

## Water and Green Growth: The Role of State, Market and Community

### -The case of the Sihwa District Development Project in South Korea-

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This paper argues water and green growth (WGG) as a pathway of achieving sustainable development. It discusses the practicability and applicability of WGG with an in-depth case study on the development of the Sihwa district in Korea. By analysing the dynamics between three institutions: state, market and community in the case, it finds an institutional mix where state opened the sharing the decision making arena to community and community developed into a mainstream institution while market provided a base of environmental cost bearing. Consequently, this research shows higher potential for WGG than conventional growth.

**Keywords:** Green Growth; Water and Green Growth; Sustainable Development; Institutional Economics;

## 1. Introduction

People would like to live a wealthy, healthy and safe life; however, socioeconomic development has been impeded by environmental degradation and resource depletion, which are accelerating due to climate change. To tackle these challenges, sustainable development (SD) has been widely discussed and been put into practice since 1992. Nevertheless, it is difficult for us to implement SD because of various reasons including collective action problems. As an innovative strategy to achieve SD, Green Growth (GG) was initiated by the Korean government, and has been echoed by international organisations like the World Bank, OECD and UNESCAP. Nonetheless, GG faces two considerable challenges. The first is whether GG is achievable. The second is, if yes, how it can overcome the free-riders' dilemma.

This paper is based on the Water and Green Growth (WGG) Research<sup>1</sup> which aims to prove GG's practicability and applicability in tandem with water through in-depth case studies. Although many reports and papers on GG have stressed GG's possibility on conceptual and theoretical bases, the research findings have not yet shown concrete cases which can be put into practice. This paper aims 1) to prove the practicability of WGG focusing on the case of Lake Sihwa in Korea, one of the representative cases of the WGG research and 2) to explain how to achieve WGG with an institutional approach.

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<sup>1</sup> The research, named *Water and Green Growth: Beyond the Theory for Sustainable Future*, is a joint project between the Korean government and World Water Council. It was launched at the 7<sup>th</sup> World Water Forum in Daegu·Gyeongbuk, Republic of Korea in 2015. This paper presents a part of the research outcome.

## 2. Analytical Framework

### 1) *State, Market and Community*

The question on whether economic growth is better served by state or market has been one of the lingering debating subjects (Johnson, 1982, p.18, White and Wade, 1988, p.2, World Bank, 1991, p.131). Neo-classical scholars have suggested market as the best approach to replace governments' incapability. However, public interest can be jeopardised if market is imperfect and subject to increasing return to scale (Wade, 1990, pp.14-15). In such conditions, market fails. Developmental analysts challenge the neo-classical arguments by indicating the role of the governments in the Newly Industrialised Countries (NICs) such as Korea, Japan and Taiwan. However without having a public consensus, state-guided market economy is prone to failure (Johnson, 1982, p.22).

Regarding how to solve the problems of free-riders in common pool resources (CPR), the debate between market and state continues to be a contentious topic. New-classical economists argue that the best way to solve collective action problems is to vest CPR in the hands of the private. State-oriented scholars insist that state should prevent opportunistic behaviour and fairly assign CPR to the public. However, Ostrom (2010, pp.659-660) insists that the tragedy of commons may not simply be overcome by governmental regulation or private ownership due to imperfect information. Ostrom (1991) theoretically and empirically shows that state and market are often caught in the trap of over-appropriation.

New institutional economics critically reflects classical economics rooted in market by incorporating bounded rationality and transactional costs. It has gradually recognised community as an important institution and trust as an important trait of a person. New institutional economists identify that humans have 'complex motivational structure' including self-interests and the polycentric nature of governance exists beyond state and market (North, 1990, Ostrom, 2010, pp.664-665). Ostrom (2010, pp.659-660) incorporated trust, social capital and reciprocity together with the benefits for oneself in her institutional analysis. In line with this perspective, Grafton (2000) explained that the success of property rights over CPRs, whether they belong to private, state or community, depends on local settings and the active participation of local users.

Some distinguish the existence and importance of community together with market and state (Streeck and Schmitter, 1985, pp.119-120, Engelen, 2011, p.494, Bowles and Gintis, 1998, p.22, Bowles and Gintis, 2002, p.F422, Christiano, 2004, p.124). Streeck and Schmitter (1985, pp.119-120) insist that though one of three institutions may be dominant in a given situation, some mix of the three institutions can be applied to analyse social, political and economic issues. Community is activated by 'strong reciprocity (Bowles and Gintis, 2002, p.F425, Fehr and Gächter, 2000, pp.159-160)' which rewards fair and retaliates unfair behaviour (Engelen, 2011, p.494) while market is activated by economic incentives and state by power.

This paper perceives that market, state or community cannot solely make social order possible, progress economic development, conserve environment and solve collective action problems without others' help, but rather a specific mix of them is

applied depending on contexts. This research follows the new institutional economists' perception on human nature, self-interested individuals, but sticks to Ostrom and North's incorporation of normative motives like trust and reciprocity. That is, it sees that self-interested persons enter competition, build trust, establish reciprocity and admit coercive power to fulfil their long-term benefits including the reduction of transaction costs.

## **2) Institutional Decomposition and Analysis Framework**

The institutional approach rejects 'one-size-fits-all-solutions' where institutions are treated as given exogenous variables. Anchored in this view, the study reshapes the Institutional Decomposition and Analysis Framework (IDAF) of Saleth and Dinar (Saleth and Dinar, 2004b, pp.94-106, Saleth and Dinar, 2005). Their IDAF decomposed water institutions into water law, water policy and water administration, included exogenous factors like demography and resources, and considered their relation with water sector performance (pp.94-106). Because the focus of this paper is on the role of the three institutions in achieving WGG, it reclassifies the water institutions into state-driven, market-centred and community-based institutions. Though community is not considered in their IDAF, by being aware of the existence of community, free-rider problems prevailing in WGG will be treated in this research. Performance is measured through the lens of the three pillars of SD to see the extent to which WGG instruments contribute.

Saleth and Dinar's IDAF (2004a, pp.32, 77) postulates perceptual convergence which leads to "the true models of the world", although it recognises that "it is impractical to consider a particular institutional form to be superior or universally valid". That is, institutional convergence in the water sector can exist or be developed. However this research sees the possibility of diverse institutional equilibriums depending on the variation of exogenous factors and historical contexts.

## **3. Case Study: Sihwa District Development**

### **1) Overview of Sihwa**

Sihwa District Development Project vividly reveals the environmental impact of development-first institutions and the recovering trajectory of balancing economy with environment. Lake Sihwa is a man-made lake with a basin area of 476.5km<sup>2</sup> and seawater of 322millionm<sup>3</sup>. The project develops 173.11km<sup>2</sup> of land which accommodates approximately 304 thousand citizens, 1,600 factories and 36.36km<sup>2</sup> of reserved farm land. The district annually produces USD 59.6 billion which is 21.4% of Korean GDP as of 2013.

The project was initiated to support the growth-first policies of the developmental government to address the concentration of population and factories in Seoul. The project caused a catastrophic environmental disaster. The COD level of Sihwa Lake was 5.9mg/L in 1994, yet reached 17.4mg/L in 1997. The pollution event was broadcasted by SBS, which aroused public concern and became a critical juncture.

The event mobilised political leaders including the President and empowered social actors. The growth-first institutions were challenged by social actors and were superseded by balanced development institutions. Accordingly, this paper divides the history of Sihwa into two periods: development-first period and balanced development period. The first period started in 1975 when the reclamation plan was formed whereas the second began in 1996 when the environmental crisis first arose and covers the period up to present day.

## **2) Exogenous Factors**

Exogenous factors which are economic, social, environmental, political and technological contexts directly or indirectly impact on transactional costs. In turns, this brings about institutional change. This subsection explores how the exogenous factors have changed institutions in this case.

Korea experienced rapid economic growth enough to be the 15<sup>th</sup> world's largest economy as of 2012<sup>2</sup> in terms of GDP per capita from one of the poorest countries. Korea's selective and sectoral developmental institutions during the industrialization period from the 1960s to the 1980s (Wade, 1990, pp.12-13/30, White and Wade, 1988, p.7) caused severe economic and social disparity between classes, regions and industries. The institutions provided strong incentives for the economic and social concentration of the capital region. To tackle the concentration, the government introduced diverse institutional measures including the enactment of the *Seoul Metropolitan Area Readjustment Planning Act* in 1982. Nonetheless, considerable benefits for the concentration had hindered the government from replacing pro-concentration institutions with balanced growth institutions.

Korea has relatively maintained political stability even though the authoritarian political elites had led Korea until the mid-1990s. This is partly because the political elites dedicated themselves to economic development which was congruent with the public interests of escaping the absolute poverty. The tendency of bureaucrats to take long-term career paths rather than short-term opportunism (Kim, 1990, p.102) contributed to the relatively low level of corruption. This political stability and relative lack of corruption can be seen as having helped to solve a kind of the large-scale conflict over the Sihwa project.

Korea's rapid industrialisation caused environmental crises. A critical event was the Phenol Contamination in the Nakdong River in 1991. Doosan Electro-Materials Co., Ltd discharged 325 tons of phenol (Kukmin-ilbo, 1991, p.1) which contaminated tap water and damaged people's health, especially pregnant women living in Daegu Metropolitan (Donga-ilbo, 1991, p.14). This event triggered a national grass-roots movement beyond environmental activity. It mobilized political will of President Roh Tae-woo, changed governmental organizations<sup>3</sup> and formed new environmental institutions. Nonetheless, continuous river and tap water contamination accidents during the 1990s strengthened environmental institutions. In this context, the severity of water pollution in Lake Sihwa in the mid-1990s easily became a national issue.

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<sup>2</sup> World Bank database

<sup>3</sup> The Drinking Water and Sewerage Bureau from the Ministry of Land Infrastructure and Transport, and Water Quality Division from the Ministry of Health and Welfare were transferred to the Ministry of Environment in 1994.

In regards to education, Koreans were eager to receive formal education as a way of escaping extreme poverty. To illustrate, the female tertiary enrollment rate<sup>4</sup> increased significantly from 4.3% in 1975 to 85.7% in 2010. Higher education exerted a highly positive impact on not only economic growth but also social development such as the high level of political participation and continuous growth in citizen activity. Students led political democratisation and ignited public participation, in many cases, at the cost of their lives (Kim and Yoon, 2007, p.36). On the other hand, well-educated labours accumulated human capital which increased productivity and ultimately contributed to economic development (Romer, 1994, Lucas, 1988, Barro, 1990). These social factors have had a positive impact on the formation of good governance and the application of scientific solution.

The developmental state aggressively introduced technology from advanced countries not only by establishing technological institutions including the Ministry of Science and Technology in 1967, Daseodeok Science Complex in 1974, but also by increasing R&D investment (Yoon, 2006, pp.91-94). Consequently, as of 2015 research and development (R&D) expenditures as a share of GDP (4.23%) placed Korea first in the world (KISTEP, 2016). Korea has been ranked the world's top tier in the number of triadic patent families (OECD, 2013). The technological factors facilitated resolutions to address the Lake Sihwa problem. They also formed the basis for communication by providing scientific understanding and evidence about controvertible issues.

### **3) Institutional Mix**

#### *The Development-first Period*

The research utilizes a polycentric approach of state, market and community. This section will examine the change of institutional mixes during the periods of development-first and balanced development. The first can be characterised as a strong state with a moderate market and a relatively weak community. The developmental regimes were dedicated to economic growth to legitimize their seizing of power (Hwang, 1996, p.309). They created the Economic Planning Board (EPB), the strongest ministry led by the vice prime minister, established indicative and hierarchical plans including the Five Year Economic Development Plan (FEDP) and Comprehensive National Territorial Development Plan. The regimes purposively neglected environmental conservation (Koo, 1996, p.276) and even controlled the environmental movement (Koo, 1996, pp. 150-151). As such, they recognised pollution as a good sign of fast development. Rapid industrialisation brought about environmental degradation which became one of the most serious national issues in the 1990s. Sihwa District was not an exception. Pollutant discharge from the district was hardly regulated and scarcely ever treated. Accordingly, Lake Sihwa became a wastewater reservoir (K-water, 2005a, p.77).

Nonetheless, in the government fierce competition existed between ministries. A concrete Sihwa development plan was originally established by the Ministry of

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<sup>4</sup> UNESCO Institute for Statistics (UIS) Data Centre

Agriculture, Food and Rural Affairs (MAFRA) in 1975 and was founded on previously conducted surveys. MAFRA's attempt was challenged by the Ministry of Land, Infrastructure and Transport (MOLIT). When MAFRA applied for a reclamation license for farmland in 1984, MOLIT rejected it by reason that it lacked agricultural water. MOLIT had strong intention to change the plan for a new industrial district. The two ministries held nine official meetings over a period of almost two years, which were in vain (Lee et al., 2007, p.61). After reporting four times to the president, EPB raised MOLIT's hands with the justification that industrialisation was more critical than food self-sufficiency. The regime secretly settled the conflict and even K-water, the developer, heard of the decision in the news. (K-water, 2005b, p.59). Subsequently, construction of Sihwa Seawall started in 1987. Korea Rural Community Corporation supervised by MAFRA designed the seawall and K-water, overseen by MOLIT, built it. Local governments took a hands-off stance because they perceived the state-led project would contribute to their economic and social development while they were politically, financially, administratively subordinate to the central government.

Community, as an institution, was not well developed. Centralised institutions dominated whereas local institutions were not fairly cultivated. The developmental and authoritarian regimes used strong hands against social actors including environmental NGOs. Social actors focused on central-level movements and tended to recognise social movements including environmental campaigns as democratisation activities (Jung, 2006, p.67, Shin, 2006) while local actors were not well organised. The level of stakeholders' participation simply remained in nonparticipation which refers to manipulated participation or passive participation (Min, 2011, p.23). The central government led the entire decision making process. NGOs and lay citizens were informed about the results of the decisions through public hearings or official gazettes. Integrated approaches covering economy, environment and social equity were scarcely considered.

Concerning market, the property rights of Sihwa District were well established and properly protected by Civil Law and the Industrial Site and Development Act. However, private participation in the project was quite limited. Private companies were only involved in the project as EPC contractors.

### *The Balanced Development Period*

As analysed in Section 2, when the environmental crisis broke in 1996, the public became increasingly concerned about the environment, and as such, political will was activated. This resulted in the rearrangement and strengthening of national environmental institutions. In the balanced development period, community institutions relating to Sihwa District have evolved and state institutions have multipolarised. Market institutions have not changed much, but provided a strong basis for cost remuneration.

On 29<sup>th</sup> April 1996, four days after the SBS broadcast of the disaster, President Kim Youngsam ordered the Ministry of Environment (ME) to prepare water quality improvement measures and directed the Board of Audit and Inspection to detect the

faults of related organisations(K-water, 2005b, p.96). On 5<sup>th</sup> July 1996 ME along with seven ministries and related organisations announced new measures. The crisis and the following measures forced MOLIT to share its power with other ministries. ME has increasingly exercised its power in environmental investment and regulation such as the establishment of the 1996 measures and the allocation of pollutant discharge quota to factories. The conversion of Lake Sihwa into a seawater lake in 2001 empowered the Ministry of Ocean and Fisheries (MOF) by chairing the Lake Sihwa Management Committee, which consists of seven ministries, six municipalities, four NGOs and three public corporations. The Ministry of Culture, Sports and Tourism (MCST) started to have great interest since fossilised dinosaur eggs were found in 1999. MCST succeeded in reserving approximately 10%(13.68km<sup>2</sup>) of the district.

The introduction of local autonomy in 1995 triggered a significant change of power relations between the central government and the local governments. Local politicians started to see the development project from the viewpoint of their residents who have voting rights. Their licensing power on the project allowed them to have considerable influence on the project. In many cases they successfully attracted more infrastructure investment or gained more subsidies from the developer. Their participation in the official governing bodies of the project became prominent from consultation organisations to equal decision makers. Nonetheless municipalities are financially subordinate to the central government because their fiscal self-reliance ratio still remains at 54.02% as of 2015. Together with this reason, because the project has attracted more investment and people, they have maintained a pro-development stance.

Community involvement had a significant effect on the outcome of the project. The development-first institutions driven by the strong state faced formidable challenges caused by pollution. The disaster jeopardized the project and incurred huge costs to political leaders, representatively the president. After a couple of attempts to address the crisis, the government and NGOs agreed to establish the Sihwa District Sustainable Development Council (SDSDC) in 2004. SDSDC was co-chaired by MOLIT and a NGO and composed of 53 members from the central and local governments, related organisations, NGOs and academics. Peculiarly it adopts a consensus decision system, not a majority vote. Its decision covers not only environmental remediation but also development plans. SDSDC discloses almost all information to the public and ensures stakeholders' participation. Through the transparent and accountable decision making processes, it has effectively coordinated conflicts between interest groups. A symbolic case was that SDSDC reduced the development area of Multi-Techno Valley from 10.5km<sup>2</sup> to 9.3km<sup>2</sup>.

Market-based institutions played a crucial role to recover environmental remediation costs. Without well-defined and protected property rights, the costs could not be recovered and the project could not be carried out. The property rights of the seawall, reclaimed land and a tidal power plant were distributed based on investment. K-water, as a main developer, has paid most of the environmental remediation costs (US\$559million) by selling the reclaimed land and operation of the tidal power plant. There has been no subsidy or tax exemptions for Sihwa environmental conservation except ordinary ones applied to all municipalities. The local governments have to

recover environmental costs including wastewater treatment costs and regulation costs through local taxes and fees according to polluters and beneficiaries pay principle.

### *Performance*

The Sihwa District Development Project is a clear example of not only the social and environmental burdens but also the economic costs that resulted from “growth first, conservation later” institutions while presenting the vivid practicability of water and green growth. The Sihwa District Development Project succeeded in alleviating the dense agglomeration of people and factories in Seoul, which was the initial objective of the project. The number of mining and manufacturing firms in the three municipalities accommodating Sihwa District increased to 6,312 in 2009 from 3,729 in 1995. The population increased to 1,359,964 in 2005 from 389,612 in 1985 while Seoul’s population reveals a decreasing pattern from the 1990s. The water quality of Lake Sihwa has improved significantly from a COD level of 17.4ppm in 1997 to 3.1ppm in 2012, which was cleaner than the 1994 level of 5.9ppm.

The economic benefit to Sihwa area has been considerable. The accommodation of businesses and population from Seoul allowed the district municipalities to form 46.2% of the industrial area of Gyeonggi Province and 87% of its total industrial district employment. Total and youth population growth rates were 5.7% and 3.2% respectively. Those were much higher than the national average of 0.7% and -0.7% respectively (Statistics Korea, 2013b). Employment opportunities increased significantly by 1.3 times from 183,053 in 1994 to 246,134 in 2009 (Statistics Korea, 2013a). One critical point is that the annual growth rate during the balanced development period was much higher than that during the development-first period. The former was 11.6% while the latter was 9.0%.

The emblematic social performance was the establishment and operation of SDSDC by which stakeholders’ participation improved from non-participation, through mere consultation, namely tokenism, to empowerment (Min, 2011, p.23). SDSDC unprecedentedly adopted and properly operated a consensus-based decision making system and common learning mechanism. This rebuilt the broken trust between state actors and community actors (Hong and Lee, 2004, p.37, Moon and Lee, 2012, p.74). The quality of life of residents has improved through environmental restoration and rest areas. Lake Sihwa itself became a leisure space which attracts residents and tourists. For example, a yacht tournament has been hosted every year since 2003. The reed wetland invites more than 30 thousand people per year and attracts film producers by offering an environmental amenity. Regarding social equity, there are no clear signs that economic gaps between classes, genders and regions have been reduced.

The rapid environmental restoration of Lake Sihwa could be evaluated as a major accomplishment. The water quality was restored to the pre project level. Biodiversity has also been restored. To illustrate, bird species increased from 97 in 1998 to 132 in 2010. However, pollution damages caused by the development-first institutions significantly impacted on the health of ecosystems and residents though it was not calculated in a monetary value. Moreover the costs of social conflict could be considerable. There were many civil appeals and lengthy procedures to resolve the conflict.

## 4. Implications and Conclusions

### *Implications*

The most critical challenge against WGG is that 'WGG is expensive, so it cannot be applied to developing countries'. However, the case of Sihwa clearly shows that WGG is feasible. Furthermore, it testifies to higher potential for WGG than conventional development and provides a stronger practicability that social and environmental costs resulted from environmental damage and social conflicts can be avoided.

The second question was 'how to achieve'. A 'One size fits all' solution does not exist, but appropriate mixes of institutions can show the way for policy makers and stakeholders. In the case of Sihwa, extreme poverty and lack of legitimacy of the military regimes allowed for the creation of a strong developmental state. Accordingly 'growth-first, conservation-later' institutions were strongly formed and applied to the Sihwa project. Consecutive environmental crises and public awareness to environmental value increased transaction costs related with environmental restoration and trust recovery. Social actors became more influential and politicians and bureaucrats started to actively respond to stakeholders. In this context, community-based institutions were significantly strengthened. This has enabled WGG to be implemented.

### **Conclusions**

A country (or regions)'s appropriate mix of state, market and community should consider its particular contexts. Bearing in mind this, the Sihwa case study can suggest as follows.

State should not be treated as trivial though its influence has decreased due to the strengthening of community. The government has demonstrated substantial leadership in this case by playing a large role in resource allocation, information distribution, legislation and indicative planning.

Market provides a basis of economic incentives. Based on the property rights on the reclaimed land and the tidal power plant, K-water has been able to recover its project and environmental restoration costs while reducing the financial burden on the central and local governments.

Stakeholder participation is essential because the environment itself is a common good. Without consensus among stakeholders, environmental and social costs cannot be avoided and in many cases developmental projects cannot be undertaken.

Among the three institutions, the determination of which one will play a more significant role depends on its contexts. In the case of Sihwa, state shares its power with community while market provides a solid base for cost distribution and remuneration.

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