mitigating flood damages: to increase the flowing capacity of rivers by broadening the width of rivers and strengthening dams and levees (Art.9); to increase the storing capacity of the entire river basin by utilizing water retention ponds, play grounds, agricultural lands, and forests as storages spaces of excessive flood water beyond the capacities of dams and levees (Art.10); to mitigate the social impact of the flood by designating the Disaster Risk Areas (DRA, Art.13). The Ordinance also provides several measures to mitigate flood damages through flood plain management that falls within the Prefecture's jurisdiction. These land management measures include requiring permits by the Prefecture Governor for new construction and renovations for old buildings in DRA, and most importantly to mandate the levelling off the ground for new buildings in DRA (Art. 24). The Shiga experience, especially the legal mandate for the Shiga Prefecture government to request real estate dealers to disclose flood-prone history of the said asset and requiring new buildings to level off the ground while

applying new building construction permit are the pioneer approaches adopted by local ordinance in Japan (Satoru, Tsuji, Taki, & Nakamura, 2016).

In short, Shiga Prefecture's local Ordinance provides riparian local authorities a good lesson to develop local urban planning and building permit ordinance that is capable of facilitating IWRM programs focusing on non-structure measures.

6.6. Recommendations and Solutions

6.6.1. Establishing a Single Comprehensive Legal Framework that specifically empowers River Managers to Implement and Promote IWRM

The implementation of IWRM concepts has been recognized by many international advocators to develop coordinated a legal framework that combines a wide-range of water management strategies such as the integration of water supply management, prevention of flood/drought through land use and development planning, demand-driven water management through smart water transfer and sustainable use of groundwater, regeneration waste water to achieve the goal of preserving and restoring freshwater system (Thompson, 2013). Both Yodo and Kaoping river basin management experience lack appropriate institutional arrangements that integrate forest conservation, landslide prevention, water resource management, and flood control under a single command system. This is mainly because a lack of comprehensive, operational framework legislation in both Japan and Taiwan capable of implementing IWRM planning. This article thus argues that the key to successfully implement IWRM shall first establish a single and comprehensive framework legislation that aims at empowering cross-sectors institutional and legal reform to address fragmentation obstacles of existing water related laws.

6.6.2. Promoting River Basin Planning, Stakeholders Participation, and Non-Structure Measures for IWRM Legal and Policy Development

As discussed earlier, this article finds that implementation of IWRM basic concepts should be incorporated in the context of watershed management. Moreover, especially in a democratic society, river basin management requires a well communicated and coordinated mechanism that allows river managers to consult and cooperate closely with riparian local governments, experts, NGOs, industrialists, local residents, and other stakeholders in order to reconcile the conflict of interests (Craig, 2010). The enhancement of interaction between river managers and all affected parties is necessary to identify mistakes made in the past, to evaluate impact to water management as a result of climate change, and finally evaluate appropriate IWRM measures and any given alternative to conventional water infrastructure development in proposing and implementing watershed plans for a specific river basin (Arnold, 2010).

In addition, both the Yodo and Kaoping experiences have revealed a trend that non-structure measures are more favourable alternatives for NGOs and the general public rather than large scale structure measures such as building dams. It is partially because structural measures such as building dams, dikes and reservoirs usually result in enormous ecological costs. On the other hand, non-structural measures such as early warning, spatial planning, land use changes, transfer of surface/underground water sources, and insurance have shown their potentials in reducing climate change impacts to water in less economic and

ecological costs. Future IWRM is thus encouraged to promote non-structure measures as primary water resource management options. In this regard, this article argues that future water policymakers could learn lessons from the case study of Japan and Taiwan's legal development experience, such as establishing Special Statute aimed at facilitating IWRM as discussed in Taiwan's experience, Japan River Act's participatory model and Shiga Prefecture's local ordinances development experience that shows the potential for local regulation to adopt non-structure measures in mitigating flood damages.

7. Conclusion

In the face of global climate change, cluster disasters are becoming more frequent worldwide. East Asia is deemed one of the most vulnerable regions on Earth to the impact of climate change. For those countries in East Asia such as Taiwan, Japan, and some ASEAN countries are particularly vulnerable to extreme climate events such as typhoons and torrential rain. It is strongly agreed by international advocates that implementing IWRM programs at river basin level is one of sensible solutions that might help to prevent or at least decrease the climate risks and human life loss and property damages as a result of floods or landslide disasters. Good water governance requires innovative legal and institutional supports to mitigate extreme climate events as well as meeting multiple purposes in a sustainable and equitable manner. In this regard, water managers could benefit from adopting IWRM principles in the context of river basin planning framework because the IWRM has proven its potential in practice to allocate water resources in an efficient and equal manner and to ensure the quality of water. As mentioned earlier, water governance in many European countries such as in the UK has adopted IWRM components in terms of integration, river basin planning and participation set by the EU Water Framework Directive. The EU Water Framework Directive has thus shown its potential as model framework legislation in facilitating IWRM principles for water managers (Benson, Gain, & Rouillard, 2015).

The Yodo River Basin model provides a good lesson for future policymakers to develop non-structure measures that meet local complex considerations and residents' expectation in preventing flood disasters. The Kaoping River experience, on the other hand, provides the lesson for establishing a framework legislation that clearly empowers competent authorities to implement IWRM at river basin level. Furthermore, Kaoping river management in practice has shown its promise for producing recycled waste water which is capable of providing water for industrial use since the operation of the newly established municipal waste water system.

In order for IWRM to be successfully implemented, obstacles like overlapping agency powers and lack of a clear mandate to institutionalize IWRM planning process should be addressed in a timely manner. Strengthening institutions for land and water management is crucial for effective adaptation. It is also critical that the law shall require all information regarding any of IWRM proposed plan be open and accessible. Moreover, the legislation shall establish a formal participatory mechanism allowing river administrators to consult with all interested parties for important river basin management policies such as the draft of the Basic Plan for River Basin Management.

Table 1 below outlines the case of Japan and Taiwan in terms of governing laws and authority as well as Proposed Legal and Policy Development.

Table 01. Comparison on Legal Framework Facilitating IWRM

	Japan		Taiwan		Proposed Actions
	Governing Laws	Governing Authority	Governing Laws	Governing Authority	Proposed Legal and Policy Development
Upstream Governance	Forestry and Forestry Basic Act; Forest Act; Sediment-Related Disaster Prevention Act	Ministry of Agriculture, Forestry And Fisheries.	Forestry Act, Soil and Water conservation Act,	Council of Agriculture	1. Establishing Coordinated Framework integrating water resource management, forestry and soil conservation 2. Enacting Special Legislation on Sediment management
Water Resource Management	River Act	Ministry of Land, Infrastructure, Transport and Tourism	Water Act,	Ministry of Economic Affairs	1.. Implementing IWRM at river basin level 2. Enacting Comprehensive Framework Legislation empowering the implementation of IWRM 3. Establishing River Basin Authority
Downstream Flood Control	Countermeasures against Flood Damage of Specified Rivers Running Across Cities; Flood Control Act; Local Ordinance (e.g. Shiga Watershed Flood Mitigation Ordinance)	Ministry of Land, Infrastructure, Transport and Tourism	Water Act, Special Statute for the Comprehensive Management of River Basins; Sewage Act; Regional Planning Act, Urban Planning Act	Ministry of Economic Affairs, Ministry of the Interior,	1. Integrating flood control authority 2. Promoting Local Ordinance on Flood Plain Management

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