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Experts' Social Responsibility in the Process of Large-Scale Nature-Transforming National Projects: Focusing on the Case of the Four Major Rivers *Restoration* Project in Korea

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This paper is concerned with the social responsibility of experts in the fields of science and technology in the process of large-scale nature-transforming national projects. This paper took the case of the Four Major Rivers Restoration Project in Korea–which has been admired internationally as a Korean-style Green New Deal on the one hand, and has caused domestic controversies especially among experts on the other hand–in order to deal with the issue of experts' social responsibility. The research questions raised in this paper include why and how experts should take social responsibility and to what extent they have to be responsible. Through exploration of the case of the Four Major Rivers Project, this paper argues that experts have to claim social responsibility when national policies and projects are associated with scientific and technological elements, since these events hugely impact the daily lives of the public and the condition of the environment and demand large investments of public money. It also underscores the necessity of having socially responsible experts reveal their values and stances based on verifiable evidence and giving the public a chance to determine which set of experts are working for the public good. Experts should be allowed to contest their arguments and positions under conditions where free speech is respected so they can practice social responsibility. Whether this is allowed or not can reveal the level of democracy of a society. The Four Major Rivers Project identifies the importance of experts' social responsibility and the conditions for its realization.

Keywords: *Expert, Social Responsibility, Democracy, Four Major Rivers Restoration Project, Korea*

Introduction

The four major rivers of the Korean peninsula, once called *Geum-su-gang-san*, "a land of embroidered rivers and mountains," have drastically lost their original shapes and characteristics. These very rapid and dramatic transformations are due to a huge national project begun under the Lee Myung-bak government referred to as the "Four Major Rivers *Restoration* Project (FMRP)."[1] This project has involved the biggest investment of government money over the shortest time period in modern Korean history.

This project, referred to as a "Green New Deal," was a symbol of Korean-style Green Growth. Ex-president Lee Myung-bak declared "Low-Carbon Green Growth" as a new national development paradigm during a speech on August 15, 2008 while marking the 60th anniversary of Korea's national independence. Despite major social controversies surrounding the project, it began in December 2008 as a Green New Deal Project under the slightly different project name of the "Four Major Rivers Maintenance Project." In June 2009, the Master Plan for the FMRP was published and the project progressed at full-scale since the ground-breaking ceremonies in December 2009 (Cha et al. 2011). A nationwide project, the FMRP was planned to be completed by the end of President Lee's term.

In March 2010, an article concerning the FMRP titled "Restoration or Devastation?" was published in the internationally prominent journal *Science*. The subheading of the article was "A massive South Korean project to dam and dredge four major rivers has provoked bitter opposition from scientists and environmentalists." The article paid special attention to social controversies surrounding the FMRP, especially the arguments of a large number of counter-scientists and the devoted use of their expertise to oppose the project. As the article noted, even though the FMRP had created tremendous controversies and had been met with strong resistance from civil society, including the intellectual community, the project continued on and was dramatically transforming the four rivers and the land surrounding

[1] Even though the Korean government named the project the "Four Major Rivers *Restoration* Project," this paper refers to the project as the "Four Major Rivers Project" and uses the abbreviation "FMRP," excluding the word "*Restoration*." This is because there is some level of framing effect embedded in the name given by the ex-government. Environmentalists and oppositional experts criticized the phrasing by calling it the "rivers killing project," as opposed to a project restoring rivers. The four major rivers involved in the project are the *Han*, *Nakdong*, *Geum* and *Yeongsan* Rivers.

them.

There is a wide range of angles one could take to examine the FMRP. The impact of the project is so immense and includes so many diverse aspects, it is almost impossible to deal with all of them in a single article. Accordingly, this paper is more concerned with the social responsibility of experts in the process of conducting such a large-scale nature-transforming national project. The project was initiated by the government, but the rationale for the project was provided by experts who supported the government's position. However, even among the experts, their arguments and positions on the same project are different. Thus, this paper aims to identify the social responsibilities of experts from the point of STS (Science, Technology and Society). To achieve this study purpose, first of all, this paper will examine the theoretical background of the social responsibility of experts based on the literature of STS in section 2, and it will explore the goals and processes of the FMRP in section 3. Then, section 4 will analyze the point that experts contest in the implementation process of the FMRP and what rationale and evidence were presented to support their arguments. Section 5 discusses the findings of this paper and section 6 presents this paper's conclusion. This study has used a wide range of resource materials, including official government documents, materials from seminars, journal publications and newspaper articles.

Social Responsibility of Experts Related to Science and Technology: What, Why and How?

Should experts in the field of science and technology have social responsibility? If so, why should they have it, what is their social responsibility and to what extent do they have to be responsible? Since the early 1970s, interest in the field of engineering ethics in STS has been on the increase (Doorn and Fahlquist 2010), and recently more importance has been placed on educating engineers to be more ethically aware. Usually, ethics in engineering deals with the issue of engineers' responsibility, and because engineering technology has a serious impact on society and the environment, responsibility becomes an essential element in addressing ethics. In particular, social responsibility at the macro-level—not personal responsibility at the micro-level such as honesty, faithfulness, safety and risk management in laboratories, anti-corruption, securing confidence, etc.—becomes crucial because engineers' impact on society and nature is

TABLE 1
Different Definition of Responsibility

Type	Definition
Responsibility-as-causation	Being the cause of some events
Responsibility-as-capacity	Having the capacity to initiate or prevent a situation or an event
Responsibility-as-blameworthiness	Being eligible for blame because what one did was wrong
Responsibility-as-liability	Being legally required to pay the damages/repair
Responsibility-as-role	Having the task to do something
Responsibility-as-virtue	Being a responsible person

Source.—Doorn and Fahlquist 2010, reconstructed

significant. Social responsibility embraces diverse dimensions, and it is defined differently as Doorn and Fahlquist (2010) have summarized (see Table 1). Even though the issue of responsibility-as-blameworthiness has generally been discussed in previous literature (Doorn and Fahlquist 2010), other dimensions also need to be considered.

While engineers influence society and the environment by directly employing technologies to enhance quality of life, scientists also significantly influence society and the environment with their professional expertise. Scientists are increasingly being asked to consult on public and policy matters away from their traditional stage of academia (Badshaw and Bekoff 2001).[2] Currently, both natural scientists and social scientists have to become agents of social responsibility because they are interested in making "the world a better place" (Hay and Foley 1998). With the gradual, but active engagement of scientists with society, the neutrality of science is losing ground. If science comes to have dual missions—i.e. "to pursue truth and to serve society" (Badshaw and Bekoff 2001)—science will become a value-laden field. Engineers and scientists have come to face the need to legitimize their activities and take responsibility for them (Song 2008). Since engineers and scientists both have expertise that allows them to significantly influence both

[2] Badshaw and Bekoff (2001) addressed changing concerns and social calls for ecologists, but such changes are not limited to ecologists. They can be extended to other scientists in general.

society and the environment, this paper uses the term "experts" to address both types of actors.

What is the social responsibility demanded of experts? In other words, how should they act to be socially responsible? Socially responsible experts have to act to contribute to the public interest or general good, and not their own private interests (Song 2008). As researchers, experts perform social responsibility by showing how their works can contribute to the improvement of the public interest through the publication of their research processes, results, and conclusions. The social responsibility of experts becomes particularly critical when their activities are associated with national policies and projects on the one hand, and these same national policies and projects are related with scientific and technological elements on the other hand. Because of their special proximity to expertise, their social responsibility for publicity is underscored. Furthermore, since national policies and projects significantly influence both the daily lives of the general public and the condition of the environment on which the general public depend on for living, and are funded through taxes, there is a critical need for experts to be socially responsible. In return for their work that contributes to the public interest/good, experts are rewarded with academic honor, social privilege and promotions (Choi 2006).

Experts must be allowed and required to raise questions when national policies and projects do not satisfy the public interest as far as their own expertise and scholarly conscience are concerned. This is the role of an "expert witness" as Harrison (1986) has noted. In order for an expert witness to be used, every kind of research and debate process and all research results have to be disclosed. This is, in effect, a litmus paper test to gauge whether a society is democratic or not. If expert witnesses are not allowed to point out problems of national policies and projects based on their research results or processes, they may have a guilty conscience and resort to whistleblowing, which then may lead to personal disadvantages and/or jeopardize their family's life. If a society forces experts to face ethical dilemmas, that society cannot be viewed as democratic.

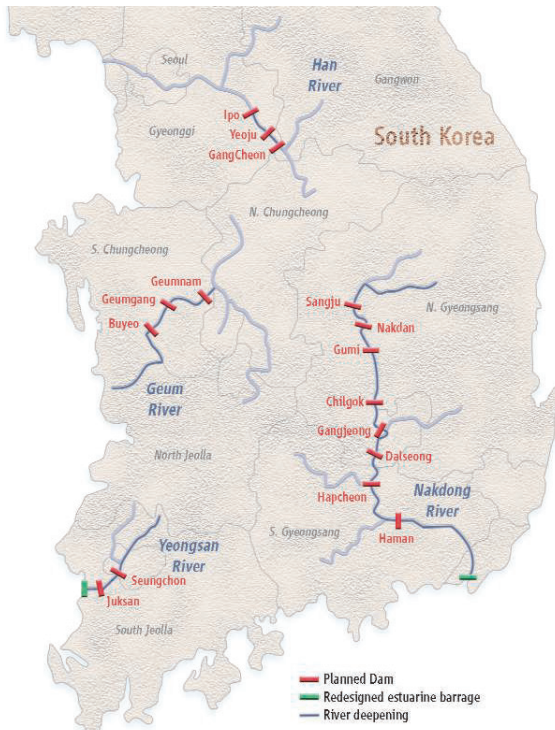
In modern society, politicians mobilize experts to legitimize their political decisions. The dependence of politics on experts is due to the fact that the superficial neutrality of expertise works as a buffering mechanism to political phenomena (Kim 2011). Expertise drawn from experts can work to "de-politicize" the issue at hand and prevent further political debate. This phenomenon can be referred to as the 'scientification of politics.' In society today, if some experts ignore their social responsibility by assisting political

decision-making with one-sided values and false information, counter-experts appear with another set of expertise to oppose this coalition of politicians and their experts. This leads to a situation where science effectively becomes politicized.

However, the securing of scholarly freedom for experts does not mean that publicly important decision-making has to depend only on experts. Maintaining professionalism causes conflicts with democratic principles that allow the public to participate in the decision-making processes of public policies and national projects. Experts should not monopolize decision-making in the public sphere. If scientific activities and engineering projects are value-laden, there should be a public sphere in which the competing values of different experts are disclosed to the public. The public can then know who pursues which values and can provide backing to the experts whose opinion they support. This so-called "politics of expertise" (Fischer 1990; Lee 2012) is related to the issue of social responsibility of experts. Experts have to reveal their research results and values in order for the public to recognize and support what they view as the most valuable and reliable. When the professional knowledge of experts becomes an object of public criticism, the public is provided with the opportunity to avoid the risks driven by science and technology in the current risk society (Jeong 2012). This process will also test the social responsibility of experts.

The Goals and Make-up of the Four Major Rivers Project

The Lee Myung-bak government presented the following seven key objectives of the FMRP: (1) Restore the natural ecosystem of the rivers; (2) Ensure steady and abundant water flow; (3) Remove sediment from the river bottoms to improve water flow; (4) Create a stable river system; (5) Bring life back to the cultivated land along the riverbanks; (6) Improve the ability to cope with climate change; and (7) Achieve sustainable development through the harmonious coexistence of man and nature (Office of National River Restoration 2010). These objectives may be furthered summarized into the following five major goals: Secure abundant water resources to prevent water scarcity; Implement comprehensive flood control; improve water quality and restore ecosystems; create multipurpose spaces for local residents; and expand regional development near the rivers (Cha et al. 2011). In other words, the FMRP is expected to provide water security, flood control and ecosystem vitality while promoting historical and cultural tourism. The



Source.—Normile 2010, *Science*

Fig. 1.— Planned Dams on the Four Rivers

government argued that the project would result in the creation of approximately 200,000 new jobs, and would expand both the country's economic growth and horizon of Korea's green growth initiative (MSF 2009; Cha et al. 2011).

The FMRP is composed of three sets of sub-projects: (1) Main projects—the *Han, Nakdong, Geum* and *Yeongsan* Rivers revitalization projects; (2) Projects on the 14 tributaries of the four major rivers; and (3) Refurbishment for other smaller-sized streams (Cha et al. 2010). The central focus of the FMRP is to build 16 new dams on the main bodies of the four major rivers as shown in Figure 1[3]; rebuild 87 old dams; reinforce 209 miles of riverbanks;

[3] The Lee Myung-bak government used the word "weir" instead of "dam" for the structures constructed on the main streams of the four major rivers. This is the first time in Korea for water to be stored by constructing dams on the main streams of the four major rivers. Experts who are opposed to the project criticize the choice of diction to describe the FMRP plan. In order to avoid

dredge 570 million cubic meters of sand and gravel to deepen nearly 700 kilometers of riverbed; renovate two estuarine barrages; and construct bike trails, athletic fields, and parks along the waterways. In addition, five new dams were planned to be built along with the reconstruction of nine more on 14 tributaries, and 243 kilometers of riverbank to be buttressed with concrete. 19 billion dollars was set aside for the FMRP, making it one of the costliest engineering projects in Korea's history. As a comprehensive public project, including a variety of plans submitted by several ministries, the FMRP has been coordinated by the Office of National River Restoration under the Ministry of Land, Transport and Maritime Affairs (MLTM).

The FMRP Implementation Process and Intense Opposition from Civil Society

The project name, Four Major Rivers *Restoration* Project, was adopted in April 2009. In fact, this project is originated from the "Pan-Korea Grand Waterway Project (PKGWP)" pledged by candidate Lee Myung-bak when he ran for the presidency. The project aimed to link all of the country's major rivers with canals. The key component of the Grand Waterway project was the construction of a canal that would connect the country's two largest rivers the *Han* River and the *Nakdong* River, which are divided by mountains at the center of the peninsula. This canal was expected to allow barges to make the 540-kilometer journey from the capital, Seoul, located in the country's northwest corner beside the *Han* River, to the second largest city, Busan, located in the southeast beside the *Nakdong* River. Plans for this Seoul-Busan canal called for dredging, widening, straightening, damming and connecting the *Han* and *Nakdong* Rivers. During his election campaign, Lee argued that barges would take heavy trucks off roads and reinvigorate rural communities by drawing tourists to artificial lakes constructed along the canal. He argued that there would be no public investment because sales of dredged sand and private investments would cover the cost of the project.

Plans for the PKGWP began with the participation of experts in September 2006 with the so-called Pan-Korea Grand Waterway Research Group. The research group was composed of around 200 experts working in

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negative connotations associated with the word "dam," the Korean government intentionally adopted the word "weir" even though their functions are different and academically the word "weir" is not appropriate to express facilities being constructed on the four major rivers.

the fields of engineering, economics, culture, history, and environment/ecology. Among them, 140 experts were actively involved in drawing up plans for the Pan-Korea Grand Waterway project. While 27 of these experts were major players, 108 were advisory professors, and the remaining five were researchers of the Waterway Research Institute. The backgrounds of the advisory professors were diverse, including environmental engineering (35 professors), built environment (20), civil engineering (13), chemistry (7), biotechnology (7), social infrastructure and social science (6), economics (5), urban planning and construction (5), ocean transportation and ocean science (4), disaster prevention (3), geography (1), tourism (1), law (1), and the liberal arts (1).[4] Even though plans for the PKGWP were met with debate during the process of the Hanara Party's nomination for a presidential candidate, the Presidential Transition Committee set up a task force team for implementation of the plan under the logic that Lee's presidential election pledge should be accomplished.

However, this PKGWP faced strong challenges from academics before the president–elect Lee took office on February 25, 2008. On January 31, 2008, 80 professors at Seoul National University launched a preparatory committee consisting of a Seoul National University professors' group to oppose the PKGWP, issued a statement to express their opposition and held an open forum titled, "Why is the PKGWP Problematic?" This event was broadcasted live by *Ohmynews*, a progressive internet newspaper. On March 10, 2008, a coalition of Seoul National University professors in opposition to the project was formed with the participation of 381 professors. Then, similar groups of professors in many other universities in Seoul and other areas throughout the country were formed and expressed their opposition through statements. Finally, a total of 2,544 professors from the country's universities inaugurated the Professors' Organization for Movement Against the Grand Korea Canal (POMAC) on March 25, 2008.[5] This was one of the few times Korea was witness to professors' commitment to a social event on such a grand scale since the democratization movement in 1987.

The POMAC challenged the project using the expertise of its members. POMAC members of diverse disciplines criticized the project's economics, which they argued was an outdated idea of canal transportation, especially in

[4] The figures in parentheses are the numbers of professors in each discipline. Information about the research group was obtained from an article titled "Those who made PKGWP," of Vol. 40 of *Economy Chosun* in December 2008.

[5] All information about POMAC is based on materials uploaded to its open online storage program, webhard.

such a peninsular state; they also questioned the claimed benefits for drinking-water supplies, rural economies, and the environment. The originally stated goal of the PKGWP was the introduction of smooth and economic transportation through canals, but the POMAC criticized the validity of the original goals because the project was altered several times to focus on boosting tourism, responding to climate change, and conducting river maintenance. The Seoul National University Professors' Group against the PKGWP, then a part of the POMAC, held a total of 10 consecutive open lectures from March to May 2008 to publicize the inherent problems of the PKGWP. The POMAC furthermore issued statements; held open forums, international conferences, and press conferences; provided expertise to environmental movements' organizations; and established networks with international experts.

Public opinion of the PKGWP was very negative. Public opposition was vividly expressed during candlelight protest vigils held in major cities in the spring of 2008 by consumer and farmer groups resisting the reopening of South Korea's market to U.S. beef imports. U.S. beef imports had been banned because of an outbreak of mad cow disease in the U.S., but the Lee government announced the resumption of imports singlehandedly during his visit to the U.S. without any public debate. That decision was made in connection with the four prerequisites of the U.S.-Korea FTA demanded by the U.S. government. During the candlelight protests that ensued in opposition to this decision, demonstrators expressed their opposition to the Grand Waterway Project. On June 19, 2008, President Lee announced that he would abandon the canal construction plan, along with a re-negotiation concerning the conditions of U.S. beef imports.[6] He also added that the cancellation of the canal plan would be conditional on the support of the general public.

However, a similar project with a different name, the "Four Main Rivers Maintenance Project," appeared at the end of 2008. Its name intentionally avoided the word "canal." This project did not mention the connection of the *Han* and *Nakdong* Rivers, but it maintained the other main elements of the PKGWP, in particular, the dredging and construction of dams. In fact, while the candlelight protests were occurring, the Lee government discussed changes in the canal project to appease the public. Even after the president's

[6] The *Hankook Ilbo* and the Hangil Research Center reported that around 70% and over 80% of respondents opposed the PKGWP in opinion surveys conducted in May and June 2008, respectively (*Hankook Ilbo*, 2008/06/16).

announcement concerning the abandonment of the canal project, the political will to carry out civil engineering projects on rivers remained and national research institutes were asked to continue their work. This was exposed by a researcher working for a national research institute, the Korea Institute of Construction Technology, in the form of whistle-blowing. He disclosed that the true nature of the Four Main Rivers Maintenance Project was the construction of canals, and national research institutes were pressed to create false logic to legitimize the projects. As a result of the disclosure, he was suspended for three months and excluded from any research works after that. He barely evaded expulsion from his institute because of support from the public, including statements made by the POMAC.

The Four Main Rivers Maintenance Project was renamed the "Four Main Rivers *Restoration* Project" in April 2009. The scale of the project was expanded in the form of the budget (from 14.1 to 22 trillion won, US$ 18 billion); the number of dams (from 5 to 16 dams); the scale of dredging (560 million cubic meters, 2.6 times more than originally planned); and the water levels at dammed water and the length of bike roads. The main goals of the FMRP are dredging and the construction of 16 dams on the main streams of the four rivers, and whose construction sites are almost the same as those of the PKGWP. The master plan for the FMRP was finally adopted and announced in June 2009. Through the press release, the Lee government stated that the master plan of the FMRP was determined following the process of a series of twelve local briefing sessions (May 7~19); consultation meetings (May 14~15) of experts recommended by relevant ministries and academic associations; conferences of relevant academic associations, including Korean Society on Water Environment and Korea Water Resources Associations (May 21~22); and a public hearing (May 25). However, experts opposing this project were not invited to participate in these processes at all.

Based on this master plan, civil engineering projects centering on dredging and dam construction have already been carried out. However, this project has encountered serious protests from civil society. Opposition blocs against the FMRP, which have expressed their opposition to the project since the case of the PKGWP, are generally composed of academic and religious groups and civil organizations. The POMAC has played a pivotal role in these academic groups. It has held numerous seminars, forums, lectures, press conferences, public meetings, and other activities based on their study results; it has issued statements whenever controversial issues emerged; it has organized citizens' field trips to the construction sites of the four major rivers; and it has organized international networks with scholars in other countries.

However, wide-ranging opposition to the FMRP comes from civil society in general, not just professors. A few days before President Lee's inauguration, religious groups created the Religious Environmental Council for No Canal, and civil organizations established the People's Actions for No Canal, which was composed of 389 civil organizations. The Religious Environmental Council for No Canal organized People Taking Care of Rivers to pilgrimage natural rivers on foot. In June 2009, the Pan-Korea Committee against Four Rivers Killing Projects and for Rivers of Life was established, which consisted of 520 diverse organizations against the FMRP. This committee included environmental, civic, religious, labor, and consumers' organizations, as well as netizens and other opposition parties.

Another important action taken by civil society has been the making of lawsuits. The POMAC, Pan-Korea Committee against Four Rivers Killing Projects, Rivers of Life, and local residents around the four major rivers collected people's signatures on the street, raised funds, and organized the People Action Group for Four Rivers to take the case to court in November 2009. They argued that the government had violated the Rivers Act, the National Finance Act, the Framework Act on Environmental Policy, the Environmental Impact Assessment Act, and the Cultural Heritage Protection Act, and filed for cancellation of the FMRP and suspension of the administrative measures' validity. Thirty-two lawyers from *Minbyun*, Lawyers for a Democratic Society, became the pro-curatorial group. The People Action Group for Four Rivers lost all watershed-based lawsuits at their second trial, in which the Busan High Court in charge of the *Nakdong* River judged that the *Nakdong*-River project had violated the National Financial Law by leaving out preliminary feasibility tests. The People Action Group for Four Rivers declared their plan to appeal to the Supreme Court and lawsuits still continue to this day.

In the meantime, the United Nations Environmental Programme (UNEP) issued an interim report titled "Overview of the Republic of Korea's Green Growth National Vision" in August 2009 and a final report, "Overview of the Republic of Korea's National Strategy for Green Growth," in April 2010. The UNEP selected South Korea as a leading country for green growth and praised FMRP as a key to green growth. The interim report, full of one-sided endorsements of the green New Deal, was not concerned with domestic controversies surrounding the FMRP, while the final report expressed slightly more concern about the environmental assessment and mitigation of the potential impact on wetlands. This was noted because of strong protests from Korean civil society.

Contesting Arguments among Experts Concerning the FMRP

The POMAC deserves academic attention in that it was composed of approximately 2,400 professors from 115 universities who opposed a single national project. As the journalist Dennis Normile pointed out in his article "Restoration or Devastation?" that was published in *Science*, the formation of such an organization is a first in Korean history, and has few parallels internationally. Originally, it was established to resist the PKGWP, but it has also criticized the FMRP by undermining its logic. Even though the government changed the name of the PKGWP, the POMAC has kept its original name because both projects are essentially the same: the FMRP maintains the main elements of the PKGWP, i.e. dredging and dam construction, and both have significantly negative impacts on the ecology and economy of Korea. The POMAC has expressed the most outspoken opposition to the project. The organization has made public all of its research results, statements, seminars proceedings, workshop and conference materials and all other data on its electronic storage account (http://www.webhard.co.kr), and has provided login information on its own website so the general public may access it. Moreover, the POMAC has published a cartoon to help the general public easily understand the problems embedded in the FMRP.

Other than the government, and especially the Office of National River Restoration, there are no other organizations composed of experts that provide arguments aimed at legitimizing the FMRP. The Office of National River Restoration is not very different from the Pan-Korea Grand Waterway Research Group, a think tank that was formed to legitimize the PKGWP. It is likely that the FMRP appeared to the government as an alternative after unavoidable public resistance to the PKGWP. However, there have been a number of experts who have voiced support for the FMRP. What is the gist of the conflict between the two groups of experts concerning the FMRP?

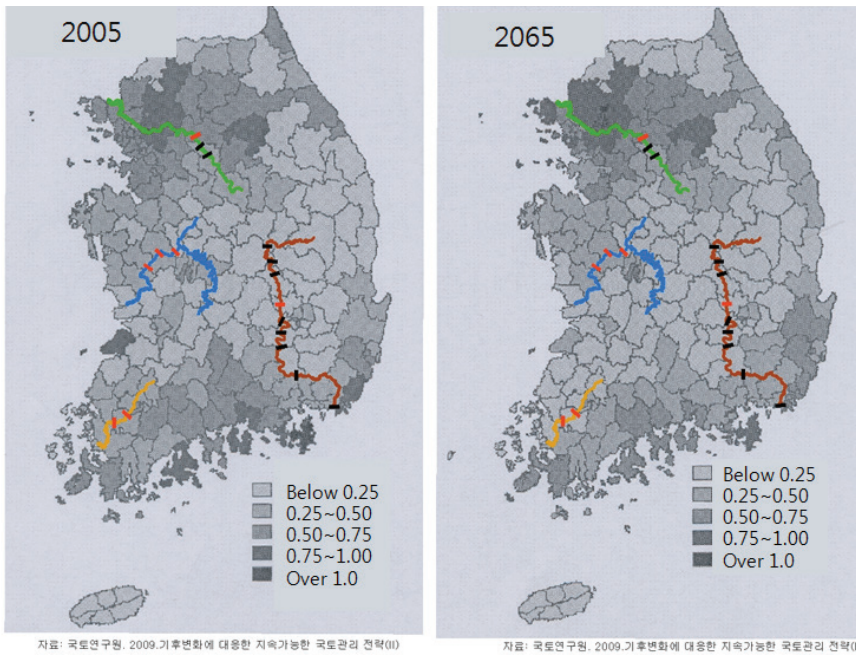
The conflict over the FMRP was focused on the project's purpose and process of implementation. Experts supporting the FMRP supported the goals of the project, while experts opposing the project strongly disputed these goals and were particularly concerned with the ecological and economic losses that would occur due to the project. Those opposed to the project also pointed out the project's illegality and the government's lack of communication with a wide range of experts and the general public. As mentioned previously, the purpose of the FMRP could be narrowed down to

achieving water supply security, flood control, improvement of water quality and ecosystem vitality, climate adaptation, job creation and revitalization of local economies (MSF 2009; Cha et al. 2011). This section will first examine the goals of the project and then move on to analyze conflicting arguments concerning the FMRP implementation process.

First, can the FMRP be considered an appropriate way to secure water supplies? The government and experts supporting the project start their argument by assuming that Korea is a water-scarce country as defined by the U.N. In addition, they argue that water scarcity will be worsened due to climate change. Therefore, they believe it is necessary to deepen the depth of rivers and begin storing water to secure an abundant water supply for the future. They anticipate that 1.3 billion m3 of water may be stored. A total of 800 million m3 of this water will come from 16 dams on the main streams of the four major rivers; 250 800 million m3 of the water will come from 96 agricultural reservoirs; and another 250 million m3 of water will come from three small- and medium-sized multipurpose dams. They liken this feat to enlarging bowls of water (H-K Kim 2009).

However, those opposed to the project refute these arguments. They believe, first of all, that Korea is not a water-scarce country as defined by the U.N. Previous Korean governments before the start of the FMRP had not accepted this characterization, nor was it reflected in the long-term comprehensive water resource plans.[7] This concept was originally established by Population Action International, a private U.S. institute, and is based on a country's water density and its average annual precipitation divided by its population (Yun 2010). In short, this means that the supporters of the FMRP have begun their argument from a false premise. Experts opposing the project stated that this definition did not reflect efficient water management efforts through the counting of the absolute amount of precipitation and

[7] There are three levels of plans established by the MLTM concerning river resource management. The long-term comprehensive water resource plan, which is the highest level of a twenty-year long-term plan for national water management, is established every 10 years as required by the River Act (article 23). The second level of plans is the Comprehensive Water Control Plans for River Basin on a ten-yearly basis based on the long-term water comprehensive resource plan (article 24). The lowest level of plans is the Basic River Plan, which must be based on the aforementioned two plans (article 25). This means that the government would have to change the highest plan in order to conduct the FMRP. However, the Lee Myung-bak government did not follow this procedure. Before the FMRP started, the most recent long-term comprehensive water resource plan was established in 2001 and amended in 2006. The Lee government started the FMRP without making any changes to the long-term comprehensive water resource plan and then amended the reestablishment period from 10 to 5 years in 2009 after initiating the project.



Source.—KRIHS 2009, reconstructed

Note.—The map without the four major rivers was created by the KRIHS. However, the author has overlapped the location of the four major rivers on the map beside it. Relatively high drought vulnerability near the downstream of the *Han* River has resulted from high population density due to significant urbanization in the Seoul metropolitan area.

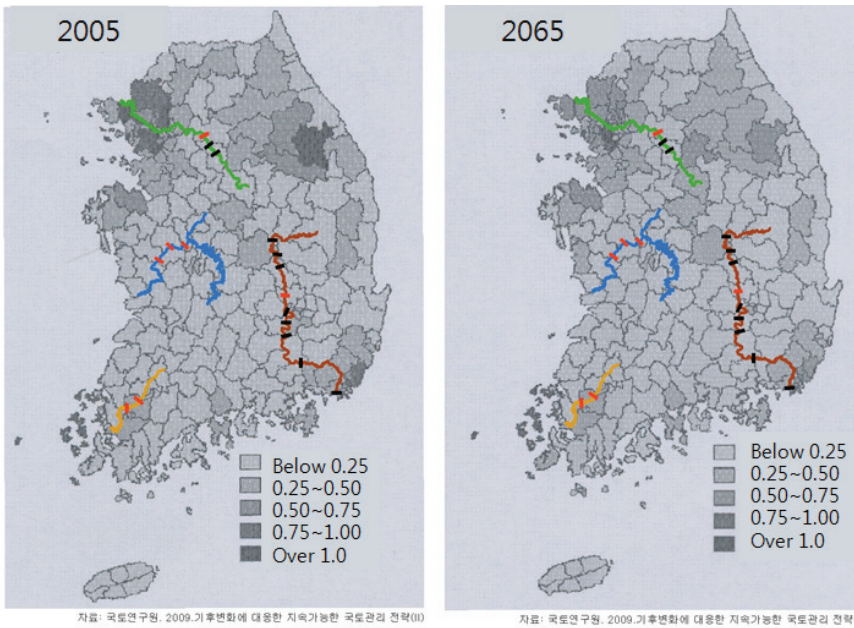
Fig. 2.—Drought Vulnerability in Korea: Present and Future

population level. Furthermore, those opposing the project argued that not supply-oriented but demand-side management was the correct approach toward water security, even if there was anticipation that water shortages would occur in the future (Ahn 2009). Two of the most serious problems embedded in the arguments supporting the FMRP were the lack of calculation about how much more water Korea would need in the future and the mismatch between areas suffering from water scarcity and those with an oversupply of water. The amount of additional water expected to be stored was calculated from the results of the dredging and damming in the project plan, and was not based on any calculations about future water demand. It was also unclear where the stored water would be used. According to a government statement, the *Nakdong* River will have a surplus, but a water shortage is expected in the *Yeongsan* River basin (Park 2010). Even though

there is more water stored from the *Nakdong* River, there is no additional water demand around it. A 2009 report, "Climate Change and Sustainable Land Management Strategies in Korea", produced by the Korea Research Institute for Human Settlements (KRIHS), is an important source of arguments aimed at legitimizing the FMRP. It demonstrates the fact that serious droughts have occurred in mountainous areas and several islands, not in major river basins (Figure 1). Even though the government stated that 62 cities and counties had experienced water shortages since the early 1990s, those areas are not located near the four major rivers.

Second, is the FMRP effective in flood defense? According to the government and the arguments made by experts who supported the project, dredging 0. 52 billion m3 of sedimentary soils from riverbeds leading to the conveyance capacity of rivers during floods, an expansion of water gates of tributaries resulting in a quick water level decline and fast draining of floods, and two flood-control areas and three underflow areas of riversides will together expand the total flood control capacity up to 0.92 billion m3 of water (Ahn 2009; Cha et al. 2011). Furthermore, reinforcement of 620 km-long riverbanks will additionally enhance this capacity. The government and some experts emphasized the importance of investing in prevention measures instead of spending money on large-scale restoration: Annual average expenditures from 2002 to 2006 totalled approximately 8 trillion won, of which the amount of damage costs was 2.7 trillion won (equivalent to $2.2 billion); restoration expenditures equalled 4.2 trillion won (equivalent to $3.4 billion); and the amount of prevention costs was 1.1 trillion won.

Experts opposed to the project criticized this argument. According to them, most flood damage has occurred in mountainous valleys and upstream tributaries, and not nearby the main streams of the four major rivers, like in the case of droughts. The KRIHS report mentioned previously also shows that past, current and future areas suffering from floods are not located along the four major rivers (Figure 3). Damage costs resulting from flooding on national rivers, including the four major rivers, is equal to only 3.6 percent of total flood-related expenditures. A total of 97 percent of national rivers and 84 percent of local rivers have put flood control measures in place. Thus, experts opposing the project argued that flood control efforts should be focused on local rivers, not national rivers. Also, these experts refuted the average annual flood control, damage and prevention costs provided by the government. According to them, the government exaggerated these figures by focusing on two years with high flooding, 2002 and 2003, which included serious damages resulting from the *Rusa* and *Maemi* typhoons, respectively.



Source.—KRIHS 2009, reconstructed
Note.—The same as that of Figure 2.

Fig. 3.—Flood Vulnerability in Korea: Present and Future

Furthermore, experts opposing the project argued that both flood control and drought prevention cannot be accomplished simultaneously. In order to secure an abundant water supply, dams have to store water, which is risky in terms of flood control. Thus, the government has constructed movable dams instead of fixed ones. According to oppositional experts, however, this move by the government does not eliminate operation risks. If a flood is not projected appropriately in advance and movable dams are not opened in time, water contained in the dams can become a source of floods (Park 2009). Instead, they argued that floods cannot be completely prevented but they can be controlled by using washlands, wetlands, and flood control reservoirs. They emphasized that the answer is to provide more room for rivers.

Third, in regard to water quality improvement and restoration of ecosystems, the government and experts in support of the project have come to the conclusion that the four rivers require restoration because they suffer from poor water quality and unhealthy aquatic ecosystems. They argued that

seasonal low-water levels and contaminated water threaten the health of the rivers' natural ecosystems. The government and some experts stated that the water quality of the main stream would be improved to an average of level two (Biochemical Oxygen Demand less than 3 ppm) by an increase in the amount of secured water, the expansion of sewage treatment facilities, the establishment of green algae reduction facilities, and the clearing of farmland along the rivers (ROK 2010; Cha et al. 2011).

However, experts opposing the project did not agree with this argument. They disagreed with the government's conclusion concerning the condition of the four major rivers. These experts noted that the overall condition of the four major rivers was generally good, with the exception of several elements. According to the Environment White Paper 2008, issued just before the initiation of the FMRP by the Ministry of Environment, the water quality of major points in the four major rivers has been improved due to the implementation of water quality improvement measures since 1997: the water quality of the *Han* River was approaching the first level; that of the *Nakdong* River remained at the second level; and that of the *Geum* River and *Yeongsan* River remained at the first level. In addition, these experts indicated the fact that the press release issued by the Ministry of Environment in 2008 had informed the public of the healthy status of the aquatic ecosystems of the five major rivers.

Furthermore, experts opposed to the project argued that the water quality of the rivers would suffer due to the construction of dams on main streams that reduce the speed of water flow, and the dredging of sand, which plays a role in removing pollutants and purifying river water. Dredging destroys the water's ecosystem by removing sand and gravel from the riverbeds and riversides, and the water-level lowering effect of dredging cannot be maintained because of sand and gravel brought downstream from upstream during flood periods. Repeated sedimentation and dredging will be necessary, resulting in increasing maintenance costs and the deterioration of water quality (J-W Kim 2009). Moreover, the development and expansion of waterfronts will worsen water quality. The experts opposed to the FMRP point out that the argument made by the government and experts in support of the FMRP was contradictory to the study results found by the Ministry of Environment and Korea Institute of Construction Technology (2004~2007). This study showed that stayed water, even within a small weir, would deteriorate and the deconstruction of small weirs resulted in the improvement of water quality. In short, the ministry and research institute denied the results of a study they had conducted in the past. The POMAC

conducted simulation analysis on the relationship between the speed of water flow and water quality and demonstrated that delayed water flow leads to water quality deterioration (J-K Kim 2009).

Fourth, the government and certain experts emphasized climate risk and the need for Korea to adapt to climate change. They argued that the strength and frequency of droughts and floods would increase and the FMRP is a proper way of adapting to climate change. However, while experts opposed to the project agreed with making efforts to adapt to climate change, they did not agree that the FMRP is an appropriate response strategy. These experts argued that adapting to climate change requires climate impact and vulnerability assessments, both of which were not conducted in the process of preparing the master plan of the FMRP (Yun 2010). They pointed out that without such an assessment, climate adaptation is simply a rhetorical expression.

Finally, the topics of job creation and revitalization of local economies through the FMRP were also controversial. The government and certain experts underlined the effect of job creation and revitalization of local economy while trumpeting the FMRP as a "Green New Deal." The government argued that 340,000 new jobs would be created by the FMRP and the economic benefits reaped from the project would be shared evenly among local communities (ROK 2010; Cha et al. 2011). Experts opposed to the project, however, argued that jobs created by the FMRP would be mostly short-term, blue-collar work, which would not solve the problem of unemployment among highly-educated young people. Also, they argued that the employment effect had been exaggerated by the government because it had simply multiplied the labor inducement coefficient of construction work with the amount of investment.

Even after the completion of the FMRP, there has been no official report detailing the FMRP's effects on employment, except for a 2010 report ("Analysis and evaluation of the impact of governmental policy on employment: Four Major Rivers Project in charge of MLTM) produced by the Ministry of Employment and Labor. According to the report, 52 percent of the employment created by the FMRP was temporary and day labor, and over one-third of this employment consisted of foreigners and those over 40. Moreover, the labor inducement coefficient was 16.9, which is lower than that of construction work itself (17.3). According to National Assembly Congresswoman Younghee, only 1,222 jobs were created by August 2010, which was only one-tenth the number of jobs predicted by the government, and around 70 percent of these jobs were either day labor jobs or contract

jobs lasting less than one month. As experts opposing the project pointed out, this signified that the employment target fell far short of governmental expectations, and the jobs created were not green or decent ones. What is worse, 23 workers died in the process of the FMRP due to the fast pace of the project that was demanded in order to complete the project before the end of Lee Myung-bak's presidency. Furthermore, in terms of project distribution by locality, little participation was allowed to local companies. The number of subcontracts provided to local companies was 28.5 percent by metropolitan councils and 13 percent at the local government level, which means little contribution was made to improving the unbalanced development situation afflicting the entire country.

Concerning the implementation process of the FMRP, experts opposing the project and legal experts in particular criticized the project's violation and evasion of several laws such as the Rivers Act, the Framework Act on Environmental Policy, the Environmental Impact Assessment Act, the Cultural Heritage Protection Act, and the National Finance Act (Lee 2009; Jeong 2010; Oh 2011). First, the government has stated that the FMRP was implemented after the revision of the Basic River Plans and was thus legal. However, experts opposing the project argue that in order to initiate it, the long-term comprehensive water resource plan should have been revised and the Central River Management Committee should have undergone a deliberation process, both of which did not happen.

Second, the master plan of the four rivers maintenance plan should have passed a prior examination of environmental nature according to the Framework Act on Environmental Policy. Furthermore an environmental impact assessment should have been carried out based on the Environmental Impact Assessment Act. While the government argued that those processes were in fact completed, some experts did not believe this to be the case. The government argued that those processes were already undertaken before the master plan was established, even since 2003 and additional assessments were taken after the master plan was established. However, experts opposing the project argued that the government's argument did not make sense, because it denied the necessity of those Acts. Even though the government's arguments might be acceptable, a short period of six months after establishment of the master plan for additional assessments is not long enough to examine the negative impacts of the projects in Korea during the four different seasons.

Third, controversy arose concerning the Cultural Heritage Protection Act. Generally, rivers are very important places which are home to historical heritage. Thus, a cultural heritage investigation process should have been

conducted before any development began on the rivers. The government argued it had carried out a cultural heritage investigation before the master plan was established. The total number of investigation sites was 105, all areas where the ground needed to be dug up. Some experts argued that the process had been performed in a lax manner. Since the FMRP was a huge nationwide project, a cultural heritage investigation should have been conducted more carefully, and the government had ignored the recommendations of pre-investigation bodies which had suggested at least 486 sites for review.

Finally, there was a debate about the violation of the National Finance Act, which requires a preliminary validity assessment to be performed when a large-scale project is going to take place (article 38). The enforcement ordinance of the National Finance Act states that large-scale national projects costing over 50 billion won or projects costing over 30 billion won and receiving national financial support (article 13) need to undergo this assessment. However, the government amended the article so that certain projects are exempted from the preliminary validity assessment. These projects included disaster "prevention" and recovery projects and projects requiring urgent economic and social response at the discretion of the Minister of Strategy and Finance. Thus, the government argued that the FMRP, as a disaster prevention project, was exempted from undergoing a preliminary validity assessment. They also argued that the article about preliminary validity assessment is a guideline, not a mandatory obligation. However, experts opposing the project criticized this government move because it disregarded the intention of the Act.

Taken on the whole, experts opposing the project underlined that one of the most significant problems of the implementation process was that these huge nature-transforming projects underwent absolutely no discussion in the public sphere; consequently, there had been no opportunity to prevent this environmentally destructive and economically harmful project nor to correct flaws inherent in the project itself. They emphasized that the FMRP had no general procedural legitimacy.

Discussions

As it was discussed earlier, experts must be able to present their values and opinions, especially in the case of a national project such as the FMRP. This was a project whose investment scale with people's taxes was the biggest within the shortest period in modern Korean history and whose impacts on

the environment and society were tremendous. From the environmentalist perspective, this drastic nature-transforming project should not been undertaken. However, some short-term development-oriented experts might support the project, believing that this project would contribute to the public interest. Even though both values and positions cannot be simultaneously correct, if both perspectives are permissible, what are appropriate ways for experts to practice social responsibility? First of all, experts need to present their views with proper empirical data. Arguments cannot sufficiently support their stances. They have to prove that their arguments are scientifically correct. If experts cannot eliminate uncertainty in their positions, they should reveal the uncertainty and demonstrate their research results clearly. Experts with different positions and different research results can then argue with each other, and the public will be able to judge for themselves. This is one socially responsible action that experts can take.

In terms of this criterion of social responsibility, how can supporting experts and oppositional experts be evaluated? Using this framework of social responsibility, how can we judge the contrasting arguments made by experts who both supported and opposed the project? Beyond arguments, experts have to provide evidence for their positions. In order to explore this aspect, papers published by experts were collected and analyzed. This study used "*Nurimedia*" (the biggest academic portal site in Korea) as a source of such papers. *Nurimedia* provides 1,688 kinds of journals and approximately 1.5 million papers, among which 457 KCI journals and 140 KCI-expanded are included.[8] This study found 153 papers from January 2008 to June 2012 by using "four major rivers" as a keyword term. After excluding papers irrelevant to the FMRP, 132 papers were used in the final analysis as shown in Table 2.

The analysis found that there were a larger number of papers opposing the project than those supporting it. In particular, experts opposing the project published papers in KCI and non-KCI journals with blind peer-review processes. There were more professors opposing the project than those supporting or neutral to it. In the case of professors and researchers

[8] KCI is an abbreviation of the Korea Journal Citation Index. KCI academic journals are approved by the National Research Foundation of Korea (NRF), which is affiliated with the Ministry of Education, Science and Technology. If some academic journals satisfy certain conditions, they are approved by NRF as KCI journals and evaluated on a regular basis. KCI academic journals conduct a blind peer-review process that raises their academic authority. Non-KCI academic journals are not approved as KCI journals but have blind peer-review processes and generally work toward becoming KCI journals.

TABLE 2
Presentations and Publications Concerning the FMRP

	KCI academic Journals			Non-KCI academic Journals			Academic Conference Proceedings			Non-Academic Journals*			Total		
	S	N	O	S	N	O	S	N	O	S	N	O	S	N	O
Professors	1	10	13			4		5	4	3	3	13	4	18	34
Governmental Officials	1						1			13		1	15	0	1
Researchers of National Research Institutes							1	1		7	2		8	3	0
Researchers of Non-Governmental Institutes			1			1				2	1	6	2	1	8
Experts of State-Owned Companies							1			4			5	0	0
Others**			1					3	1	5	2	21	5	5	23
Sum	2	10	15	0	0	5	3	9	5	34	8	41	39	27	66

Note.—* Non-academic journals do not have peer-review processes and papers are usually essay-type, non-academic articles.

** Others includes graduate students, environmental activists, priests, ministers, journalists, staffs of private enterprises, editorial boards of academic association journals, newsletters of academic associations, etc. Others do not include readers because they are not experts. Essays written by readers were excluded from this analysis.

*** S means supporting, N means neutral, and O means oppositional. When papers do not address any opinion on the purposes or processes or when papers address both positive opinions and negative opinions, those papers were classified as "neutral."

**** The numbers in Table 1 refer to the number of papers by a category of experts. If a paper was written by co-authors, the first author was used as the basis of classification.

Source.—*Nurimedia* (http://www.dbpia.co.kr/), retrieved on June 20, 2012.

who supported the project, they accepted the project because it had already been initiated by the government. They then proposed better ways to complete the project successfully (Min 2010).

One serious problem with experts who supported the project is that

their arguments lack evidence. Since most papers were written more like essays than academic papers, there are few scientific analysis results or detailed evidence supporting their argument. That is to say, expectations were presented as scientific facts. The number of articles published in KCI journals by experts supporting the project equalled only two. The first was published by a former journalist and current spokesman of the Ministry of Health and Welfare who analyzed reporting frames of major newspapers on the FMRP while criticizing progressive newspapers for not taking a balanced approach because they included too many voices of opposition to the project. The other paper argued that environmentally-friendly materials they found should be used in the project.

Furthermore, there was a distortion of facts and reality in arguments supporting the project along with a host of rhetorical expressions. In regard to figures about droughts and floods, certain experts in support of the project always used terms like "total" and "average," despite the fact that droughts and floods are "place-specific" phenomena. Also, there was no evidence backing the logic about the amount of water that would be secured with the construction of 16 dams and no proof was presented for the anticipated increase in future water demand. No paper investigated these questions thoroughly. Even though experts supporting the project referred to the impact of climate change, no impact assessment or vulnerability assessment had been conducted. They just argued that the increasing threat of climate change would lead to a higher risk of floods and droughts. Interestingly, government officials, researchers working for national research institutes, and experts working for state-owned companies–mainly the Korea Water Resources Corporation (K-water), which was requested to participate in the FMRP as a main investor by the government–wrote essays and presented research results lacking specific evidence to strongly support the FMRP. Even though experts opposing the project raised questions about the logic and numbers given by experts supporting the project, they did not respond to nor dispute them.

Most of the government officials who wrote the papers or essays shown in Table 2 were appointed by President Lee. These government officials were originally professors or scholars at universities/research institutes. One of the most frequent contributors among the governmental officials was a minister of the Office of National River Restoration (ONRR), along with several head officials of the same office.[9] The minister of the ONRR is a professor of civil

[9] Usually, a ministry head is usually referred to as a minister. However, the head of the "Office" of

engineering. He served not only as a former vice president of the Korea Water Resource Association and the Korean Society of Civil Engineers but also as an executive board member of environmental NGOs such as Environmental Justice and Korea Water Forum. The public and experts opposing the FMRP have criticized his changed stance and rationale for the project that contrast sharply with his previous view. Even though it is an accepted fact that people's values can change over time, he has yet to explain to the public why his values and attitudes have changed and provided reasons for changing his opinion.[10]

As mentioned previously, the POMAC was the center for opposition from experts. The members of the POMAC defined their role as experts in the organization's manifesto of establishment as follows:

> ……We believe that the FMRP, not only as the biggest civil engineering project in Korean history but also as the most serious threat to the national land, should be based on objective data and evidence. We will study and research the project by ourselves and share the data with the public. We professors will objectively analyze the Pan-Korea Grand Waterway Project based on scholarly conscience, verify its validity and effects, and open the research results to the public through diverse data and articles. We declare that the political will and interests of specific groups should not be involved in the decision-making on the implementation of the project and validity assessment. Therefore, we hope and intend that our research results be used in evaluating the validity of the project based on an objective basis, and not be utilized and distorted for political objectives.……We professors plan to analyze and publicize problems of the Pan-Korea Grand Waterway Project through continuous studies, research, discussions and debates. Please understand our sincerity to take actions in front of the people, and not from our laboratories and classrooms. We promise to continuously perform our research works until the Pan-Korea Grand Waterway Project is evaluated and examined by objective and rational logic……

National River Restoration, which was established to solely implement the FMRP, was given the title of minister. This is very unusual, implying how much premium was placed on this project by the Lee government.

[10] There is another embarrassing example of value transformation with the change of status. The environmental vice-administrator of the ONRR had been a renowned ecologist before she took that position. She had published several books about trees, forests, and ecosystems, in which she maintained ecocentric perspectives. She had contributed to the expansion of ecocentric perspectives in Korea, but her stance on the FMRP was incompatible with her past views and led to immense disappointment from her readers.

This shows that members of the POMAC recognized their own social responsibility. Since its establishment, member professors of POMAC have produced and presented simulation results about the flow velocity of and the possible deterioration of water quality in the *Nakdong* River after the construction of the planned 16 dams. Some members surveyed and monitored the conditions of riverbeds before and during the project. Concerning Haman Dam on *Nakdong* River, one member professor conducted a simulation and found that a larger area than what the government anticipated would be inundated. When he presented this research finding, the government decided to lower the level of dammed water only after strongly denying the professor's finding. The scale of the damaged area was minimized at the very least. One economics professor conducted a cost-benefit analysis of the FMRP and provided his evidence in court. Meanwhile, the government and supporting experts have not provided any numbers. According to him, the benefit-cost ratio of the FMRP is only 0.16~0.21. He also analyzed annual maintenance expenses expected to be approximately 600 billion won after 2012. Members of the POMAC risked their positions as scholars and voluntarily conducted their research without financial support. They devoted their time and expense to perform their social responsibility as experts.

The POMAC has continuously held open lectures for the public, guided field trips for the public, and published a cartoon book to help the public understand problems concerning the FMRP more easily. The expenses for sharing its research results and communicating with the public have been collected from religious groups and the public, as well as through donations from its own membership. However, the efforts of the organization cannot be compared with the huge amount of money spent by the government for advertisement. There was no level playing field for fair competition between the two sides. This aspect reveals the abandonment of the government's role for creating fair public discourse.

The case of the FMRP vividly shows it is very difficult for experts to perform social responsibility under an undemocratic government.[11] This can

[11] One of the major indicators of democracy is the level of freedom of press and expression. Korea's press freedom index evaluated by Reporters without Borders was 69th in 2009, lower than 47th in 2008, which was the first year of the Lee government, and substantially lower than the 31st in 2006, under the Roh Moo-hyun government. The relatively conservative Freedom House evaluated Korea's freedom of press as 70th in 2011, lowered from 67th in 2010. This means that Korea has become a "Partly Free" country from having been a "Free" country since 1990. According to the U.S. Gallup's opinion survey on freedom of the press in 2012, only 59 percent of respondents answered that there is freedom of the press in Korea, while 36 percent answered that there was no freedom of

be symbolized in the case mentioned previously about a whistle blower who suffered from negative consequences after he went public with his concerns. Another example is the failure to establish an academic association composed of socially-conscious professors who oppose the FMRP. Professors from diverse disciplines launched an academic association, the Korea Water Society (KWS), to deal with rivers from the perspective of civil engineering, ecology, water quality, culture, history, administration, economics, etc., in September 2009, and has produced and presented another view totally different from the arguments of the government and certain experts. Even though the KWS tried to register itself as a non-profit organization (NPO) under the auspice of the MLTM, which was in charge of the FMRP, in January 2010, it failed to do so. The MLTM did not approve it, citing the fact that there were already incorporations such as the Korea River Association (KRA) and the Korea Water Resources Association (KWRA) with similar names and functions. However, it was one of only two cases among 112 applications that did not obtain a certificate to work as an approved NPO.[12]

A personal attack was launched against experts opposing the project by an expert supporting the government position. A professor at the Department of Civil and Environmental Engineering at the University of Wisconsin-Madison criticized oppositional experts and environmental organizations through various lectures, seminar presentations and contributions to newspapers and non-academic journals. In particular, he severely criticized those opposed to the project at a parliamentary audit of the government held in October 2010, which he attended as a witness. He argued

the press in the country. Thus, Korea ranked 87th among the 133 countries surveyed.

[12] The establishment of NPOs requires registration under the competent authorities based on a Civil Law in Korea. The authority can be selected according to the characteristics of the organization. Since the KWS is concerned about the rivers in charge of the MLTM, it tried to register itself under the MLTM. Since the Judging Committee for NPO Establishment was established in the MLTM in 2005, there has been just one case which was not approved. However, since the KRA is not an academic association but a legal organization based on the River Act, its characteristics and functions are different from those of the KWS. In the case of the KWRA, even though it is an academic association just like the KWS, its research field is different from the KWS. The KWA deals with water in general but the KRA deals with rivers from diverse perspectives of various disciplines. Thus, the two associations are different. The MLTM's disapproval caused controversy around the limitation of freedom of academic activities, since the KWA had held seminars and conferences devoted to the FMRP more than 20 times with the POMAC. The KWS tried to register itself under the Southern Kyungsang-province, where the *Nakdong* River flows, in 2011 and it was finally approved, for local governments have a right to grant permission to NPOs, just like ministries. The governor of the province, who was elected in 2010, did not agree with the central government's one-sided and speedy implementation of the FMRP. See No. 858 of *Weekly Kyunghyang* issued on January 12, 2010, for more detailed information.

that the experts opposing the project were not specialists in rivers and had not published papers in globally-renowned SCI journals. He distributed five pages of notes to members of the National Assembly present, and argued that the experts were not scholars because they were committing insane and irresponsible fraud. He also claimed that they should be answerable to their conduct after the successful completion of the FMRP. In response, the four experts who were referred to in his notes prosecuted him for libel. A court soon sentenced him to pay them 200 million won (50 million won per person) because the plaintiffs had been acknowledged as experts by a substantial number of articles related to the study of rivers, research reports, lectures, and book publications, etc. This clearly shows that experts supporting the project have behaved in ways that are socially irresponsible.

In another case, a professor of civil engineering, one of the most active professors of the POMAC, was prosecuted for libel by the Korea Water Resources Corporation (K-Water) for spreading false information. He played a key role in the POMAC's activities from the beginning of the FMRP and had criticized problems of the project through field studies, especially as a chairman of the Special Committee on the *Nakdong* River Project in Kyungnam Province. The media reported that K-Water discussed this lawsuit with the MLTM. He was finally acquitted of libel. This action of the government and public corporation can be interpreted as a threat to experts opposing the FMRP who publicly present their own research results based on scholarly conscience.

The social responsibility of experts has also been called to attention by civil society. Diverse environmental and civil organizations published a biographical dictionary of major public figures who supported the project in 2010 and 2011. They stated that the reason for announcing this list was to warn the present and future generations to prevent such an absurd project from occurring ever again and to raise questions about the irresponsible social climate for a project that would have serious negative consequences. Table 3 displays the biographical dictionary of experts who support the FMRP. Politicians composed the largest portion of those supporting the project, but experts shared the second biggest portion. The announcement of the list demonstrated civil concern for the social responsibility of experts.

After this list was made public, one conservative civil organization called the "Research Committee on Oppositional Actions to National Projects" was established and published a biographical dictionary of organizations and individuals opposing national projects and the FMRP. It argued that the publication of such a list aimed to help realize scientific rationality and

TABLE 3
Composition of Major Supporting Social Figures by Field

	Politicians		Governmental Officials		Experts*		Business leaders		Influencers		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
A class	66	39.3	31	18.5	44	26.2	15	8.9	12	7.1	168	100
B class	25	25.0	15	16.5	20	22.0	10	11.0	21	23.1	91	100
Sum	91	35.1	46	17.8	64	24.7	25	9.7	33	12.7	259	100

Note.—classes were divided by the frequency and strength of their statements reported by news media for 50 months from July 2007 to October 2011 by using "canal" and "four major rivers" as key words.

* Experts include professors and researchers of national and civil research institutes.

Source.—Press release of Four River Corruption Notebook Producers 2011, reconstructed.

advance the environmental movement. In addition, it emphasized the problems of blind opposition based on ideology and political beliefs and the necessity of realistic responsibility and historical evaluation of improper statements and behavior. This organization criticized the political ideology of groups opposing the project for changing the framework from the issue of scientific fact into an issue of conservatism versus progressivism. However, in contrast to the argument made by this organization, the POMAC is composed of conservative professors as well as progressive professors. This unique feature of the POMAC places it in contrast with other organizations made up of professors and civil groups of the past.

Conclusion

Experts in science and technology must have social responsibility not only when their activities are associated with national policies and projects but also when policies and projects are related with issues of science and technology. Such projects deeply impact the daily lives of the public and the condition of the environment and require a tremendous amount of taxpayer money. If one of the roles of experts is to contribute to making the world a better place to live, their actions are value-laden because the meaning of and conditions for a "better" state depend on what their values are: What is defined as better and what is required for a better state? Most experts voicing their opinions on national policies and projects tend to think their stance is

beneficial to the public interest. The opinions and actions of either side can be deemed proper only after the implementation of the national policy or project in question.

However, post-verification is not the point. A more significant point is pre-verification to prevent the fatal results of nature-transforming policies and projects. For this, it is critical for experts in science and technology to reveal their values and stances and provide verifiable evidence to support them. The public, both as those influenced by the policies and projects and as taxpayers, must have a chance to test which side is working more for the public interest. The government, if it is democratic, has to allow an atmosphere for public debate in which both sides of experts contest their arguments and provide evidence and the public has an opportunity to engage in the process.

However, in the case of the FMRP in Korea, experts supporting the project along with the government have not presented the reasons for their arguments and have presented questionable empirical data as analyzed in the discussion section. Some of them did not dispute the validity of the project and procedural problems and only paid attention to the measures for its successful implementation. Researchers working at national research institutes were mobilized to develop legitimacy for the project and appointed governmental officials from the academic community to spread the gospel of the FMRP, even though the project itself contrasted sharply with their past research results and former beliefs.

Experts involved in the POMAC who oppose the FMRP have continuously held public lectures, seminars, conferences, and have issued reports, press releases, and statements. They have produced counter-knowledge and disseminated it among the public, while requesting governmental officials and supporting experts to discuss problems of the FMRP with recognition of experts' social responsibility. However, they have failed to prevent the implementation of the project and have lost lawsuits. Nevertheless, these circumstances do not mean that all of their efforts have been fruitless. Their actions have contributed to preventing a larger number of negative consequences that would have occurred if no opposition to the project had materialized, and despite their inability to block the project itself, their efforts revealed how undemocratic the Lee administration had been.

Recently, after the completion of the FMRP, Korea has witnessed drastic negative changes in its ecological landscape along rivers that had already been anticipated by experts who opposed the project from the beginning. These changes include green algae bloom, retrogressive erosion, scour

phenomenon, inundation of river-side farmlands, cracks and water leak in dam structures, and the inability to prevent droughts and floods in areas prone to these natural disasters, among others.

After the implementation of a policy or project, it soon becomes clear who acted in a socially responsible manner. However, the question of who will claim responsibility for negative ecological and economic side effects of such a policy or project has yet to be resolved. In particular, the issue of how and what kind of social responsibility experts should have had not yet been answered. There can be no final answer to this. It depends on social capacity, in particular how successfully civil society can demand that experts be responsible for their actions. In addition, the case of the FMRP in Korea implies that an ideal situation for discourse where experts can contest their arguments and positions is necessary for experts to practice social responsibility. Ordinarily, this precondition for public debate on the desirable direction of experts' social responsibility is ignored, and it is regarded as a matter of personal decision without the public's engagement. The level of democracy of a society and its government is dependent the degree to which experts are allowed to put their social responsibility into practice by offering dissenting opinions that are aimed at increasing the public good.

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