Damming the Nation:

How Engineers Transformed Rivers into Water Tanks for Modern South Korea

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Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
In
Science and Technology Studies

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May 5, 2022
Blacksburg, Virginia

Keywords: Science, Technology, and Society (STS); Infrastructure; River; Development; Engineering; Nation-building

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ABSTRACT

Damming is one of the most high-profile forms of human intervention in the environment, and it is commonly found across the modern Korean landscape. Since the 1960s, under the name of "Comprehensive Water Resources Development," South Korean state engineers have constructed more than a dozen large multi-purpose dams on rivers in the nation. The prevailing Korean narrative tends to regard the surge of large dam-building as the outcome of modern state authority. Rather than granting all agency to the state, this dissertation shifts focus to newly emerged water experts who rationalized the damming of the nation. These new experts with backgrounds in civil engineering embraced hydrology as part of their research agenda to lead a comprehensive dam construction plan from a perspective of national water circulation. By examining the work of these experts, I demonstrate that river engineering became crucial for Korean engineers to position themselves in the developing nation that stood between the colonial legacy on the one side and American hegemony on the other. By utilizing both colonial data and Western development models, hydrological engineers quantified rivers, a process that compressed complex understandings of and interactions with unruly rivers into a singular vision—rivers as a manageable *national* resource. This conceptual and physical infrastructure naturalized a form of life dedicated to industrial South Korea while marginalizing social and cultural lives in rural areas. I ultimately argue that the modern *dammed* riverscape of the nation is the product of engineers' precarious and contested efforts to build their own professional identities and research programs in developing South Korea. This contextualization of river engineering allows us to examine the violence of river engineering not just from a lens of top-down state authority but from compromises, contestations, and negotiations over the legitimate forms of rivers, modern South Korea, and how they are related.

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GENERAL AUDIENCE ABSTRACT

Damming is one of the most visible forms of human intervention in the environment, and it is commonly found across the modern Korean landscape. Since the 1960s, under the name of "Comprehensive Water Resources Development," South Korean state engineers have constructed more than a dozen large multi-purpose dams on rivers in the nation. The prevailing Korean narrative tends to regard the surge of large dam-building as the outcome of modern state authority. Rather than granting all agency to the state, this dissertation shifts focus to newly emerged water experts who rationalized the damming of the nation. These new experts with backgrounds in civil engineering embraced hydrology as part of their research agenda to lead a comprehensive dam construction plan from a perspective of national water circulation. By examining the work of these experts, I demonstrate that river engineering became crucial for Korean engineers to position themselves in the developing nation that stood between the colonial legacy on the one side and American hegemony on the other. By utilizing both colonial data and Western development models, hydrological engineers quantified rivers, a process that compressed complex understandings of and interactions with unruly rivers into a singular vision—rivers as a manageable *national* resource. This conceptual and physical infrastructure naturalized a form of life dedicated to industrial South Korea while marginalizing social and cultural lives in rural areas. This historical investigation of river engineering shows that the current riverscape and its violence in modern South Korea are the products of compromises, contestations, and negotiations over the legitimate forms of rivers, modern South Korea, and how they are related.

Acknowledgements

Throughout the course of my journey at Virginia Tech, I have received innumerable assistance from many people. My co-advisors, Matthew Wisnioski and Gary Downey, have always guided me in the right direction whenever I was struggling with both my studies and outside life. Their encouragement allowed me to stand on my feet as a scholar. My committee members were of great help as well. Not only from classes, but along every milestone, Mark Barrow and Lee Vinsel provided valuable feedback which helped me shape my ideas and polish my writing. My experience at Johns Hopkins University thanks to mentorship from Yulia Frumer is a valuable memory which led me to engage intensely with the history of science and technology and East Asian studies scholarship.

I owed much to my colleagues in finishing my dissertation. Many members of the Virginia Tech STS community read chapter drafts, asked insightful questions, suggested ways to improve my writing, and encouraged me to continue further. I was able to improve my work based on comments garnered from a weekly research group meeting with Kari Zacharias, Marie Stettler Kleine, Annie Patrick, Michael Meindl, and Toma Kawanishi. I appreciate Hyungsub Choi, John Dimoia, Jaehwan Hyun, Wonkyo Jung, Jongmin Lee, Juyoung Lee, Aaron Moore, Jinyoung Park, Peter Potter, and Chuyoung Won for their feedback and assistance with finding sources.

My research has been supported by the generosity of several institutes. The International Center for Korean Studies at Seoul National University Kyujanggak Institute supported my first fieldwork in South Korea. The D. Kim Foundation provided travel funds with which I was able to conduct follow-up archival research. With a generous one-year fellowship from the Department of the History of Science and Technology at Johns Hopkins University, I was able to focus on writing my dissertation. I would also like to thank Ki-young Jung at K-Water for kindly providing sources stored at the library and the archives.

My last piece of gratitude goes to my friends and family both near and far. I thank my parents for their unconditional love, support, and patience. Yooni, thank you for standing by me at all times. I would be nothing without your love and passion.

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List of Abbreviations

BOE	Bureau of Electricity
BOWR	Bureau of Water Resources
CEB	Combined Economic Board
EPB	Economic Planning Board
FMRP	Four Major Rivers Restoration Project
HJST	Han River Joint Survey Team
IHD	International Hydrological Decade
KACN	Korean Association for Conservation of Nature
KASH	Korean Association of Scientific Hydrology
KEPCO	Korea Electric Power Company
KWRDC	Korea Water Resources Development Corporation
MCI	Ministry of Commerce and Industry
MOC	Ministory of Construction
NCA	National Construction Agency
NECD	Natural Environment Conservation District
OEC	Office of the Economic Coordinator
SH&G	Smith, Hinchman & Grylls Associates
SMDA	Specific Multipurpose Dams Act
SNU	Seoul National University
TVA	Tennessee Valley Authority
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey

Introduction

In 2009, the Lee Myung-bak government initiated the "Four Major Rivers Restoration Project (FMRP)," the so-called largest construction project since the time of Dangun, the legendary founder of the first Korean nation Gojoseon. The core purpose of the FMRP was to control water flow by constructing sixteen large structures on the Han, Nakdong, Youngsan, and Geum Rivers and dredging 570 million cubic meters of riverbed to deepen approximately 700 kilometers of waterways. The Lee government promoted the FMRP as a "Green New Deal," one that aimed to prevent floods, secure water resources, and conserve the environment during the era of climate change.[1]

This large national construction project faced serious opposition from environmentalists, intellectual communities, progressive civic organizations, and religious groups.[2] They castigated the FMRP as a different version of the "Grand Korean Canal Project," which Lee Myung-bak had presented as a major campaign pledge but then abandoned after being elected due to receiving severe criticism that the project would be a fatal environmental disaster. The anti-FMRP movement was ignited by Buddhist Monk Moonsoo, who committed suicide by self-immolation to protest against construction in the rivers. Monk Moonsoo set himself on fire to assert that the FMRP was ecologically destructive and against Buddhist doctrines. A Buddhist leader mourned Monk Moonsoo's death, saying "Monk Moonsoo's self-immolation was the exceedingly Buddhist manifestation to save life by sacrificing his own life, and a serious

[1] Myung-bak Lee, "New Year Speech," 2009, http://17cwd.pa.go.kr/kr/president/speech/speech_view.php?uno=179&article_no=1&board_no=P04&search_key=2&search_value=4%B4 밭&search_cate_code=&order_key1=1&order_key2=1&cur_page_no=1&cur_year=2009&cur_month=.

[2] Dennis Normile, "Restoration or Devastation?," *Science* 327, no. 5973 (2010): 1568–70.

reprimand for the activities of brutal destruction of rivers of life."[3] Anti-FMRP activists denounced that the government's river "restoration" project as an illegitimate human exploitation of nature, which would lead to ecological devastation.

Scholars have examined the FMRP from the perspective of long-standing national fetishism of state-led land development that has characterized postwar South Korea.[4] Such scholars have identified that "the construction alliance" of bureaucrats, politicians, and large construction corporations served as the driving force behind the ruinous national-scale project. According to their findings, the construction alliance has imprinted construction and development as the two fundamental ideologies of modern and, later, neo-liberal South Korea. Not only Lee Myung-bak but also the previous presidents, Roh Moo-hyun and Kim Dae-jung, from the opposite political party were dedicated to undertaking national construction projects, including the Saemangeum seawall and land reclamation, Gyeongin canal, and planned city development in the Seoul area.[5] Within this interpretation, the FMRP was more than a symbol of the indulgence in construction of President Lee Myung-bak, who was the former CEO of Hyundai Construction; rather, the FMRP manifested the national identity, as scholars named it a "construction state" (*T'ogŏn'gukka*).[6]

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[3] MBC, "Munsu Sŭnim '4taegang Chungdan' Ipchŏk · · pulgyogye Aedo [Death of Monk Moonsoo 'Stop Four Major Rivers'.. Condolences from Buddhists]," June 1, 2010.
[4] Hae-jin Lee, "4taegangsaŏpkwa Chiyŏkkaebarŭi Chŏngch'i [The Four-River Project and the Politics of Regional Development]," *ECO: The Korean Journal of Environmental Sociology* 16, no. 2 (2012): 51–87; Jin-Tae Hwang, "Changing South Korean Water Policy after Political and Economic Liberalisation," *Journal of Contemporary Asia* 47, no. 2 (2017): 225–46; Seong-Tae Hong, "Kaebalchuŭiwa Kongdongch'e: Kaebalgukkaŭi Saengt'aejŏk Chŏnhwanŭl Wihae [Developmentalism and Community: For Ecological Transition of Developmental State]," *ECO: The Korean Journal of Environmental Sociology* 22, no. 1 (2018): 47–73.
[5] Seong-Tae Hong, *Kaebalgongsawa t'ogŏn'gukka: Kaebalgongsaŭi Saengt'aeminjujŏk Kaehyŏkkwa Saengt'aesahoeŭi Chŏnmang [The Development Corporation and the Construction State: Eco-Democratic Reform of the Development Corporation and the Perspective of Eco-Society]* (Paju-si, Korea: hanul ak'ademi, 2005).
[6] Bae Gyoon Park, "Territorial Politics and the Rise of a Construction-Oriented State in South Korea," *Korean Social Sciences Review (KSSR)* 1, no. 1 (2011): 185–220.

The origins of the "construction alliance" date back to the era of the authoritarian leader, Park Chunghee (1917-1969). As his favorite motto, "construct as we fight," indicates, Park Chunghee equated land construction with the regime's primary vision, anti-communism. He publicly claimed that "victory in a war against communism" was the same as "victory in a fierce economic war," and thus, "national defense is construction and construction is national defense."[7] Under Park's draconian leadership, the nation conducted large-scale infrastructure building projects, including the Gyeongbu Highway, the first subway line in Seoul, industrial complexes, and large multi-purpose dams. Land development was the primary agenda by which the Park Chunghee regime could win over the Communist North through national economic growth. With this national demand, construction corporations in South Korea rapidly expanded as a mainstay of the "construction state." In this regard, the anti-ecological FMRP was a legacy of Park Chunghee's military and dictatorial rule.

Interestingly, the pro-FMRP faction recalled President Park Chunghee as well. It asserted that President Park had planned the same project decades prior, which involved building large dams and weirs on the four major rivers to prevent floods and droughts.[8] Declaring Park Chunghee an original advocate of the FMRP was done to link the proposed project with memories of remarkable economic growth during the Park Chunghee era. The pro-FMRP sides appeared on the media and named the FMRP as a "Green New Deal," which would achieve both economic growth and climate change measures at the same time.

[7] Chunghee Park, "1969 Sinnyŏnsa [1969 New Year's Address]," 1969, https://www.pa.go.kr/research/contents/speech/index.jsp.
[8] Yonhap News, "Pakchŏngŭi Chŏngbudo 4taegang Kaebalsaŏp Ch'ujinhaetta [Park Chunghee Government Also Promoted Four Major Rivers Development Project]," September 14, 2009.

The legacy of Park Chunghee within the FMRP debate implies a prevailing narrative in South Korea. Under President Park's dictatorial leadership, the nation achieved dramatic economic growth thanks to Park's large infrastructure development and industrialization policy; however, on the other hand, the nation needed to suffer social and environmental degradation in return. Proponents of Park Chunghee have claimed that Park's totalitarian rule was inevitable for building the postwar nation that was in chaos and falling behind North Korea even though it was against democratic rule. Yet, the other side has criticized that Park's approach inscribed anti-democratic and anti-ecological footprints, even if we can consider Park's era an "economic miracle." Regardless of how they evaluate Park Chunghee, both sides share the common narrative that South Korea achieved rapid economic expansion under his leadership.

This dominant narrative describes South Korea during the 1960s and 1970s as the starting period of environmental destruction: "As the economy grew since the 1960s, our society overcame poverty and enjoyed material affluence but also experienced difficulties accompanied by industrialization and urbanization. … Our society has faced serious environmental problems since the mid-1970s."[9] While this account is common, not all Korean scholars agree with this framework. Recent studies have provided profound nuance to the literature on the environmental management and nature conservation in the 1960s and 1970s South Korea.[10] These studies have

[9] Uriyŏksanet, "Sahoeŭi Pyŏnhwa [Change of Society]," http://contents.history.go.kr/mobile/ta/view.do?levelId=ta_h62_0050_0040_0020. Accessed on January 15.
[10] Jaehwan Hyun, "Brokering Science, Blaming Culture: The US–South Korea Ecological Survey in the Demilitarized Zone, 1963–8," *History of Science* 59, no. 3 (2021): 315–43; Chuyoung Won, "Tijel Chadongch'a Sidaeŭi Taegioyŏm Kwalli : 1960-70yŏndae Han'guk Chŏngbuŭi Kongaech'ayang Tansokkwa Ch'aegimŭi Kaeinhwa [Regulating Air Pollution in the Diesel Car Era : The Automobile Pollution Control and Individualized Responsibility in South Korea," *Hwan'gyŏngsahoehagyŏn'gu ECO [ECO: The Korean Journal of Environmental Sociology]* 24, no. 1 (2020): 303–31; Jongmin Lee, "Engineers for Seoul: Sewage Treatment and the Professionalization of Sanitary Engineering in Korea," *Han'gukkwahaksahak'oeji [The Korean Journal for the History of Science]* 43, no. 2 (2021): 483–504; Manyong Moon, "Ijungŭi Noksaekhyŏngmyŏng: Pakchŏngŭi Sidae Singyangjŭngsan'gwa Sallimnokhwa [The Dual Green Revolution in South Korea: Reforestation and Agricultural Revolution under the Authoritarian Regime]," *Chŏnbuksahak [The Jeonbuk Historical Journal]* 36 (2010): 155–84.

shown that development during the period did not always mean environmental degradation; rather, the authoritarian regime and governing bodies included environmental management as part of their political agenda.

On the whole, however, the notion that "Park's version with its militarist ethos and unabashed environmental destruction represented almost the diametric opposite of any 'sustainable development'" continues to monopolize our understanding of the past.[11] Unsurprisingly, scholars who examine the political discourse on the "environment (*hwan'gyŏng*)" pay attention only to the post-1970s, considering a previous couple of decades as illiterate to environmental values as the postwar poor nation indulged in "bread-and-butter" economics.[12] These narratives reduce the complicated infrastructure development projects in postwar South Korea to a single account: the ignorant destruction of nature toward achieving the goal of national productivity.

These prevailing narratives imply a strong teleology that South Korea marched toward industrialization under Park Chunghee's leadership while engaging in the gradual destruction of the natural environment. To Korean critical thinkers, the story of "ruined nature by modernization of destructive development" was the only one worth telling.[13] Considering the environmentally harmful impacts of Park's "modernization" project and the fact that environmentalism emerged as a form of democratic movement against military regimes in South

[11] Nak-chung Paik, "How to Assess the Park Chung Hee Era and Korean Development (Korean Original Text Available)," *Asia-Pacific Journal-Japan Focus* 3, no. 12 (2005), 4.
[12] Do-wan Ku, "Han'guk Hwan'gyŏngundongŭi Tamnon: Nangmanjuŭiwa Hamnijuŭi [Environmental Discourse: Romanticism and Rationalism]," *Kyŏngjewa Sahoe [Economy and Society]* 69 (2006): 128–53.
[13] Seong-Tae Hong, "Han'gugŭi Kŭndaehwawa Mul: 'choguk Kŭndaehwa'wa Murŭi p'agoerŭl Chungsimŭro [Modernization and Water In Korea. Focused on 'the Modernization of Fatherland' and the Destruction of Water]," *Kyŏngjewa Sahoe [Economy and Society]* 62 (2004): 296.

Korea, it appears natural that they assume the authoritarian development thesis as a form of environmental degradation.

However, this popular narrative has prevented us from examining the complex conceptualization and shaping of the natural environment from which Park's modernization program evolved. Accordingly, both public and scholarly narratives tend to describe Park's era as a coherent and coercive process of unnaturalizing the nation in the pursuit of industrialization and urbanization, which was not always the case. At least in the cases of river development, state agencies paid considerable attention to understanding the unruly rivers to rebuild them for the sake of nation-building in South Korea. Advocates of river development utilized the available sources, including hydrologic data produced by past Japanese colonizers and the Cold War influx of Western knowledge. Bureaucrats and experts from a variety of backgrounds debated over how to conceptualize nature to take the initiative of national development in their favor. Through a process of river engineering, state elites formulated the argument that a dammed river offered an example of national beauty that should be appreciated by modern South Korean citizens. Moreover, national construction efforts in the environment were challenged by unexpected floods and resistance from local residents. Hardly the sole story, environmental destruction was only one dimension of the multifaceted activities of identifying and building the natural environment in developing South Korea.

The declentionist narrative overlooks the shifting relationship between humans and nature generated through large infrastructure development within the environment. As Pritchard and Zeller noted, modern development was far from denaturalization because "industrial processes were embedded within, and thus ultimately dependent upon, natural resources,

environmental processes, and ecosystems."[14] These interconnections, however, are often masked by the dichotomy between nature and technology. A close examination of the politics of dam-building in modern South Korea indicates that damming generated new norms via reimagining and reshaping human interaction with the natural environment. Damming rivers projected the view that river water should be used to build the nation and not be *wasted*, as it flows to the sea without irrigating farmland, chilling engines in manufactories, and generating electricity. The idea of utilizing wasted water led to the development of rivers as infrastructure to supply water resources to the national development scheme. Damming rivers marginalized small-scale activities in rural river basin areas, which state authorities considered a hindrance to reconstructing the riverscape for developing South Korea. My avoidance of the declentionist narrative does not intend to diminish environmental and social violence caused by land development. Rather I demonstrate that examining the reworking of human and nature relationships serves as the foreground to understanding uneven consequences, power configurations, and violence regarding river development.

Rivers as Infrastructure

This dissertation traces large-scale dam-building as a lens through which to examine human engagement with the natural environment in modern South Korea. Damming is one of the most high-profile forms of human intervention in the natural world, and it is common throughout the Korean Peninsula. Since the 1960s, South Korea has constructed more than a dozen gigantic multi-purpose dams on its rivers, all in the name of "Comprehensive Water Resources

[14] Sara B. Pritchard and Thomas Zeller, "The Nature of Industrialization," in *The Illusory Boundary: Environment and Technology in History*, ed. Martin Reuss and Stephen H. Cutcliffe (Charlottesville, VA: University of Virginia Press, 2010), 70; William. Cronon, *Nature's Metropolis : Chicago and the Great West* (W.W. Norton, 1991).

Development." These dams, which contain a total of approximately 9.1 billion cubic meters of water, have transformed the nation's landscape as well as the ways in which people regard, utilize, and live with water.

Dam construction has imbued Korean society with the notion that rivers are valuable natural resources that should be properly managed. Various versions of dam blueprints in official reports, news articles, and promotional pamphlets have all encouraged a common concept that dams can secure water resources and promote economic affluence nationwide. Damming has framed flowing water as a "raw material" out there, "which must be shaped and processed by technological means to satisfy human ends."[15] To this extent, damming is a process of turning rivers into infrastructure, as "to construct infrastructure is simultaneously to construct a particular kind of nature, a Nature as Other to society and technology."[16] Viewing rivers as infrastructure has converted water into a natural resource and a potential beneficial input to society if properly processed.

To explore rivers as conceptual and physical infrastructure through which human and nonhuman nature interact, I focus on technical experts who produced knowledge for conceptualizing and constructing such artificial environments. I pay particular attention to a newly-emerged hybrid of civil engineers and hydrologists and their techniques, which provided a rationale for damming in modern South Korea. Popular narratives have tended to focus on Park Chunghee's leadership in describing land development, but reducing development to the "leader's decisive measure" conceals historical dynamics surrounding the rationalization of

[15] Paul N Edwards, "Infrastructure and Modernity: Force, Time, and Social Organization in the History of Sociotechnical Systems," in *Modernity and Technology*, ed. Thomas J. Misa, Philip Brey, and Andrew Feenberg (Cambridge, MA: MIT Press, 2003), 189.
[16] Ibid.

costly construction projects.[17] Instead of simply designating powerful political figures as key motivators, this dissertation asks who helped legitimize damming as an authentic contributor to modern state-building in South Korea, how they did so, and also how they attracted the enthusiastic support of individuals like Park Chunghee.

Challenging ahistorical accounts that authoritarian power enforced dam construction, this dissertation demonstrates that engineers' numerical representations of the natural environment led to broad and energetic support for dam construction. At its core, this dissertation argues that quantification techniques compressed complex understandings of and interactions with rivers into a singular vision: rivers as a manageable resource for state-building. Such a narrow technical vision of rivers rationalized their use in serving national interests while ultimately marginalizing the social and cultural lives in and depending on river basins.

This is hardly the first study to assert the role of engineering expertise in bureaucratic modernization projects. James Scott's groundbreaking *Seeing Like a State* examines how modern state scientists and engineers simplified complex environmental arrangements to eradicate local diversity and bring groups under control according to what Scott calls "high modernism."[18] Similarly, Timothy Mitchell pointed out that engineers built the modern world by imposing an abstract order onto a disorderly world. Elements of this expert-constructed abstract world, such as cadastral maps, allowed centralized administrations to contend with distance and distrust.[19] Quantification is often at the heart of these modern techniques, as it makes messy realities

[17] Tae-Ho Kim, "Kwahakkisulsaŭi Chuch'edŭrege Che Mokŭl Ch'adajugi [Giving Credit to the Main Agents of the History of Science and Technology]," in *"kwahaktaet'ongnyŏng Pakchŏngŭi" Sinhwarŭl Nŏmŏ [Over the Myth of 'Science President Park Chunghee']* (Gyeonggi, Korea: yŏksabip'yŏngsa, 2018), 4–10.
[18] James C Scott, *Seeing Like a State* (New Haven, CT: Yale University Press, 1998).
[19] Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley, CA: University of California Press, 2002).

calculable and allows state agencies to manage the world by relying on seemingly neutral numbers.[20]

When engineers engage in nature with quantitative representations—their language for understanding and rebuilding the natural environment—they also inscribe certain human values onto the landscape. The first nationwide river measurements conducted by technocrats from the Government-General of Korea (also known as the Chosŏnch'ongdokpu, the colonial administration) established the moral and material basis of authority for colonial resource management. River management based on numerical data, considered "rational" and free from human bias, provided a legitimate means by which to control the colonial environment as well as the society at large. Later, South Korean engineers quantified river flow by drawing on that colonial data in order to convert the messy riverine system into manageable national water resources. Numbers on hydrologic maps and tables, such as precipitation, water levels, and river flow, not only represented physical characteristics of rivers but also created "manageable rivers" with a set of new norms, rules, and power relations.[21] As Alonso and Starr argued, "[P]olitical judgments are implicit in the choice of what to measure, how to measure it, how often to measure it, and how to present and interpret the results."[22] Measuring rivers manifested technical bureaucrats' aspirations to make the riverine environment under control and rebuild it toward their end.

Of course, river engineering was never imposed from the top without any frictions. American engineers, who participated in a river basin survey in South Korea as a form of Cold

[20] Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, NJ: Princeton University Press, 1995).
[21] Ashley Carse, "Nature as Infrastructure: Making and Managing the Panama Canal Watershed," *Social Studies of Science* 42, no. 4 (2012): 539–63.
[22] William Alonso and Paul Starr, *The Politics of Numbers* (New York, NY: Russell Sage Foundation, 1987), 3.

War technical aid, had a different priority than the Korean state engineers who wanted to expedite development processes. Likewise, Korean technical officials from various government agencies clashed over the implications of dam-building subverting the authority of a national construction plan. Within the Korean hydrological research community, research engineers from academia debated with state engineers over the trajectory of the dam construction policy. And among rural populations, many complained that dam construction would ruin their lives and livelihood and demanded proper compensation. The state authority manifested in water infrastructure was not a singular entity but instead consisted of conflict among government agents, engineers, and local residents.[23] Damming became a flashpoint when social groups struggled to define the legitimate forms of rivers, modern South Korea, and their relations.

This politics of river engineering has received little attention in modern Korean studies. This is in part due to a historiographical bias towards the political economy of modern development. Historians have paid significant attention to explaining the unprecedented economic success of postwar South Korea, referred to as "the miracle on the Han River," by focusing on economic and political structures. [24] These approaches have explored the complicated relationships of colonialism, modernity, Cold War geopolitics, and nationalism in paving the unprecedented path forward for South Korea as a developmental state. And yet, the interaction of these forces in the riverine environment remained understudied. A few exceptional studies have discussed state-building in South Korea through the lens of river development, but

[23] Jessica Barnes, "States of Maintenance: Power, Politics, and Egypt's Irrigation Infrastructure," *Environment and Planning D: Society and Space* 35, no. 1 (February 26, 2017): 146–64, https://doi.org/10.1177/0263775816655161.
[24] Byeong Cheon Lee, "Political Economy of Korean Development after Liberation: A Critical Reflection," *Korea Journal* 46, no. 3 (2006): 49–79; Tae-gyun Park, *Wŏnhyŏnggwa Pyŏnyong: Han'gung Kyŏngjegaebalgyehoegŭi Kiwŏn [Archetype and Metamorphosis: The Origin of Korea's Economic Development Plans]* (Seoul, Korea: Sŏultaehakkyoch'ulp'anmunhwawŏn, 2007); Carter J Eckert, *Park Chung Hee and Modern Korea: The Roots of Militarism, 1866–1945* (Cambridge, MA: Harvard University Press, 2016).

they have addressed state authority as a homogenized unit, leaving engineers as secondary characters or merely servants to state power.[25] As a result, the dynamic socio-political array laid out via contestation over rivers remains largely unexplored.

Taking into account the material foundation of the developmental agenda in South Korea during the second half of the twentieth century, this gap becomes more obvious. The state developmental thesis required water. Newly built industrial complexes needed water to operate efficiently and cool down machines. Rapid population growth and urbanization required more and more water to meet the demands of daily life. Skyrocketing energy demand led to the construction of hydropower plants on rivers. The expansion of urban areas resulted in the reclamation of riverside land vulnerable to floods. In such ways and many others, river engineering was at the heart of the national mission of modern transformation, or as Donald Worster has said, "[C]ontrol over water has again and again provided an effective means of consolidating power within human groups."[26]

The notion that water control is a means for social engineering does not mean that rivers have existed outside of society as pure nature to be conquered. As environmental historians have demonstrated, rivers are a form of "hybrid nature" where humans (and their technological measurements) and non-human nature are closely intertwined and inseparable.[27] The boundary between nature and technology is not fixed or pre-determined, but a product of conflict, negotiation, and violence. During the colonial period, the Japanese identified Korean rivers,

[25] Jin-Tae Hwang, "A Study of State–Nature Relations in a Developmental State: The Water Resource Policy of the Park Jung-Hee Regime, 1961–79," *Environment and Planning A* 47, no. 9 (2015): 1926–43.
[26] Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York, NY: Oxford University Press, 1985).
[27] Sara B. Pritchard, *Confluence : The Nature of Technology and the Remaking of the Rhône* (Cambridge, MA: Harvard University Press, 2011); Mark. Fiege, *Irrigated Eden : The Making of an Agricultural Landscape in the American West* (Seattle, WA: University of Washington Press, 1999); Richard White, *The Organic Machine: Remaking the Columbia River* (New York, NY: Hill and Wang, 1995).

which had been occupied for generations, as "primitive nature" to legitimize their control over river basins. American technical aid experts in Cold War Korea redefined Korean rivers as "wasted" due to a lack of technological interventions in the water cycle. Research engineers emphasized the distinctive natural characteristics of South Korean rivers, claiming the necessity of Korea's own hydrological research program. Examining how technical experts work on the boundary between nature and technology thus opens a window through which to investigate the politics of river infrastructure as it said "defining what is technological in our world and what is natural directly affects ethics, politics, and how we relate to our environment."[28]

Colonial Legacy in Cold War Development

Exploring Korean rivers as infrastructure also affords new perspectives on the nature of global Cold War development. Large dam-building proliferated not only in South Korea, but "the world went on a dam-building spree after 1945, peaking in the 1960s and 1970s."[29] Some scholars who adopt the lens of Cold War geopolitics have interpreted damming as the outcome of post-World War II competitions over international development.[30] They have focused on American technical and political elites as the driving forces behind the surge of dam construction in newly independent postcolonial nation-states. They have argued that international construction projects

[28] Martin. Reuss and Stephen H. Cutcliffe, "Introduction," in *The Illusory Boundary : Environment and Technology in History*, ed. Martin. Reuss and Stephen H. Cutcliffe (Charlottesville, VA: University of Virginia Press, 2010), 1–6.

[29] John Robert McNeill and Peter Engelke, *The Great Acceleration: An Environmental History of the Anthropocene since 1945* (Cambridge, MA: Harvard University Press, 2014), 33.

[30] Christopher Sneddon, *Concrete Revolution: Large Dams, Cold War Geopolitics, and the US Bureau of Reclamation* (Chicago, IL: University of Chicago Press, 2015); Chris Sneddon and Coleen Fox, "The Cold War, the US Bureau of Reclamation, and the Technopolitics of River Basin Development, 1950–1970," *Political Geography* 30, no. 8 (2011): 450–60; Richard P. Tucker, "Containing Communism by Impounding Rivers: American Strategic Interests and the Global Spread of High Dams in the Early Cold War," in *Environmental Histories of the Cold War*, ed. John Robert McNeill and Corinna R Unger (Washington, D.C. and New York, NY: German Historical Institute and Cambridge University Press, 2010), 139–66.

intended to demonstrate the benefits of capitalist economic growth with a form of novel technologies and planning practices. In this vein, the diffusion of large dams and the spread of river basin development throughout the world was a critical facet of efforts by the US to weaponize economic development for anti-communism.

This Cold War geopolitical perspective has undergone critical revisions by recent postcolonial development studies that questioned the extent to which American hegemony shaped the postwar world.[31] Postcolonial studies scholars have argued instead for the need to consider the local specificities of river basin development other than American Cold War strategy. Specifically, recent studies have illuminated the impacts of colonial legacy on international Cold War river basin development. In investigating the Mekong River, a Southeast Asian river where the US invested tremendous resources for building Free World nations, recent scholarship has articulated the role of indigenous and colonial knowledge, infrastructure, and culture.[32] The fact that the Mekong Committee modeled its river development scheme after the Tennessee Valley Authority does not mean that Cold War developmental ideas and practices were simply transferred from the US to the peripheral Mekong area.

Aaron S. Moore comprehensively discussed the continuity between colonial large infrastructure-building and Cold War development in Asia by following Japanese engineers.[33] Emphasizing intra-Asian connections rather than American technical aid, Moore shows that Japanese engineers who had cultivated experiences and expertise through large dam construction

[31] Joseph M. Hodge, "Writing the History of Development (Part 2: Longer, Deeper, Wider)," *Humanity: An International Journal of Human Rights, Humanitarianism, and Development* 7, no. 1 (2016): 125–174.
[32] David Biggs, *Quagmire: Nation-Building and Nature in the Mekong Delta* (Seattle, WA: University of Washington Press, 2010); Vincent Lagendijk, "Streams of Knowledge: River Development Knowledge and the TVA on the River Mekong," *History and Technology* 35, no. 3 (2019): 316–37.
[33] Aaron S. Moore, *Constructing East Asia: Technology, Ideology, and Empire in Japan's Wartime Era, 1931-1945* (Stanford, CA: Stanford University Press, 2013).

projects in colonial Korean and Manchukuo later led river development in Asian countries during the Cold War period. In this transition from colonial construction to postcolonial economic development, Moore argued that Japanese engineers simply rebranded violent imperial discourse and power relations into a form of technical aid in their ”re-entry into Asia and the creation of a postcolonial, Cold War development system.[34] Tracing colonial origins of Cold War development suggests that “the challenge for historians is to determine how these cold war-era activities became embedded into older, colonial-era conditions and simultaneously transformed them into postcolonial, postmodern environments.”

Building upon this scholarship, I propose that examining nationalist appropriations of colonial practices in Cold War development offers a helpful lens for examining both continuities and discontinuities between colonial and postcolonial practices in development. Exploring the impacts of colonial footprints on Cold War development in postcolonial nation-states has occupied scholars’ attention. However, in many cases, boundaries between the colonial and postcolonial were blurred as historical actors played with the issue of continuity and discontinuity in the context that the end of colonial rule was “the beginning of competing narratives of the colonial past.”[35] If we consider colonial legacy not as a pre-existing resource waiting to be merged into postcolonial development but as multi-faceted outcomes of competitions, negotiations, and compromises, it is imperative to study how different social groups labeled what was colonial and what was postcolonial.

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[34] Aaron S. Moore, “From ‘Constructing’ to ‘Developing’ Asia—Japanese Engineers and the Formation of the Postcolonial, Cold War Discourse of Development in Asia,” in *Engineering Asia: Technology, Colonial Development and the Cold War Order*, ed. Hiromi Mizuno, Aaron S Moore, and John DiMoia (London, UK: Bloomsbury Publishing, 2018), 85.

[35] Theodore Hughes, *Literature and Film in Cold War South Korea* (New York, NY: Columbia University Press, 2012).

In the case of river engineering in postwar South Korea, engineers turned colonial infrastructure into a resource for nation-scale development. South Korean and American state engineers drew on hydrologic data and knowledge produced by Japanese colonizers to calculate the benefits of river basin development and dam construction. They acknowledged that a colonial set of data was the only useable source for characterizing Korean rivers. Postcolonial engineers also rebuilt water measurement stations installed during the colonial period to quantitatively study rivers in South Korea. To this extent, remnants of colonial river management allowed South Korean engineers to rationalize a dam construction plan. However, at other times, especially research engineers from academia questioned the accuracy of colonial data and asked for government support in building new infrastructure for river measurements. They also mobilized anti-colonial sentiment to legitimize their own research program, saying current river management derived from the colonial era was ill for Korean society, something should be overcome to advance the nation.

Similarly, Korean engineers selectively employed the Cold War influx of development models and knowledge to their own ends. Engineers widely used a story of the economic "success" of TVA in promoting that river basin development and dam-building would lead South Korea to attain the goal of industrialization and modernization. The Korean government embraced American technical aid to use Western development know-how for a river basin plan in South Korea, but at the same time, they learned that American scientific methods could not be applied to Korea due to different conditions. To this end, Korean engineers argued that simple transplantation of American river basin development methods should be rejected because they were devised based on the "continental" characteristics of rivers in the US while Korean rivers

had totally different natural traits. This claim led to the necessity of establishing Korea's own hydrological research program to understand the distinctive conditions of rivers in South Korea.

If we focus on appropriations of colonial infrastructure in postcolonial nationalist development, it opens up a door to examine how local actors positioned themselves in developing South Korea that stood between the colonial legacy and American hegemony. Engineer's labeling of any data, knowledge, and infrastructure as (post)colonial tied to their strategies to position themselves in developing South Korea. And this positioning reflected their uncertain and contradictory status. Colonial data helped engineers numerically represent water resources of rivers. Western development models also allowed engineers to envision river basin development for national progress. Simultaneously, however, Korean engineers distinguished their development and research program from both colonial river management and American methods to build their own contributions to the national developmental agenda. Colonial legacy and as well as international Cold War development were resources for Korean engineers to mobilize in establishing themselves as legitimate contributors to modern South Korea.

Sources and Chapter Outlines

This dissertation benefits from the abundance of government documents stored at the several archives and libraries in South Korea and the US. The National Archives, the National Library, the Seoul National University Library, and the Korean Water Resources Corporation Library and Archives contain a number of survey reports, engineering papers, correspondence, and memorandums. The National Archives and Records Administration in Maryland also houses valuable historical records on American missions for technical aid in South Korea. These sources allow me to offer a rich analysis of the planning and implementation of river basin development

and dam construction in modern South Korea. In particular, I pay close attention to river basin maps and hydrologic data and tables created by hydrological engineers, analyzing the assumptions embedded in the representations of rivers that simplified the messy reality of the riverine environment into numbers.

Admittedly, these government documents tell a partial story. There are power dynamics in the archives; the official texts are full of hype, bias, and one-sided narrative. Technical documents are filled with tedious numbers and formulae that conceal how river engineering affects lives in river basins. Acknowledging this limitation, where possible, I have attempted to support my analysis with diverse sources, including media interviews and public speeches of politicians and engineers, promotional literature, and memoirs. The main actors of the dissertation are South Korea's hydrological engineers, but using local newspapers, magazines, a series of civil petitions, and oral history materials, I also examine how damming disturbed the everyday lives of local people.

The dissertation consists of five chapters. Focusing on the Han River, so-called "the lifeline of the nation," the first chapter examines how rivers provided everyday living spaces in precolonial South Korea. This opening chapter shows that Korean people have long been engaging with rivers with which they imbued their own meanings of living.

The second chapter traces the Japanese colonial rule over rivers in Korea. Japanese colonizing efforts intervened in lives in river basins with an extensive set of hydrologic data that they produced. Japanese colonizers identified Korean rivers as "untouched nature" that should be managed based on national-scale quantification data. Data-based river management rationalized colonial rule over Korean rivers as well as social lives although this approach failed due to recurring floods.

The next chapter illuminates American technical aid in South Korean water development after the Korean War (1950-53). This chapter particularly focuses on an international team of American and Korean state engineers, the Han River Basin Joint Survey Team, who studied the Han River from the late 1960s. The survey project was driven by the US technical aid initiatives during the Cold War, and included American engineers' attempts to install advanced water gauging stations and train Korean personnel. However, the survey ultimately relied on previously measured water records collected by colonial technical officials to turn the river into a calculable national resource.

The fourth chapter explores the emergence and stabilization of a hybrid community of practitioners merging engineering with hydrology.

In order to rationalize dam-building with quantifications of rivers, state engineers sponsored the establishment of a professional society of hydrological engineers, recruiting research engineers from academia. This chapter especially illuminates the tensions between technocrats and academic engineers, which arose from the fact that technocrats prioritized accelerating river basin development while academic engineers aspired to build their own research program considering the local conditions of the nation. It argues that the tension is indicative of the uncertain and precarious cha of South Korean hydrology positioned between Western methods and colonial river management.

The last chapter examines the Soyanggang Dam construction and its impact on modern Korean society. This chapter shows that state engineers implemented the construction of an unprecedently large multi-purpose dam on the Han River, under the name of national development. The Soyanggang Dam promised to secure water resources in the form of a large-scale reservoir, as needed for building an industrial nation. This chapter shows that this damming

project consequently marginalized rural farms and community-building activities at the rural dam site, while naturalizing people's participation in manufacturing production as a modern form of life.

These chapters collectively provide deeper understandings of contemporary conflicts over construction in the environment. Framing environmental conflicts either as rational developmentalists versus emotional environmentalists, or a villain construction alliance versus guardians of nature tells only part of the whole story. Rather than the collisions between economic and environmental values, the current environmental politics stems from questions such as how we represent nature, what is counted as valid representations of nature, who has the authority to represent nature, what is included and excluded from their representations, and what social norms, values, and forms of life were supported by those representations. Only by addressing these questions, we can draw a more holistic picture of the nature of power dynamics and the violence of river engineering.

Chapter 1 The Great Artery of Korea

The Han River runs across the center of the Korean Peninsula from east to west following the nation's east-high and west-low topography. The Han River has two main tributaries in its upstream: The North Han River rising from the Kumgang Mountains and the South Han River from the Taebaek Mountains. The North Han River flows through the more steep and higher terrain while the South Han River is located in a lower but still hilly area.[36] These two rivers merge at Yangsu-li in Gyeonggi Province where the land becomes flattened before running toward Seoul. The Hang River is 497.5 kilometers in length, and its basin occupies 34,397 square kilometers, which is the second-largest basin in the Korean Peninsula following the Yalu River Basin in North Korea.[37]

The Han River basin is basically a temperate rainy climate region with approximately 1,200-1,300 millimeters of annual precipitation.[38] The upstream Han River particularly has excessive precipitation during the summer season because of humid wind from the sea southwest of the peninsula. As moist air moves up along the elevated eastern terrain, it condenses and rains down on the ground. As rainfall supplies water, the North Han River and the South Han River flow rapidly in their upper courses along the steep valleys while eroding riverbeds and waterways. The two Han Rivers slow down around the confluence and deposit sediments travel from upstream in the basin.

[36] Gyeonggi Province Museum, "Kyŏnggido 3taehach'ŏnyuyŏng Chonghap'aksulchosa II: Han'gang [The Site Survey Report in Han RIver Valley, Kyonggi Province]" (Yongin, Korea, 2002), 50.
[37] Hyungseok Lee and Juhwan Kim, *Han'gang [Han River]* (Seoul: Daewonsa, 1990), 64; 69.
[38] Seoul Historiography Institute, "Han'gangŭi Ŏjewa Onŭl [The Past and Present of the Han River]" (Seoul: Sŏult'ŭkpyŏlshisap'yŏnch'anwiwŏnhoe [Seoul Historiography Institute], 2001), 24.

[Figure 1] The Han River Basin Map

(Source: International Crane Foundation, https://savingcranes.org/travels-with-george-north-korea-fall-2012/)

In addition to this orographic precipitation, the Han River basin has intense rainfalls concentrated during the summer season. The uneven precipitation distribution is caused by the East Asian monsoon, a system of wind that carries moist air from the Indian Ocean and the Pacific Ocean. From mid to late June, the peninsula especially undergoes a couple of heavy rainy weeks due to the formation of the monsoon boundary—called *Changmajŏnsŏn*—between the humid and hot

air mass from the Pacific and the humid but cooler airmass from the Okhotsk.[39] Because of this meteorological phenomenon, seventy percent of precipitation concentrates between June and September.[40] The Han River with this precipitation pattern has provided the ecological foundation to its basin, but at the same time, it has challenged humans in the Korean peninsula with fluctuating water flow, resulting in repetitive floods and droughts.

The natural landscape of the downstream Han River basin is totally varied from the upstream because of the topographical differences. Contrary to the steep and mountainous upstream Han River basin, the river formulates vast flood plains on its downstream basin, including the Gimpo and Ilsan plains located in western Seoul. These flood plains were generated by sediment deposition on the riverbed along with the rise of sea level after the last great glacial period (B.C. 18,000-15,000).[41] The altitude of these plains was only about five to seven meters; thus, repeated inundation and sedimentation occur especially during the rainy season.[42] The ceaselessly flowing Han River connects the mountainous east to the flat and littoral regions of the west, redistributing soils from upstream to downstream.

The Han River has supplied resources for human economic activities, including water, fertile soil, and abundant wildlife, and vice versa, human forces have shaped the landscape of the Han River. Along the Han River downstream, several Neolithic and Bronze Age sites have been discovered, including Seoul Amsa, Hanam Misari, and Namyangju Jinjungri, meaning

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[39] This monsoonal rainy season is called *tsuyu* (梅雨) in Japan and *meiyu* (梅雨) in China and Taiwan. For its etymology, see Seung Taik Ahn, "Changmawa Maeu Sai Kihunŭn Shingminji Chosŏnŭi Nongŏbŭl Ŏttŏk'e Kyujŏnghayŏnnŭn'ga [Between Jangma and Baiu: How Climate Prescribed the Agriculture of Colonial Korea]," *Han'gukkwahaksahak'oeji [The Korean Journal for the History of Science]* 32, no. 2 (2010): 223–58.
[40] Gyeonggi Province Museum, "Kyŏnggido 3taehach'ŏnyuyŏng Chonghap'aksulchosa II: Han'gang [The Site Survey Report in Han RIver Valley, Kyonggi Province]," 49.
[41] Ui-han Lee, "Pŏmnamwŏn [Flood Plain]," *Encyclopedia of Korean Culture*, 2009, http://encykorea.aks.ac.kr/Contents/Item/E0066448.
[42] Hyeok-jae Kwon et al., "Han'gang [The Han River]," *Encyclopedia of Korean Culture*, 1995, http://encykorea.aks.ac.kr/Contents/Item/E0060950.

agricultural culture began along the downstream Han River almost six thousand years ago.[43] Ancestors of the Korean Peninsula settled in this region because the riverine environment provided organisms that could be converted to foods as well as materials for constructions and utensils, including reeds and alluvial soils.[44] Since the prehistorical period, people have interacted with the nonhuman natural environment of the Han River basin.

The downstream Han River basin, specifically near present-day Seoul, was the heartland of Baekje (B.C. 18 – C.E. 660), one of the three kingdoms of the peninsula's ancient history. The dominant account tells that Onjo, a son of Jumong, the founder of the northern kingdom of Goguryeo (B.C. 37 – C.E. 668), founded Baekje in the Han River downstream. He was satisfied with its geographical attributes of being surrounded by the Han River like a natural fortress and fertile ground for agriculture.[45] Arriving at the downstream Han River, Onjo's servants mentioned that

> [This land] has the Han River in the north like a belt; turns to high mountains in the east; has fertile land in the south; blocked by the big ocean in the west. It would be good to construct the capital here because there would be no place like this good land with these advantageous geographical features.[46]

King Onjo established the capital of Baekje in the area in B.C 5., and the later history of the three kingdoms centered on the tug of war for occupying the productive downstream Han River basin. The three kingdoms had long fought against each other to take the basin which provided not only fertile agricultural land but also geopolitical advantages. The era of the three kingdoms finally

[43] Gyeonggi Province Museum, "Kyŏnggido 3taehach'ŏnyuyŏng Chonghap'aksulchosa II: Han'gang [The Site Survey Report in Han RIver Valley, Kyonggi Province],"66.
[44] Gyeonggi Province Museum, "Kyŏnggido 3taehach'ŏnyuyŏng Chonghap'aksulchosa II: Han'gang [The Site Survey Report in Han RIver Valley, Kyonggi Province]," 194.
[45] Sugwang Lee, *Han'gangi Malgŏlta [The Han River Talks]* (Seoul, Korea: Seoul Government, 2014), 26.
[46] Busik Kim, *Samguksagi Paekchebon'gi Che 1 [The History of the Three Kingdoms: The Main History of Baekje Vol. 1]*. trans. National Institute of Korean History, http://db.history.go.kr/id/sg_023r_0020_0010.

ended as Silla (B.C. 57 – C.E. 935) took control of the Han River waterfront and established an alliance with the Chinese Tang Dynasty (618-907). King Jinheung (540-576) of Silla seized the Han River basin from Goguryeo, which allowed Silla to interact with the Tang Dynasty via maritime routes of the western sea. Establishing a close relationship with the Chinese imperial dynasty, the military, economic, and cultural power in the East Asian region, Silla overthrew Baekje and Goguryeo and united the Korean Peninsula.[47] The Han River basin was an economically productive region as well as a strategic location, connecting Northern and Southern parts of ancient Korea as well as a passage to Chinese civilization via water transportation.

The Artery of the Joseon Dynasty

The Han River emerged as the political, economic, and cultural center of Korea with the establishment of the Joseon Dynasty (1392 – 1897). The Han River had been a strategic location during the Silla and Goryeo (918 – 1392), but it received a spotlight as the center of Korea since King Taejo (1335 – 1408), the founder of the Joseon Dynasty, decided to construct the capital in Hanyang, the old name of Seoul. Overthrowing the Goryeo Dynasty, Taejo wanted to relocate the capital city from the original Kaesong in order to move away from the influence of the old ruling groups. Taejo considered Hanyang as the first candidate because of its militarily advantageous location surrounded by the mountains, the West Sea, and the Han River.[48]

More importantly, the Han River provided water transportation which allowed Hanyang to be the hub of the dynasty's logistics. Premodern Korea was an agrarian society, and the grain

[47] Seoul Historiography Institute, "Han'gangŭi Ŏjewa Onŭl [The Past and Present of the Han River]," 81-2.
[48] Korea Creative Content Agency, "Chosŏn'gŏn'gukkwa Hanyangch'ŏndo [The Establishment of Chosŏn and the Transfer of Capital to Hanyang]," 2006, https://www.culturecontent.com/content/contentView.do?search_div=CP_THE&search_div_id=CP_THE001&cp_code=cp0617&index_id=cp06170009&content_id=cp061700090001&search_left_menu=.

tax provided the financial backbone for the dynasty. Grain products collected by the local governments as tax needed to be transported to the capital, but ground transportation was ineffective due to the inferior roads network and the peninsula's mountainous terrain. Compared to ground transportation, shipping grain through river waterways was a much more effective way to collect tax. In this regard, the downstream Han River basin was a promising candidate for a new capital of the dynasty. In searching for a place for the capital, Taejo commented that "[O]bserving the geographical features of Hanyang, this place deserves to be the capital. This location is specifically convenient for the people because transport by ships (*Choun,* 漕運) is available through the river."[49] Lee's Joseon dynasty finally settled in Hanyang, renaming it Hanseong.

The Han River was the core of the dynasty's taxation system. All the grains collected from the country were shipped to Hanseong through the Han River.[50] The role of the river in the transportation system became more significant after a marine accident in 1403. Thirty-four transport ships that had departed from the Gyeongsang Province, the southeastern part of the Korean Peninsula, sank on their voyage through the South Sea and the West Sea to carry grain tax to Hanseong.[51] This accident, resulted in a loss of a ten thousands sok (石) of rice (approximately 1.4 million kilograms) and a thousand people, caused controversy among officials whether the tax-collection route departing from the Gyeongsang province should be through inland to avoid such a risk. The transport course finally changed to use land routes to Chungju from where water transportation to Hanseong along the South Han River was

[49] *T'aejoshillok 6Kwŏn [Taejo Annals Vol. 6]*, August 13, 1394, http://sillok.history.go.kr/id/kaa_10308013_001.
[50] *Sejongshillok 148kwŏn Chiriji Kyŏnggi [Sejong Annals Vol. 148 Geography Gyeonggi]*, 1454.
[51] *T'aejongshillok 5Kwŏn [Taejong Annals Vol. 5]*, May 5, 1403, http://sillok.history.go.kr/id/kca_10305005_001.

available.[52] Compared to sailing in the ocean, inland waterways provided more hospitable and safe transport conditions.[53] Except for some regions where marine routes were much more accessible than the Han River, local officials delivered grains via the inland Han River waterways. Dynasty officials stored grain tax in the national granaries, such as Gaheungchang and Heungwonchang in the South Han River and Soyanggangchang in the North Han River, and send it to the capital city through the river in spring after the frozen river melted.

Rulers of the dynasty maintained the taxation routes of the Han River by establishing an official agency that overlooked water transportation. In 1395, King Taejo established seven branches of *Surojŏnunso* (水路轉運所) along the Han River, waterway transportation stations, placing fifteen ships and thirty rowers at each station.[54] This institution was renamed as *Sucham* (水站) by King Taejong (1367 – 1422) in 1414.[55] Officials of *Sucham* were in charge of supervising the shipping of grain tax collected from all over the country, supporting navigation of transport ships, and removing sediment on the riverside for safe sailing. During the dry season when the river became shallow, the king ordered local government officials to mobilize people and dredge the river, making it navigable.[56] Because transport ship accidents caused serious damage to the dynasty's finance, the dynasty paid close attention to the maintenance of the water transportation system on the Han River. This taxation system drawing on water transportation continued until the late nineteenth century.[57]

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[52] Jeong-hun Han, "Chosŏn Kŏn'gukki Chounch'ejeŭi Chŏngbiwa Kŭ Ŭimi [Maintenance of the Water Transportation System in Early Joseon and Its Meaning]," *Chindanhakpo [The Chin-Tan Society]* 120 (2014): 62.
[53] *T'aejongshillok 5Kwŏn [Taejong Annals Vol. 5],* June 5, 1403, http://sillok.history.go.kr/id/kca_10306005_002.
[54] *T'aejoshillok 7Kwŏn [Taejo Annals Vol. 7]*, January 11, 1395, http://sillok.history.go.kr/id/kaa_10401011_001.
[55] National Institute of Korean History, *Hangung Munhwasa 16: Changshiesŏ Mat'ŭkkaji Kŭnhyŏndae Shijang Kyŏngjeŭi Pyŏnch'ŏn [Modern Korean History 16: From Traditional Market to Mart Transformation of Modern Market Economy]* (Seoul, Korea: Doosan Donga, 2007), 149.
[56] *Sejongshillong 20kwŏn [Sejong Annals Vol. 20]*, April 16, 1423, http://sillok.history.go.kr/id/kda_10504016_006.
[57] Yokeun Jeong, "Choun [Ship Transport]," *Encyclopedia of Korean Culture*, 2017, http://encykorea.aks.ac.kr/Contents/Item/E0052436.

The Han River allowed transporting not only tax grain but all kinds of goods to the dynasty's biggest consumption site, Hanseong. Timber was one of the major commodities that traveled through the North Han River and the South Han River to Hanseong. The capital city demanded a huge amount of wood for building palace architectures, government offices, warships, transport ships, and private houses as well as for fuel. In order to meet this demand, wood was provided from the mountainous forests in the North and South Han River basin. In preparation for constructing the main buildings of the palace, King Taejong ordered to obtain timber from the upstream Han River Basin.

> [I] want to build the *Pon'gung* (the main palace) but I am afraid that it disturbs farming. Give clothes and food to sixty privately hired personnel and have them cut down a thousand trees, tie the trees like rafts, and float down them from *Nangcheon* (Present-day Hwacheon in Gangwon province).[58]

Transportation of timber was managed by an official agency, *Sucham*, but there were also people who made a living by trading timber. King Sejong (1397 – 1450) noted that

> [D]uring the off-farming season, people in the Gangwon province always cut down the forests, make rafts, flow them down, and sell timber at the mouth of the river. … This work is a means for living, but it also benefits the dynasty.

These raft carriers, called *Ttekkun* (*Tte* means a raft while *kkun* corresponds to "ist"), cut down pine and fir trees, high-quality construction materials, from mountains in the North and South Han River basins, such as Inje and Youngwol in the Gangwon province. *Ttekkun* transported logged trees by floating them through the river in a form of rafts. This job was lucrative for low-

[58] *T'aejongshillok 27Kwŏn [Taejong Annals Vol. 27]*, 1414, http://sillok.history.go.kr/id/kca_11406028_004.

class people but dangerous and difficult because they had to pass through rapids in the upstream Han River without damaging the timber.[59]

Products also traveled in the opposite direction, sailing against the stream. Salt, for example, was a valuable commodity transported from salt farms on the west coast to Hanseong and other regions through the Han River.[60] Salt was the essential ingredient in traditional Korean food culture but a precious commodity in the inland areas, and it functioned as money in exchanging goods. Explaining the necessity of building more government transport ships, the ministry of taxation (*戶曹, Hojo)* told King Sejo (1417-1468) that "[B]ecause salt is very rare in the western part of the Gangwon province, … please send salt using transport ships … and exchange [salt] for timber and transport timber to the dockyards to build ships."[61] Another record also indicates that during the Gwanghaegun era (1575-16641), the taxation department acquired timber from Wonju in Gangwon province by exchanging it with salt.[62] These records imply that the Han River was the main channel where commodities were moved to and from Hanseong, the hub of the dynasty's logistics.

As goods moved back and forth, economic activities flourished along the water transportation routes. *Naru* (a dock on the river) was a special focal point of water transportation where people loaded and unloaded cargo. At a *Naru,* roads and waterways were intersected through which people and commodities flowed. *Naru* also provided the only route to cross the

[59] Korea Creative Content Agency, "Araetkang Ttetkil [Lower River Raft Way]," 2006, https://www.culturecontent.com/content/contentView.do?search_div=CP_THE&search_div_id=CP_THE001&cp_code=cp0617&index_id=cp06170543&content_id=cp061705430001&search_left_menu=.
[60] National Institute of Korean History, *Hangung Munhwasa 16: Changshiesŏ Mat'ŭkkaji Kŭnhyŏndae Shijang Kyŏngjeŭi Pyŏnch'ŏn [Modern Korean History 16: From Traditional Market to Mart Transformation of Modern Market Economy],* 159.
[61] "Sejoshillok 27kwŏn [Sejo Annals Vol. 27]," February 30, 1462, http://sillok.history.go.kr/id/kga_10802030_003.
[62] "Kwanghaegunilgi 106Kwŏn [Gwanghaegun Diaries Vol. 106]," 1616, http://sillok.history.go.kr/id/koa_10808005_007.

Han River with a *Narutpae* (ferryboat), until the first bridge was constructed across the Han River in the early twentieth century.[63] Around major *Naru* sites —including *Gwang-Naru, Sambat-Naru, Hangang-Naru, Nodeul-Naru, and Yanghwa-Naru*—villages, towns, and cities were formulated as people gathered, commodities were transported, regional markets occurred, and taverns and inns emerged.[64]

Tradespeople based on the *Naru* areas accumulated wealth as they mediated the movement of goods, services, and people all across the Han River. They emerged as an influential group of merchants since the seventeenth century, called *Kyŏnggangsangin* (Merchants of the Han River in the Seoul area), using on the Han River as their stage.[65] Lee Junghwan (1691-1756), a scholar, thinker, and geographer in late Joseon noted that

> Most of the merchants of the country load cargo on the back of horses because the country is mountainous without a vast field. Therefore, if the journey is long, it has a narrow margin of profit due to the shipping costs. When trading goods, it is less profitable than loading and transporting cargo and property using ships.
>
> In the whole country, the Han River is the biggest and longest one … Hanyang has an advantage as ships that deliver all the goods of the nation through the river in the east and west crowd in.[66]

Merchants made a profit traveling along the Han River that connected cities, villages, granaries, and ports in its basin. These merchants were from lower social classes as in the traditional occupational hierarchy of *Sa-nong-gong-sang* (scholar-officials-peasants-artisans-merchants).[67]

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[63] National Institute of Korean History, *Hangung Munhwasa 16: Changshiesŏ Mat'ŭkkaji Kŭnhyŏndae Shijang Kyŏngjeŭi Pyŏnch'ŏn [Modern Korean History 16: From Traditional Market to Mart Transformation of Modern Market Economy]*, 152.
[64] Seoul Historiography Institute, "Han'gangŭi Ŏjewa Onŭl [The Past and Present of the Han River]" 98.
[65] Ibid. 108-10.
[66] Junghwan Lee, *Taek'ri-Ji*, Pokkŏch'ongnon Saeng-ri [Physiology], 1751.
[67] Kyonghee Han and Gary Lee Downey, *Engineers for Korea* (San Rafael, CA: Morgan & Claypool Publishers, 2014), 17.

However, they dominated the dynasty's economy by transporting tax grain on behalf of the government, collecting local farm rents for *Yangban*, landed gentry in Hanseong, and trading commodities across the country. The role of *Sucham* diminished as tax transportation became privatized, and the class-rich merchants emerged as they accumulated wealth by taking control of the Han River water transport.

The Han River constituted the core of the Joseon dynasty's transportation system, distributing resources, commodities, and human labor. The ruling power incorporated the river into its taxation system and managed transportation through waterways. The flowing Han River was also home for people who made living relying on the transferability of the Han River.

The Artificial Stream

Hanseong benefited from the Han River as it provided water transportation, but water flow also imposed a major challenge to the capital city: flooding. In East Asian ancient history, flood control was considered the primary virtue of rulers. The story of Yü the Great (circa B.C. 2123-2025), a legendary king in ancient China who successfully controlled the floods and relived his people, tells that water control provided the moral and material basis for the establishment of state authority.[68] On the other hand, failure of flood control represented the political and social malfunction that derived from ineffective rule. Rulers of the Joseon dynasty referred to Yü the Great when they legitimized the mobilization of human labor for water management and built their authority through controlling the natural flow of water.

King Taejong conducted the first extensive public work to prevent floods in Hanseong. Since the transfer of the capital, Hanseong suffered several floods during the summer rainy

[68] David Allen Pietz, *The Yellow River: The Problem of Water in Modern China* (Cambridge, MA: Harvard University Press, 2015), 28-31.

season that devastated bridges and inundated roads. In order to prevent floods, Taejong decided to clean and dredge Gaecheon, an eleven-kilometer-long stream that originated from the valleys in the Northern part of Hanseong and ran through the central part of the city before merging into the Han River.[69] Taejong stated that "I have long decided to open the stream waterway because I have worried night and day as the heavy rain swells the stream every year and submerges private houses."[70] Taejong mobilized 52,800 servicemen to dredge Gaecheon, construct a river bank with stones and wood, and build bridges.[71] This construction was arduous work, resulting in the death of sixty-four laborers.

Gaecheon was the human-built environment that required continuous maintenance and repair work in order to function properly as a flood-prevention infrastructure. In spite of extensive maintenance construction during the Taejong period, Hanseong suffered flooding again which inundated seventy-five households and killed people.[72] The successor, King Sejong, had the Ministry of Public Works (工曹, *Kongjo*) maintain the stream and construct artificial waterways to drain the waterlogged capital during the heavy rain.[73] Sejong kept maintaining the stream for more than ten years during the agricultural off-season to prevent flood damage.[74]

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[69] *T'aejongshillok 13Kwŏn [Taejong Annals Vol. 13]*, May 27, 1407; *T'aejongshillok 17Kwŏn [Taejong Annals Vol. 17]*, May 8, 1409; *T'aejongshillok 20Kwŏn [Taejong Annals Vol. 20]*, July 17, 1410; *T'aejongshillok 22Kwŏn [Taejong Annals Vol. 22]*, September 7, 1411. *Kaech'ŏn*'s present name is Cheonggyecheon. The stream had been covered with concrete roads since late 1950, and later it was restored in 2005. See the history of Cheonggyecheon, Chihyung Jeon and Yeonsil Kang, "Restoring and Re-Restoring the Cheonggyecheon: Nature, Technology, and History in Seoul, South Korea," *Environmental History* 24, no. 4 (2019): 736–65.
[70] *T'aejongshillok 22Kwŏn [Taejong Annals Vol. 22],* December (leap month) 1, 1411.
[71] *T'aejongshillok 23Kwŏn [Taejong Annals Vol. 23]*, January 15; February 15, 1412.
[72] *Sejongshillok 12kwŏn [Sejong Annals Vol. 12]*, June 12, 1421.
[73] *Sejongshillok 12kwŏn [Sejong Annals Vol. 12],* July 3, 1421.
[74] Ho Cheol Ryu, "Sahoejŏng Kongganŭrosŏ Ch'ŏnggyech'ŏnŭi Ŭimi Hyŏngsŏnggwa Pyŏnhwa [Meaning Formation and Changes of Cheong-Gye-Cheon as a Social Space]," *Chibangsawa Chibangmunhwa [Journal of Local History and Culture]* 11, no. 1 (2008): 265.

Gaecheon also constituted a sewage system of the capital city as it flushed out the garbage and domestic sewage generated from households to the Han River. A debate between dynasty officials over the function of Gaecheon that occurred during the Sejong period reveals its primary role as a sewer. Lee Seon-ro, a scholar at Jiphyeonjeon (集賢殿, Hall of Worthies), a royal advisory and academic research institute, requested to the King that "Water of Gaecheon should be maintained clear by prohibiting dumping nasty and smelly stuff into it."[75] Lee's appeal was based on P'ungsuhak (風水學, wind-water studies), Korean traditional geomancy that studies the flow and balance of energy on earth to determine the arrangement of buildings harmonized with the natural environment. According to a geomancy theory, Gaecheon was Myŏngdangsu, auspicious water that would bring prosperity to the dynasty; thereby it should be protected from pollution.

However, Eo Hyo-cheom, another scholar at Jiphyeonjeon, refuted Lee Seon-ro's appeal, arguing that Gaecheon was the capital's essential part of the sewage disposal system. He stated that

> In the capital city, people live prosperous lives, and prosperous lives make nasty and smelly stuff accumulate, so the capital would be clean only if flowing streams and wide creeks crisscross in the capital and flush out dirty stuff, which means their water cannot be clean. … It is not feasible to make water in the capital as clean as the mountains.[76]

King Sejong agreed to Eo Hyo-cheom's claim and made Gaecheon be used as a sewer of the capital city. As a consequence of this debate, Sejong reconfirmed that Gaecheon was part of

[75] *Sejongshillok 106kwŏn [Sejong Annals Vol. 106]*, November 19, 1444.
[76] *Sejongshillok 106kwŏn [Sejong Annals Vol. 106]* December 22, 1444.

urban infrastructure that washed out sewage produced from social life in Hanseong to the Han River.

Gaecheon experienced large-scale construction again during the period of King Yeongjo (1694-1776). Since the sixteenth century, the Hanseong area went through deforestation due to the abnormal climate, the growth of the city, and the aftermath of the East Asian War (1592-1598). The deforestation caused erosion from the upstream while sediment accumulated on the downstream bed. As a result, the clogged Gacheon lost its function as the capital's sewage system. Residents near the stream banks said that "[W]hen we were young, we saw that horses passed under the bridge, but now, the bridge and the ground have met at the same level."[77] Hong Bong-han, a scholar-official, argued for dredging Gaecheon, saying "[In] every summer rainy season, all people near the stream prepare for moving, and some people are drowned." The malfunctioned Gaecheon paralyzed the city's drainage system and caused frequent floods.

Moreover, due to the population increase during the seventeenth century, from about 80,000 in 1657 to 190,000 in 1669, sewage flowed to Gaecheon exceeded its capacity. As the city grew, Gaecheon became the dirtiest place in the capital on which not only sediment but domestic waste, night soil, and animal carcasses were piled.[78] Even human dead bodies were found in the streambed. Ordering maintenance of Gaecheon, Youngjo mentioned that "[H]ow I can just see exposed skeleton by sitting silently? If old corpses are found from dirt [of the streambed] during maintenance, wrap them in cloth and bury on the high and clean place."[79] The clogged and polluted stream was trouble for the city.

[77] *Yeongjoshillok 75kwŏn [Yeongjo Annals Vol. 75]*, January 27, 1752.
[78] Hak-ju Hwang, "Chunch'ŏnsashil [Stream Maintenance Report]," *Encyclopedia of Korean Culture*, 1995.
[79] *Yeongjoshillok 95kwŏn [Yeongjo Annals Vol. 95]*, February 27, 1760.

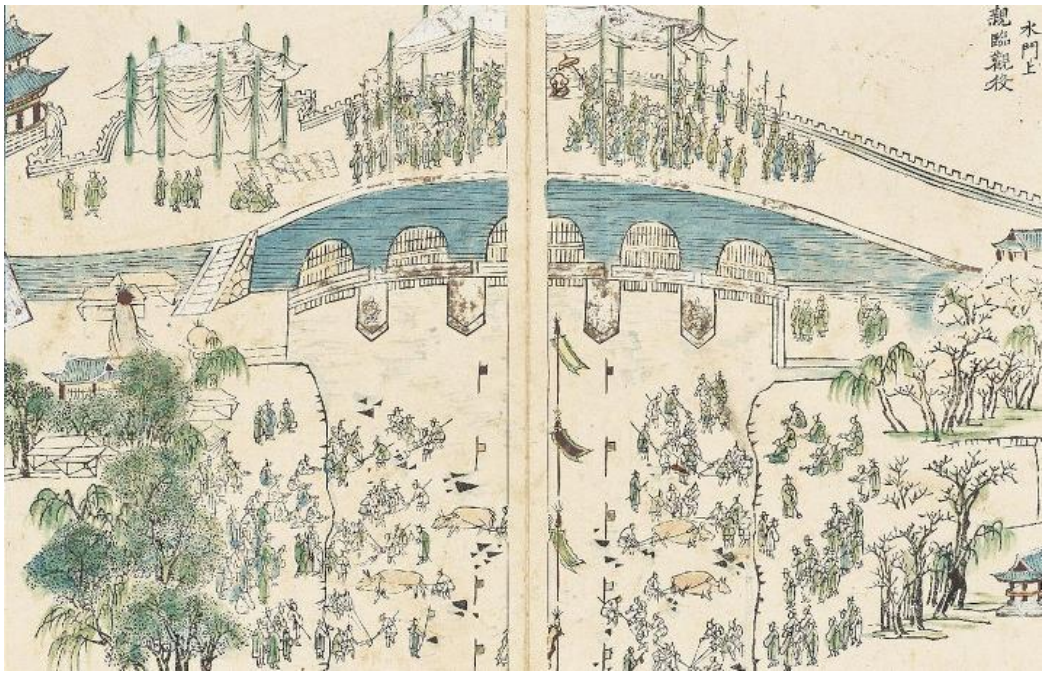
In 1760, Youngjo initiated the large maintenance project by mobilizing 150,000 residents in Hanseong who had public service duty as well as 50,000 paid laborers.[80] Legitimizing the large construction project, Youngjo stated that "Yu the Great of the Xia dynasty managed rivers well … and Yu the Great of the Xia dynasty flourished the country … [This construction], is just, on the one hand, for the country, and on the other hand, for the people."[81] It took two months to dredge the clogged stream, construct a wooden fence, and plant willows along the streamside. In 1773, Youngjo led the stream maintenance construction again, linearizing and widening waterways as well as replacing the wooden fence with a stone embankment.[82] Completing the construction project, Youngjo marked the level of the dredged stream, making it a standard for future maintenance.[83]

[80] Kwang-kweun Cho, "Chosŏnwangjo Chunch'ŏn Kwajŏnge Nat'anan Wimin Tamnonbunsŏk [A Study on the Political Discourses of Joon-Cheon(濬川) for Cheonggyecheon (淸溪川) in Cho-Son Dynasty," *History and Society* 33 (2004): 29.

[81] Hong Gye-hee, *Kukyŏng Chunch'ŏnsashil Chugyojinam [國譯 濬川事實/舟橋指南],* trans. Young-hwan Won (Seoul, Korea: Seoul Historiography Institute, 2001), 6.

[82] Deok-jae et al., *Sŏul Chaehaesa (Sang) [Disasters in Seoul History],* 389-393.

[83] Gye-hee, *Kukyŏng Chunch'ŏnsashil Chugyojinam [濬川事實/舟橋指南]*. 33.



[Figure 2] Gaecheon under maintenance work

(Source: *Chunch'ŏn'gaech'ŏp* [濬川稧帖], 1760)

The massive construction work also maintained the poor community in the city. Because of the inhospitable and unpleasant conditions, the streamside was a living place for lower-class people who could not afford decent housing in the city.[84] Through the maintenance work, Youngjo removed shanty houses and prohibited constructions in the streamside, saying "[Houses near the streamside] clogged Gaecheon and blocked waterway, which brings about flood with a mess of water and soil."[85] He also warned that "If the malady of building houses in Gaecheon occurs, … the officials of Hanseong who leave the construction unattended would be punished by a proper law."[86] Through the Gaecheon maintenance work, Youngjo also maintained the

[84] Jeon and Kang, "Restoring and Re-Restoring the Cheonggyecheon: Nature, Technology, and History in Seoul, South Korea," 740.

[85] Gye-hee, *Kukyŏng Chunch'ŏnsashil Chugyojinam [濬川事實/舟橋指南]*, 33.

[86] Ibid, 34.

residential environment. In a report on stream maintenance, Youngjo told later generations that "[I] am writing this preface not for the present but for the future. If this is considered as temporary public works … how can the country be sustained?" The king's comment reminded us that Gaecheon was part of the urban system, which required continuing maintenance work by human labor to function.

The history of Gaecheon, a tributary of the Han River, epitomizes that people in the Korean peninsula interacted with water flow for a long time. People could never dominate the natural environment as floods kept occurring even after the large maintenance work led by King Youngjo.[87]Nevertheless, the debate over the function of Gaecheon and large construction work on dredging the Gaecheon show that the stream was the human-built environment formulated and maintained through a mission of state-building, the debate over the role of the stream in the dynasty, and ruling society.

Life in the Basin

People in the Han River basin outside of the capital also struggled to tame the stream of water in their favor. In Joseon Dynasty, with its predominantly agricultural economy, water control was one of the vital tasks for expanding arable areas and increasing productivity. Especially for farming wet-rice crops, the dominant grain products of the dynasty, the irrigation system was necessary to provide regular water supply in paddy fields.

However, the climate condition in Korea was inhospitable to rice cultivation. The Korean peninsula had enough precipitation, from 900 mm to 1,500 mm annually, but it was concentrated

[87] Hyeon Jun Kim, "Chosŏnsidae Ch'ŏnggyech'ŏnŭi Hongsuwa Hach'ŏnjŏngbi Yŏn'gu [A Study on Flood and River Maintenance of Cheonggye-Cheon Stream in the Josun Dynasty]," *The Korea Water Resources Association 2006 Conference*, 2006, 211.

in summer whereas the land suffered from dry between March and May of the lunar calendar. The lack of water in spring, when a stable water supply was essential for planting rice, significantly threatened the dynasty's agricultural economy. Due to the irregular precipitation pattern, drought was the most severe natural disaster in Korea as much as flooding.

In order to reduce the risk of flood and drought, Joseon Dynasty officials and farmers constructed barrages and weirs to control the Han river and its tributaries. From early Joseon, local officials supervised the construction and maintenance of irrigation infrastructure. One major infrastructure was *Cheŏn (堤堰)*, an artificial reservoir in a valley where rainfall and stream water were contained to be used for agricultural water. In 1395, three years after the establishment of the dynasty, the government created the standard form of *Cheŏn* that consisted of the bank as well as a masonry waterway to use the contained water.[88] In the late seventeenth century, *Cheŏn* was built at almost every possible location, and the institute emphasized the maintenance and management of the existing irrigation system.[89]

Another important water control artifact was *Ch'ŏnbang (川防)*, a sort of weir designed to secure irrigation water and protect farming lands from floods. *Ch'ŏnbang* was constructed across a small stream or a river to block water flow; thus, protecting farming fields from inundation and providing water to farmland through an artificial waterway.[90] *Ch'ŏnbang* was promoted by the government on a nationwide scale. For example, King Munjong (1414-1452) ordered officials to encourage the construction of *Ch'ŏnbang*.

[88] Jeongsup Yeom, "Chung·kŭnseŭi Nongbŏpkwa Surisisŏl [The Agricultural Techniques and Irrigation Facilities in the Medieval Age · Early Modern Age]," *Chunganggogoyŏn'gu* 10 (2012): 124.
[89] Joong-Yang Moon, *Chosŏnhugi Surihakkwa Suridamnon [Hydraulics and Hydraulic Discourse in Late Joseon]* (Seoul, Korea: Jipmoondang, 2000).
[90] Yeom, "Chung·kŭnseŭi Nongbŏpkwa Surisisŏl [The Agricultural Techniques and Irrigation Facilities in the Medieval Age · Early Modern Age]", 126.

> *Ch'ŏnbang* is the best followed by *Cheŏn* because *Ch'ŏnbang* has plenty of profit with less amount of work as it draws on the natural flow of water. … I heard that several villages have many potential places for building *Ch'ŏnbang*, so you investigate and report if they use the benefit of water.[91]

In the eighteenth century, *Ch'ŏnbang* became the dominant irrigation structure. The paddy fields watered by *Ch'ŏnbang* infrastructure, called *Pojŏn* (洑田), were marked as the highest grade farmland.

These irrigation structures required persistent maintenance work.[92] If a structure was destroyed by flooding, it needed to be reconstructed. Farmers were mobilized to eliminate sediments accumulated within the bed of infrastructure. Local officials monitored irrigation infrastructure to check if a structure was solid or if people illegally appropriated irrigation water. Later, the official institute, *Cheŏnsa*, was established to inspect if local governors properly managed the operation of the irrigation system and punish people who caused the malfunction of the irrigation system.

Along the Han River, more than a hundred *Cheŏn* and *Ch'ŏnbang* consisted part of the riverine environment in the late nineteenth century.[93] The vastest plain in the downstream Han River, Gimpo flood plain, had forty-four weirs. The breadbasket of the South Han River basin, including Yeoju and Icheon, drew on more than ten irrigation structures for rice farming. The Han River basin was the human-built environment constructed by interactions of the natural environment and human labor, which consisted of farmland, irrigation infrastructure, and living space of humans who constructed and maintained the environment.

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[91] *Munjongsillok 4Kwŏn [Munjong Annals Vol. 4]*, 1450.

[92] Seoul Historiography Institute, *Sŏul Chaehaesa [Disasters in Seoul History],* 293.

[93] Suhwan Jung, "『朝鮮地誌資料』e Nat'anan Kyŏnggido Surisisŏrŭi Hyŏnhwanggwa t'ŭkching [State and Characteristics of Gyeonggi Province Irrigation Facilities in Joseon Jijijaryo: The Case of Reservoir and Dam]," *Yŏksawasirhak* 39 (2009): 154-155.

Of course, however, nature was never under control. Throughout the five hundred years of history, people in the dynasty continued to suffer from floods and droughts. In *Chosŏnwangjoshillok*—the Veritable Records of the Joseon Dynasty (1392-1910) spanned from the first king Taejo (1335-1408) to the last emperor of the Korean Empire Sunjong (1874-1926)—211 cases of floods were reported (flood referred to 大水 or 洪水).[94] For example, in 1467, the Han River flooded due to heavy rain with 30 cheok (1 cheok = 20.81 cm) of water level from the land, so government officials evacuated people near the riverside.[95] The word drought (害) can be found more often from the Veritable Records as it was used more than 3,000 times.[96] More close examination is necessary to investigate each case, but the numbers of records at least show that the two types of disaster related to water management were the concern for the dynasty as King Sejong mentioned "Because flood and drought are matters of heaven while plowing and sowing are matters of human, we should wait for the time and do our job."[97] Because both flood and drought severely impacted the dynasty's economy, the government elites paid significant attention to water control.

The human-built environment of the Han River basin in the late nineteenth century Joseon was depicted by Isabella Lucy Bird who traveled South Korea four times between 1894 and 1897. Bird was a British explorer and the first woman elected as a fellow of the Royal Geographical Society. She recorded what she experienced and learned from her travel to several Asian countries, including Japan, China, Vietnam, Singapore, Malaya, and Korea. After a series

[94] Han River Flood Control Office, "Ŭlch'ungnyŏn(1925nyŏn) Taehongsuŭi p'yŏngga Min Hongsugirong Pogwŏn Yŏn'gu [Study on the Evaluation of the Great Flood in 1925 and Restoration of Flood Records]," 2012, 22.
[95] Hyeon Jun Kim, "Chosŏnshidae Hongsu Kirong Chosa [Study on the Records of Flood during the Joseon Dynasty]," 1999, 30.
[96] Hyeon Jun Kim, "Chosŏnsidae Kamum Kirok Chosa [Study on the Records of Drought during the Joseon Dynasty]," 2001, 3.
[97] Ibid, 1.

of trips to Korea, she wrote a travelogue, *Korea and Her Neighbor*, a record of geographical features and social life of the nation.[98] The vivid portrayal of late Joseon by a stranger's eyes provides a valuable lens through which to look into the times.

Bird spend five weeks on a sampan along the Han river from Seoul to the North Han River region.[99] Throughout this long and adventurous travel, she observed the landscape and life in the Han River basin. When she departed from Seoul sailing toward the upstream Han River, she first recognized that the river was the center of the dynasty's economy.

> [T]he Han, … is the great artery of communication for much of Kong-wön-Do [Gangwon Province] and Kyöng-Kivi Do [Gyeonggi Province], and for the north-east portion of Chung-Chöng Do [Chungcheong Province]; down it all the excess produce of this great region goes to Seoul, and nearly all merchandise, salt, and foreign goods come up it from the sea-board, to pass into the hands of the *posang*, or merchant pedlars, at various points, and through them to reach the market-places of the interior. … There is a very large floating population on the Han.[100]

The Han River was still the most important transport route for the flow of goods in the late nineteenth century. She observed about 75 ships sailing up or down the river every day.[101] Many people made a living by working for waterway transportation and trading markets opened along the river. As she traveled out from Seoul, she observed the extensive farmland in the riversides.

> Not having been able to learn anything about the route or any of its features, I was much surprised to find a very large population, not only along the river, but in the parallel valleys, many of them of great length and extreme fertility, in its neighborhood. … Along the river banks only, between Han Kang [River] and Yöng-Chhun, there are 176 villages. … There is on the whole an air of greater

[98] Isabella Bird Bishop, *Korea and Her Neighbors : A Narrative of Travel, with an Account of the Recent Vicissitudes and Present Position of the Country* (New York, NY: Revell, 1898).
[99] Ibid, 68.
[100] Ibid, 75.
[101] Ibid.

ease and prosperity about the Han valley than about any other region that I have seen in Korea.[102]

There, and in most parts of the Han valley, I was much surprised with neatness of the cultivation. … As a general rule the stones were carefully picked off the land and were used for retaining walls for the rice terraces, or piled in heaps. … All the parallel valleys are neatly and carefully cultivated. … Every valley has its streamlet, and is barred across by dykes of mud from its head down to the Han.[103]

[Figure 3] Isabella Bird's Sampan

(Source: *Korean and her Neighbors,* 1898)

Her description might sound like the romanticized scenery, but it confirms that the Han riverine environment was the outcome of incessant interaction between human labor and natural forces. The well-organized and fruitful arable land Bird observed was produced by human endeavors to control natural flow. Despite these efforts to tame the river, people in the dynasty continued to

[102] Ibid, 75-76.
[103] Ibid, 100-101.

suffer from floods and droughts throughout the five hundred years of history. The riverscape inscribed human efforts to utilize the river in their favor, tame unruly water flows, and rebuild the human environment continually disordered by disasters.

Conclusion

People in the Korean Peninsula have long interacted with the riverine environment. Particularly during the Joseon Dynasty, rivers were an essential part of the national economic system. The Han River provided water routes for taxation as well as distribution of logistics across the nation. The dynasty tried to control and maintain the river waterways because water transportation was the backbone of the economy. As goods flew back and forth through the river, economic activities flourished and villages were formulated along with the riparian areas. Taming stream flow to prevent floods and utilize water for agriculture was another significant task that required the authorities to mobilize resources and labor to construct structures. Rivers constituted the human-built environment that staged social and economic life in Korea.

Rivers constituted the human built environment where people tried to tame river flow in their favor. River control was about reasserting state authority as well as making living in and around river basins although water flow was never completely under control. Rivers were the place where powers attempted to impose their control over both the natural and social environment. Thus, it is not surprising that Japanese colonizers invested a great deal of resources to dominate the riverine environment as we will examine in the next chapter.

Chapter 2 Colonizing Korean Rivers

The Han River went through a physical and conceptual transformation as Japan occupied the Korean peninsula. When Japan colonized Korea in 1910, ending the long-lasting rule of the Joseon Dynasty (1392-1897) and the Korean Empire (1897-1910) shortly followed thereafter, colonizers targeted rivers to build the material and moral basis of their colonial rule. The Japanese colonial government claimed that the lack of river management at the hands of irresponsible Korean regimes had harmed Korean society. Emulating the classical East Asian story of Yü the Great in which water management was the barometer to evaluate a reign of the country, colonizers condemned past Korean rulers for their failure of river management and irresponsibility.

The Japanese colonial government aimed to legitimize its rule over Korean rivers as well as society with an extensive river survey project. Conducted over thirteen years, the survey produced a huge amount of hydrological data concerning water level, precipitation, and stream flow. These numerical data helped replace colonial intervention in river basins with "rational" river management, although the survey entailed haphazard observation practices and speculative calculations. The quantified representation of rivers was a means through which to rule over rivers and lives in colonial Korea.

The discordance between the proclaimed rational river management based on data and the real-world was revealed by recurring floods. However, colonial government interpreted floods more as natural disasters, not as the failure of colonial river management, and utilized disasters to rebuild social arrangements.

Measuring Rivers

Colonial officials of the Government-General of Korea legitimized their intervention in the colonial environment by arguing that rivers in Korea had been totally neglected. The colonial government announced that their new policies would root out regular floods that had harassed Korean people for generations, unlike past Korean leaders who failed to control water and abandoned their responsibility.[104] Honma Takayoshi (本間 孝義, 1885-1972), a state civil engineer who had engaged in colonial river management since 1913, stated that Korean rivers were in the "natural" status "untouched by human."[105] The Bureau of Civil Engineering with which Honma was affiliated claimed that "every flood eroded soil, the land was underdeveloped, and rivers were not properly used" due to the longtime disregard of river management in Korea. State engineers of the bureau argued that Korean rivers needed to be structured.

> [In Joseon], It is hard to find any traces of dike constructed under a systematic policy for water control. For some cases of embankments along a river, the structure was constructed without an arrangement plan. It is too shoddy to prevent floods and even causes disturbance of river flow. Weirs were also constructed without considering water use, so it has played no small part in causing the devastation of rivers.[106]

Japanese colonial bureaucrats differentiated their river management from the former measures with the nationwide river survey project that began in 1915. The river survey team, created under the Bureau of Civil Engineering of the Government-General Secretariat, investigated the thirteen

[104] Maeilshinbo, "Ch'isanch'isuŭi Kŭmmu [The Most Urgent Task of Soil Proection and Water Regulation]," May 10, 1912.
[105] Takayoshi Honma, "Kasen Chōsa Ni Shū Te [Beginning the River Survey]," *Chōsen Oyo Manshū* 151 (1920): 31–32.
[106] Government-General of Korea, "Chosŏnŭi Hach'ŏn [Rivers of Joseon]" (Seoul, Korea, 1923), 2.

major rivers in Korea. Considering that the first year's revenue of the team was 40,000 yen whereas previously approximately 30,000 yen had been annually allocated to cover all the civil engineering surveys, including road and port construction, the Government-General invested a significant amount of resources in the river survey. The survey team began with one high-ranking engineer (*Gishu*, 技師) and five assistant engineers (*Gishi*, 技手), but after four years, it expanded to the team of three high-ranking engineers and twenty assistant engineers with increased annual budget of 150,000~160,000 yen.[107]

The river survey aimed to measure the hydrological characteristics of rivers and draw river maps to establish a river management plan. Specifically, the survey team closely studied the water flow changes of each river to properly design flood prevention structures. Water flow could be directly measured by a group of trained engineers and technical workers with a hydrometer, but it was impossible to dispatch a measurement team to each river all around the country on a regular basis. While still directly measuring water flow at several points of the rivers, technical officials mostly relied on indirect computational methods using precipitation and water level data that they could easily acquire from water gauging stations. In order to gather data for tracking water flow, the survey team took over water level stations from the Bureau of Communications, which were established to study Korea's hydropower potential between 1911 and 1941.[108] In terms of precipitation data, the survey team cooperated with the Meteorological Observatory of the Government-General.[109] Installing more gauges at appropriate points, the team consequently gathered measurement records from 206 rainfall stations and 186 water level

[107] Government-General of Korea, "Chosŏnhach'ŏnjosasŏ [Survey of the Rivers in Chosŏn]" (Seoul, Korea, 1929), 25.
[108] Ibid, 145.
[109] Ibid, 99.

stations across the nation throughout the first survey projects that spanned from 1915 to 1928.[110] The numerical data produced from the survey project became a means to rationalize colonial control over rivers. Colonial officials declared that the data would lead to the systematic management of rivers that contrasted with the shoddy water management of the past.

[Figure 4] Water Level Gauge

(Source: Chosŏnhach'ŏnjosasŏ [Survey of the Rivers in Chosŏn], 1929)

However, unlike colonial officials' self-acclamation of their river management as "rational measures," the process of collecting hydrologic data involved unstable and imprecise practices

[110] Ibid, 26.

conducted by ordinary people on a daily basis. The operation of water gauges required personnel who read a watermark and reported the results every day. Because survey team members could not cover all the water gauge stations in major rivers across the nation, they hired nearby Korean residents. Hired residents were paid 3 to 10 yen monthly, and in return, they reported water level every day at 8 a. m. If water level exceeded a designated threshold, observers had to report the water level every hour to monitor the possibility of floods.[111]

This measurement practice necessitated negotiations with different institutions, people, and the natural environment. The survey team requested local police officers to supervise hired Korean observers and report the records to the office in order to secure the quality of data. From time to time, survey engineers had to rely on guesswork and hearsay coming from local residents to complete the data set in case measurement was not possible due to floods.[112] Even when observers could reach a water-level meter, observation activities depended on every observer's assessment of each situation. For example, when a river was frozen during winter, observers had to determine how much ice around a watermark they needed to break to properly measure a water level.[113]

These daily measurements with makeshift practices generated reams of hydrological data on rivers in Korea, and state engineers collected these data to establish a river management plan. These hydrological data constituted a basis for the authority of colonial resource management.

Hydrological Center of Calculation

[111] Government-General of Korea, "Chosŏnhach'ŏnjosasŏ [Survey of the Rivers in Chosŏn]," 146.
[112] Aaron S. Moore, *Constructing East Asia: Technology, Ideology, and Empire in Japan's Wartime Era, 1931-1945* (Stanford, CA: Stanford University Press, 2013), 157.
[113] Government-General of Korea, "Chosŏnhach'ŏnjosasŏ [Survey of the Rivers in Chosŏn]," 677-678.

The acquired data from water gauging stations were mostly rainfall and water level records, while predicting floods required tracking real-time changes of stream flow. The challenge for state engineers was thus to derive stream flow from rainfall and water level data with some degree of speculative estimation. This problem was solved by Kajiyama Asajiro (1891-1960), a junior official in the Bureau of Civil Engineering. Kajiyama started his career as a civil engineer in the Government-General of Korea in 1913 after his graduation from Kōgyokusha Technical Highschool (Kōgyokusha Kougakkō) in Tokyo where he learned hydraulics. As an assistant engineer in the Bureau of Civil Engineering, Kajiyama participated in the river surveys until he moved to Joseon Land Improvement Company (Chōsen Tochi-Kairyō) in 1929.

Based on his extensive experience in the Korean river survey projects, Kajiyama made a mathematical formula for calculating streamflow with precipitation data. He derived the relational function between water flow and rainfall by using data gathered from twenty-five water measurement points in which both forms of data were available. Kajiyama devised his formula to be calibrated with a coefficient and constant according to the specific local conditions. This adjustment was an effort to best estimate stream flow from rainfall data at different locations.

Kajiyama's formula was at the core of constructing a colonial administrative office as the "centre of calculation" where experts produced knowledge by building upon resources gathered from other places.[114] His formula allowed state engineers to easily compute river flow without necessarily visiting every river and directly measuring stream flow with a hydrometer. Thanks to local residents who read rainfall marks every day and police officers who reported data via

[114] Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge, MA: Harvard University Press, 1987).

telegraph, state engineers could track stream flow of rivers across the nation from their office. As far as river measurement infrastructure—including rainfall and water level gauges, local people, police officers, and a telegraph network—operated without any malfunction, technical officials could always represent each stream's flow on a hydrological map with Kajiyama's formula. While the accuracy of Kajiyana's formula was not always guaranteed, it proved convenient to use to estimate stream flow with rainfall data.[115] Japanese colonial officials announced this data-based river management as a rational measure while concealing all the haphazard practices inevitable entailed throughout the data-gathering and data-interpreting processes. Completing the survey, Ikuta Seizaburo (生田 清三郎,1884-1953), a Chief of the Home Affairs Bureau, mentioned that

> [Korean rivers] have impeded the stabilization of the public sentiment and industrial development as they have often flooded. Nevertheless, due to a lack of a basic survey, it has been hard to come up with emergent actions as well as foundational measures. Now I am deeply grateful as this survey is illuminating the nature of major rivers like a lamp in the night.[116]

The data-oriented river management constituted the "techno-politics" with which Japanese technical officials could manage colonized Korea.[117] Under the banner of rational river management, the Government-General prohibited any unsanctioned activities in the riverine environment. In 1914, the colonial government announced "Hach'ŏnch'wich'egyuch'ik (River Regulation Rule)," which tried to restrain hands-on practices that might transform the status of

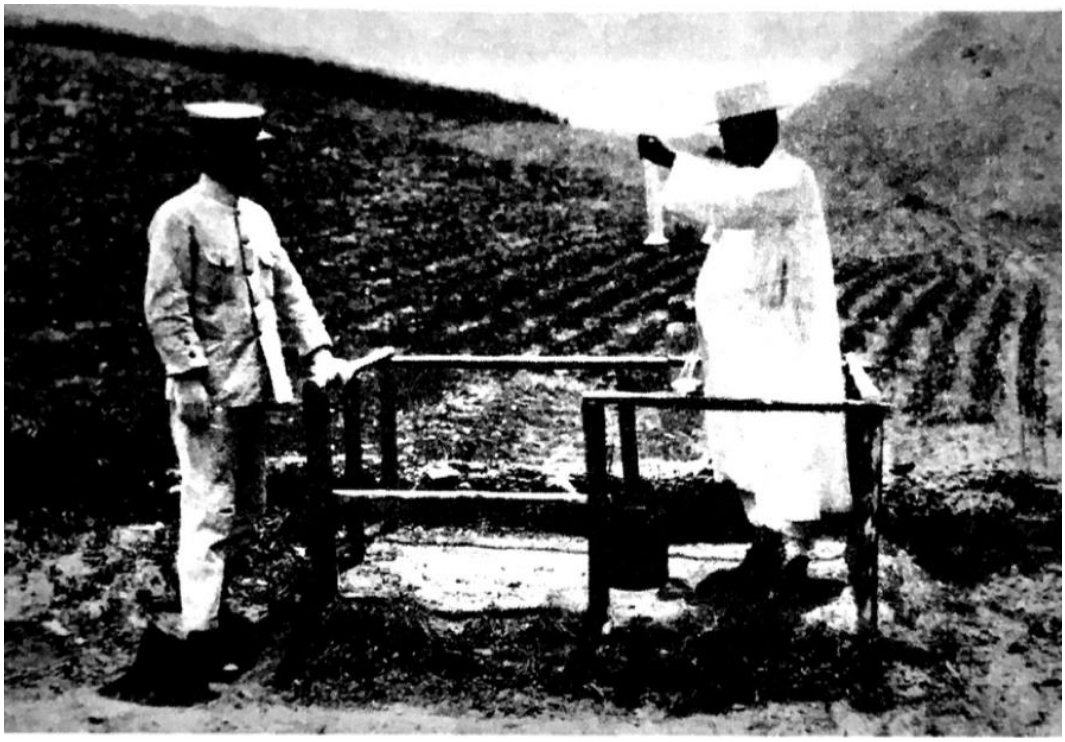
[115] Youngha Hong, "Chŏsuji Yuhyojŏsuyongnyang Kyŏlchŏnge Issŏsŏ Kajiyamaŭi Wŏlbyŏryuch'ulgogongshik Sayongŭi Munjejŏm Chegi [Problem of Using Kajiyama's Monthly Depth of Runoff Formula in Determining Water Storage Capacity of a Reservoir]," *Han'guksujawŏnhak'oe Nonmunjip [Journal of Korea Water Resources Association]* 16, no. 1 (1983): 30–35.
[116] Government-General of Korea, *Chosŏnhach'ŏnjosasŏ (1929nyŏn) [Survey of the Rivers in Chosŏn (1929)]* (Gwacheon, Korea: Kukt'ohaeyangbu [Ministry of Land, Transport and Maritime Affairs], 2010), vii.
[117] Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity*.

the rivers under the survey.[118] Under this rule, levees built without due notice were deconstructed, and police officials penalized people who gathered sand and gravel on a river without official permission.[119]

As the river survey came to the completion, the colonial government enacted "Chosŏnhach'ŏllyŏng (Joseon River Order)" in 1927, which made major rivers under state ownership and allowed only authorized people to manipulate rivers.[120] This stipulation of river management assured that only colonial technocratic officials armed with survey data had the exclusive authority to manipulate rivers. Improvising activities on rivers by local residents to control river flow for agriculture or flood prevention were regarded as faulty. River survey not only characterized physical and hydrological characteristics of Korean rivers, but it also allowed technical officials to manage the social and environmental arrangements in colonial Korea.

The extensive data activities on Korean rivers achieved through improvisations, negotiations, and compromises allowed colonial officials to establish the authority to dominate Korean rivers. The colonial government aspired to rule over rivers as well as Korean society while hiding its colonial intervention under numerical data. On the ground, however, nothing could be completely under control according to the bureaucratic scheme due to unruly floods.

[118] Tae-woo Ko, "Chosŏnch'ongdokpu t'omokhaengjŏnggwa t'omokkwallyoŭi Chosŏn'gaebal Insik [Civil Administration and the Development of Joseon by the Japanese Government-General of Korea]," *Yŏksawagyŏnggye [History & the Boundaries]* 97 (2015): 281.
[119] Donga Ilbo, "Yŏksŏkch'ech'wirojaep'an [Collecting Gravel and Rock Resulted in a Trial]," July 25, 1922; Donga Ilbo, "Ansŏngjebangmunjehaegyŏl [The Problem of An-Seong Levees Solved]," October 18, 1923.
[120] Donga Ilbo, "Chosŏnhach'ŏllyŏng Irwŏrisibiilgomgp'o [Joseon River Order Announced on January 22]," January 22, 1927.



[Figure 5] Reading a Rainfall Gauge

(Source: *Chosŏn Suryŏk Chosasŏ Ch'ongnon (1930nyŏn)* [Collection of Chosŏn Hydropower Survey (1930)], 1930*)*

The Great Floods

In spite of Japanese colonial government's efforts to improve river management, the Korean peninsula kept suffering from floods. In the summer of 1920, due to heavy rain that struck the nation, the Han River flooded the colonial capital Gyeongseong (京城府, present Seoul). The floods turned riverside areas along with the Han River, including Yongsan-gu, into ruins.

> Heavy rain, suddenly started from August first at 3 am, does not know when to stop and steadily pours down. From 12 pm, floods occur from the outskirt of Gyeongseong. … Red waves from the Han River fiercely and ceaselessly sweep down Ichon-dong, which has not been recovered yet from the previous devastating flood ravages. On the one hand, the flood invades Wonjeong and

> Yeongjeong [Administrative districts in Yongsan-gu], and on the other hand, it reaches in front of the Yongsan Post Office, passing through the Official Residence of Railroad and the Yongsan Station. This flood is fiercer, no way less significant form, than the past flood that being said the greatest flood in fifty years.[121]

As a countermeasure to destructive floods,technical officials contrived a flood warning system for Gyeongseong, especially in the Yongsan area. Flood damage in Yongsan-gu received a spotlight because the region was the emerging center of Japanese settlers. Yongsan was becoming the new homeland for Japanese military camps, railroad facilities, and the increasing number of Japanese people.[122] Flooding in Yongsan thus meant paralysis of colonial military power and traffic as well as property damage for Japanese settlers. To protect this Yongsan area, colonial officials put lots of resources in flood prevention measures.

Colonial technical officials designed the flood forecasting system by drawing on water-level records at a certain point in the upstream Han River as an indicator for flood warning in downstream Yongsan. Kajiyama, as a leading expert of this project, examined which water level gauge, among eighteen established in the Han River basin, would provide the most effective data for predicting flood flow in Yongsan.[123] The first candidate was the gauge in the Goan, a point after the North Han River is merged into the mainstream Han River. Goan was an ideal measurement point because no major stream joined thereafter, so calculating flood flow in Yongsan with water level records gathered

[121] Donga Ilbo, "Ch'amdamhan Yŏn'gangbangmyŏn [Horrendous Riverside]," August 3, 1920.
[122] Todd A Henry, *Assimilating Seoul: Japanese Rule and the Politics of Public Space in Colonial Korea, 1910–1945* (Berkeley, CA: University of California Press, 2016), 31.
[123] Kajiyama Asajiro, "Chosŏn Han'gang Naktonggang Taedonggangŭi Hongsu Yeboe Taehayŏ [On the Method of Flood Prediction Applied to the Korean Rivers, Kan, Daido and Rakuto," *T'omok'ak'oeji [Journal of Japan Society of Civil Engineers]* 14, no. 1 (1928): 77–142 trans. Ministry of Land, Transport, and Maritime Affairs .

from Goan had less variable and less noise. However, Kajiyama had to eliminate Goan from the list because Goan water level gauge was located in the back woods without communication facilities, so measurement records could not be sent to Gyeonseong in real time.[124] Instead, Kajiyama looked further upstream Han River and designated Yeoju in the mainstream Han River and Gapyeong in the North Han River as the two reference points, both 90 kilometers far from Gyeongseong. Because Yeoju and Gapyeong had police offices, post offices, and county offices, state engineers in Gyeongseon could conveniently receive water level data through those facilities.[125]

The making of the flood forecasting system was to establish infrastructure for the purpose of estimating flood flow in the Yongsan area in the most efficient way. Compared to referencing water level data from Goan, calculating flood flow based on data from Yeoju and Gapyeong was more complicated because state engineers had to consider more variables, such as rainfall in the river basin between those two points and Gyeongseong. Nevertheless, Kajiyama and colonial technical officials decided to predict floods drawing on water level data gained from Yeoju and Gapyeong to take advantage of existing communication infrastructure. To this extent, river management was not just an effort to more correctly understand hydrological characteristics of Korean rivers, but also an effort to efficiently deploy artifacts and people with a purpose. In this case, the aim was to predict floods for the colonial capital especially the Yongsan area.

Despite these measures, the great *Eulchuk* floods, one of the most disastrous flood events in Korean history, devastated the Korean peninsula. The four massive floods,

[124] Ibid, 28
[125] Ibid.

caused by heavy rain and typhoons, hit Korea from July to September, killing more than six hundred people and destroying tens of thousands of houses.[126] The total sum of damage was estimated at a hundred million won, which was comparable to 58% of the colonial government's annual budget.[127] The Han River basin, including Gyeonseong, had severe damage from these floods as well; 404 people died. The devastating *Eulchuk* floods were transformed the Han riverscape, and even the mainstream flow around Jamsil Island shifted from the Southern Sonpa River to the Northern Sincheon River by the floods.[128] The tragic scenes were captured by news reporters.

> The great flood around the Gyeonseong area was an unprecedent disaster. The railroad bridge was drifted away, river banks were broken, countless lives and properties were taken away. … The terrible scenes were indescribably miserable and truly horrendous. Poor children were flown away, beloved wife was drowned, people died in the pursuit of their duties, several people of a family were swept away by muddy stream while screaming for help, a group of people were dying brutally. It was tragic. … Every person cannot help shedding a tear of sympathy when hearing this situation.[129]

The flood forecasting system established in the Han River basin failed to prevent the Eulchuk Floods. At the core of flood forecasting, hired local personnel were supposed to check water marks every day at 8 am, and if water level exceeded a threshold, 4 meters for Gapyeong and 3.5 meters for Yeoju, they had to record water marks every hour to monitor the possibility of

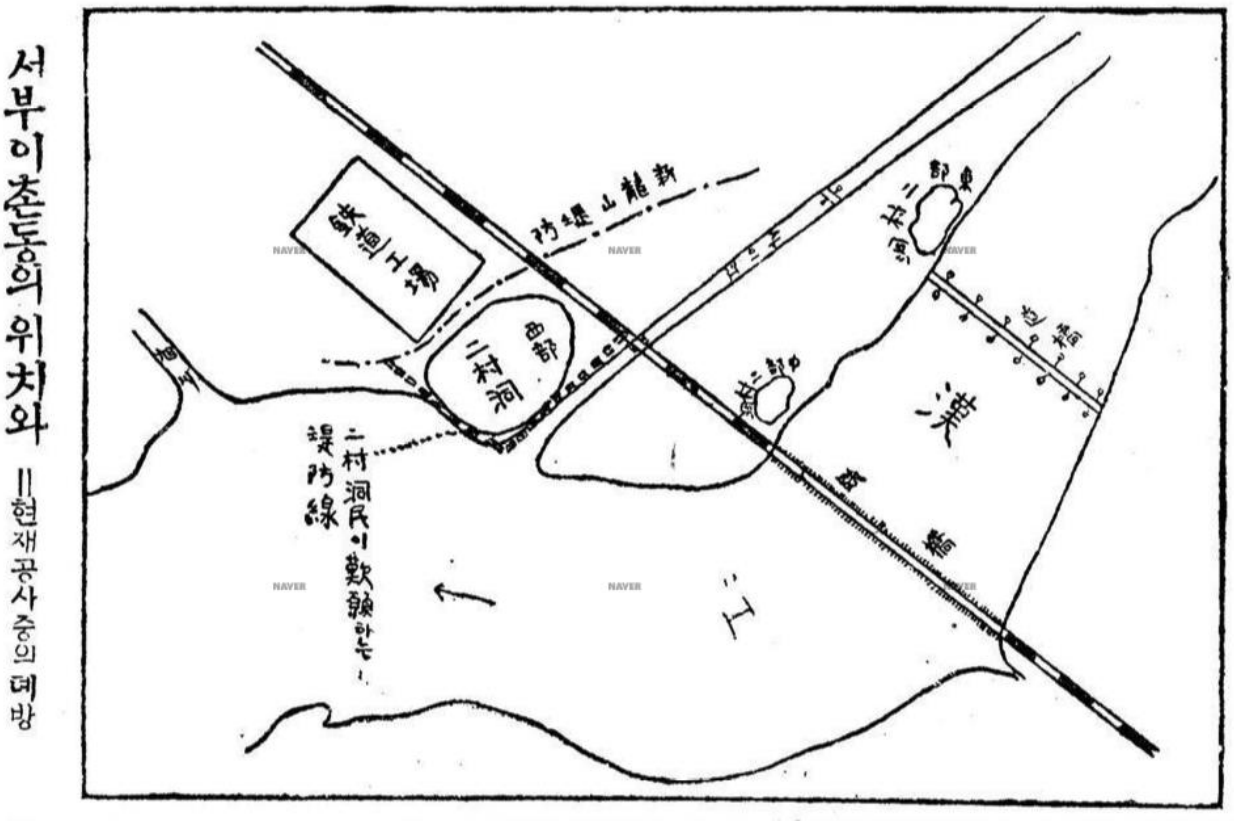
[126] National Archives of Korea, "Ŭlch'ungnyŏn Taehongsu [Eulchuk Great Floods]," 2007.
[127] Ibid.
[128] Sincheon means "new stream." Jamsil Island later became a part of Gangnam, the south of the river, after the Jamsil District Public Waters Reclamation Projects completed in 1977 and 1978.
[129] Kento Nakamura, *Kyŏngsŏngbugŭn Suhaeshirhwanggi (1925nyŏn) [The Actual Scene of Flood Damage near Kyŏngsŏng (1925)]*, trans. Kukt'ohaeyangbu [Ministry of Land, Transport and Maritime Affairs] (Paju, Korea: Cheongmungag, 2012), xix.

floods.[130] The Yongsan Police Office was responsible for receiving water level data from Gapyeong and Yeoju via telegraph or telephone and announcing flood warning to people in Gyeongseong.[131] However, this system failed to predict *Eulchuk* floods because harsh weather destroyed the communication network between Gyeongseong and the upstream water level measurement points.[132] A malfunction of communication infrastructure in Gyeongseong made it impossible for technical officials to have the water-level data which they needed to predict flood flow in the Yongsan area. The failure of flood prediction hampered early measures and expanded damage.

Flood defense facilities also failed to work. After the flood occurred in 1920, the Government-General built the river bank to protect the Yongsan area. The colonial government designed the river bank to protect railroad facilities but excluded Ichon-dong, a residential area of mostly Korean people, on the pretext of budget limitation.[133] More essentially, the Government-General refused to embank Ichon-dong because colonial officials intended to ultimately evict residents from the area, which they perceived as a hotbed of infectious disease.[134] Ichon-dong, vulnerable to floods and without water supply facilities, was a home for many Korean urban poor who sought for low-skill jobs in developing Yongsan. Residents protested against the colonial government, claiming the construction of levees for Ichon-dong,

[130] Asajiro, "Chosŏn Han'gang Naktonggang Taedonggangŭi Hongsu Yeboe Taehayŏ [On the Method of Flood Prediction Applied to the Korean Rivers, Kan, Daido and Rakuto]," 45.
[131] Ibid.
[132] Ibid, 47-48.
[133] Donga Ilbo, "Ich'ondongminŭi Saengmyŏngbojangbinŭn Ilmanobaegwŏnimyŏn Chok'ada [Ten Thousand and Five Hundred Won Is Enough for the Cost of Life Guarantee for Ichondong Residents]," July 27, 1923.
[134] Tae-woong Kim, "1925nyŏn Ilcheŭi Kyŏngsŏngbu Ich'ondong Suhaedaech'aekkwa Toshigaebal Kusang [Imperial Japan's Flood Countermeasure of Ichon-Dong, Seoul and Plan for Urban Development in 1925]," *Yŏksayŏn'gu [The Journal of History]* 33 (2017): 102-103; 106.

but the colonial government was reluctant to comply with the request.[135] Finally in 1925, Ichon-dong was devastated by a series of floods. One news article reported that more than 800 households, all occupied by Korean residents, were inundated.[136]



[Figure 6] Embankment Map of the Yongsan Area

(Source: Donga Ilbo, July 27, 1923)

The embankment established to protect the Yongsan area also failed. The embarkment in Yongsan, believed as an impregnable fortress, was demolished by the *Eulchuk* floods, inundating the whole Yongsan area.

[135] Young-mi Kim, "Ilcheshigi Kyŏngsŏngich'ondongmindŭrŭi Suhaedaech'aegundonggwa Chiyŏkchŏngch'i [The Embankment Construction Movement and Local Politics of Ichon-Dong, Seoul during the Japanese Occupation Period]," *Toshiyŏksamunhwa [The Journal of City History and Culture]* 5 (2006): 129-130.
[136] Donga Ilbo, "Ch'amdamhan Yŏn'gangbangmyŏn [Horrendous Riverside]."

A series of floods revealed that colonial river management was not merely a rational measure to better identify physical characteristics of Korean rivers. It was rather a process of negotiating with social and technological arrangements towards a certain goal. Colonial officials prioritized to construct the flood forecasting system for Yongsan relying on the existing communication infrastructure. Colonial officials also built the river bank prioritizing to protect colonial key facilities and settlers in power while excluding the urban poor who were priced out to the vulnerable areas. Undoubtedly, flooding was not just a natural disaster but also a failure of the colonial river management system.

Conclusion

When Japanese settlers colonized Korea, they also intervened in rivers. Japanese technical officials rationalized their rule over Korean rivers with extensive hydrologic data that they collected from hundreds of water gauging stations in rivers across the peninsula. The numerical data let colonial officials replace colonial intervention with "rational" management. This data-based river management was informed by the of haphazard practices of local Koreans who read the markings on a daily basis and speculative calculations by Japanese engineers to convert available hydrologic data into flood prediction measures. However, official proclaims by the colonial government concealed the contingent nature of hydrologic data and used seemingly neutral numbers as toolkits through which to legitimize colonial dominance over rivers and lives in and around river basins. The mismatch between the real world and the quantitative representations of rivers is often revealed by recurring floods, but colonial authorities only appropriated these disasters as a means for social engineering.

Japanese colonial intervention identified that Korean rivers remained untouched and primitive natural status. Colonial officials disregarded interactions that Koreans had had with rivers over centuries or identified past engagement in the riverine environment as shoddy and rule-of-thumb improvisations without any clear plans. This examination of Korean rivers was the first step towards colonial domination over the riverine environment. Under the name of the appropriate control and use of rivers, colonial technical officials equipped with hydrological data monopolized river management and had Korean rivers under the ownership of the colonial government, or the empire.

Colonial rule and the first nationwide hydrologic data gathering project changed the conceptual and physical meanings of Korean rivers. With the collection of data, colonial bureaucrats planned river management at the national scale and reformulated the Han River in a way to distribute resources in favor of the colonial rule. Colonial officials also turned rivers into resources during the period of the wartime mobilization; the Hwacheon and Cheongpyeong Hydropower Plants were built on the Han River to secure power sources in colonial Korea. As colonial authority took control over the Han River, it gradually lost its role as the water route for the nation's economic system. The colonization of the riverine environment was an attempt to exclude riparian life from rivers and make the river flow under the control of the empire.

Chapter 3 Cold War Reformulation of Colonial River Management

After the liberation from Japanese colonial rule in 1945, Korea was soon split along the 38th parallel as the Soviet Civil Administration seized northern Korea, while southern Korea was occupied by the United States Army Military Government in Korea. The divided peninsula ended up with the outbreak of the Korean War (1950-53), which turned the territory into a bloody battlefield devastating the nation's economy and social infrastructure. Most of the weather and water gauging stations established during the colonial era were also shut down during wartime.

The nationwide hydrologic survey was resumed in postwar South Korea with a technical assistance project from the United Nations Economic and Social Commission for Asia and the Far East in 1955.[137] This project aimed to assist the Civil Engineering Bureau under the Ministry of Home Affairs to establish the standard of hydrologic measurements and publish survey reports.[138] After that, during the early 1960s, American government agencies and private engineering corporations engaged in water resources launched several survey projects in South Korea under the guidance of the United States Operations Mission.[139]

These international survey projects in South Korea, mostly driven by the US, corresponded to the global surge of dam-building during the Cold War period. In the twentieth

[137] Korean Civil Engineering History Institute, "Han'gukt'omoksa [Korean Civil Engineering History]" (Seoul, 2001).
[138] Ministry of Home Affairs, "Han'gukhach'ŏnyoram [Korean Rivers Survey]" (Seoul, 1960).
[139] R. J. Dingman and W.W. Doyel, "Summary of Occurrence and Present Use of Ground Water in the Republic of Korea and Proposed Programs for Investigation and Training" (Seoul, Korea, 1963); Smith Hinchman & Grylls Associates, "Feasibility Study of Hydro Sites on North Han River Part I — Chunchon Hydroelectric Project," 1959; Smith Hinchman & Grylls Associates, "Feasibility Study of Hydro Sites on North Han River Parts II and III — Soyang Hydroelectric Project," 1960.

century, giant dams symbolized the triumph of modern science and technology over nature.[140] Especially in the Cold War ideological battle, the US sold a utopian picture of a river basin development model such as the Tennessee Valley Authority (TVA) to the so-called "developing areas."[141] TVA was established in 1933 as a federally-owned electric utility corporation to carry on President Franklin Roosevelt's New Deal policy. The core of the TVA project was to build larges dams on the rivers within the regions to provide navigation, electrify the rural areas, prevent floods, and construct fertilizer manufactories. American politicians and engineers sold the economically successful story of TVA as a free world development model. The chairman of TVA, David E. Lilienthal appraised the achievements of TVA.

> It [TVA] is a tale of a wandering and inconstant river now become a chain of broad and lovely lakes which people enjoy, and on which they can depend, in all seasons, for the movement of the bares of commerce that now nourish their business enterprises. It is a story of how waters once wasted and destructive have been controlled and now work, night and day, creating electric energy to lighten the burden of human drudgery. Here is a tale of fields grown old and barren with the years, which now are vigorous with new fertility, lying green to the sun; of forests that were hacked and despoiled, now protected and refreshed with strong young trees just starting on their slow road to maturity. It is a story of the people and how they have worked to create a new valley.
>
> I write of the Tennessee Valley, but all this could have happened in almost any of a thousand other valleys where rivers run from the hills to the sea.[142]

The TVA-type development model of utilizing water as a resource was promoted by the US as a means to contain the global expansion of communism. American political and technical elites

[140] Maria Kaika, "Dams as Symbols of Modernization: The Urbanization of Nature between Geographical Imagination and Materiality," *Annals of the Association of American Geographers* 96, no. 2 (2006): 276–301.
[141] Sneddon and Fox, "The Cold War, the US Bureau of Reclamation, and the Technopolitics of River Basin Development, 1950–1970."
[142] David E. Lilienthal, *TVA: Democracy on the March* (New York, NY: Harper & Brothers Publishers, 1944), 1-2.

aspired to showcase the free world development model via damming the underdeveloped regions. To this end, the US Bureau of Reclamation (USBR), the US Geological Survey (USGS), and American private engineering firms provided technical aid for water infrastructure development to countries in Asia, the Middle East, Latin America, and Africa. After World War II was the golden age of global dam construction as tens of thousands of large dams were constructed on rivers across the world.[143]

This global phenomenon reveals how US-led water resources surveys in South Korea offer an example of Western technology transfer to the periphery, but this interpretation illuminates only one dimension of complex development practices on the ground. A close examination of surveys reveals that the core work achieved by international survey projects was to characterize rivers in South Korea by organizing colonial hydrological data and knowledge. American engineers definitely brought their expertise to the Far East "frontier of freedom," installing advanced water gauging devices and training Korean personnel. However, because of the nature of river surveys, which require an extensive set of hydrologic data collected for more than a decade, survey projects mostly focused on establishing development plans using previously measured water records. The South Korean authoritarian regime determined to expedite dam construction for its modernization efforts also contributed to the appropriation of colonial data.

In order to show the use of colonial data in Cold War development, this chapter focuses on the Han River Basin Joint Survey Team (HJST). This international team of ten American experts from the USBR and the USGS and South Korean members surveyed the Han River Basin from 1966 to 1971 and devised a dam-building and river basin development plan. The

[143] Peter Bosshard, "10 Things You Should Know About Dams," *Huffpost*, May 27, 2017.

team of engineers identified that rivers had been "wasted" without proper technological intervention; thus, damming was needed to develop river water as a resource for economic development. This HJST project was the first extensive and one of the most influential river studies in South Korea, so-called "the bible" of the Han River Basin development during the second half of the twentieth century.

Examining the survey in the Han River, this chapter shows how South Korean state engineers appropriated data and knowledge produced by Japanese colonial officials while adopting technology transfer from the US. When the preliminary survey team conducted fieldwork in the Han River Basin, the American survey team engineer identified a lack of hydrological data as a significant problem and suggested an improvement of the water measurement system. However, the South Korean developmentalist regime aspired to expedite development of the Han River Basin to use it as a material and symbolic element of nation's modernization scheme. This gap was remedied by Korean state engineers who gathered and utilized colonial water measurement records and mathematical methods.

Cold War Water Development Program in South Korea

In 1949, US President Harry S. Truman presented his renowned "Point Four Program," which aimed to protect newly independent postcolonial nations, so-called the "Third World," from the expansion of communism. [144] The core idea was to provide technical aid to new regimes to build the nations, and river basin development was a crucial part of this aid strategy. Truman especially sold a TVA development model, saying that the US should help postcolonial nation-

[144] Harry S. Truman, "Inaugural Address," 1949, https://avalon.law.yale.edu/20th_century/truman.asp.

states to turn rivers and valleys in their land into "TVAs and Columbian Valley developments."[145] In terms of this river basin development, the USBR and USGS participated in technical aid programs all over the world. The USBR assisted more than a hundred countries to develop their river basins after World War II.[146] The USGS also participated in river development programs, particularly groundwater development, in more than eighty nations in Asia, Africa, the Middle East, and Latin America.[147] These technical agencies' participation in global technical aid was promoted by political demands from American political leaders as well as aspirations of host nations to developing economy with support for US technical aid.

One of the regions where the US invested huge resources was the Korean peninsula where communist North Korea and Free World South Korea were competing. Paying close attention to the expansion of communism in Asia, including North Korea, China, and Indo-China regions, American elite bureaucrats and politicians regarded South Korea as a "Frontier of Freedom." The US considered South Korea as a strategic point because the nation is geographically adjacent to the hearts of Asian communists.[148] To this extent, the US offered a range of technical aid, including river basin development, to South Korea to help its nation-building.

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[145] Truman, *Public Papers of the Presidents of the United States Harry S. Truman: Containing the Public Messages, Speeches, and Statements of the President, 557*.

[146] Sneddon, *Concrete Revolution, 4*.

[147] Taylor, Jr., "Historical Review of the International Water-Resources Program of the US Geological Survey, 1940-70," 1.

[148] Poats, "Statement of the Honorable Rutherford M. Poats, Assistant Administrator, Far East, Agency for International Development Before the Subcommittee on Foreign Operations House Appropriations Committee"; Halifax, "We Must Defend the Frontier of Freedom," 9.

Thanks to technical aid from the US, South Korea quickly shifted toward rehabilitation of the nation, recovering from the war. The Combined Economic Board (CEB), which was established in 1952, lead the national economic rehabilitation plan and US foreign aid programs in South Korea. The CEB supervised aid programs conducted by the Office of the Economic Coordinator (OEC) for the effectiveness of technical aid programs.

For the purpose of establishing a comprehensive plan for building national infrastructure with technical aid, the CEB assigned an American engineering firm, Smith, Hinchman & Grylls Associates (SH&G).[149] As a global technical consultant agency, SH&G took the responsibility of surveying rivers in the nation. American engineers from SH&G particularly studied potential hydropower plant construction sites on the Han River to electrify the nation.[150] The project team surveyed several potential dam construction sites and suggested a dam size, power generation capacity, and cost of dam construction at each location. As this survey projected dam-building as a way of national power development, SH&G engineers cooperated with the Power Division of

[149] Smith, Hinchman & Grylls widely affected US technical aid activities in Korea from the late 1950s to the early 1960s by providing technical advice to the Korean government and the US aid agencies about the investment on Korean society. National infrastructure building projects, including transportation, cement industry, fertilizer industry, textile industry, and heavy chemical engineering, had to have a feasibility study by SH&G to be implemented. See, Han, "1950nyŏndae Migugŭi Taehanwŏnjoesŏ Chŏgaebalguk Kaebal(Development)Ŭi Ŭimi Migukkye k'ŏnsoshiŏm, Sŭmisŭ Hinch'imaen Aen Kŭrilsŭŭi Kisurwŏnjorŭl Chungshimŭro"

[150] Combined Economic Board, "Task Order Feasibility Study of Hydro Sites on South Han River," 1957.

the United States Operations Mission to Korea, the Ministry of Commerce and Industry, and the Korea Electric Power Company.[151]

In another part of the technocratic development scheme, rivers were also seen as water resources, more than a source of power generation.[152] The OEC collaborating with the Ministry of Home Affairs constructed the "Joint River Basin Committee" to "assess fully the present development and to serve as a basis for careful future planning."[153] This committee, led by Lewis G. Smith, an engineer affiliated to the OEC, prepared for the nation-wide river basin survey.[154] Unlike SH&G's plan of building dams for power development, the river basin committee attempted to establish a comprehensive river basin development plan, including water supply and flood prevention. The committee envisioned that this comprehensive way of river basin development would bring about a better outcome than building dams only for power development.[155] According to this vision, the committee renamed itself the "Water Resources Committee" with "the purpose of coordinating water resource survey and long-range development planning activities of the various ministries operating in the field."[156]

Both of the development plans projected by SH&G and the Water Resources Committee could not be realized because of the unstable political situation. President Rhee Syngman (1875-

[151] Smith Hinchman & Grylls Associates, "Feasibility Study of Hydro Sites on South Han River Part I – Chungju Hydroelectric Project," 1960; Smith Hinchman & Grylls Associates, "Feasibility Study of Hydro Sites on North Han River Parts II and III — Soyang Hydroelectric Project."

[152] For the establishment and the role of the OEC, see Kim and Kim, "Coordination and Capacity-Building in U.S. Aid to South Korea, 1945-1975," 55-6.

[153] Combined Economic Board, "Land Reclamation in Korea," 27.

[154] UNC Economic Coordinator, "OEC Representatives on River Basin Committee," 1959.

[155] Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life,* 160-1.

[156] Combined Economic Board, "River Basin Committee," 1.

1965) rigged the presidential election, which ignited a nationwide protest. And later, in 1961, General Park Chunghee (1917-1979) led a coup and took power.[157]

Comprehensive River Basin Development for the Nation

Park Chunghee's new regime envisioned a reconstruction of the nation. His political vision consisted of two parts: economic development and anticommunism. [158] Park Chunghee attempted to legitimize his taking over the country with economic growth and show the superiority of his regime over communist North Korea. After the success of a coup, Park Chunghee took the head of the Supreme Council for National Reconstruction and created the Economic Planning Board (EPB) in July 1961 and proclaimed that "rebuilding our economy is the only shortcut to remove the threat from communists."[159]

Park prioritized infrastructure-building projects for national economic development. He established the National Construction Agency (NCA), the predecessor of the Ministry of Construction (MOC), and had the agency control a national infrastructure building plan. Dam construction became part of this infrastructure construction planned by the NCA. Ahn Kyung-mo, a leading engineer at the NCA, particularly considered that dam construction was a crucial part of the nation's infrastructure because damming would supply water for economic activities, prevent floods in the urban areas, and generate electricity. To this end, Ahn created the Bureau of Water Resources (BOWR) under the NCA and allowed the bureau to plan dam construction and

[157] Kim, "Yuyŏkchonghapkaebal Kyehoek Hoego," 64.

[158] Han and Downey, *Engineers for Korea,* 54-7.

[159] *Kyŏnghyang shinmun*, 3 December 1961, 1.

water resources development.[160] The BOWR's plan of comprehensive development drew on the idea of comprehensive river basin development projected by the "Water Resources Committee." The NCA's vision of dam-building and comprehensive development plan showed its bureaucratic aspiration to take control of rivers on the national scale.[161]

However, in order to lead a national dam construction plan, the BOWR had to compete with the Ministry of Commerce and Industry (MCI), which had been in charge of damming in the nation as part of national power development. The BOWR argued that national dam-building should be managed from a perspective of comprehensive water resources development for the best use of rivers for economic development. The Park regime agreed to the benefit of the comprehensive development plan and authorized the BOWR to take charge of the national dam construction plan.[162] As a result, the Chuncheon and Seomjingang hydroelectric dams once had supervised by the MCI were under the control of the BOWR. This transfer of authority demonstrated that Park's regime was sold by the scheme of the comprehensive water resources development plan.

With the BOWR's scheme of water resources development, Park Chunghee envisioned that the TVA type of development would contribute to the nation's economic growth and industrialization. The slogan chanted by his regime "miracle on the Han River" showed that Park Chunghee wanted to epitomize the nation's efforts toward economic growth via Han River Basin

[160] Kim, "Han'gugŭi Taem (4)."

[161] Saraiva and Wise, "Autarky/Autarchy: Genetics, Food Production, and the Building of Fascism," 424-5.

[162] Kyŏngjegihoegwŏn, "Kyŏngjejanggwanhoeŭi - Sujawŏn'gaebalgyehoekch'ujinbangan"; Kim, "Han'gugŭi Taem (4)," 85.

development. [163] Park Chunghee attended the ceremony for the completion of the Chuncheon dam, saying that "[I] deeply hope that this project marked the beginning of not only power resources development but also comprehensive development of the Han River Basin like the TVA of America."[164] To Park's mind, dam construction was a key to advance national economy modeling after TVA.

However, contrary to Park Chunghee's political vision, the BOWR had a lack of experienced experts who could lead river basin development projects. The government recruited engineers from overseas, and Kim Yeotaek (1925-2018) was one of the engineers who came back to Korea to take part in the BOWR's dam construction projects. Kim had education in civil engineering from Kyoto University and started his career in a construction industry in Japan.[165] When he returned to Korea to take the head of the BOWR's power division in 1961, he was astonished by the fact that the Bureau had a severe lack of personnel who had experiences in large dam construction.[166] The nation's technical capability in comprehensive water resources development could not satisfy Park Chunghee's political expectation.

The BOWR attempted to deal with this technical issue by drawing on technical aid from the US. Succeeding Truman's Point Four Program, US President John F. Kennedy declared the "Decade of Development" in 1961 to assist postcolonial nation-states to repel poverty and prevent them from the influence of communism. The US Agency for International Development (USAID), created by rebranding the ICA, managed technical and financial support to help

[163] Kyŏnghyang shinmun, 30 November 1964, 3.

[164] Park, "Ch'unch'ŏndaemjun'gongshik Ch'isa."

[165] Kim, "Naŭi Insaenghaengnoesŏ Mannan Hach'ŏn'gwa Taem," 12-13.

[166] Kim, "Han'gugŭi Taem (1)," 95.

"underdeveloped" countries, and South Korea was one of the major recipient countries.[167] American diplomatic elites considered that South Korea would exemplify a Free World development model achieved by US aid programs in Asia.[168]

In early 1965, the BOWR and the USAID agreed to initiate a survey in the Han River Basin to design a development plan.[169] In terms of providing technical and engineering assistance, the USBR and the USGS, the prominent US agencies in water resources development, participated in the survey project in Far East Asia. For a preliminary survey, M. E. Von Seggern and William F. MacMillan from the USBR and J. T. Callahan from the USGS visited South Korea. This team of three American engineers undertook a field survey on the Han River to study the potential economic benefit of river basin development.

Having two months of on-site study, the preliminary survey team reported that the Han River Basin possessed valuable water resources but it had been *wasted*. Three American engineers identified that "half or more of the annual runoff goes into the Western (Yellow) Sea completely wasted."[170] In order to utilize this "wasted" water, the engineers argued that the nation needed technical intervention in the river basin and regulation of river flow. This idea of "wasted" water at the basin scale was new in South Korea. The preliminary report conveyed that if the government built large reservoirs on the Han River, thereby securing water resources rather

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[167] Gregg A Brazinsky, "From Pupil to Model: South Korea and American Development Policy during the Early Park Chung Hee Era," *Diplomatic History* 29, no. 1 (January 1, 2005): 83–115, https://doi.org/https://doi.org/10.1111/j.1467-7709.2005.00460.x.

[168] Brazinsky, *Nation Building in South Korea: Koreans, Americans, and the Making of a Democracy*, 2.

[169] Kyŏngjegihoegwŏn, "Han'gangyuyŏkchonghapkaebalchosasaŏpkyehoek."

[170] Von Seggern, Callahan, and MacMillan, "Report of Preliminary Survey Han River Basin, Republic of Korea," 1.

than just letting it flows toward the sea, it would "bring about the expansion of industry, an increase in the gross national product, a higher level of employment, and an improvement in the general standard of living."[171] This preliminary survey also legitimize what the nation's dam construction should take a way of comprehensive development than power development. The preliminary report pictured a TVA-type of a comprehensive development plan in the Han River Basin, which would not only electrify the nation but also contribute to industrialization, urbanization, large-scale agriculture, flood control, and so forth.

The preliminary survey finally recommended a full-scale survey of the Han River Basin to establish a detailed development plan. The American engineers especially argued that dam-building in the Han River basin should be designed from a perspective of comprehensive development, rather than building dams for a single purpose like power generation. In this vein, the team called for "a comprehensive analysis of the entire Basin to determine whether the storage can be obtained, how much storage can be effectively utilized at each location."[172] The preliminary team emphasized that the river basin development plan should be carefully designed to maximize the use of water resources stored in the Han River basin.

For the next step of the survey, the team engineers emphasized the installation of water measurement devices and the training of Korean personnel to acquire high-quality hydrological data. In order to determine the most effective size and location of dams, engineers needed data on streamflow, which showed how much water flows through a stream per unit time. [173] However, the American engineers had difficulty because of a lack of useful hydrological data in

[171] Ibid..

[172] Ibid., 2.

[173] Ibid., 43.

the nation. They argued that it was hard to understand the flow system of the Han River with the existing data, saying that "[r]eliable historical data for the river is practically non-existent."[174] This lack of data prevented American engineers from conducting cost-benefit analysis developed by the US Army Corps of Engineers to estimate the feasibility of a dam construction plan.[175] The survey team thus argued that, for the full-scale survey, "[g]uidance should be extended to the Koreans in the establishment of a program for obtaining good hydrological data."[176] The American engineers prioritized improving water gauging stations and training Korean counterparts to obtain hydrological data that would construct a basis for comprehensive development of the Han River Basin.

Appropriating colonial hydrology

Soon after the termination of the preliminary survey, the Han River Basin Joint Survey Team (HJST) was organized. Ten American engineers from the USBR and USGS joined the team to lead the survey on the Han River. From the Korean side, seventy-five personnel, including state engineers and administrative assistants, participated in the joint survey team. The missions of the survey included the examination of the "the magnitude and characteristics of the water resources of the basin, investigate the probable future need for these sources, and show how to make them available for beneficial use."[177] As recommended by the preliminary survey, the HJST worked on improving water measurement system. The American engineers provided magnetic water-

[174] Ibid., 64

[175] For the history of cost-benefit analysis, see Porter, *Trust in Numbers,* 148-189.

[176] Ibid., 54.

[177] "Han River Basin Report," 1.

level and rainfall gauging devices that would be used for obtaining advanced hydrological data. They also introduced electronic hydrometers that measured streamflow of the river. [178]

The survey also included training programs for Korean state engineers to learn about river development and hydrological methods from America. [179]As part of these training programs, Kim Jongcheon, a chief engineer in the Hydrology Division of the HJST, visited the headquarters of the USBR and the USGS for seven months. Throughout his visit to the US, Kim learned about the hydrological techniques that were used to calculate daily average streamflow with precipitation data. Yet, returning from his technical training in the US, Kim concluded that the techniques could not be applied to the South Korean environment due to a lack of hydrological data, although he admitted the usefulness of the techniques.[180]

In the early period of the survey, the American engineers helped South Korea improve the water measurement system and trained state engineers, but these technology transfer activities did not directly contribute to the initiation of the national development scheme. The advanced technology for acquiring water measurement records and hydrological techniques for interpreting those acquired data would be beneficial in planning river basin development in the future. However, to initiate river basin development immediately, the survey team needed a set of hydrological data gathered at least for decades rather than a few months or years. Only with

[178] Han River Basin Joint Survey Team, "Han'gangyuyŏkchosasaŏp 1967nyŏndo Sŏnggwabogo Sang," 20, 98-100.

[179] Fifteen Korean engineers received technical training in the US for seven months in average during the survey project. Han River Basin Joint Survey Team, "Republic of Korea: Han River Basin: Reconnaissance Report, Water Resources Study Appendixes Volume 1," A16-7. (Hereafter cited as "Han River Basin Report Appendixes V.1")

[180] Jongcheon Kim, "Sujawŏn Kaebal Kyehoek Suribe p'iryohan Sumun Yŏn'gubangbŏp."

the extensive data, survey engineers could plan river basin development by estimating the general tendency of the changes in streamflow. Therefore, technology transfer by American engineers could not contribute to immediate actions for river basin development although it helped envision comprehensive river basin development and improve the water measurement system for the long term.

Park's regime could not wait until enough hydrological data was gathered. Park wanted to begin dam construction and Han River development as soon as possible to expedite national land development and present the developed river basin as a symbol of modernization of the nation. State engineers in the BOWR also aspired to initiate an immediate dam construction plan from a perspective of comprehensive development to win over the competition with the MCI and KEPCO over the authority of taking control of national dam construction. For this reason, the BOWR wanted to propose large multi-purpose dam construction plans on the Han River, instead of some hydropower plant dam construction proposals suggested by the MCI. The BOWR considered that the making of a comprehensive river basin development plan for the Han River would be significant for seizing the initiative of the national dam-building business.[181]

According to the request from Park Chunghee and the BOWR to initiate Han River Basin development as quickly as possible, the survey team established a plan by collecting hydrological data produced by Japanese colonial officials. The survey team first labeled a colonial set of data as "unreliable" because hydrological data were produced by non-experts during the colonial period. However, those data were the only available sources that allowed survey engineers to estimate the average annual flow of the Han River and construct a dam-

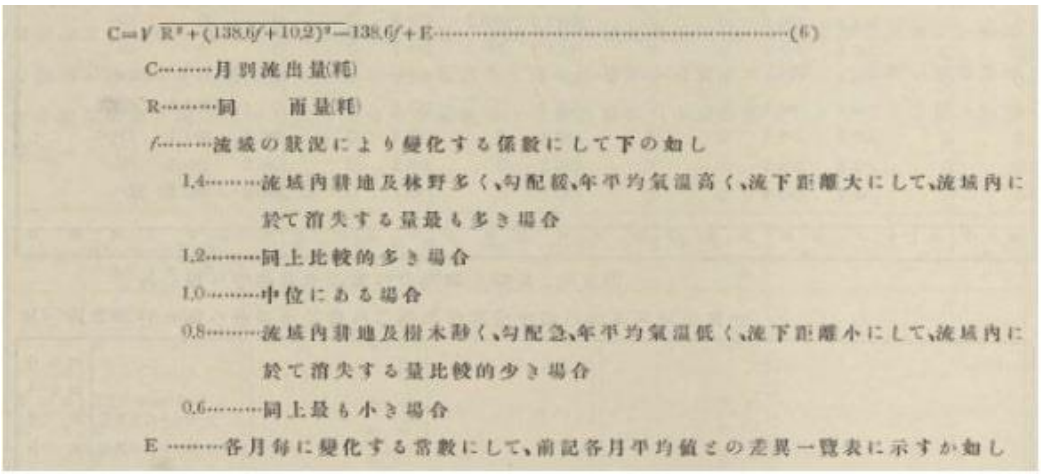
[181] Kim, "Han'gugŭi Taem (7)," 68-9.

building plan on the Han River.[182] There were also available hydrological data that were recorded from 1955 to 1965, but this data set alone was not enough to study the tendency of streamflow changes of the Han River.[183] The survey team identified that the colonial data should be included in their calculations because the colonial set of data included two extreme drought seasons so that it might properly represent water cycle from low to high flow. With colonial hydrological data, although they were incomplete, the survey team engineers computed the average annual flow of the Han River and used their calculation to plan dam construction on the Han River.

The next step for the survey engineers was to convert rainfall data to streamflow. Most of the available colonial data were in a form of rainfall records, but what was needed for a dam construction plan was the average amount of water flowing through the Han River during a month or year. Therefore, the survey team had to compute streamflow based on rainfall data. This calculation required specific knowledge of the local environment because the correlation between rainfall and streamflow highly depends on land slopes, soil types, riverside development, and so forth. Because of this reason, American engineers could not simply apply their hydrological methods developed in their homeland to South Korea. Instead, they attempted to find solutions from the past surveys on the Han River basin.

[182] "Han River Basin Report Appendixes V.1," C36-7.

[183] Ibid.



$C=\sqrt{R^2+(138.6f+10.2)^2}-138.6f+E$ ……(6)

C……月別流出量(粍)

R……同　雨量(粍)

f……流域の狀況により變化する係數にして下の如し

1.4……流域内耕地及林野多く、勾配緩、年平均氣温高く、流下距離大にして、流域内に於て消失する量最も多き場合

1.2……同上比較的多き場合

1.0……中位にある場合

0.8……流域内耕地及樹木尠く、勾配急、年平均氣温低く、流下距離小にして、流域内に於て消失する量比較的少き場合

0.6……同上最も小き場合

E ……各月毎に變化する常數にして、前記各月平均値との差異一覽表に示すが如し

A theoretical equation employed to produce the Soyang runoff record from rainfall is as follows:

$$C = \sqrt{R^2 + (138.6\ f + 10.2)^2} - 138.6\ f + E$$

Where C = average monthly runoff depth in millimeters

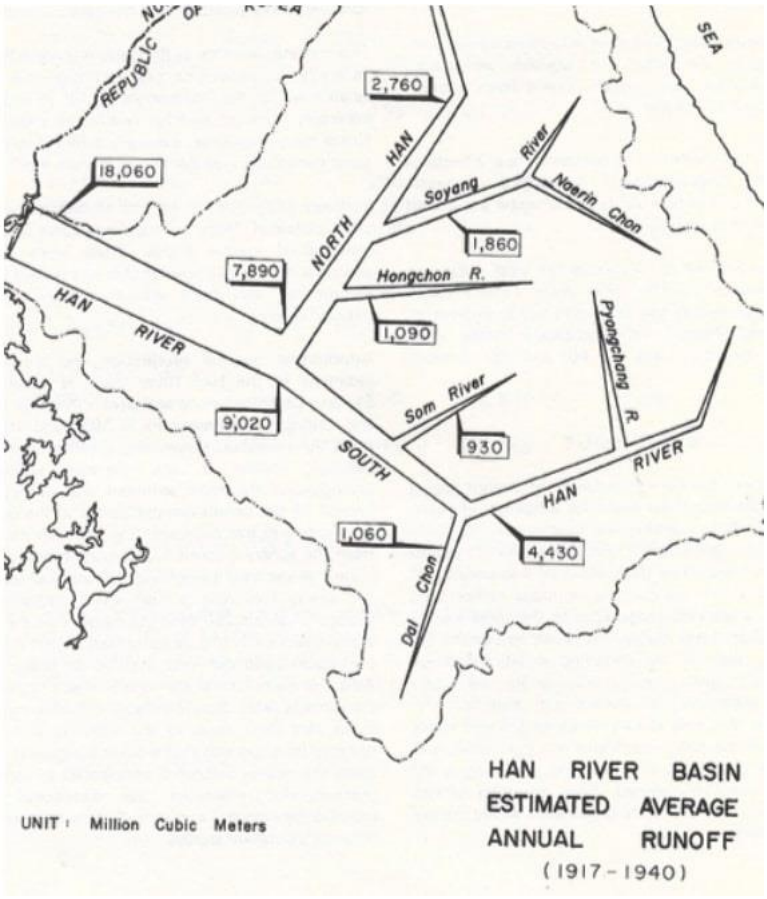
R = average monthly rainfall in millimeters

f = a coefficient = 1.1, affected by shape, ground cover, slope, temperature, flow distance, etc.

E = a constant varying from month to month affected by temperature differences, number of rainy days, conditions of streams such as ice coverage, etc.

[Figure 7] Kajiyama's original formula (top) and that used by the HJST (bottom).

(Source: Government-General of Korea, 'Chosŏnhach'ŏnjosasŏ', 292; Han River Basin Joint Survey Team, 'Republic of Korea: Han River Basin: Reconnaissance Report, Water Resources Study Appendixes Vol. 1', C36.)



[Figure 8] The Estimated Average Annual Flow of the Han River

(Source: Han River Basin Joint Survey Team, "Republic of Korea: Han River Basin: Reconnaissance Report, Water Resources Study", 38.)

The survey team engineers had solutions from the work of a Japanese colonial official, Kajiyama Asajiro.[184] As mentioned in chapter 2, Kajiyama had developed an empirical formula to drive

[184] SH&G engineers also referred to colonial hydrological data and Kajiyama's formula to conduct feasibility studies of dam construction projects in South Korea. The SH&G reports probably affected the HJST's decision on appropriating colonial data and knowledge. Smith Hinchman & Grylls

streamflow from rainfall data. The accuracy of Kajiyama's formula was not always guaranteed, but his method allowed the survey team engineers conveniently turn a form of precipitation data into river flow.[185] By utilizing both colonial data and empirical knowledge, the survey team could calculate the average annual water flow of the Han River and quantify water resources possessed in the Han River Basin. Figure 8 shows how the survey engineers simplified and quantified the Han River. The survey team engineers turned the complex riverine environment into several linear streams and the amount of water flowing through each stream. All the other dimensions of the river, including its ecosystem, living organisms, and socio-cultural arrangements were erased by the engineers. This Han River map was "a means of recording complex statistical information in a centralized, miniaturized, and visual form."[186]

The survey team accounted for this abstract representation of the Han River as the "unchangeable" physical characteristic to protect their scheme from any political changes and turmoil. They argued that "[A]s the physical features of a country cannot be changed or revised, the same plans must be based on the elemental principles of logic that will remain unaffected by changing shades of political opinion."[187] Proposing this notion as a fundamental principle of the national land development plan, survey team engineers projected their work as a legitimate technical intervention in the natural environment, far from politics. The survey team ultimately

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Associates, "Feasibility Study of Hydro Sites on North Han River Parts II and III — Soyang Hydroelectric Project," 16-21.

[185] Hong, "Chŏsuji Yuhyojŏsuyongnyang Kyŏlchŏnge Issŏsŏ Kajiyamaŭi Wŏlbyŏryuch'ulgogongshik Sayongŭi Munjejŏm Chegi."

[186] Mitchell, *Rule of Experts,* 9.

[187] This statement is from the preface to "Guidelines for National Physical Plan" by Han-lim Lee, the Minister of Construction, quoted in "Han River Basin Report," i.

asserted that "[R]egardless of the uses to be made of the water,…the plan presented here will still be valid because it deals primarily with furnishing water supplies."[188]

The appropriation of colonial data and knowledge allowed the survey team engineers to present the Han River as a manageable and quantifiable water resource. The hydrological representation of the Han River allowed technical intervention while concealing incompleteness of hydrological data, unruly river flows, and human interactions with the natural environment. As Timothy Mitchell noted, in the hydrological representation, "the world came to be simplified into what seemed nature on one side, and human calculation and expertise on the other."[189] This dichotomy between nature and technology let the survey team engineers to manipulate the riverine environment and construct a dam-building plan.

Damming the Han River for National Development

After five years of studies, the survey team recommended a dam construction plan on the Han River. The final report concluded that "[B]ecause most of the stream runoff occurs in a few weeks during the summer, further development of the Han River Basin water resources requires large storage reservoirs to impound the floodflows."[190] The quantification techniques allowed the survey team turn the river into a container of water resources, and damming was rationalized as a means through which to make the river bigger water tanks. As noted above, the weather conditions, uneven distribution of precipitation throughout the year, reassured the survey team's plan to construct large dams on the Han River. The survey team projected that damming would

[188] Ibid.

[189] Mitchell, *Rule of Experts*, 36.

[190] "Han River Basin Report Appendixes V.1," iii.

secure excessive water flow during the rainy season and provide the stored water to society during the dry season.

The survey team also scheduled a dam construction plan based on the projected water demands of the nation. The survey team estimated future water demands drawing on the modernization theory that assumed a linear development path from a traditional society to an industrialized society. [191] As a role model for the trajectory of economic development, the survey team set Japan as a role model following the South Korean elites' developmental strategy. Economic bureaucrats in the South Korean government planned national economic development by assuming that South Korea was lagging behind Japan by 24.5 years.[192] This goal of following Japan's economic system allowed the survey team engineers to calculate increasing water demands as required by industrialization, urbanization, and population growth. This calculation showed that South Korea would soon suffer from water shortages. In order to deal with this water problem, the survey team suggested a plan to build seven dams on the Han River until by 2010.[193] The graph demonstrates that more dams should be built as time passes to meet the increasing water demand that would exceed water supply.[194]

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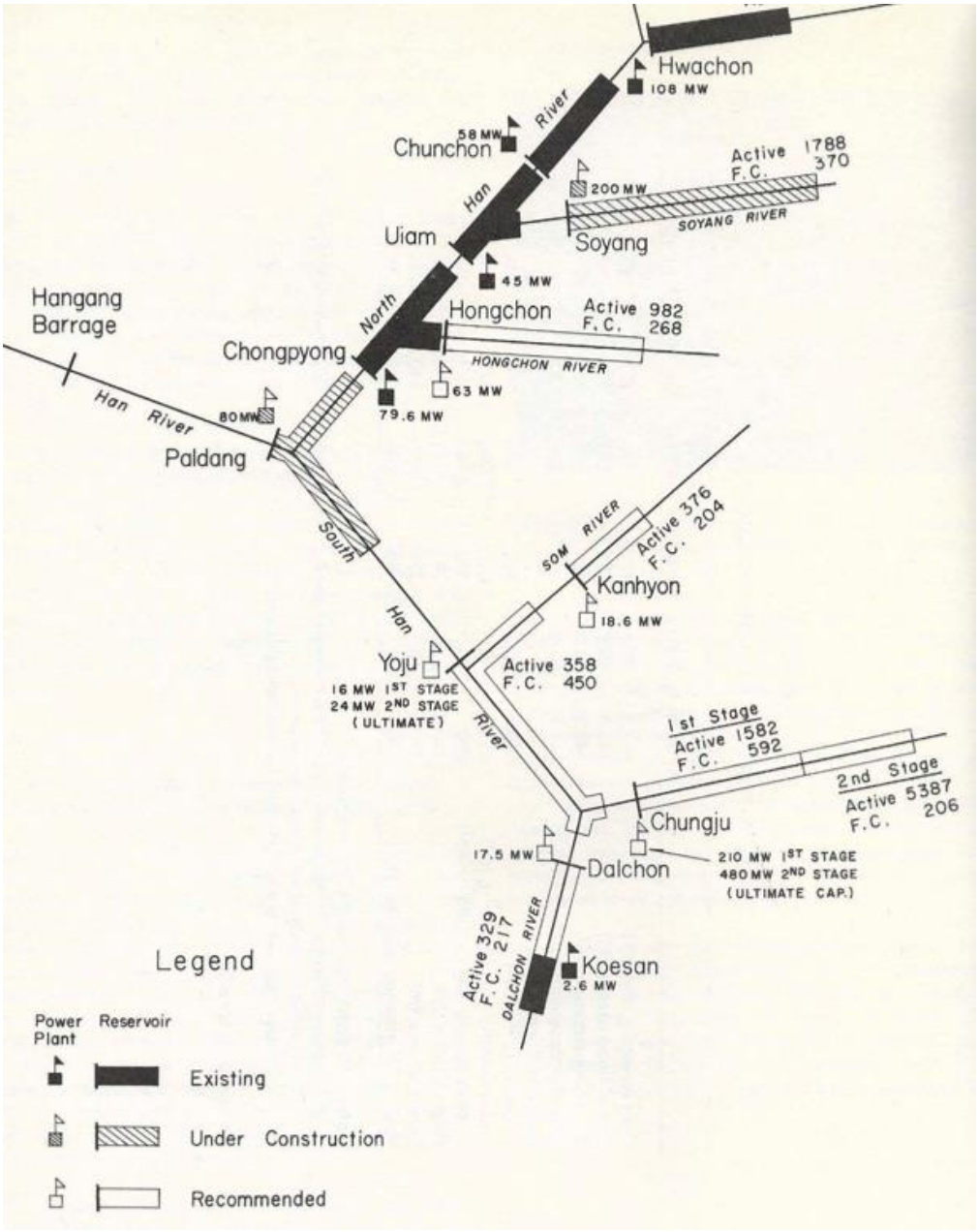
[191] For the influence of an American modernization theory in Korea during the 1960s, see Tae-gyun Park, "W. W. Rostow and Economic Discourse in South Korea in the 1960s," *Journal of International and Area Studies* 8, no. 2 (2001): 55–66.

[192] "Han River Basin Report," 19.

[193] Ibid., v.

[194] The change of water supplies at the first bullet point was presented with the long-dashed line because the first dam, Soyanggang Dam, was under construction when the final report was published in 1971. The other seven bullet points indicate the suggested dam construction plan in the future.



[Figure 9] Dam Construction Plan on the Han River

(Source: Han River Basin Joint Survey Team, 'Republic of Korea: Han River Basin: Reconnaissance Report, Water Resources Study', 52.)

This dam construction plan on the Han River, established by utilizing colonial data and knowledge, contributed to Park Chuinghee's political vision of economic growth. The assumptions of increasing water demand produced by economic elites showed that the government aspired to achieve national economic development following Japan's postwar economic boom. This economic development plan especially emphasized the industrialization of the nation. The joint survey team embraced this development plan as the final report considered manufacturing as "the dynamic element in the Korean economy" as it had "played a similar role in Japan."[195] The report specifically projected that the portion of heavy industry in the nation's economy, far less significant than the light industry in the 1950s, would dominate other types of industry.[196] This economic growth was supposed to cause skyrocketing water demand in the future of the nation.

By presenting future national water supply and demand, Korean state engineers called for large dam construction projects on the Han River. The survey team constructed this dam-building plan from a perspective of comprehensive water resources development and intertwined damming with Park Chunghee's aspiration to build an industrial nation. The outcome of the joint survey became a rationale for large dam construction on the Han River as it echoed a developmental state vision.

[195] Han River Basin Joint Survey Team, "Republic of Korea: Han River Basin: Reconnaissance Report, Water Resources Study Appendixes Volume 2," J37.

[196] Ibid., J37-8.

Conclusion

Korean state engineers affiliated with the newly created Bureau of Water Resources aimed to expand their influence on developing South Korea by leading large dam construction projects on the Han River. This scheme was assisted by American engineers who provided technical aid for surveying the Han River and planning river basin development. The idea of comprehensive development persuaded the authoritarian regime, as it chanted "Korean TVA" and "the miracle on the Han River." State engineers with the state authority presented the damming of the Han River and the utilization of water resources as a means to achieve national economic growth.

The joint survey project supported by the US introduced Western techniques and methods, but the core of the survey was to appropriate colonial data and knowledge. In order to design the Han River Basin development, the survey engineers collected past hydrological data that Japanese colonial technical officials generated to establish a basis for imperial resource management. The joint survey team also utilized the empirical formula devised by a colonial technical official to convert colonial precipitation records into a useful form of data for designing dams on the Han River. The Han River Basin Joint Survey was a process of reassembling colonial infrastructure to transform rivers into manageable water resources with technical intervention.

The appropriation of the colonial legacy reflected Korean state engineers' aspirations to participate in the national developmentalist agenda and thus elevate their positions in developing South Korea. American engineers during the preliminary survey accounted that the set of colonial data was unreliable, inconsistent, and incomplete. There was also no consensus about the accuracy of the colonial empirical formula that was used to construct a dam construction plan. Regardless of these technical conundrums, the survey team consequently drew on colonial

data and knowledge to expedite development in the Han River Basin and satisfy Park Chunghee's political demands.

In this sense, abstracted hydrological maps and calculated numbers that represent water resources did not merely represent the natural characteristics of the Han River. The hydrological representation of the Han River was a product of state engineers' position-making in postcolonial and Cold War South Korea. The appropriation of "unreliable" colonial data and knowledge demonstrated their aspirations to be legitimate contributors to developing South Korea.

This river survey project allowed the state authority to realize its developmental agenda and the building of national land. To this extent, the hydrological representation processed reconfiguration of power and redistribution of social resources. The large dam construction projects on the Han River valued economic and social activities associated with the vision of comprehensive water resources development, such as manufacturing industries, large-scale and mechanized agriculture, and life in the urban areas. On the other hand, damming marginalized small-scale rural farming and community-building, which were not aligned with the developmentalist state vision.

Chapter 4 Neither Colonial River Management nor Western Methods

I have enjoyed and done many works of carving the mountains, filling the sea, impounding water, and constructing dams while following nature for a long time. … My work turns into a physical and tangible property that can be observed by everyone's eyes. It is like a piece of artwork.[197]

Ahn Kyung-mo (1917-2010) was an elite technocrat who led South Korea's water resources development as the CEO of the state-owned Korea Water Resources Development Corporation (KWRDC) from 1967 to 1983.[198] Every person who entered his office would have first seen the framed calligraphy of "鑿山導水 (Ch'aksandosu, digging mountains and guiding water)" hung on the wall behind his desk. Ahn proudly proclaimed that the phrase was his motto to block river water, build dams, and reimagine the homeland.[199] Under his leadership, the KWRDC was committed to building large multi-purpose dams and brought about the golden age of dam construction in South Korea.

[197] Kyung-mo Ahn, "Naui Chwimi [My Hobby]," *Taehant'omok'ak'oeji [Journal of the Korean Society of Civil Engineers]* 39, no. 2 (1991): 8.
[198] The Korean Water Resources Development Corporation, which has changed its name to the Korea Water Resources Corporation or K-Water, is a public corporation. Technocrats of the Ministry of Construction led the establishment of the KWRDC to initiate national multi-purpose dam constructions. Korea Water Resources Development Corporation, *Han'guksujawŏn'gaebalgongsa Sasa [History of the Korea Water Resources Development Corpoation]* (Korea Water Resources Development Corporation, 1977).
[199] Maeil Business Newspaper, "Kajang Kŭ Ilgwa (1) Han'guksujawŏn'gaebalgongsasajang an'gyŏngmossi [The Head of Household and the Daily Routine (1) The CEO of the Korea Water Resources Development Corporation Ahn, Kyung-mo]," July 30, 1968.

[Figure 10] Ahn Kyung-mo (left) and Gilbert G. Stamm from the US Bureau of Reclamation (right). Framed "鑿山導水" on the Wall behind Them.

(Source: Korea Water Resources Development Corporation, Kiroksajinch'ŏp [1968 Photo Archives])

Ahn promoted the idea of manipulating nature as he wished in cooperation with an emerging group of water experts affiliated to the Korean Association of Scientific Hydrology (KASH) established in 1967.[200] The leading researchers of this professional organization had their roots in civil engineering, but redefined their expertise as hydrology, translating it into "水文學

[200] Han'guksujawŏnhak'oe, *Han'guksujawŏnhak'oe 30nyŏnsa [30-Year History of the Korean Water Resources Association]* (Seoul, Korea: Han'guksujawŏnhak'oe [Korea Water Resources Association], 1997), 38-39.

(Sumunhak, studies on water)". The collaborations between these two institutions became stronger as Ahn Kyung-mo also started to serve as the president of the KASH in 1969.

I name these newly-emerged water experts as "hydrological engineers." Founding members of the KASH proclaimed that they were trailblazing a new field of hydrology while maintaining their identity as civil engineers. Hydrological engineers did not totally shift their identity from civil engineers to hydrologists, but, brought hydrology into their research agenda. With this new professional identity that merged civil engineering and hydrology, hydrological engineers helped rationalize large multi-purpose dam construction from a perspective of national-scale water circulation in the environment.

This chapter traces how these hydrological engineers formulated modern views on the natural environment in the midst of building their identity in between colonial legacy and the Cold War influx of knowledge from the West. Within the community of hydrological engineers, there were two types of engineers with different backgrounds: research engineers from academia and state engineers. While Korean research engineers worked closely with state engineers they also made significant efforts to construct their own hydrology program. Members of the association called for detailed hydrological studies on the nation's distinctive environmental characteristics, arguing that colonial river management was outdated, and Western hydrological methods, mostly originated from the US, were not directly applicable to South Korea's conditions. The KASH's close relationship with the KWRDC did not mean that it merely served the state's project of building gigantic structures. Academic engineers sometimes criticized that the government's development policy was disordered, claiming the national land-building project should be based on detailed domestic hydrological research. The KASH and the KWRDC needed each other as the KASH provided rationalization of large dam construction, and in return,

members of the KASH secured government support. Yet, there also existed a tension between the two institutions that had different goals.

Following hydrological engineers' identity-making, I argue that the slogan of "*鑿山導水*" by the CEO of the KWRDC was not just an expression of modern state authority or the human hubris of disciplining unruly nature. Rather, it was an audacious declaration to conceal the haphazardness of the national water resources development plan, which was shown in the tension between the KASH and the KWRDC. As hydrological engineers aspired to build their professional identity and own research program, they emphasized careful studies on subtle interaction between humans, technology, and nature in the riverine environment. However, when they had to contribute to immediate development planning for technocrats, hydrological engineers drew on available resources: colonial data and development models from the West. Propagation of the idea of "carving nature" aimed to hide this precarious modern South Korean hydrology—stood in between colonial legacy and the Western influence—on which technocratic development was based.

International Initiative toward "Scientific Hydrology"

In 1961, the year Park Chunghee came into power through a May 16 coup d'état, Ahn Kyung-mo led the establishment of the Bureau of Water Resources (BOWR) under the National Construction Agency.[201] The agency, controlled by the Economic Planning Board, had a mission

[201] Ahn Kyung-mo's career will be discussed later in this chapter, but here I briefly mention his career path in construction bureaucracy. In 1961, he led the establishment of the BOWR as the Vice Commissioner of the National Construction Agency, which was rebranded to the Ministry of Construction later in June 1962. Ahn had also served as the Vice Minister of Construction (1963-64) and the Minister of Transportation (1964-1967) until he became the CEO of the Korea Water Resources Development Corporation in 1967. Yeotaek Kim, "Han'gugŭi Taem (4) [Dams of Korea (4)]," *Taehant'omok'ak'oeji [Journal of Korean Society of Civil Engineers]* 43, no. 4 (1995): 83–84.

to implement the "building of national land (*國土建設*, *Kukt'ogŏnsŏl*)" project pushed forward by Park to eliminate poverty, achieve economic growth, and ultimately defeat communist North Korea. Park asserted that constructions of roads, manufactories, powerplants, levees, and other types of infrastructure should be the primary national agenda. The newly established BOWR under construction technocracy aspired to expand its influence by taking part in this national infrastructure construction initiative.

In order to contribute to Park's vision of national land-building, the BOWR projected a large dam construction plan. Since its establishment, the BOWR had conflicted with the Bureau of Electricity (BOE) under the Ministry of Commerce and Industry (MCI) and the Korea Electric Power Company (KEPCO) over the authority of planning and managing national large dam construction. As the newcomer in dam-building, the BOWR attempted to frame large dam construction as a matter of 'water resources development' rather than 'power development' to become the main agent of national dam construction that had been controlled by the BOE and the KEPCO. The BOWR technocrats argued that national dam construction had to be planned not only for power generation, but also from the perspectives of water supply, flood prevention, and river basin development.[202] In order to design dams for water utilization, the BOWR claimed that they should control the national dam-building plan rather than electrical technocrats in the BOE or KEPCO who approached dam construction only for power development.

In this vein, the Director of the BOWR, Lee Mun-hyeok, proposed the "comprehensive water resources development plan" that highlighted large multi-purpose dam construction for

[202] Economic Planning Board, "Kyŏngjejanggwanhoeŭi - Sujawŏn'gaebalgyehoekch'ujinbangan [Economic Ministers' Meeting - Plan for Water Resources Development]."

water utilization.[203] Lee was inspired by the Tennessee Valley Authority (TVA) and postwar Japan's comprehensive land development that was modeled after TVA. Lee asserted that South Korea had to invest more efforts in "*利水* (use of water)" as much as "*治水* (control of water)" to attain the goal of industrialization. Lee pointed out that, considering limited land and expanding population, the nation could not overcome poverty with a policy centering on agricultural development. In order to build an industrial, independent, and self-sufficient nation, the nation should secure water by constructing reservoirs and utilize water resources properly.

According to Lee, South Korea specifically needed large dams due to the nation's distinctive environmental condition. Based on colonial precipitation data gathered and organized by the BOWR, Lee noted that South Korea had a relatively large amount of annual average precipitation, approximately 1,100 mm, which was higher than the world's 750 mm. However, two-thirds of the nation's precipitation fell only for three months, between mid-June and mid-September. Lee stressed that this uneven distribution of precipitation throughout the year had troubled the nation. During the summer, torrential rains had flooded the land, while the nation had suffered from a lack of water for the rest of the year. As a solution to this problem, Lee suggested the building of large reservoirs to store the excessive flow of water during the summer and use stored water during the dry season. Adding that hydroelectric power had a better cost-benefit than its rival, thermal power, Lee projected multi-purpose dam construction as a key toward an epoch-making stage in terms of water utilization. The BOWR later specified this idea

[203] Mun-hyeok Lee, "Urinara Sujawŏn'gaebarŭi Panghyang [Direction of Our Country's Water Resources Development]," *Kuk'oebo [National Assembly Review]* 36 (1964): 83–90.

through the "10-year Comprehensive Water Resources Development Plan (1966-1975)" and "Specific Multi-purpose Dams Act (1966)."[204]

Taking account of Lee's experience of studying civil engineering at Nihon University and his reference to Japanese postwar comprehensive development, it is apparent that Lee drew his ideas from large dam construction projects in Japan. In the early post-World War II period, Japanese intellectuals and policymakers reconceptualized Japan's domestic landscape as a resource to deal with the anticipated economic crisis resulting from decolonization and unstable overseas market in the Cold War.[205] Borrowing TVA as a postwar development model, Japanese elites envisioned a situation where dams would convert Japan's hydrosphere into a manageable resource for rebuilding of the economy. This TVA-type comprehensive development and postwar economic boom in Japan would have inspired Lee and the BOWR technocrats to frame water as a resource for industrializing the nation.

However, the BOWR had difficulty scaling up the large multi-purpose dam construction plan due to the conflicts between the government branches. Unlike Japan which had had experiences in establishing cooperation between the ministries for imperial land planning during the era of wartime mobilization, South Korean ministries were competing to take the leadership of postwar nation-building.[206] The MCI and the KEPCO, managing agencies of the large dam constructions since the Korean War including the Chuncheon Dam and the Seomjingang Dam, suppressed the BOWR's water resources development plan so they would not lose control of the

[204] Ministry of Construction, "Sujawŏn Chonghapkaebal 10kaenyŏn Kyehoek (1966-1975) [10-Year Plan for Comprehensive Water Resources Development (1966-1975)]" (Seoul, 1966).
[205] Eric Dinmore, "Concrete Results? The TVA and the Appeal of Large Dams in Occupation-Era Japan," *The Journal of Japanese Studies* 39, no. 1 (2013): 1–38.
[206] Aaron S. Moore, *Constructing East Asia: Technology, Ideology, and Empire in Japan's Wartime Era, 1931-1945* (Stanford, CA: Stanford University Press, 2013, 79-80.

nation's dam business.[207] The Economic Planning Board and the Ministry of Finance also opposed the BOWR's multi-purpose dam construction plan with concern for the overspending.[208]

In the time when the BOWR was struggling to prove its value in the developing nation, world-leading hydrologists proposed a plan to promote "scientific hydrology."[209] Hydrologists under the leadership of the International Association of Scientific Hydrology demonstrated the necessity of an international hydrology program to solve global water problems and elevate the status of their field, which lagged behind other scientific disciplines.[210] The hydrologists argued that the program should embrace as many participants as possible from policymakers in developing nations interested in practical solutions to water problems to scientists in the advanced nations who had intellectual interests. To this end, they chose to initiate the program in consultation with international non-governmental organizations.[211]

After a series of preparatory meetings, in January 1965, hydrologists led UNESCO's declaration of the International Hydrological Decade (IHD).[212] This worldwide program aimed to expand teaching, training, and research of hydrology with the notion that water circulates all around the globe; therefore, water could be effectively studied only with international cooperation. Activities of this program included installing water measurement stations and

[207] Ministry of Commerce and Industry, "Chŏnwŏn'gaebalsamuirwŏnhwajoch'iŭi Kŏn [The Unification of Power Resources Development]," 1963.
[208] National Institute of Korean History, "1960~70Nyŏndae Kyŏngje Kowigwallyoege Tŭnnŭn Han'gukkyŏngjejŏngch'aegŭi Suripkwa Chip'aeng Kusul Ch'oejongsŏng [The Establishment and Enforcement of Korea's Economic Policy Listening from an Elite Economic Bureaucrat during the 1960s~70s Oral History Choi" (Gwacheon, Korea, 2009), 33.
[209] Max Adam Kohler, "The International Hydrological Decade," *World Meteorological Organization Bulletin* 12, no. 4 (1963): 193–97.
[210] Raymond Lee Nace, "The International Hydrological Decade," *Transactions, American Geophysical Union* 45, no. 3 (1964): 413–414.
[211] Kohler, "The International Hydrological Decade," 194.
[212] Paul Bock, "Year One of the International Hydrological Decade," *Transactions, American Geophysical Union* 46, no. 4 (1965): 657–60.

gathering and interpreting hydrologic data to better understand water circulation.[213] In order to achieve this goal, the program made it mandatory for each participating country to organize a committee, while encouraging collaboration coordinated by international agencies and scientific associations.

This IHD program entailed the universalization of the notion of the hydrologic cycle and large-scale technical solutions. Water circulation on Earth was not a totally new idea, but the simplified hydrologic cycle diagram was a modern invention that helped state planning agencies make water visible. Specifically, in the era of New Deal programs, the US state officials employed the visual representation of the hydrologic cycle to normalize massive engineering intervention and nation-scale water control.[214] In the same manner, the IHD emphasized that humans had to manage water, "a gift from God," which had been wasted.[215] Articulating water problems across the world, from water pollution to human conflicts over water resources, the IHD argued that we first needed to deepen our scientific understanding of water circulation before considering how to construct infrastructure for securing enough water resources.

The IHD also naturalized modern industrial development originated from Western society. The cover story of *Time* published on October 1, 1965, introduced hydrology and the IHD, saying "[T]he world's demand for water will double" due to "the result of modern industrial society's increasing and unquenchable thirst."[216] The article stated that the increasing water demand would come from the use of modern technologies at home, including "bathtubs,

[213] Nace, "The International Hydrological Decade," 415.
[214] Jamie Linton, "Is the Hydrologic Cycle Sustainable? A Historical–Geographical Critique of a Modern Concept," *Annals of the Association of American Geographers* 98, no. 3 (2008): 636-637.
[215] Time, "Hydrology: A Question of Birthright," October 1965.
[216] Ibid.

dishwashers, washing machines, and lawn sprinklers."[217] The production of petroleum, steel, and synthetic rubber would also require a huge amount of water. Framing industrial society as the goal of the entire global population, the article presented scientific hydrology as a way to prepare for skyrocketing water demand.

This international initiative for scientific hydrology provided the BOWR with an opportunity to promote its comprehensive water resources development. Drawing on UNESCO's IHD program, the BOWR aimed to raise the importance of multi-purpose dam construction in the nation's economic development scheme. Yet, the BOWR had difficulty recruiting hydrologists who would take charge of hydrological research, surveys, and an education as members of the national IHD committee. Even the technocratic leaders in the BOWR mostly had a background in civil engineering but lacked training as hydrologists. They only learned about hydrology from the periodicals and reports obtained from the US foreign aid agencies and the United Nations Economic Commission for Asia and the Far East [218]. Most of the personnel in the bureau were hydroelectric plant technicians transferred from other government agencies rather than hydrologists.[219]

[217] Ibid.
[218] Kyeho Kim, "Murŭi Iron'gwa Shilch'erŭl Kyŏmbihan Kojaeung Sŏnbae [Jae-Ung Ko Who Is Proficient in Both Theories and Practices of Water]," *Mulgwa Mirae [Water for Future]* 31, no. 5 (1998): 7–8.
[219] Kim, "Han'gugŭi Taem (4) [Dams of Korea (4)]," 84.

[Figure 11] IHD Commemorative Postcard and Stamp Issued in South Korea

(Source: https://rammb.cira.colostate.edu/dev/hillger/ihd.htm)

Because having a national committee was mandatory to participate in the IHD, the BOWR still established the "Water Resources Development and Hydrological Survey Committee" by executive order in April 1965. With administrative support from the BOWR, the committee was supposed to consist of thirty-one members who had had academic training or experience in hydrological studies.[220] However, as expected, the committee was merely a nominal representative organization that took charge of the IHD program in South Korea. During the first year, the committee only had one meeting, and no government budget was allotted for any

[220] Ministry of Government Administration, "Sujawŏn'gaebalmitsumunjosashimŭiwiwŏnhoegyujŏng(Taet'ongnyŏngnyŏng 2120ho) [Water Resources Development and Hydrological Survey Committee Rules (Executive Order 2120)]," 1965.

domestic IHD program.[221] The bigger problem was the limited researchers and technicians who could take over hydrological research and surveys. Moreover, no universities in South Korea had the curriculum to train experts and researchers in the field of hydrology.[222] South Korea registered its name on the list of IHD participating countries by establishing the committee, but in practice, the committee had meager capacity to initiate hydrological studies in South Korea.

From Hydraulic Engineering towards Scientific Hydrology

While the IHD program lost its momentum in South Korea, several civil engineering professors were pioneering the field of "*水理學* (Surihak)," meaning studies on the principles of water. The equivalent word in English is hydraulics, which studies the mechanical behavior of water in the physical system based on fluid mechanics and hydraulic experiments. One of the leading researchers in hydraulic engineering was Ahn Soo-hahn (1925-2008), a professor in the Department of Civil Engineering at Seoul National University (SNU). Ahn had all of his education from Japan since middle school and graduated from the Department of Civil Engineering at Kyushu University in 1951. While studying at the Graduate School of Tokyo University, he came back to Korea to take a lecturer position at Seoul National University (SNU) in 1954.[223]

[221] Kyunghyang shinmun, "Segyeŭi Taeyŏresŏ Han'guk'aksurŭi Kukchech'amyŏ (2)Kukchesumun'gaebalgyehoek [International Participation of Korean Scholarship in the World (2) International Hydrological Development Plan]," January 12, 1966.
[222] Kyunghyang shinmun, "Kukchemulgaebal 10kaenyŏn'gyehoek [International Water Development Ten-Year Plan]," August 28, 1965.
[223] Chong Kun Pyun, "Konghakpu-Ansuhan Paksa Hoesangnok [Engineering Department-Memoirs of Dr. Ahn, Soo-Hahn]," 2015, https://kast.or.kr/kr/member/memoir.php?bbs_data=aWR4PTk2MDkmc3RhcnRQYWdlPTEwJmxpc3RObz0yNiZ0YWJsZT1jc19iYnNfZGF0YSZjb2RlPWh1aSZzZWFyY2hfaXRlbT0mc2VhcmNoX29yZGVyPQ==%7C%7C&bgu=view&idx=9609&PHPSESSID=09d77499d370366409d2cc2742fa25fa&ckattempt=1. Accessed on February 23, 2022.

During his early career, Ahn Soo-hahn was interested in flood prevention. In the year he was appointed at SNU, Ahn published an article in the College of Engineering Bulletin, *Puramsan*. The article interpreted the importance of the national afforestation from a perspective of hydraulic engineering, arguing that afforestation could help stabilize water runoff in a river.[224] Ahn published more technical articles in the *Journal of the Korean Society of Civil Engineers*, discussing formula calculations and experiments to examine the water flow of a river.[225] He also designed the first hydraulic laboratory in South Korea at SNU with assistance from an American civil engineering professor, Harold Babbitt, who visited South Korea to advise the College of Engineering of SNU.[226] Ahn's overall research agenda focused on interpreting water flow for the purpose of river control and flood prevention.

Ahn's focus on flood prevention led him to depict nature as an evil to humankind and something that had to be dominated. In an editorial he wrote in the nation's one of the leading newspapers, Ahn cited a novel, *The Good Earth*, written by Pearl S. Buck, articulating that floods and droughts were "merciless punishment" to Chinese peasants who "only loved and complied with nature".[227] Ahn also brought a case of TVA, saying that a river in Tennessee had been an "intractable tyrant," but it became totally under the control of humans after a decade of

[224] Soo-hahn Ahn, "Kukt'onok'waŭi Kwahak'wa [Scientization of Homeland Afforestation]," *Puramsan [Puram Mountain]* 17 (1954): 16–19.
[225] Soo-hahn Ahn, "P'yŏnggyunyusokkongshige Taehaesŏ [On the Mean Velocity Formula of Flow]," *Taehant'omok'ak'oeji [Journal of the Korean Society of Civil Engineers]* 4, no. 1 (1956): 6–14; Soo-hahn Ahn, "Surimohyŏngshirhŏme Taehayŏ (1) [On the Experiment of the Hydraulic Models (1)]," *Taehant'omok'ak'oeji [Journal of the Korean Society of Civil Engineers]* 5, no. 2 (1957): 1–12; Soo-hahn Ahn, "Unit HydrographE Taehayŏ [On the Unit Hydrograph]," *Taehant'omok'ak'oeji [Journal of the Korean Society of Civil Engineers]* 7, no. 1 (1959): 33–38; Soo-hahn Ahn, "Hach'ŏnyusae Taehan Myŏtkaji Koch'al [Research on River Sediment]," *Taehant'omok'ak'oeji [Journal of the Korean Society of Civil Engineers]* 8, no. 1 (1960): 19–28.
[226] Harold E. Babbitt, "College of Engineering, Seoul National University: Final Report of Adviser in Engineering," 1961; Soo-hahn Ahn, "Sŏulgongdae Surishirhŏmshirŭi Kaeyo [Sketch of the Hydraulic Laboratory at Seoul National University College of Engineering]," *Taehant'omok'ak'oeji [Journal of the Korean Society of Civil Engineers]* 10, no. 1 (1962): 119–22.
[227] Donga Ilbo, "Hongsunŭn Ch'ŏnjaein'ga [Is Flooding a Natural Disaster?]," July 4, 1963.

conflicts against nature.[228] He concluded that nature gives punishment to neglectful people in the form of floods and droughts as in South Korea where rivers were completely out of control.

Ahn attributed this failure of taking control of nature to the outdated river levees constructed during the Japanese colonial period (1910-45). He claimed that the colonial river management system was built without considering future riverbed changes. According to Ahn, sediment deposition had been accumulated on the bottom of rivers for more than 30 years, making even a small amount of precipitation result in floods. Saying that "rivers are alive," Ahn emphasized the studies on fluctuating water flows and the rebuilding of the flood prevention system ill-designed by Japanese colonizers.[229]

Ahn connected this anti-colonial sentiment to his call for national support in hydraulic engineering. He asserted that river management inevitably requires national support because research for improving the flood prevention system necessitates a huge amount of resources that are not affordable to an individual or an organization. In this vein, Ahn asked for the establishment of a national hydraulic laboratory in which researchers could model the rivers in the nation. At the end of the editorial, Ahn noted that "there was a political revolution (May 16 coup d'etat led by Park Chunghee), but why haven't we had a scientific and technological revolution although it is more important?".[230] Ahn concluded that scientists and engineers should play a key role in building the nation.

As a way to expand hydraulic engineering in South Korea, Ahn formed a research group by gathering professors from different universities. Ahn worked closely with two early-career scholars, Lee Won-hahn and Choi Young-bak, who both graduated from SNU. They learned

[228] Ibid.
[229] Ibid.
[230] Ibid.

from Professor Won Tae-sang (1903-1976), who had studied civil engineering from Keijō Higher Technical School and worked at the Bureau of Home Affairs under the Government-General of Korea before teaching at SNU.[231] After studying river engineering and hydraulics at SNU, Lee gained a professor position at Pusan National University and Choi was hired at Chunggu University, both located in the southern part of the Korean peninsula. Ahn asked Lee and Choi to come to Seoul in order to have more close interactions and construct a hydraulic engineering research collective.

Fortunately, both Lee and Choi could find their new positions in Seoul without difficulty thanks to increasing demands for civil engineers for postwar national infrastructure-building.[232] Lee joined the Civil Engineering Department at Yonsei University, and Choi had a position at the Civil Engineering Department at Hanyang University.[233] Gathering in Seoul, Ahn, Lee, and Choi organized a "Hydraulic Engineering Research Group," inviting six more professors. The group held the first research meeting at SNU on January 21, 1964, with Ahn's presentation on his paper, "Experiment of the Muju Dam Spillway Hydraulic Model".[234] The research group decided to have meetings twice a year to share their research among the members.

This group of hydraulic engineers took an opportunity to participate in the IHD, advertising their expertise and obtaining support from the government. According to the request

[231] Keijo Higher Technical School was later incorporated into the College of Engineering at SNU. For the early history of hydraulic engineering in SNU, see these memoirs, Won-hahn Lee, "Wŏllo Sugonghakcha Chŏngam Wŏnt'aesangbaksaŭi Sam [Life of a Senior Hydraulic Engineer, Chŏngam Won, Tae-Sang]," *Han'guksujawŏnhak'oe Haksulbalp'yohoe [Korea Water Resources Association Conference]*, 1993, 27–36; Young Bak Choi, "Mul, Hach'ŏneŭi Naŭi Hoego [My Retrospection of Water and Rivers]," *Mulgwa Mirae [Water for Future]* 30, no. 6 (1997): 11–26.
[232] Kichun Kang and Hyungsub Choi, "Kongŏm Ŏmnŭn Konghang: 1950-60nyŏndae Sŏultaehakkyo Konggwadaehagŭi Chihyanggwa Hyŏnshil [Engineering without Industry: The Vision and Reality of Seoul National University College of Engineering in the 1950s and 60s]," *Sahoewa Yŏksa [Society and History]* 119 (2018): 52.
[233] Won-hahn Lee, "Han'gung Sugonghagŭi Palchach'iwa Pijŏn [History and Vision of Korean Hydraulic Engineering]," *Mulgwa Mirae [Water for Future]* 41, no. 1 (2008): 61–66.
[234] Han'guksujawŏnhak'oe, *Han'guksujawŏnhak'oe 30nyŏnsa [30-Year History of the Korean Water Resources Association]*, 48.

from the BOWR, members of hydraulic engineering joined the national committee for the IHD program.[235] The first task for initiating the IHD in South Korea was to arrange the glossary as well as the translations of English terms in hydrology. In the summer of 1967, the BOWR requested Choi Young-bak and Lee Won-hahn to join the committee for reviewing the terminology of hydrology.[236] The glossary committee also included one professor from SNU College of Agriculture, and three technocrats from the Ministry of Agriculture and Forestry, the Agricultural Development Corporation, and the Central Meteorological Service.

In the process of selecting and defining terminology, Choi and Lee had to deal with the interdisciplinarity of hydrology. The committee translated hydrology to "水文學 (*Sumunhak*)," studies about water, and articulated that deciding the glossary would be the first step toward facilitating communications among scholars from different disciplines. Choi and Lee had expertise in mechanical studies of water based on hydraulics, but studying water circulation—the core theme of hydrology—also needed perspectives of meteorology, geology, silviculture, soil science, and agriculture. Committee members with different backgrounds underwent conflicts for identifying some of the terms and kept offering different opinions, so they had to stop the meeting from time to time. The committee mentioned that this difficulty stemmed from the nature of hydrology. In the introduction of the glossary, the committee stated that

> Academic terms in *Sumunhak* have not been determined and entirely standardized even in advanced countries except for some of them. This is because, first, hydrology is a recently developed field in relation to many other disciplines, and its boundary is changing and expanding. Also, technicians and scholars responsible for academic terms have different perspectives and interests although they have common concepts.[237]

[235] Ibid, 17.
[236] Ibid, 8-10.
[237] Ministry of Construction, "Kŏnsŏryongŏjim (Sumunp'yŏn) [Construction Glossary (Hydrology)]," 1967, 4.

As the glossary committee noted, hydraulic engineering alone could not cover all the dimensions of "scientific hydrology" coined by the IHD, which called for a comprehensive understanding of water circulation in the environment. Scientific hydrology required other types of expertise than mechanical studies on water movement in order to investigate water circulation in the ecological system. To that end, the BOWR requested the glossary committee team to organize an interdisciplinary association for hydrological surveys and research to assist the government and the initiation of the IHD in South Korea. According to this request, the hydraulic research group had a meeting on July 29, 1967, to prepare for establishing an association. Hydraulic engineering research group members, including Ahn Soo-hahn Ahn, Choi Young-bak, and Lee Won-hahn, took part in the preparatory committee which also included scholars from other relevant fields.[238]

Governmental attention to hydrology, triggered by the international initiatives, provided the hydraulic engineers with both opportunity and challenge. The hydraulic engineering research group had a chance to expand its community. The government needed the group's expertise to initiate the IHD program and promulgate the comprehensive water resources development plan, and the hydraulic engineers aspired to demonstrate their important role in the developing nation. However, members of the research group had to redefine their expertise and engage with those from other disciplines to fill the gap between hydraulic engineering and scientific hydrology.

Identifying Hydrology for the Industrial Nation

[238] Han'guksujawŏnhak'oe, *Han'guksujawŏnhak'oe 30nyŏnsa [30-Year History of the Korean Water Resources Association],* 29-30.

While the preparatory committee internally had difficulty defining hydrology, it was eager to publicly promote the discipline. As one way to publicize hydrology, the team issued an IHD commemorative postcard that depicts society centered on an engineered river.[239] The postcard image pictured rain falling to the reservoir and water contained and released from the dam. Leaving the reservoir, water keeps running through a linearized stream of a river being joined by other straight streams. As a river flows downstream, it passes through farming land, a bridge, irrigation facilities, and a factory. This simplified image of a river delivered a message that a well-regulated river harmonized with society facilitates human economic activities. The postcard depicted an imaginary river engineered by hydrological experts. The description of the stamp issued with this postcard stated that "[T]he purpose of initiating hydrology as an international project is … to gain the full benefit from water. … As we suffer from no little flood and drought damages, development of hydrology is absolutely necessary."[240]

Around the end of 1967, the preparatory committee established the association and named it "*水文協會* (Sumunhyŏp'oe)" with its English name as the "Korean Association of Scientific Hydrology (KASH)." The association stated its mission as follow:

> Water … contributes to development of culture, industry, as well as daily life, but on the other side, its intimidating destructive power threatens life and severely impedes industrial development in a form of flood. … [The initiative from the IHD] clearly proves how the development of scientific hydrology has a great influence on the national building of industry and its development. … Following the international and domestic trends, we are establishing the KASH to make a groundbreaking leap for the nation's development of hydrological technology,

[239] Ministry of Communications, "Postage Stamp to Commemorate International Hydrological Decade," 1967.
[240] Korea Stamp Portal Service, "Kukchesumun'gaebal 10kaenyŏnsaŏm Kinyŏm [Commemorating the International Hydrological Decade]," accessed February 7, 2021, https://stamp.epost.go.kr/sp2/sg/spsg0102.jsp?tbsmh15seqnum=636&tbsmh01seqnum=2160&page_num=239&mainThemeCode=&stampCode=&yearCode=&strKeyword=. Accessed on February 23, 2022.

> which had lagged behind, by advancing the scientific process of hydrology and actively participating in making water policy.[241]

The association justified the value of its expertise by emphasizing hydrology as a means to expand industries in the nation. This identity-building echoed President Park's emphasis on industrialization in the first year of the second five-year economic development plan (1967-71). In his 1967 new year's address, Park framed Asia as the "hardship area" where the Free World was facing challenges arising from Communist China and the Vietnam War.[242] He argued that, through the past years, South Korea had grown as a leading country in building the Asia-Pacific community within this global circumstance. As the nation moved to the second phase of the economic development plan, Park declared 1967 as the "year of progress". Park highlighted building South Korea as the "shining industrial nation" in Asia, speaking that "Let's unite the government and the people as one and launch a full-scale operation to build the nation based on the industry!"[243] The KASH's mission argued that hydrological experts could be legitimate contributors to this elite state vision of industrializing the nation.

KASH constructed a close relationship with the government by appointing an elite technocrat, Kim Yoon-ki (1904-1979), as the first president of the association.[244] At the time, Kim was the Minister without Portfolio for Economic Affairs as well as the president of the Korean Federation of Science and Technology Societies. Kim had also served the Minister of Transportation, the Minister without Portfolio for State Affairs, and the Minister of

[241] Korean Association of Scientific Hydrology, "Han'guksumunhyŏp'oesŏllipch'wiji [The Mission of the Establishment of the Korean Association of Scientific Hydrology]," 1967.
[242] Chunghee Park, "1967nyŏn Taet'ongnyŏng Yŏndugyosŏ [1967 Year's Address]," 1967.
[243] Ibid.
[244] Ministry of Government Administration, "Sadanbŏbin 'Han'guksumunhyŏp'oe'Sŏllip'ŏgasŏ [Permission to the Establishment of the Korean Association of Scientific Hydrology]," January 9, 1968. BA0938371 National Archives of Korea.

Construction.[245] However, this elite bureaucrat had never had any experience in the area relevant to water management. In his early career, Kim studied architecture at Waseda University in Japan and worked at the Bureau of Railway Management under the Government-General during the colonial period. After the liberation from Japan, he continued building his career at the Ministry of Transportation.

The appointment of Kim as the president reflected the association's position as a partner of the government in building the nation's economy, industry, and progress. In the preface of the first issue of the association's journal, president Kim stated that

> It is unsatisfactory that the ideas that support and lead it [water resources development] remained only in academia, a research community of particular scholars. Politicians, scholars, and the people have to be united as one and push forward water development by mobilizing all the wisdom and knowledge. … In the time of establishing our nation's international position as a membership country of the IHD, we should be the people who know water and utilize water.[246]

Along with Kim's call for cooperation, the association framed a water problem from a national scale. The association especially problematized a projected lack of water supply in the near future of developing South Korea, pointing out that water supply was not following the increasing water demand caused by the rapid expansion of industrial facilities.[247] The association argued that this shortage of water supply might have been attributed to the obsolete water supply and storage system, but the fundamental problem lay in the insufficient amount of fresh water

[245] Maeil Business Newspaper, "Muimsojanggwan'gimyun'gi Hagihimdŭn Changgwanjari4pŏn Kajŏnginajikchangesŏ Wan'go [The Minister without Portfolio Yoon-Ki Kim Has Had the Hard-to-Be Minister Positions for Four Times Obstinate at the Office as Well as Home]," October 4, 1967.
[246] Yoon-ki Kim, "Taeŏŭi Kwangjang Toegirŭl [Hope to Be a Square of Correspondence]," *Mul [Water]* 1, no. 1 (1968): 8.
[247] Chosŏnilbo, "Yŏnch'oe Sŏlliptoen Han'guksumunhak'oe [The Korean Association of Scientific Hydrology Established Early This Year]," March 3, 1968.

rather than unsatisfactory water supply facilities. To this respect, the association argued for a comprehensive plan for the efficient use of the nation's entire riverine system.

The installation of Ahn Kyung-mo in 1969 as the second president of the KASH furthered the association's close relationship with bureaucracy. Ahn had led water resources development in South Korea since he contributed to the creation of the BOWR in 1961, but he was an elite construction technocrat rather than a hydrologist. He started his career at the Railway Bureau of the Government-General of Korea in 1939 after studying civil engineering at Tokushima Higher Technical School.[248] After liberation, he kept working in the Ministry of Construction and the Ministry of Transportation and participated in the nation's "modernization" projects, including the First Five-Year Plan, Ulsan industrial city planning, and Gyeongbu highway construction.[249] Later, in December 1967, he began to serve as the CEO of the newly established state-owned enterprise, the Korea Water Resources Development Corporation (KWRDC). Ahn reminisced his time in the KWRDC as an extension of his career as a construction technocrat, proudly saying he dedicated himself to "change the map" of the nation with large dams.[250]

The cooperation between the BOWR and the KASH was mutually beneficial. The BOWR expected that the KASH would promote the bureau's idea of comprehensive water development by conceptualizing the natural environment as a national resource to be used for industrializing the nation. In return, the BOWR helped the KASH by offering financial and

[248] Kwater, *Kangsa Ahn Kyung-mo* (Daejeon, Korea: Kwater, 2017), 16.
[249] Ibid, 137-38.
[250] Kyung-mo Ahn, *Chidorŭl Pakkugo Yŏksarŭl Mandŭlmyŏ [Changing a Map, Making History]* (Daejeon, Korea: Han'guksujawŏn'gongsa [Korea Water Resources Corporation], 2002).

administrative support.[251] Under bureaucratic support, members of the KASH rebuilt their expertise in hydrology and took the mission of expanding hydrology to rationalize comprehensive water development.

Neither Colonial River Management nor American Hydrology

Following the inauguration of the KASH president, Ahn Kyung-mo wrote a foreword to the association's journal, *Murŭi kwahak [Science of Water]*, with the title, "Water Is a Commodity." He wrote that

> Receiving periodic attention, development of water resources is a vital task, which will support prosperity of the 70s by surveying major rivers, strategically build multi-purpose dams, and supplying residential, agricultural, and industrial water. … *Science of Water* is published to train personnel and establish a right vision that water is a commodity with enlightenment about water problems, dissemination of scholarship, and comprehensively dealing with technical problems of water development.[252]

Leaders of the KASH utilized their rebranded expertise, hydrology, to secure government support, but at the same time, they struggled to build their identity. To this point and as noted by Ahn, the association's journal, *Water Science*, provided a window through which to explore how the members of the KASH framed water issues and identified themselves. One of the enthusiastic contributions to the journal was Choi Young-bak, one of the founding members of the hydraulic engineering research group.[253] He was the only researcher who authored an article in every issue of *Water Science* for the first five years. His early publications in the journal paid

[251] Han'guksujawŏnhak'oe, *Han'guksujawŏnhak'oe 30nyŏnsa [30-Year History of the Korean Water Resources Association],* 10-11; 23.
[252] Kyung-mo Ahn, "Murŭn Hanaŭi Sangp'umida [Water Is a Commidity]," *Murŭi Kwahak [Science of Water]* 2, no. 2 (1969): 9.
[253] Choi Young-bak moved from Hanyang University to Korea University in 1967.

attention to analyzing the current status of water resources development in South Korea and suggesting a future development direction rather than technical solutions to a specific problem. The broader framework in his writings indicates how advanced civil engineers redefined the natural environment and the nation's economy through the lens of water development, as they were rebranding themselves as hydrologists.

Responding to President Park's vision and the mission of the KASH, Choi Young-bak presented the TVA as a model for industrializing the nation. In projecting South Korea in the 2000s, Choi anticipated the rapid increase of urban population, the expansion of heavy and chemical industry, and the improvement of living standards.[254] Choi argued that this change would increase the total amount of annual water use in the nation from 9.2 billion tons in 1968 to 26.8 billion tons in 2001. Mentioning that the TVA transformed the Tennessee Valley, notorious for heavy rain and flooding, into one of the most industrial districts in the US, Choi suggested multi-purpose dams as a key towards industrial society.[255] Choi added that South Korea lacked hydrological research which led the success of TVA in the US.

Choi's engagement in hydrology led him to present a domestic water problem from the perspective of water circulation subject to the local environment. Representing South Korea's environmental conditions, Choi drew on data produced by the Government-General of Korea. Choi calculated that the nation annually has 114 billion tons of water by simply multiplying annual average precipitation (1,159 mm) and the nation's land area (98,477 km^2).[256] Then he

[254] Young-bak Choi, "Urinara 2000nyŏndaerŭl Wihan Mul Sugŭpkwaje [Issues for Water Supply and Demand for Our Country in the 2000s]," *Murŭi Kwahak [Science of Water]* 3, no. 1 (1970): 20–21.
[255] Young-bak Choi, "Sujawŏn'gaebalgwa Irŭl Wihan Kungnaeoe Chegisultonghyang [Water Resources Development and Domestic and Foreign Technology Trends for It]," *Murŭi Kwahak [Science of Water]* 1, no. 1 (1968): 12.
[256] Young-bak Choi, "Urinara Yongsu Sugŭp'yŏnhwanggwa Sujawŏn'gaebalbanghyang [The Water Supply and Demand Status and the Water Resources Development Direction in South Korea]," *Murŭi Kwahak [Science of Water]* 4, no. 1 (1971): 37.

subtracted 51 billion tons of water loss resulting from evaporation and other causes, identifying that the nation has 63 billion tons of "permanently recyclable water resource."[257] This amount of water resources was enough for the nation considering the expected national water demand of 26.8 billion tons in 2001, but according to Choi, South Korea used only 9.2 billion out of 63 billion tons of available national water resources.[258]

Choi pointed out that the nation had hostile natural conditions for utilizing river water. First, Choi mentioned that the nation has uneven precipitation distribution throughout the seasons. He explained that South Korea has a hot and humid summer because of high pressure formulated as the maritime tropical air mass from the North Pacific meets the maritime polar air mass from the Sea of Okhotsk.[259] This meteorological event as well as typhoons that mostly occur between July to September, produced heavy rain. Choi claimed that, even though the peninsula had enough rain, a huge seasonal difference made it difficult to steadily use river water. Choi also indicated that sixty-eight percent of the land area is mountainous with a steep slope, so that water quickly flows toward the downstream, resulting in unstable water flow.[260] Due to these conditions, Korean rivers have much higher river regime coefficients—the ratio of maximum discharge to minimum discharge throughout the course of a year— compared to other rivers in the world. For example, the coefficients of the two longest rivers in South Korea, the Han River and the Nakdong River, are 393:1 and 372:1 respectively, while those of the well-known Rhine, Yangtze, Nile, and Mekong Rivers are 14:1, 22:1, 30:1, and 35:1.[261]

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[257] Ibid.
[258] Choi, "Sujawŏn'gaebalgwa Irŭl Wihan Kungnaeoe Chegisultonghyang [Water Resources Development and Domestic and Foreign Technology Trends for It]," 21.
[259] Choi, "Urinara Yongsu Sugŭp'yŏnhwanggwa Sujawŏn'gaebalbanghyang [The Water Supply and Demand Status and the Water Resources Development Direction in South Korea]," 36-37.
[260] Choi, "Sujawŏn'gaebalgwa Irŭl Wihan Kungnaeoe Chegisultonghyang [Water Resources Development and Domestic and Foreign Technology Trends for It]."
[261] Ibid, 12.

Choi employed these tough river conditions to legitimize localized hydrological research for water resources development. During the colonial period, Japanese officials studied monthly precipitation and streamflow for the purpose of flood prevention that repetitively occurred in Korea during the summer.[262] Drawing on the same data, Choi articulated that Korean rivers had distinctive characteristics, thus national water resources development required a new research program specific to the local environment rather than just applying hydrological techniques from foreign countries. For instance, Choi asserted that many hydrological methods developed in the US during the 1930s were designed based on rivers with "continental" characteristics that were relatively stable and linear waterways.[263] Choi doubted if those methods would be appropriate for interpreting non-linear rivers in the mountainous land of South Korea.

Choi's claim echoes his and his fellow civil engineers' identity-making and positioning in postcolonial/postwar South Korea. In order to define the nation's riverine environment, their scholarship largely drew on survey outcomes produced by Japanese colonizers, such as hydrologic data on rivers. On the other side of the coin, Choi and his fellow engineers concealed the colonial origins of the references to distinguish their work from the Japanese legacy and claim for their own role in studying Korean rivers.[264] At the same time, they appropriated the water resources development ideas of the TVA. However, in order to secure significant support from the government, hydrological engineers had to prove that their research was more than borrowing the Western methods.

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[262] Government-General of Korea, "Chosŏnhach'ŏnjosasŏ [Survey of the Rivers in Chosŏn]."
[263] Choi, "Sujawŏn'gaebalgwa Irŭl Wihan Kungnaeoe Chegisultonghyang [Water Resources Development and Domestic and Foreign Technology Trends for It], " 13.
[264] Colonial Data became available as the BOWR gathered and organized them. Ministry of Construction, "Han'guksumunjosasŏ: Suwip'yŏn [Hydrologic Data in Korea: Records of Water Level," 1961; Ministry of Construction, "Han'guksumunjosasŏ: Uryangp'yŏn [Hydrologic Data in Korea: Rainfall Records]," 1963..

To this end, Choi highlighted the "locality" and "historicity" in investigating the relationship between water and human activities.[265] By locality, he meant that each nation should employ a different approach to using water in its natural environment. Choi argued that there is no universal way of developing water resources; but, every river engineering practice should be based on a specific survey and a construction method corresponding to a local condition. He also added temporality to river engineering, saying that its purpose changes depending on the needs of the times. The conclusion was that "If [we] do not understand that a direct purpose of river management varies from country to country as well as according to the times, … river improvement should fail."[266] By defining temporal and spatial specificity of river engineering, Choi aspired to establish South Korea's own hydrology program, keeping distance from colonial river management (historicity) and hydrological methods developed from the US (locality), concealing that both are essential sources on which to draw.

Choi went further to conceptualize the relationship between nature, society, and technology in river engineering. Choi explained that water, human, and technology interact with each other. In an advanced society, the reaction of natural force to human action becomes larger and stronger as people utilize more water from the natural environment, which would bring about unexpected outcomes.[267] Choi gave an example that a layer of sediment accumulated on a riverbed over time could cause a malfunction of an artificial waterway.[268] Dam-building also divides a river, resulting in the accumulation of sediment upstream and riverbed scour

[265] Young-bak Choi, "Mul Chawŏnmunjeŭi Koch'albangbŏp [A Study on Water Resources Issues]," *Murŭi Kwahak [Science of Water]* 2, no. 2 (1969): 39–41.
[266] Choi, "Urinara Yongsu Sugŭp'yŏnhwanggwa Sujawŏn'gaebalbanghyang [The Water Supply and Demand Status and the Water Resources Development Direction in South Korea],"49.
[267] Choi, "Mul Chawŏnmunjeŭi Koch'albangbŏp [A Study on Water Resources Issues]," 39.
[268] Ibid, 41.

downstream. Noting that these phenomena have negative effects on society, Choi called for paying close attention to the balance of dynamic interaction between nature, society, and technology.

In this vein, Choi did not present multi-purpose dam construction as a magic bullet. Instead, he argued that a multi-purpose dam should be carefully designed and operated from a hydrological point of view. Choi advocated a multi-purpose dam as the primary solution to a future water problem, but cautioned that "it is excessive to say that multi-purpose dam construction alone can solve all the water problems."[269] He first indicated a contradiction between water use and flood prevention inherent in a multi-purpose dam. In order to generate electricity and respond to increasing water demand, a dam should contain enough water all the time in its reservoir. However, for the purpose of flood prevention, a dam needs to remain empty to prevent heavy rains from flowing downstream. In conclusion, Choi solicited "surveys, planning, and measures for new problems, such as sluice gate operation, upstream and downstream riverbed change, sediment problem in a reservoir"[270]

In the early years, civil engineers associated with the KASH incorporated hydrology in their research agenda and rationalized national water resources development. For Choi Young-bak and other civil engineers who studied hydraulics, participating in the KASH provide a good opportunity to receive government support and better position themselves in the developing nation. The KASH collaborated with the Ministry of Construction, conducting river basin

[269] Choi, "Urinara 2000nyŏndaerŭl Wihan Mul Sugŭpkwaje [Issues for Water Supply and Demand for Our Country in the 2000s]," 22.
[270] Ibid.

surveys as well as providing studies on the national "four major river basin development project" in a special issue of *Water Science*.[271]

However, the identity-making by those engineers and technocrats' interests in leading national development was not without inconsistency. The leader engineers of the KASH advocated the national comprehensive water resources development plan. Yet, as a newly emerged group of researchers, they also aspired to establish their own professional identity standing between colonial legacy and the global influx of hydrological knowledge. Choi conceptualized the "locality" and "historicity" of hydrology for this purpose, but the bureaucrats were only interested in accelerating water resources development to meet President Park Chunghee's vision.

Two Different Dreams

Hydrological engineers' identity-building during the early period could not be separated from colonial river management and Western hydrology. On the one hand, hydrological engineers utilized both of those as useful resources for the sake of contributing to the national development plan and proving themselves in the developing nation. On the other hand, however, hydrological engineers defined the outdatedness of colonial river management and the inapplicability of Western hydrological methods in order to articulate the value of their own research program specific to the environmental conditions found in South Korea. The latter was more important for hydrological engineers as they aspired to construct their professional identity as hydrologists, rather than mere collectors of colonial data or translators of Western hydrological methods.

[271] Han'guksujawŏnhak'oe, *Han'guksujawŏnhak'oe 30nyŏnsa [30-Year History of the Korean Water Resources Association],* 112;128.

Unlike hydrological engineers, technocrats prioritized contributing to Park Chunghee's land-building program. The first project implemented by the Korea Water Resources Development Corporation, since its establishment in 1967 in cooperation with the BOWR, was to reclaim 100,000 pyeong (1 pyeong = approximately 3.3 m^2) of the Han riverside in Seoul.[272] This project, called "Sŏbinggo Reclamation," was feasible due to the comprehensive water development plan. The KWRDC anticipated that large dam construction in the upstream Han River would lower the water level. In this way, the abandoned Han riverside could be free from recurring floods.[273] This reclamation business was successful from both financial and political points of view. The KWRDC earned a profit of 1.7 billion KRW by selling the reclaimed Sŏbinggo area. The corporation also proved their contribution to the national land-building program as they named the reclaimed land "the symbol of modernization, the Han riverside water resources village.[274] This profitable business model proved that investment in dam-building would not be a losing game.[275]

However, hydrological engineers had concerns over the nation's riverside development projects. In his comment on the deadly flood that occurred on August 19th, 1972, which killed two hundred people, Choi Young-bak and Lee Won-hahn mentioned that the disaster resulted from the haphazard city planning of Seoul and an inherent lack of hydrological research. Articulating that cities in advanced nations prohibited urbanization of the lowland, Choi argued

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[272] Maeil Business Newspaper, "5ŏktŭryŏsŏbinggo10manp'yŏngmaerim 4wŏlchungwan'gongk'iro [Reclamation of Seobinggo 100 Thousands Pyung with 500 Million KRW Completion Expected in April]," January 16, 1969.
[273] Ahn, *Chidorŭl Pakkugo Yŏksarŭl Mandŭlmyŏ [Changing a Map, Making History],* 48.
[274] Donga Ilbo, "Han'gangbyŏn Kŭndaehwaŭi Sangjing Sujawŏnch'on [The Symbol of the Han Riverside Modernization, the Water Resources Village]," March 4, 1970; KTV, "709ho Urinŭn Kŏnsŏrhanda [No.709 We Build]," January 18, 1969.
[275] National Institute of Korean History, "1960~70Nyŏndae Kyŏngje Kowigwallyoege Tŭnnŭn Han'gukkyŏngjejŏngch'aegŭi Suripkwa Chip'aeng Kusul Ch'oejongsŏng [The Establishment and Enforcement of Korea's Economic Policy Listening from an Elite Economic Bureaucrat during the 1960s~70s Oral History Choi," 36.

that the government should not overissue construction permits in the areas prone to flooding.[276] His suggestion of turning those areas into parks or flood reservoirs rather than residential or commercial zones opposed the KWRDC's reclamation business.[277] Hydrological engineers further criticized the government's naïve attitude towards a large multi-purpose dam. They pointed out that large multi-purpose dam-building alone could not solve all the issues pertaining to water control and water use. They claimed that a new structure on a river could change flooding areas, water flow, and patterns of sediment deposits, resulting in unexpected damages to society.

[276] Donga Ilbo, "Int'ŏbyu Koryŏdaeigongdaegyosu Ch'oeyŏngbang Paksa Sŏurhasudoshisŏl Chaegŏmt'o Shigŭp [Interview Dr. Choi Young-Bak Professor from the Engineering College at Korea University Re-Examination of the Drainage System in Seoul Is Urgent]," August 21, 1972.

[277] Kyunghyang shinmun, "「Ch'isu」 Ŏmnŭn Toshigaebal Sŏurŭn Mure Yak'ada Chŏnmun'gadŭrŭi Punsŏkŭl Tŭrŏbonda [City Planning without Water Control Seoul Is Vulnerable to Water Listening to Experts' Analysis," August 22, 1972.

[Figure 12] Blueprint of Large Multi-purpose Dam

(Source: Han'gugŭi Mulchawŏn [Water Resources of Korea], 1970)

Hydrological engineers also pointed out the unreliability of colonial hydrologic data and a need for more hydrological research. They questioned the quality of hydrologic data on which river management was based because they had been collected by untrained personnel.[278] According to their claim, the failure of water management would be obvious considering the lack of reliable

[278] Ibid.

data. Here, hydrological engineers labeled colonial data unreliable—the data once used for numerically representing the water resources of the nation—calling for hydrological studies on rivers.

Taking into account the different motivations between research engineers and technocrats, it is not surprising that technocrats appropriated knowledge produced by hydrological engineers in a different way than the expectations of hydrological engineers. A promotional pamphlet published by the BOWR used the calculation of water resources in order to rationalize large dam construction in South Korea.[279] The promotion says that we need to utilize the 56.3 billion tons of "unused water" that flows out of the country. The promotion depicts the dammed utopian world, focusing on the well-managed river that provides water to economic activities in society. While hydrological engineers requested further research, technocrats utilized a hydrological understanding of rivers to envision a developed society enriched with abundant water resources.

Conclusion

Despite the concerns of hydrological engineers, technocrats expedited the implementation of water resources development. Construction technocrats showed confidence in initiating additional large dam constructions with a blueprint that drew upon an engineered river for water use. Technocrats rationalized their costly construction projects with a hydrological representation that human intervention in water circulation would provide affluent water resources, leading South Korea towards becoming an industrial nation. In that sense, the government promotional

[279] Ministry of Construction, "Our Rivers [Uridŭrŭi Hach'ŏn]," 1976.

materials projected a utopian society centered on well-controlled water circulation, rather than a gigantic dam itself as a technology to awe.[280]

Behind this blueprint lay the caution by the hydrological engineers, who argued for "Korean hydrology"—neither colonial river management nor Western hydrology—during the planning and operations of the water resources development. Although the hydrological engineers cooperated with construction bureaucrats, their priority was to build their own research program that consisted of measuring the hydrologic characteristics, conducting and modeling experiments, and developing empirical formulae pertaining to the local environment. They argued that the nation should sponsor hydrological research for more accurate and effective development of the riverine environment, rather than merely bringing in colonial data or applying Western methods. From these hydrological engineers' perspectives, the government's rapid initiative on massive dam-building needed to be slowed down until they had enough of a hydrological understanding of rivers.

In this sense, the propaganda referring to "carving nature" indicates the attempts by elite government officials to conceal the unstable partnership between the government agency and the professional association, indicative of the precarious identity of South Korean hydrology. With the chant of manipulating nature for national interests, elite construction bureaucrats downplayed the hydrological engineers' call for long-term studies and pushed forward with large multi-purpose dam construction. Within this representation of nature, technocrats erased the ironic position of "Korean hydrology" which relied heavily upon colonial data and Western models while simultaneously aspiring to overcome them. "*鑿山導水*" on the wall of Ahn Kyung-mo's

[280] David E Nye, *American Technological Sublime* (Cambridge, MA: MIT Press, 1996).

office was not the representation of human domination over nature led by modern state and science. Instead, leading technocrats publicized the idiom of manipulating nature to expedite large construction projects and contribute to the elite state vision while obscuring the uncertainty of localized scientific and engineering practices standing between the colonial legacy and the global expansion of Western knowledge.

Chapter 5. Water for Industrializing the Nation

On October 15, 1973, the Korean government issued a postage stamp to commemorate the inauguration of the Soyanggang Multi-purpose Dam. Depicting the landscape of the Soyanggang Dam area and its location on the Korean peninsula, this commemorative stamp was issued "in honor of the successful construction of the dam and with the purpose of publicizing its inauguration at home and abroad."[281] President Park Chunghee proudly stated, "[T]his is the largest rockfill Dam in East Asia…Just like everyone else, I am delighted to see the completion of this grand history, an accomplishment major enough to change the map of our nation."[282] The construction of Soyanggang Dam epitomized Park's "*祖國近代化 (Chogukkŭndaehwa*)," modernization of the homeland project.

[281] Ministry of Communications, "Soyanggang Tamokchŏktaem Chun'gongginyŏmup'yo [Postage Stamp to Commemorate the Inauguration of Soyanggang Multi-Purpose Dam]," 1973.
[282] Chunghee Park, "Soyanggang Tamokchŏng Taem Tamsushik Ch'isa [Appreciation for the Start of Receiving Water into Soyang Multi-Purpose Dam]" (Gangwon, Korea, 1972), http://www.pa.go.kr/research/contents/speech/index.jsp, Accessed on March 17, 2021.

[Figure 13] A memorial stamp to mark the completion of the Soyang Multi-purpose Dam

(Source:

https://theme.archives.go.kr/next/stampPoster/stampPosterDetail.do?stampPosterId=DH20000865&stampPosterType=Y&year=ALL)

The image on this stamp exactly captures the elite state vision manifested in the Soyanggang Dam. First, the dam represents national progress. The top left of the stamp features the Taegeuk mark, a symbol of the nation. The dam exemplifies Park's modernization program, as he stated, "[W]e are seeing the evidence before our eyes that we have overcome nature and achieved a triumph through human will."[283] Second, the dam concentrated resources on developing urban and industrial areas. The map on the right side of the stamp only marks Seoul, the Soyang Dam, and the flow of the river along the blue line, implying that the dam was built to supply resources

[283] Ibid.

to Seoul. While Seoul benefited from the Soyanggang Dam, the dam construction marginalized the agrarian and pastoral dam site. Lastly, the stamp shows the nationalized natural environment. The image of green mountains and clear water contained by the dam shows abundant nature. On the one hand, the dammed river became an affluent natural environment of the nation that should be conserved. On the other hand, the image implies that economic activities would take place somewhere else, in industrial districts to which electricity would be transmitted through power lines. The stamp depicts the ideals of what Park aspired to achieve in modernizing Korea.

However, the dam did not serve this vision of modernization in the beginning.[284] Japanese colonial technocrats first surveyed the feasibility of hydroelectric dam construction on the Soyang River during the 1920s. [285] Yet the survey did not lead to the dam's construction because Japanese bureaucrats and dam businesspeople prioritized building hydropower plants in northern Korea according to the empire's policy to industrialize that region.[286] After the liberation from Japanese colonial rule (1910-45) and the Korean War (1950-53), in the late 1950s, American engineers initiated a plan to construct a hydroelectric dam on the site to alleviate the nation's power shortage problem. The US aspired to build South Korea as "freedom's frontier" through technical aid, and the postcolonial and postwar South Korean government imbued the Soyanggang Dam with the spirit of building a self-determined nation.[287]

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[284] Hankyoreh21, "Soyanggangdaemesŏ 4taegangŭl Poda [Looking at the Four Major Rivers from the Soyanggang Dam]," October 11, 2012; Chungang ilbo, "'Han'gangŭi Kijŏk' Sumŭn Kongshin, Soyanggangdaem 40nyŏn [A Hidden Figure of the 'Miracle of the Han River,' 40 Years of the Soyanggang Dam]," October 12, 2013.
[285] Government-General of Korea, *Chosŏn Suryŏk Chosasŏ Ch'ongnon (1930nyŏn) [Collection of Chosŏn Hydropower Survey (1930)]* (Gwacheon, Korea: Kukt'ohaeyangbu [Ministry of Land, Transport and Maritime Affairs], 2010).
[286] Mitsuhiko Kimura and Abe Keiji, *Chŏnjaengi Mandŭn Nara, Puk'anŭi Kunsa Kongŏp'wa [The Nation Made by War, Military Industrialization of North Korea],* trans. Cha Mun-seok and Park Jeong-jin (Seoul, Korea: Mizibooks, 2009).
[287] Kyunghyang shinmun, "Kŏnsŏre Minjokchagyŏlchŏngshin Ttaemch'akkongŭro Samilchŏrŭl Kinyŏm [The Spirit of Self-Determination to Construction: Commemorating the March 1st Movement with the Beginning of Dam Construction]," January 11, 1961; John DiMoia, *Reconstructing Bodies: Biomedicine, Health, and Nation-Building in South Korea since 1945* (Stanford University Press, 2013), 3.

Park Chunghee's regime inherited this dam construction plan after coming into power through the May 16, 1961 coup d'état.

The design of the dam, planned thus far as a smaller hydroelectric dam, was changed into the "largest rockfill dam in East Asia" by a group of emerging water experts who succeeded in adapting themselves to Park's vision of modernization. Those water experts—affiliated with the Bureau of Water Resources and the Korean Water Resources Development Corporation—reframed dam-building from a matter of "power development" to "water resources development" based on hydrological knowledge. By providing a vision of industrializing the nation through water resources development, hydrological experts persuaded Park Chunghee to build a larger multi-purpose dam on the Soyang site in order to maximize water use. As a result, these experts took over the authority for national dam construction from the electrical engineers, the former experts in charge of the dam's construction.

When we detach Park Chunghee's vision of modernization from the Soyanggang Dam and historicize the dam-building, it turns out that the dam construction was the arena of competition between different social groups over establishing the imagery of what Korea should be. Those planned *dams* had embraced different imaginings of developing Korea, but the hydrological engineers finally won out by envisioning the industrialized nation that echoed Park's vision. Yet the friendly relationship between the hydrological experts and the Park regime was never stable. The hydrological engineers had to change the dam's design from a concrete dam to a rockfill dam when the contractor construction company raised an issue with the dam's durability against bombardment by North Korea, another critical concern for the Park regime. After starting to build the dam, the hydrological experts had to expedite the construction following Park's request, ultimately marginalizing and redefining local communities that did not

fit into the scheme of the emerging industrial nation. The Soyanggang Dam was not planned and constructed to serve the Park regime's vision of modernization per se. Instead, the vision of modernization in the commemorative stamp was the outcome of contestation, negotiation, and persuasion among different social groups over identifying what should be the dominant imaginary of national progress and how to be legitimate contributors to constructing that imagery.

As many historical case studies have shown, dam-building is not only a technical intervention in the natural world but a process of social engineering. Karl Wittfogel theorized this tie between water control and social control by examining ancient civilizations.[288] His "hydraulic state" thesis elucidates that building a large-scale water management system inevitably gives rise to a centralized form of bureaucracy, like authoritarian states in Asia. Although some aspects of Wittfogel's idea have since been challenged, scholars have focused on dam-building and water control as a lens through which to investigate the constitution of different forms of political regimes, such as technocratic bureaucracies in the arid American West,[289] Chinese elite socialism,[290] colonial regimes across the world,[291] and global Cold War developmentalism.[292] These studies demonstrate how hydraulic knowledge and management practices reflect and help construct political power in different socio-cultural contexts.

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[288] Karl Wittfogel, *Oriental Depotism: A Comparative Study of Total Power* (New Haven, CT: Yale University Press, 1957).
[289] Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West*.
[290] Pietz, *The Yellow River: The Problem of Water in Modern China*; Judith Shapiro, *Mao's War against Nature: Politics and the Environment in Revolutionary China* (Cambridge, UK: Cambridge University Press, 2001).
[291] Michael E. Latham, *The Right Kind of Revolution : Modernization, Development, and U.S. Foreign Policy from the Cold War to the Present and U.S. Foreign Policy from the Cold War to the Present* (Cornell University Press, 2011); Sara B Pritchard, "From Hydroimperialism to Hydrocapitalism:'French'Hydraulics in France, North Africa, and Beyond," *Social Studies of Science* 42, no. 4 (2012): 591–615.; David Biggs, *Quagmire: Nation-Building and Nature in the Mekong Delta* (Seattle, WA: University of Washington Press, 2010).
[292] Nick Cullather, "Damming Afghanistan: Modernization in a Buffer State," *The Journal of American History* 89, no. 2 (2002): 512–37; Richard P. Tucker, "Containing Communism by Impounding Rivers: American Strategic Interests and the Global Spread of High Dams in the Early Cold War," in *Environmental Histories of the Cold War*,

In a specific Asian context spanning from the expansion of the Japanese empire to postcolonial state-building, Aaron Moore examines dam construction and the emergence of a "technocratic regime of colonial development expertise".[293] His main critique states that technical expertise, formulated from large dam construction projects in colonial Manchukuo and Korea, survived and prospered in the form of power in post-World War II Asia. By highlighting how Japanese colonial engineers later led dam construction in Burma, South Vietnam, Laos, and Indonesia as technical consultants, Moore argues that the wartime-colonial era technocratic regime kept shaping the Asian continent under the banner of economic development.[294] As a result, the Japanese development community brought about "increasing militarization, repressing minorities and dissent, destroying ecologies and environments, and threatening local socioeconomic practices and cultural traditions."[295]

Moore provides an overarching picture of how the technocratic regime originated and swept postcolonial Asia, but we know less about its localization and internal tensions. By examining the dam's own history from planning to construction, I show that different types of expertise and social groups contended over the ideal image of national development. A closer look at the politics involved in dam-building history reveals how dam construction not only leads to the formation of a technical regime, but also serves as a basis for competition among different developmentalist visions.

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eds. John Robert McNeill and Corinna R Unger (Washington, D.C. and New York, NY: German Historical Institute and Cambridge University Press, 2010), 139–66; Christopher Sneddon, *Concrete Revolution: Large Dams, Cold War Geopolitics, and the US Bureau of Reclamation* (Chicago, IL: University of Chicago Press, 2015).

[293] Aaron S. Moore, "' The Yalu River Era of Developing Asia': Japanese Expertise, Colonial Power, and the Construction of Sup'ung Dam," *The Journal of Asian Studies* 72, no. 1 (2013): 115–39.

[294] Aaron S. Moore, "From 'Constructing' to 'Developing' Asia—Japanese Engineers and the Formation of the Postcolonial, Cold War Discourse of Development in Asia," in *Engineering Asia: Technology, Colonial Development and the Cold War Order*, eds. Hiromi Mizuno, Aaron S Moore, and John DiMoia (London, UK: Bloomsbury Publishing, 2018), 85–112.

[295] Ibid, 110.

This chapter will start with the planning of the Soyanggang Dam as a hydroelectric dam, first by Japanese colonizers and later by American engineers. They each injected different conceptualizations of Korea into the Soyanggang Dam, the former as part of an empire and the latter as a Cold War buffer state. Next, the chapter will show how Park Chunghee inherited this hydroelectric dam construction plan when he came into power, but that the dam's design evolved into a much bigger, multi-purpose structure. This change was caused by hydrological experts who claimed the dam for comprehensive water resources development rather than just for generating electricity. Echoing Park's vision of the industrialized nation, hydrological experts were granted the authority to lead the dam's construction. The rest of the chapter will describe how the construction of "modern South Korea" through the dam-building marginalized rural populations and redefined the pastoral rural dam site to create the industrial nation.

Planning the Soyanggang Dam for Electrifying the Nation

The Soyang River flows down from the mountainous and through rural area of Inje-gun in Gangwon-do. This largest tributary in the North Han River basin passes through Chuncheon, the capital city of Gangwon-do, until it reaches its confluence with the Han River. The river then flows west toward the Seoul metropolitan area. During the colonial period, the Soyang River drew the attention of Japanese technical officials who recognized its suitability for hydroelectric dam construction. Sufficient annual water flow, a narrow and steep-sided valley downstream, and its close proximity to Chuncheon and Seoul made the Soyang site a promising candidate as a hydroelectric dam site.

Japanese colonial technocrats included the Soyang River in the Second Hydropower Study (1921-29) that collected data on water flow to evaluate the power generation capacity of

each potential dam site.[296] With this extensive hydropower survey, the Government-General planned to meet the demand of electricity for industrializing and urbanizing Korea. By incorporating various methods, such as flood studies data analysis, hydrometric tests, and measurements of precipitation and streamflow, state engineers concluded that Korea had 150 potential hydropower plant sites with a theoretical average power generation capacity of 1,879,832 kW.[297]

However, Japanese technocrats and business people never initiated dam construction on the Soyang site following the Government-General's industrialization policy.[298] The largest dams built under Japanese colonial rule—including Pujon River Dam (1929) and Changjin River Dam (1938) by Chosen Nitrogenous Fertilizer Company and the Sup'ung Dam (1943) by Yalu Hydropower Company—were in the northern region. Part of the reason was that rivers in North Korea had faster streamflow and higher and tougher mountainous terrain, providing superior conditions for hydropower plants.[299] More importantly, Japanese engineers built dams to supply electricity to heavy and chemical industries in North Korea, constructed under the imperial plan of industrializing barren North Korea with the aim of converting it into a military base camp. Under this policy, fertile South Korea focused on promoting agriculture to stabilize the food

[296] Government-General of Korea, *Chosŏn Suryŏk Chosasŏ Ch'ongnon (1930nyŏn) [Collection of Chosŏn Hydropower Survey (1930)]*.
[297] Ibid, 43.
[298] Moore, "' The Yalu River Era of Developing Asia': Japanese Expertise, Colonial Power, and the Construction of Sup'ung Dam," 119.
[299] Sunsil Oh, "1920-30 Nyŏndae, Shingminji Chosŏnŭi Chŏllyŏkshisŭt'em Chŏnhwanr Kiŏbyong Taehyŏng Suryŏkpalchŏnsoŭi Tŭngjanggwa Chŏllyŏngmang Ch'egyeŭi Kuch'uk [Transformation of the Electric Power System in Colonial Korea, 1920s-30s: The Advent of Private Large-Scale Hydropower Power Plant and Construction of Grid System]," *Han'gukkwahaksahak'oeji [Journal of the Korean History of Science]* 30, no. 1 (2008): 12.

supply of the empire. Within this scheme of constructing colonized Korea as part of the empire, the Soyanggang Dam was removed from the dam builders' priority list.[300]

The Soyanggang Dam received attention again after the Korean War (1950-53) by American engineers who participated in the technical aid program. In the late 1950s, Smith, Hinchman, and Grylls (SH&G), an American engineering and planning firm, investigated possible hydroelectric dam construction sites on the Han River to solve the nation's power shortages. As mentioned earlier, Japanese colonizers built large hydropower plants in the North Korea region. In 1945, when Korea was liberated from Japan, the annual average power generation capacity from north of the 38th parallel was around 942,282 kW, while that from the south was only around 42,520 kW.[301] After the Korean War, the South Korean government constructed several power plants to deal with the nation's deficit in power generation capacity, but power shortages persisted, exacerbated by the increase in power demand for reconstructing the postwar nation.[302]

SH&G engaged in the postwar power development program supported by the US International Cooperation Administration to build a buffer state against the communist North. The SH&G engineers studied the technical and economic feasibility of hydroelectric dam sites, cooperating with the Ministry of Commerce and Industry (MCI) and the Korea Electric Power Corporation (KEPCO).[303] Based on available data and a series of field surveys, SH&G engineers suggested construction plans that included the Chunchon Dam and the Soyanggang Dam on the

[300] Kimura and Keiji, *Chŏnjaengi Mandŭn Nara, Puk'anŭi Kunsa Kongŏp'wa [The Nation Made by War, Military Industrialization of North Korea]*.
[301] Korea Electric Power Company, *Han'gukchŏn'gi100nyŏnsa [100-Year History of Korean Electricity]* (Seoul, Korea: Korea Electric Power Company, 1989).
[302] Kyunghyang Shinmun, "Hwaryŏkkŏnsŏllo Chŏllyŏngnanwanhwa [Alleviating Power Shortage with Thermal Plants]," August 9, 1958.
[303] R. E. Everett, "Letter from R. E. Everett to Korea Joint Venture USOM/SH&G," March 1, 1960.

North Han River. They estimated that the Chunchon Dam would be smaller, with a generating capacity of 50,000 kW and a total construction cost of 19 million dollars, while the larger Soyanggang Dam was expected to generate 86,700 kW with a total construction cost of 36.34 million dollars, owing to the site's advantageous conditions for a hydroelectric power plant.[304] The survey concluded that these hydroelectric dams would benefit the nation's power development because the cost per kilowatt hour of each dam would be less than that of an equivalent thermal plant.

Based on the survey result, SH&G engineers recommended constructing a rockfill-type hydroelectric dam on the Soyang River in lieu of its nearest competitor, a concrete gravity dam, expecting this would reduce construction costs.[305] At the time, South Korea lacked the capacity to produce cement, so building a concrete gravity dam would have necessitated costly and extensive investment in imported concrete. However, materials for constructing a rockfill dam, sand and gravel deposits, could be gathered near the construction site. American engineers anticipated that "unlimited quantities" of aggregates along the river would make the construction cheaper and easier.[306]

The Korean government employed this recommendation from SH&G to present a vision of building a "self-reliant" nation. In 1961, Prime Minister Chang Myon and the Democratic Party planned to hold a national ceremony for the March 1st movement—a public uprising against the Japanese rule over Korea that began on March 1, 1919—near the Soyanggang Dam

[304] Smith Hinchman & Grylls Associates, "Feasibility Study of Hydro Sites on North Han River Part I — Chunchon Hydroelectric Project"; Smith Hinchman & Grylls Associates, "Feasibility Study of Hydro Sites on North Han River Parts II and III — Soyang Hydroelectric Project."
[305] Smith Hinchman & Grylls Associates, "Feasibility Study of Hydro Sites on North Han River Parts II and III — Soyang Hydroelectric Project."
[306] Ibid, 13.

site. By pairing a touchstone event of nationalist sentiment and the Soyanggang Dam construction project, the government used the dam as an important symbol of independent nation-building.[307] The government officials assumed that power generated from the Soyanggang Dam would help the nation establish the foundations for national economic growth.

This Soyanggang Dam construction was part of the Chang administration's national land development program. Through the program, the government aimed to provide jobs, increase national productivity, and build an economically independent nation.[308] Yet, in contrast to the national declaration that the dam would be "constructed by our own hands," the Korean government actually relied on overseas technical assistance. Korean bureaucratic elites consulted the Commander of the U.S. Forces Korea, Carter B. Magruder, and requested technical aid from the Eighth U.S. Army Corps of Engineers in designing and building the dam.[309]

Park Chunghee's military regime that emerged through the May 16, 1961, military coup inherited this ambitious construction plan. After assuming control of the Korean government through the coup, the Military Revolutionary Committee, consisting of Park and his allies, asserted that all of the Chang administration's construction projects should be considered "national tasks."[310] Thus, the military coup embraced the Chang administration's national land development program while claiming that national infrastructure building projects had to be implemented without being dominated by a particular power or political influence. Along with

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[307] Kyunghyang shinmun, "Kŏnsŏre Minjokchagyŏlchŏngshin Ttaemch'akkongŭro Samilchŏrŭl Kinyŏm [The Spirit of Self-Determination to Construction: Commemorating the March 1st Movement with the Beginning of Dam Construction]."

[308] Jin-A Chung, "Changmyŏn Chŏnggwŏnŭi Kyŏngjejŏngch'aeng Kusanggwa Kyŏngjegaebakaenyŏn'gyehoek [John Myon Chang Government"s Economic Policy Initiative and The Five Year Economic Development Plan]," *Han'guksayŏn'gu [The Journal of Korean History]* 176 (2017): 317–57.

[309] Kyunghyang shinmun, "Migun'gisulto Chegong [Provision of American Technology]," January 29, 1961.

[310] Kyunghyang shinmun, "Kukt'ogŏnsŏlsaŏm Kŭdaero Ch'ujin [Forging Ahead with National Construction Projects]," May 18, 1961.

this decision, Park's military regime continued to push forward the Soyanggang Dam construction plan as one of the most significant national construction projects. In terms of construction costs, the Park regime planned to rely on private sector loans from Japan.[311] Ironically, the Soyanggang Dam, once denoted as symbolizing independence from Japanese colonial rule, now drew on funds from Japan.

To design the dam, the Korean government contracted with Nippon Koei, a Japanese consulting engineering corporation established in 1946, based on its colonial experiences of large infrastructure-building. The Korean government selected Nippon Koei as a promising partner because it was one of the prominent dam-building agencies in the second half of the 20th century. Many senior engineers of Nippon Koei had previously worked for large dam-building projects in colonial Korea, Manchuria, and Burma—including Sup'ung Dam on the Yalu River between Korea and Manchukuo, the second largest dam in the world, during the 1940s.[312] Based on these experiences, Nippon Koei dominated the dam-building business in Asia after World War II. The Soyanggang Dam was one of the examples.

Through the Soyanggang Dam project, Nippon Koei aspired to provide a development vision and expand its influence in postcolonial Asia.[313] In December 1962, the founder of Nippon Koei, Kubota Yutaka, visited South Korea. Kubota had experience in building hydropower infrastructure in colonial Korea as a head engineer of the Korea Nitrogenous Fertilizer Company and as president of the Chosen Electricity Company. In his field survey trip,

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311 Kyunghyang shinmun, "Ire Min'ganch'agwanshinch'ŏng 15kŏne Ch'ong 1ŏech'ŏnmanbul [Request Private-Sector Loans to Japan 150 Million Dollars for 15 Projects]," July 12, 1963.
312 For historical analysis on Nippon Koei regarding continuity between colonial and postcolonial Asia, see Moore, "From 'Constructing' to 'Developing' Asia—Japanese Engineers and the Formation of the Postcolonial, Cold War Discourse of Development in Asia."
313 Ibid.

Kubota asserted that South Korea should fully utilize its affluent hydraulic power resources for developing the nation. He argued that hydropower plants would be less expensive than drawing on thermal power plants, as well as more efficient for developing the nation's industry and agriculture.[314] Just like the survey conducted by SH&G, Nippon Koei suggested building a rockfill dam on the Soyang River.[315]

However, due to budget limitations, the government could not immediately commence construction of the Soyanggang Dam.[316] Meanwhile, water experts changed the meaning of national progress related to the dam construction.

The Multi-purpose Dam for Industrializing the Nation

The Bureau of Water Resources (BOWR), under the Ministry of Construction (MOC), was established in June 1962. During the time, the bureau struggled to expand its bureaucratic influence, while competing against traditional ministries that were eager to defend their boundaries.[317] Ahn Kyung-mo, the founder of the BOWR, envisioned that the MOC could greatly contribute to Park Chung-hee's "modernization of the homeland" vision by building large dams.[318] Yet, to lead dam construction, the MOC had to contend with the Ministry of Commerce

[314] Tongailbo, "Sujŏn'gaebari Hyoyulchŏk [Hydroelectric Power Development Is More Efficient]," December 12, 1962.
[315] Nippon Koei, "Geological Investigation Report on Soyang Kang Damsite," 1963, 2-3.
[316] Kyunghyang shinmun, "Soyanggangdaem Kongsa Tŭng Chungdan [Suspension of Soyang Dam Construction]," April 24, 1963.
[317] National Institute of Korean History, "1960~70Nyŏndae Kyŏngje Kowigwallyoege Tŭnnŭn Han'gukkyŏngjejŏngch'aegŭi Suripkwa Chip'aeng Kusul Ch'oejongsŏng [The Establishment and Enforcement of Korea's Economic Policy Listening from an Elite Economic Bureaucrat during the 1960s~70s Oral History Choi Jong-Seong]" (Gwacheon, Korea, 2009), 49.
[318] When the Bureau of Water Resources was first founded in September 1961, it was under the National Construction Agency. The National Construction Agency was later elevated to the Ministry of Construction in June 1962. Kyung-mo Ahn, *Chidorŭl Pakkugo Yŏksarŭl Mandŭlmyŏ [Changing a Map, Making History]* (Daejeon, Korea: Han'guksujawŏn'gongsa [Korea Water Resources Corporation], 2002), 19-20; Yeotaek Kim, "Han'gugŭi Taem (4) [Dams of Korea (4)]," *Taehant'omok'ak'oeji [Journal of Korean Society of Civil Engineers]* 43, no. 4 (1995): 83–84.

and Industry (MCI) and the Korea Electric Power Corporation (KEPCO), which had experience in overseeing a national dam construction plan that enhanced the nation's electricity generating capacity.

To deprive the MCI of the authority of national dam construction and management, the BOWR argued that multi-purpose dams should be constructed, rather than considering single-purpose hydroelectrical dams.[319] Additionally, by employing hydrological knowledge, BOWR bureaucrats asserted that the national dam construction initiative needed to be planned from the perspective of water resources development in order to meet the increasing water demand for industrializing the nation. As an effort to initiate the multi-purpose dam construction, the MOC bureaucrats worked on creating the Specific Multipurpose Dams Act (SMDA).[320]

The Soyanggang Dam was the first multi-purpose dam planned following the SDMA. M. E. Von Seggern, an American hydrological engineer from the US Bureau of Reclamation, implemented a preliminary survey of the Han River basin in accordance to the invitation from the MOC. He reviewed the past Soyanggang Dam construction plans formulated by SH&G and Nippon Koei.[321] Von Seggern identified the Soyanggang Dam site as a key spot to initiate a comprehensive basin-scale development plan. He argued that the dam construction should get started right away as a way to maximize the use of water resources of the Han River Basin. Von Seggern agreed with the past dam-building plans, in that the site had great economic potential,

[319] Ministry of Construction, "Sujawŏn Chonghapkaebal 10kaenyŏn Kyehoek (1966-1975) [10-Year Plan for Comprehensive Water Resources Development (1966-1975)]."
[320] Yeotaek Kim, "Han'gugŭi Taem (6) [Dams of Korea (6)]," *Taehant'omok'ak'oeji [Journal of Korean Society of Civil Engineers]* 43, no. 6 (1995): 83; Ahn, *Chidorŭl Pakkugo Yŏksarŭl Mandŭlmyŏ [Changing a Map, Making History]*, 21-2.
[321] Von Seggern, Callahan, and MacMillan, "Report of Preliminary Survey Han River Basin, Republic of Korea." For the Han River Basin Joint Survey Project, see chapter X.

however, he concluded that the size of the dam needed to be bigger in order to "fully develop" the Han River basin.[322]

Von Seggern suggested a larger multi-purpose dam, instead of a hydroelectric dam, based on a comprehensive river basin development plan. The hydroelectric dam proposed by the Nippon Koei in 1963, had a maximum height of 86 meters. However, the HJST argued that the height of the dam should be built as high as possible, to help secure more water into the dam. The American survey team estimated that the Soyanggang Dam should be built with a maximum height of 145 meters, to fully develop the Han River basin's water resources and to meet the future's expected water demands.[323] Yet, due to the expensive construction costs, the BOWR compromised on a maximum height of 122 meters, which showed the most efficient net benefits.[324] With this considerable size, the Soyanggang Dam would become the highest dam in South Korea.

Technocrats of the BOWR also suggested building a concrete gravity dam instead of a rockfill dam in order to boost the nation's construction industry. They argued that building a rockfill dam would be slightly less expensive, but the advantages of a concrete gravity dam would outweigh the given expense gap. Unlike a rockfill dam, a concrete dam could start power generation before completion, and it would be safer in terms of unforeseen overtopping during the construction phase. More importantly, the BOWR technocrats considered that constructing a concrete gravity dam would ignite the domestic cement industry and provide a boom for the national construction economy.[325] This consideration echoed Park Chung-hee's favorite

[322] Ibid, 1-2.
[323] Kim, "Han'gugŭi Taem (6) [Dams of Korea (6)], 85."
[324] Han River Basin Joint Survey Team, "Interim Report Han River Basin Survey Project" (Seoul, Korea, 1968) iv; 12.
[325] Nippon Koei, "Soyang Gang Multi-Purpose Dam Project Volume I Design Report" (Tokyo, 1969), 29.

catchphrase, “Let’s construct as we fight,” which represented his political vision of pursuing economic growth and anti-communism through national infrastructure-building projects.[326] Park viewed building a concrete dam— once recognized as an irrational choice by both Japanese and American engineers considering the lack of cement plants in the nation—should not to be viewed as a hurdle, but rather, as an opportunity to encourage national economic development.

As the BOWR suggested a multi-purpose dam, two construction proposals were competing for the one dam site: The 122-meter-high multi-purpose concrete dam, and the smaller 86-meter-high hydroelectric rockfill dam, suggested earlier by the MCI and KEPCO. Additionally, KEPCO engineers tried to move ahead from this rivalry through contracting Nippon Koei and Marubeni-Iida on April 12, 1967. KEPCO signed to purchase construction equipment from Marubeni-Iida, using 1.1 million dollars of government loans from Japan, which came from the Treaty on Basic Relations between Japan and the Republic of Korea in 1965.[327] After one month, the deputy Prime Minister briefed President Park Chung-hee at a monthly economic trend report meeting that KEPCO commenced the Soyanggang Dam construction project. Worried that this briefing would determine the Soyang Dam construction in accordance to KEPCO’s plan, the Vice Minister of Construction, Choi Jong-seong, countered on the spot that KEPCO’s plan had to be rejected.[328] Choi claimed that, because construction of a low dam would not even use half of the potential water resources of the Soyang site, the dam should be built as a larger multi-purpose dam. Considering the authoritarian atmosphere in the decision-

[326] The slogan of “Let’s construction as we fight” also embodied in the Gyeongbu Highway project, another biggest national construction project during the Park’s era. See Chihyung Jeon, “A Road to Modernization and Unification: The Construction of the Gyeongbu Highway in South Korea,” *Technology and Culture* 51, no. 1 (2010): 55–79.
[327] Korea Electric Power Company, “A Letter from KEPCO to the Minister of the Economic Planning Board,” 1967 BA0147103 National Archives of Korea.
[328] Moon-hyuk Lee, “Soyanggang Tamokchŏktaemgŏnsŏrŭi San’gobihwa [Secret Story about the Birth of Soyanggang Multi-Purpose Dam],” *Taehant’omok’ak’oeji [Journal of Korean Society of Civil Engineers]* 50, no. 3 (2002): 62.

making process at that time, arguing against the Deputy Prime Minister in front of President Park revealed the significance of the Soyanggang Dam for the MOC. Construction technocrats regarded that taking control of the Soyanggang Dam construction was critical in terms of establishing their firm presence in South Korea.

Although President Park assigned the Prime Minister to arbitrate in the dispute, however, the two ministries continued competing against each other.[329] Meanwhile, one news article reported that the Economic Planning Board decided to build an 86-meter-high hydroelectric dam to help reduce the rising construction costs.[330] In order to break a deadlock, Choi asked for a chance to brief the President on the benefits of building a multi-purpose dam at the Soyang site. In the briefing, Choi, with Lee Moon-hyuk, the director of the BOWR, reemphasized that the Soyang site was a strategic point for maximizing the use of water resources from the Han River basin.[331] After the briefing on July 7, 1967, Park decided to build a multi-purpose dam on the Soyang site, persuaded by the slogan "Full development of water resources"[332] KEPCO countered the proposal, pushing the fact they already begun a field survey and secured the necessary machinery and equipment; therefore, the abrupt change would fail the Soyang Dam construction and the national power development.[333] However, the President did not change his decision.

The story above has often been remembered among hydrological engineers as a saga of how water resources development began in South Korea, giving credit to brave MOC elites and

[329] Yeotaek Kim, "Han'gugŭi Taem (7) [Dams of Korea (7)]," *Taehant'omok'ak'oeji [Journal of Korean Society of Civil Engineers]* 43, no. 7 (1995): 69.
[330] Maeil Business Newspaper, "Decision on the Soyanggang Dam Construction Plan," July 4, 1967.
[331] Ibid.
[332] Minister of Construction, "132 1 - 10735 A Letter from the Minister of Construction to the Manage of KEPCO," July 12, 1967 BA0147103 National Archives of Korea.
[333] KEPCO, "710-9209 A Letter from KEPCO to the Minister of the Economic Planning Board," July 20, 1967 BA0147103 National Archives of Korea.

the decisive leader Park Chung-hee.[334] Hydrological engineers recollected that Park Chung-hee led a culmination of water resources development in the second half of the twentieth century, and with his foresight he was able to drive the unprecedented multi-purpose dam construction.

Behind this heroic narrative, what appealed to Park Chunghee was the promise of a multi-purpose concrete dam construction initiative for industrializing the nation. BOWR technocrats envisioned that the larger Soyanggang Dam would contribute to building an industrialized society with high productivity rates. The multi-purpose dam would secure more water otherwise wasted, thus providing saved water to industries and cities. The immense demand for cement required for building the concrete dam would stimulate the domestic construction economy. Further, they assured Park that the bigger Soyang Dam would prevent floods in its downstream area, allowing for the development of the wasteland of the Han riverside located in Seoul.[335]

This promise perfectly meshed with Park's national infrastructure building scheme. As Park's declaration of the year 1968 as "The Year of Construction" and his favorite catchphrase, "Let's construct as we fight," indicated, Park's military regime assumed that the national economic growth could be best achieved through construction projects.[336] Park's obsession with construction echoed building the Soyanggang Dam as a bigger concrete dam that would bring about the nation's construction boom. In this alignment, the larger Soyanggang Dam became a perfect imaginary artifact that embodied Park's nation-building vision.

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[334] Lee, "Soyanggang Tamokchŏktaemgŏnsŏrŭi San'gobihwa [Secret Story about the Birth of Soyanggang Multi-Purpose Dam]," ; Kim, "Han'gugŭi Taem (7) [Dams of Korea (7)]."
[335] National Institute of Korean History, "1960~70Nyŏndae Kyŏngje Kowigwallyoege Tŭnnŭn Han'gukkyŏngjejŏngch'aegŭi Suripkwa Chip'aeng Kusul Ch'oejongsŏng [The Establishment and Enforcement of Korea's Economic Policy Listening from an Elite Economic Bureaucrat during the 1960s~70s Oral History Choi Jong-Seong]" 36-7.
[336] Jeon, "A Road to Modernization and Unification: The Construction of the Gyeongbu Highway in South Korea," 63-4.

Building the Higher and Cheaper Dam

Following the approval by Park Chung-hee, the MOC initiated the multi-purpose dam construction on the Soyang site. The MOC had to first address the contract issue between KEPCO and Marubeni and Nippon Koei. The government suspended all the construction work led by KEPCO because of the change in the agent in charge of the dam construction from KEPCO to the MOC. Marubeni challenged the changes since they were already in the process of shipping equipment according the terms and conditions stipulated by the contract.[337] Also, Marubeni demanded payments for the items prepared for shipping and preliminary works for the construction, valued at millions of dollars.

Fortunately, both parties reached a settlement whereby MOC and Marubeni agreed to waiver the compensations on the condition that they would resume the process at the earliest date with some revisions on the equipment list and modifications of shipping schedules.[338] Additionally, the two agencies agreed that any additional equipment and plant required for the Soyang Dam construction should be procured through Marubeni. Furthermore, the MOC lodged a request to the Economic Planning Board to increase the total amount of loan funds from the reparation claims against Japan from 14.1 million to 26.3 million dollars for building a bigger

[337] K. Kajita, "A Letter from Marubeni-Iida to KEPCO," September 14, 1967. BA0147103 National Archives of Korea.
[338] Ministry of Construction, "Taeilch'ŏnggugwŏn Che2ch'anyŏndo Ch'agwanjagŭme Ŭihan Soyanggangdamokchŏktaem Kŏnsŏlgigye Kumaejishi Yoch'ŏng [Request of Purchases of Soyanggang Multi-Purpose Dam Construction Equipment in Accordance with the Second Year Loan Fund of Reparation Claim Against Japan]," December 5, 1967 BA0147103 National Archives of Korea.

dam with increased power generating capacity.[339] The MOC planned to complete the Soyang Dam construction by 1971 to meet Park's expectations.

However, the construction process stalled from the MOC side. For several months, the MOC had difficulty establishing detailed specifications of the dam since its recognition as the main construction body in July 1967. The MOC was not technically prepared for initiating the dam construction project despite assuring President Park of the need for the larger multi-purpose dam construction on the Soyang site. However, plans for construction and funds use could not be prepared since the MOC had not provided detailed dam specifications.[340] It took almost ten months for MOC to finally complete a basic planning and design of the Soyang Multi-purpose Dam with technical assistance from Nippon Koei.[341]

Notably, Hyundai Construction, the principal contractor, halted the construction plan again by arguing that the Soyanggang Dam should be changed from a concrete gravity dam to a rockfill dam. Chung Ju-young, the founder of Hyundai Construction, considered it hard to make a profit by constructing a gravity concrete dam because the main materials for a concrete gravity dam, cement, and steel, were supposed to be government furnished.[342] However, materials for a rockfill dam, including sand and gravel, could be gathered near the dam site, as indicated in the previous surveys by SH&G and Nippon Koei. Because the Han River, including the riparian

[339] The Ministry of Construction, "Proposal for the Appropriate Use of Japanese Loan Funds for Soyanggang Dam Construction [Soyanggangdaem Kŏnsŏl Taeilch'agwanjagŭm Chŏkki Sayong Choch'i Kŏnŭi]," November 30, 1967.
[340] KEPCO, "Soyanggang Suryŏng Palchŏnso Kŏnsŏryong Kyeyakpunhware Ttarŭn Munjejŏm Chosong Haegyŏl Yoch'ŏng [Request to Solve the Problem of the Soyanggang Hydroelectric Dam Construction Originated from the Split of the Contract]," February 16, 1968, BA0147103 National Archives of Korea.
[341] Nippon Koei, "Soyang Gang Multi-Purpose Dam Project Volume I Design Report"; The report mentioned that the basic planning report was submitted by the Korean Engineering Consultants Corporation (KECC), but the exact work was completed by Nippon Koei as the KECC contracted out the basic planning to Nippon Koei. Tongailbo, "Soyangdaemgaebal Pon'gyŏk'wa [The Start of the Soyang Dam Construction]," December 1, 1967.
[342] Wŏlganjosŏn, "K'onk'ŭrit'ŭ Chungnyŏktaemi Hŭkkwa Moraeŭi Saryŏktaemŭro Pakkwin Naemak [The inside Story of How a Concrete Gravity Dam Changed to a Rockfill Dam]," October 2010.

land, was state-owned, Chung expected that aggregates could be collected at minimal cost without much compensation.[343]

To change the type of dam, Hyundai Construction persuaded Park Chunghee with nationalist discourses. Since the MOC and its partner Nippon Koei rejected the idea of building a rockfill dam, Chung Ju-young decided to persuade Park.[344] Chung argued that, since cement and steel materials had to be imported, probably from Japan, the construction of a concrete gravity dam would only benefit Japan by giving back loan funds received as a reparation. Furthermore, Chung introduced an imagined military threat from North Korea. He asserted that a concrete gravity dam would be more vulnerable to military attacks from North Korea. A rockfill dam—a structure consisting of sand, gravels, and rocks like a mountain—would be more tolerant towards bombardment because it could maintain its form even after collapsing. However, a concrete dam could crack and completely tear down the structure resulting in the flooding of the Seoul area.[345]

Park's military regime took this military threat issue seriously. Park assigned the three Forces Chiefs to research which type of dam would be more tolerable to the North's bombardment.[346] In response to their report that a rockfill dam would be more desirable from a military perspective, in May 1968, Park ordered the MOC to investigate how much could be saved in the construction costs by changing the dam type. MOC officials were puzzled due to this change of the construction plan in which they completed the basic design and worked on a detailed designing process. However, in an era where anti-communism was the top national

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[343] "River Act," 1961.
[344] Ju-young Chung, *Shiryŏnŭn Issŏdo Shilp'aenŭn Ŏpta [There Are Trials, but No Failures]* (Seoul, Korea: Chesamgihoek, 2001); Sports Hankook, "5nyŏnban Kongsaro 6kaeŭmmyŏn 4,600sedae Sumol [6 Villages and 4,600 Households Were Submerged Due to 5 and Half Years of Construction]," September 26, 2009.
[345] Wŏlganjosŏn, "K'onk'ŭrit'ŭ Chungnyŏktaemi Hŭkkwa Moraeŭi Saryŏktaemŭro Pakkwin Naemak [The inside Story of How a Concrete Gravity Dam Changed to a Rockfill Dam]."
[346] Kwater, *Kwater 50Nyŏnsa: Iyagip'yŏn [Fifty-Year History of K Water: Stories]* (Daejeon, Korea: Kwater, 2017), 10-11.

agenda, they had no choice but to abide by Park's directives. The MOC's investigation concluded that the total cost of the concrete dam construction would increase to 23.9 billion KRW from 20.3 billion KRW estimated in 1966 because of the rise in material prices, while building a rockfill dam would cost 20.5 billion KRW.[347] In August 1968, after considering the reports on the construction costs and the security issue, the government finally decided to build a rockfill dam on the Soyang Dam site.

This turbulent trajectory of the Soyanggang Dam planning demonstrates the contingent nature of the friendly relationship between Park Chunghee and the multi-purpose dam advocators. The MOC could initiate the multi-purpose dam construction on the Soyang site by gaining support from Park Chunghee with the potential construction economy boom promoted by the dam construction. However, the MOC had to pause and alter the design of the dam when the contractor succeeded in presenting the concrete Soyanggang Dam as a potential threat to national security. This contingency partly resulted from the authoritarian decision-making process where Park could exercise excessive influence. However, the principal reason lay in that the whole process of designing and building the dam was beyond the MOC's capability and control. Undergoing this haphazardness, the MOC eventually started the dam construction in the rural Soyang site.

Marginalizing the Damming Area

Once determining the dam's size and specifications, the MOC assigned the Korea Water Resources Development Corporation (KWRDC) to oversee dam construction procedures. The

[347] Minister of Construction, "Soyanggangdamokchŏktaemgongsaga Chŏlgambangan'gaeyo [The Outline of Reducing Construction Cost of the Soyanggang Multi-Purpose Dam]," August 1968 BA0138785 National Archives of Korea.

first task was to quickly complete the compensation of the submerging area and initiate construction as soon as possible to meet Park Chunghee's expectations. The KWRDC organized a task force to evaluate the appropriate amount of compensation.[348] The Korea Appraisal Board helped the task force evaluate properties within the area, including buildings, graves, crops, and fruit trees, for the purpose of compensation.[349] The MOC also planned to build a light industrial complex in Chuncheon to relocate people living in the dam site. The MOC prepared 150 thousand pyeong (495,867 m^3) to build the complex and attracted 21 companies from the textile, leather, food, and furniture industries.[350] The primary purpose of the building of the Chuncheon Industrial Complex was to offer jobs to relocating people. The MOC expected that this industrial complex could attract at least 1,890 out of 4,017 households in the submerged district to the Chuncheon area.[351]

The MOC received many complaints from dam-site dwellers but disregarded their petitions by legitimizing their harm under the banner of "Soyanggang Dam for national progress." Rural residents whose homes were submerged by the dam, rather than standing against the dam construction itself, petitioned for compensation for their losses. While admitting that the dam construction was necessary for "modernizing the homeland," petitioners argued that they deserved more compensation, demonstrating how they had contributed to building the nation in their own ways. However, the task force asked for cooperation for the success of the

[348] Task Force for the Soyanggang Dam Submergence, "Soyanggangdamokchŏktaemsumoltaech'aeng (an) [Countermeasure to Soyanggang Multi-Purpose Dam Submergence (Plan)]," 1968 BA0138698 National Archieves of Korea.
[349] Korea Appraisal Board, "Kamjŏngsŏ [Appraisal Statement]," 1970 BA0875707 National Archives of Korea.
[350] Chuncheon City, "Ch'unch'ŏn'gongŏptanjijosŏngshilshi Kyehoegin'gashinch'ŏngsŏ [Application for Approval of Building Chuncheon Industrial Complex]," October 1968 BA0103588 National Archives of Korea.
[351] Ministry of Construction, "Soyanggangdaem Kŏnsŏre Ttarŭn Kongŏptanjijosŏng Ipchijosŏng Haptongjosa [Joint Survey on the Industrial Complex Site Following the Soyanggang Dam Constrution]," July 5, 1968 BA0103588 National Archives of Korea.

national project and excluded their modes of life from the concept of an industrialized nation imagined by the completion of the Soyanggang Dam.

"The success of the national project" was interchangeable with providing resources for economic activities in and around Seoul while sacrificing the rural dam site. Three anecdotal cases below show how the dam's construction marginalized local populations in favor of industrializing the nation.

Stressed Chickens

In 1966, Chung Hengsoo settled in Cheonjeon-ri, a small village in Gangwon Province located in the North Han River basin where the Soyang River passes by. He moved to this serene village after sixteen years of military service, including his participation in the Korean War. In his new place, Chung started poultry farming with his retirement fund and additional government support for the livestock business. The number of his chickens was 500 at first, but his business soon expanded to the size of 2,700 chickens in 1969. Chung made a living for his family with this small poultry business, aiming at raising 3,000 chickens on his farm in 1970.[352]

The dam construction ruined his dream of a prospering poultry farm business. Around late June of 1970, large construction equipment came into the village to dig and transport aggregates for the rockfill dam construction. Without notice, power shovels, bulldozers, scoopers, and large trucks drove in and out of the village and worked twenty-four hours a day, seven days a week, next to Chung's poultry farm.[353] As heavy machinery occupied the village, the rural area suddenly turned into a dusty, noisy, and hectic construction site. Since the start of

[352] Haengsoo Chung, "Chinjŏngsŏ [Petition]," January 9, 1971 BA0875716 National Archives of Korea.
[353] Chung, "Chinjŏngsŏ," Appendix #1.

the digging, the egg-laying productivity of his chickens had severely decreased. Because of low productivity, Chung killed 350 chickens. By the end of 1970, he ended up culling 1,300 more chickens in order to maintain his business. [354]

A frustrated Chung wrote letters to the MOC several times, asking for compensation for losses resulting from the construction. However, he only heard from them that it would take time to handle the case. Exhausted by unresponsive government officials, Chung finally sent a letter to President Park. He started the letter by positioning himself as an army reserve, contributing to government initiatives for agricultural community modernization. He emphasized that he had settled down in the village to promote the livestock industry and had succeeded in developing a poultry farm, but his business had been devastated by the construction. He said,

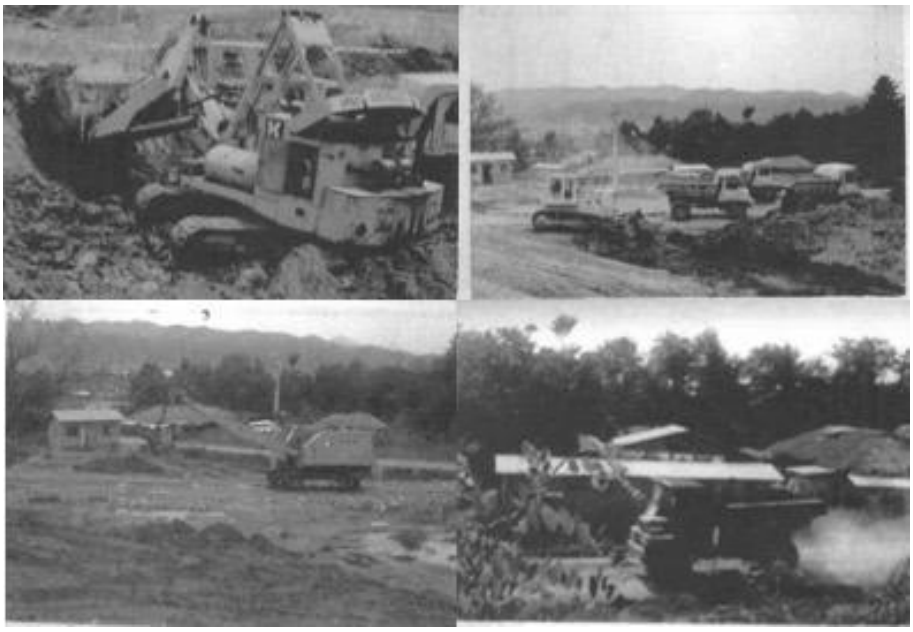
> I decided to settle in this place in response to the government's agricultural community modernization policy. … Because many new gigantic machines (bulldozers, etc.) have been generating noise and vibration (24 hours) for months (expected until 1972) to dig and transport clay soil for the Soyanggang Dam, the poultry farm is in confusion, throughout the night, a time that needs to be quiet, resulting in low productivity, an increase in fatality rate, low efficiency of breeding due to nervous disease, and culling under the permission of a public veterinarian."[355]

Chung also attached pictures to support his claim, depicting heavy machinery vehicles moving on a rural road and digging in the ground. He also attached notes from the president of the Gangwon Veterinary Association and the representative of Gangwon Chuncheon livestock breeding farms, who confirmed that the noise and vibration from the digging site could stress chickens, resulting in low egg production, nerve disorder, and abnormal growth.[356] Chung

[354] Chung. "Chinjŏngsŏ."
[355] Ibid.
[356] Chung, "Chinjŏngsŏ [Petition]," Appendix #3, #4.

conclusively claimed compensation for relocation expenses, the culling of 1,650 chickens, and living costs for the farm's six months of being shut down.

However, Chung's request was denied because his ideals of successful small farming and rural peace were not in line with what Park Chunghee and construction technocrats imagined through this dam construction. A representative in charge of civil affairs answered that there had been no precedents of compensation for noise generated from a national construction project. The representative asked for understanding and cooperation, mentioning that this sort of national construction work would be "generally acceptable."[357]



[Figure 14] Heavy Machinery Taken by Chung Haengsoo near His Farm

(Source: Chung,"Chinjŏngsŏ" [Petition], BA0875716 National Archives of Korea)

[357] Ministry of Construction, "Chinjŏngsŏ Ch'ŏri [Response to a Petition]," January 25, 1971 BA0875716 National Archives of Korea.

Diasporic Goats

Kim Youngdae raised a hundred goats between his two livestock farms located in Inje-gun, a county in Gangwon Province. He milked his goats every morning and sold bottles of milk to communities near the farms. One day in 1968, Kim announced that his farms would be submerged by the Soyanggang Dam construction. Government officers from the MOC visited his farms several times to estimate the amount of compensation for relocation. Because the officers assured Kim that the nation would compensate everything lost by the dam construction, Kim was thankful for the government's generosity.[358]

As the relocation date came closer, Kim recognized that his goat farms were excluded from the compensable livestock businesses listed by the MOC. Kim pleaded for compensation to the government, arguing that it was unfair to exclude goat farms from the list in which pig and poultry farms were included. Kim petitioned that, although he understood the necessity of the Soyanggang Dam for the nation's future, a diligent farmer who was forced to leave his dear home for the people's welfare deserved proper compensation. He said,

> We, farmers, are not leaving of our own will, but forced to leave for the future of the nation and the welfare of the people. How this can be, to us, farmers who have lived on the land of our ancestors, accepted as earning an honest livelihood by the sweat of our brow as volition. … Please save us by including goats in the compensation list.[359]

In the petition, Kim asserted his right to receive compensation in the way of representing other farmers, addressing that dam construction was destroying the community. Kim also attached a sales statement that verified an annual net profit of 4.76 million KRW to request compensation

[358] Youngdae Kim, "T'anwŏnsŏ [Petition]," January 1972, BA0875727, National Archives of Korea.
[359] Ibid.

comparable to this profit. He argued that his rights as a business should be protected with proper compensation, just as other businesses were compensated.[360]

However, the MOC refused Kim's petition under the reason that goats were able to be moved to another place.[361] Kim petitioned a second time, explaining that relocation would be difficult because milk should be consumed on the day it is harvested due to the low-temperature pasteurization method used at that time. Relocation was not merely moving goats from one place to another; relocating to another region meant that he could not sell his products until he could set up product distribution channels and secure potential consumers, which was not affordable. Yet, the MOC did not change its tune and asked for cooperation and understanding as the dam-building project was for the nation.

[Figure 15] Kim's Goats and Milk Delivery

(Source: BA0875727 National Archives of Korea)

[360] Ibid.
[361] Ministry of Construction, "T'anwŏnsŏ Ch'ŏri [Response to a Petition],"BA0875727 National Archives of Korea January 15, 1972.

Submerged Religion

In 1955, Yang Chi-hyeon, a pastor of the Korean Evangelical Holiness Church, established the Karori Church in a temporary building located in Inje-gun, Gangwon Province. Later, Yang built a church building on a hillside thanks to the offertory fund from the church's people and volunteer labor from the army camp near the community. The church was able to complete interior work, such as windows, floors, and the ceiling with financial support from the local worthies. Yang proudly said the church had contributed to the community by praying for the nation and the people, participating in community development, guiding the youths, and worshipping for soldiers at the front lines.[362]

As the dam construction started, Yang noticed that the community surrounding the church would be submerged, except for the church building located on the hilly site. Every church community member had to be relocated, and of course, Yang wanted to relocate the church along with them. However, Yang heard that the church building was not included in the compensation list because the building itself would not be submerged. The task force explained that only material properties located within the submergence area would be compensated. Because the building would remain, although part of the stairs to the church would be submerged as shown in [Figure 16], the church was not compensated.

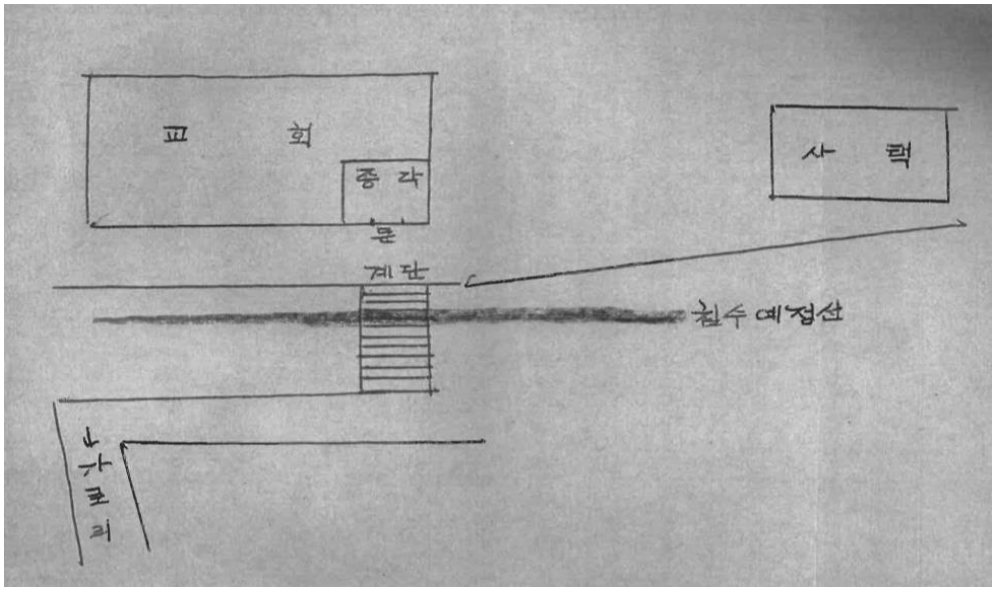
Yang submitted a petition with the signatures of the fifty-three church members. He emphasized that the church members had prayed for the nation as well as participated in local community development. He stated,

> I am sorry to waste your valuable time meant for the modernization of the homeland project. … Because the whole community is being submerged according to the national policy, the church is losing its mission … Water would

[362] Chi-hyeon Yang, "Chinjŏngsŏ [Petition]," 1971, BA0875716 National Archives of Korea.

> rise to the stairs, just one meter below the building, so please consider the situation and allow us to move with the congregation.[363]

The task force again answered that the building could not be compensated, asking Yang to check if indirect compensation from the local government would be available. Even though the church could not exist without the community, the task force asked for the understanding and cooperation for the national construction project, as it did for other petitions.[364]



[Figure 16] Church Building (top left) and the Submergence Line

(BA0875716 National Archives of Korea)

These three anecdotes reveal that the technocrats marginalized rural life which did not fit into their imagery of the industrialized nation. The petitioners did not resist the Soyanggang Dam construction; contrarily, they appreciated the government's modernization project, at least on the

[363] Ibid.
[364] The Ministry of Construction, "Chinjŏngsŏ Ch'ŏri [Response to a Petition]," July 3, 1971.

surface. What the petitioners requested was compensation for their economic and social activities that were also for the nation. However, the MOC did not include anything other than material properties on the compensation list, prioritizing the fast dam construction.

The completed Soyanggang Dam could secure 2.9 billion tons of water. This big reservoir generated electricity, fed industries and municipalities, and prevented floods for the Seoul metropolitan area. On the contrary, however, the dam construction made rural life invisible from the national perspective. This division between rural and urban life became legitimized by the nationalization of the dammed environment meant for people of the industrial nation.

Nationalizing the Dammed River

While the government buried local suffering, the Soyanggang Dam became a symbol of industrialization and national progress. As the construction was nearing completion, the MOC held an appreciation event for the start of receiving river water into the reservoir at the dam site. President Park Chunghee took the stage at the event, saying that "[H]ere, we take on a big challenge to great nature, and we are seeing the evidence before our eyes that we overcome nature and achieved a triumph through human will." [365] Park also stated that "Because Chuncheon, Seoul, and especially the Gyeongin industrial district are located in its downstream, we can imagine how much this Soyanggang Dam will contribute to the construction and development of our country."[366] He envisioned that the Soyanggang Dam would provide downstream urban and industrial areas with resources, like water, electricity, and a flood-

[365] Chunghee Park, "Soyanggang Tamokchŏng Taem Tamsushing Ch'isa [Appreciation for the Start of Receiving Water into Soyang Multi-Purpose Dam]" (Gangwon, Korea, November 25, 1972), http://www.pa.go.kr/research/contents/speech/index.jsp. Accessed on March 17, 2021.
[366] Ibid.

detention reservoir. After the speech, President Park walked up to the viewing platform and looked down from the top over the Soyang River like a great man who had conquered nature.

[Figure 17] President Park Chunghee Looking down the Dammed Soyang River from the Viewing Platform

(Source: CET0021287 National Archives of Korea)

A month later, at the dawn of the Soyanggang Dam's completion, the KWRDC also advertised the dam in a daily Korean English-language newspaper. It said that "The Soyang Multipurpose

Dam, the largest ever built in Asia … will turn the Han River's affluent natural graces in our favor, and thus contribute to developing the national economy." [367] Both Park's presence at the appreciation event and the KWRDC's propaganda projects dams at the core of national progress.

On the other side of this showcase, the Soyanggang Dam deconstructed lives in the dam site that were not included at the scheme of industrializing the nation. The dam construction forcefully dislocated 18,546 people of 3,153 households.[368] Rural people lost their homes, farmlands, and their communities as a result of the enforced migration directed by the authoritarian regime. Wealthy people possessing well-verified properties in the form of a certificate or register could at least afford to relocate somewhere with compensation. However, poor tenant farmers and residents living in unauthorized houses had difficulty asserting their property rights.[369] Because of the strict standards of compensation, the compensation rate to the total construction costs was twenty-four percent. In comparison, those of other dam construction projects after the 1970s were around fifty to seventy percent.[370]

The people who remained near the area suffered from the environmental changes caused by the dam construction.[371] The region's agriculture, which relies on water from the Soyang River, was damaged by cold water cooled in the deep reservoir. The water quality of the Soyang River gradually declined after the dam construction. Foggy conditions produced by the dam

[367] The Korea Herald, "Soyang Multipurpose Dam..... A Landmark for Achieving National Prosperity," January 1, 1973.
[368] Hankyoreh, "Soyanggangdaem Ttawinŭn Tŏ Isang p'iryohaji Ant'a [Soyanggang Dam Is Not Necessary Any More]," May 24, 2013.
[369] National Institute of Korean History, "Soyanggangdaem Kŏnsŏre Ŭihan Chiyŏkchuminŭi Idonggwa Sam: Kusul Kim Jonghyŏn [Migration and Lives of Rural Residents by Soyanggang Dam Construction: Oral History Kim Jonghyŏn]" (Gwacheon, Korea, 2012), 26-7.
[370] Kangwŏndominilbo, "Soyanggangdaem Chun'gong 40nyŏn Kŭ Hu: 4. Kohyang Irŭn Saramdŭl [40 Years after the Completion of Soyanggang Dam: 4. People Who Lost Their Home]," September 12, 2013.
[371] Yeonsil Kang, "Cold War's Cold Legacy: Soyang Multipurpose Dam, the Local Environment, and Envirotechnical Development in South Korea," *Technology's Stories* 8, no. 3 (2021).

caused respiratory problems to local residents. People in Yanggu-gun were isolated because roads to the adjacent city, Chuncheon, were submerged. Originally, it had taken less than an hour to get to Chuncheon from Yanggu-gun, but after the construction, it took three hours of driving on unpaved roads. The benefits of the dam construction were for cities and manufactories downstream while its costs were laid on the local area.

Dam builders concealed those issues from the Soyanggang Dam landscape by staging the dammed area as a natural environment that had to be conserved. After completing the construction, the MOC depicted the dammed area as the nation's affluent nature. In December 1973, the MOC announced its plan to designate the dammed area as a "Natural Environment Conservation District (NECD)" to "prevent damage to the natural environment of the territory."[372] Two years later, the MOC stipulated the "NECD Rule" by using executive power to control the water quality of the Soyanggang Dam. The rule prohibited any construction in the area except for houses for local farmers, primary schools, and military facilities, limiting residents' economic activities near the dam site.[373]

In addition, the MOC presented the artificial Soyang Lake as a place for people in the industrial nation to enjoy the nation's beautiful nature. In 1974, the MOC established the Soyang Lake as one of the nation's five sightseeing routes, tying it with Mt. Seorak—a beautiful mountain in the North Han River basin—to attract private capital for constructing tourist facilities.[374] The prime minister, Kim Jongpil, promised to build a "fantasy road" that would

[372] Maeil Business Newspaper, "Kŏnsŏlbu Chayŏnhwan'gyŏngbojŏnjigu Chijŏng [The MOC Designated the Natural Environment Conservation District]," December 11, 1973.
[373] Gangwon Development Research Institute, "Soyanggangdaem Chubyŏnjiyŏgŭi Chayŏnhwan'gyŏngbojŏnjiyŏng: Chiyŏgeŭi Yŏnghyanggwa Kaesŏndaech'aek [Natural Environment Conservation Area Near the Soyanggang Dam: Impacts on the Local and Improvement Measures]" (Gangwon, Korea, 2009).
[374] Maeil Business Newspaper, "5kae Kwan'gwangnut'ŭ Sŏlchŏng [Establishing Five Sightseeing Routes]," July 8, 1974.

connect Seoul, Chuncheon, the Soyang Dam, and Mt. Seorak with a vision to establish the area as a global tourist attraction.[375] Kim requested that the governor of Gangwon Province conserve the natural landscape of Gangwon Province, a valuable tourism resource. The government also produced a promotional film, picturing tourists enjoying the Soyang Lake's landscape from a passenger ship.[376] The film delivered the message that "pure and clear nature is the source of life" and "our life would be enriched when we protect and tend nature beautifully."

First Lady Yuk Youngsoo gave a presentation at the Soyang Lake, contributing to this national making of the site as a place to witness nation's beautiful nature. She visited the Soyang Dam with President Park and their son and daughter, mentioning, "I importuned the president to go out because the scenery of the Soyang Dam was so impressive." The president and his family spent time taking pictures with other tourists.[377] The presence of the political elites epitomized the dammed landscape as a special natural venue.

The First Lady also led a nature conservation campaign in the dammed area. On May 28, 1974, Yuk participated in an event that released a hundred thousand young fish into Soyang Lake. This event was prepared by the Korean Association for Conservation of Nature (KACN), an organization consisting of biologists and geologists with the purpose of studying and preserving the nation's nature and natural resources.[378] The KACN erected a monument, saying, "Our nature will be more beautiful and affluent, as today we release a hundred thousand fish,

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[375] Kyunghyang shinmun, "Hwansang Toro Kaebal Chiwŏn Yaksong Kimch'ongni, Kangwŏndosŏ [Prime Minister Kim Promised to Support the Construction of the Fantasy Road in Gangwondo]," March 29, 1974.
[376] KTV, *Soyanghorŭl Ttarasŏ [Following the Soyang Lake]*, 1980.
[377] Kyunghyang shinmun, "Soyanggang Taem Nadŭri Kwan'gwanggaekkwa Ŏullyŏ Kinyŏmch'waryŏng [Taking Pictures with Tourists Visiting the Soyang Dam]," June 8, 1974.
[378] The predecessor of the KACN was the Korean Commission for Conservation of Nature and Natural Resources (KCCN). KCCN was rebranded as KACN in 1974. See Manyong Moon, "The Politics of Science in Korean Biology: From the DMZ Ecological Survey to the Nature Con-Servation Movement," *Han'gukkwahaksahak'oeji [Journal of the Korean History of Science]* 42, no. 2 (2020): 435; 442-443.

including grass and fancy carp, into this place, the Soyang River."[379] The campaign continued despite the assassination of Yuk on August 15, 1974, by replacing her with her daughter, Park Guenhye. These campaigns enacted the dammed site as a treasury of nature.

[Figure 18] First Lady releasing fish into the Soyang Lake

(Source: CET0076134 National Archives of Korea)

[379] KTV, *985ho Yangjam Shibŏm Taehoe [No. 985 Sericulture Contest]*, June 1, 1974, http://www.ehistory.go.kr/page/view/movie.jsp?srcgbn=KV&mediaid=893&mediadtl=7027&gbn=DH. Accessed on March 17, 2021.

The making of the dammed area as an affluent natural environment excluded local communities from the landscape. All the practices of designating the area as the NECD, developing the area as a tourist spot, and implementing the natural environment conservation campaign constructed a bifurcated world in which the rural dam site was separated from the urban areas. In other words, allies of dam-building presented the artificial Soyang Lake as a repository of fertile nature, while economic activities would happen far from this natural world, namely the industrial area in downstream Han River. These demarcating practices were not surprising at all if we trace the Soyanggang Dam construction as a process of determining what Korea should be.

Conclusion

The trajectory of the Soyanggang Dam construction project depended on which Korea the dam planners aspired to build. Japanese colonial technocrats surveyed the potential of the Soyang site for a hydropower plant but did not build the dam according to the imperial scheme to industrialize North Korea. Later on, after the liberation, American engineers planned to build a hydroelectric dam on the Soyang site to showcase the Free World development achieved by technical aid. The Korean government leveraged this foreign assistance to symbolize the Soyanggang Dam as postcolonial nation-building, although the dam's construction was not realized due to budget limitations.

After Park Chunghee seized power through a coup d'état, the project kept serving as an arena where different visions were fought over. Park Chunghee used the Soyanggang Dam to present his vision of constructing the nation, but, under the influence of the hydrological engineers, the structure evolved into a larger multi-purpose dam. They envisioned the promise of the multi-purpose dam for boosting the construction economy and industrializing the nation.

Because this aspiration to develop South Korea echoed Park's vision of modernization, the hydrological experts beat out the electrical engineers in the competition for authority over the project. However, this harmonious alignment between the engineers and the authoritarian leader did not last forever, and the hydrological experts had to change the dam type when an attack by North Korea became a matter of national security.

The dam construction process also marginalized the rural dam site, which did not align with the image of an industrial South Korea. The dam planners and builders excluded rural ways of life in order to accelerate the dam's completion. Rural residents petitioned for compensation, highlighting their contributions to the nation, but they failed as their claims were opposed to what Park aspired to achieve through the infrastructure project. The dammed Soyang River eventually became a rich piece of the nation's nature. The conservation efforts were not for locals but rather to provide the citizens of the industrial nation with a beautiful natural place.

Tracing the Soyanggang Dam construction from planning to aftermath reveals that it was a battleground of imagined *Koreas*. The Soyanggang Dam served as a lens through which to see the ideals of Korea imagined by different actors. Technocrats with expertise in hydrology ultimately won the race as they succeeded in presenting the larger multi-purpose dam as a key to industrializing and developing the nation. Their vision lasted for a while, and the community of hydrological engineers expanded, leading to the golden age of large multi-purpose dam construction in South Korea during the 1970s and 1980s. Later, the community participated in global official development assistance in Cambodia, Indonesia, Nepal, Afghanistan, and other developing countries.[380] This technical regime emerged through the Soyanggang Dam construction project, a process of imagining and building the industrial nation.

[380] K-Water, *Kwater 50Nyŏnsa [Fifty-Year History of K Water]* (Daejeon, Korea: K-Water, 2017), 143.

Conclusion

"Water resource (*Sujawŏn*)" is a familiar term widely used in the media, policy briefs, and throughout everyday life in South Korea. In the 1990s, at a public bathhouse where I regularly went with my father and grandfather, I could see slogans from everywhere, such as "wasting water is wasting national power" and "saving water is saving money." During my school days, saving water resources was one of the common topics for post-making contests. I grew up hearing that South Korea is a "water scarcity country" as designated by the UN, a message that the government spread to emphasize water resources development policy.[381] Framing water as a resource, or economic good, conveys the sense that water should be well-managed. Further, if we can secure more water resources by building artificial reservoirs, it would enrich the nation. But unasked questions about this national propaganda have remained. If water is a resource, how do we distribute it? Where could we save water? If water is scarce, how much water do we need for what? Who decides the amount of water needed for the nation?

Tracing how "water resource" was introduced in South Korea sheds some light on these questions. Water resource had been uttered before, but arguably, Ahn Kyung-mo was a pioneering technocrat in spreading the word publicly. When Ahn established the Bureau of Water Resources under auspices of the Ministry of Construction, he envisioned that water is a prospective resource which should be properly utilized to modernize the nation. Ahn, as the leader of the Korean Water Resources Development Corporation, along with fellow hydrological engineers projected that major dam-building was the key to turning natural water into a manageable supply of national resources. Dams would contain river water and make it usable in a variety of ways, which otherwise is wasted as it flows out toward the sea. The governmental

[381] Khil-Ha Lee, "Korea Has No Water Scarcity!," *Water Resources* 43, no. 3 (2016): 579–82.

use of the term “water resource” implied *dammed rivers* as infrastructure where resources are gathered, stored, and distributed in order to serve the nation.

Infrastructuring rivers accompanied the ordering of the messy real world in which nature and society were intertwined. Hydrological engineers were at the frontier of this mission. Their quantifications allowed for the construction of rivers as potential inputs to national productivity coming from outside the social and economic systems. Based on hydrological data, including precipitation, water level, and flow rate, they calculated the volume of water flowing annually through rivers and transformed it into the water supply for the nation. On a hydrological map, the complex riverine environment is simplified to several linear streams that represent the quantity of river water, conveying a message that this abundant river water is waiting to be used if properly developed.

Hydrological abstraction not only described the physical specifications of rivers, but idealized a novel form of life dedicated to a national modernization scheme. Missing from a hydrological map is life in the river basins, particularly in rural dam sites. Hydrological representations purposefully omitted the local landscape, where individuals have interacted with the environment, while filling the map with rivers turned into water tanks for supplying resources. Hydrologically represented rivers implicitly valued social and economic activities only from where water resources would be delivered, namely urban and industrial areas. In this sense, the hydrological making of rivers was intended to concentrate resources on what the national plan prioritized while marginalizing other forms of life. At the heart of this normative reconstruction of rivers, numerical descriptions permitted bureaucrats to calculate available water resources and rationalize a dam construction plan which was aligned with economic development. As quantification techniques purified “nature” from the hybrid riverscape and

turned it into a national resource, hydrological engineers rearranged society towards the goal of authoritarian modernization efforts.

My point here is not to suggest that quantification was a neat or singular tool capable of bringing both the natural and social world under control. On the contrary, quantifying nature was a challenging game that entailed complex speculations, haphazard data-gathering, and extreme variable controls, all of which occasionally made the abstracted hydrological world decidedly discordant with the real world. To solve the complicated puzzle, hydrological engineers drew upon available sources at their disposal. Colonial hydrologic data and knowledge produced by the Government-General of Korea were valuable sources for engineers for calculating annual water flow. TVA-type development models and American Cold War aid helped engineers provide blueprints for large dam construction. Colonial legacy and the Western influx of knowledge were the two pillars with which hydrological engineers played the game of rebuilding the rivers.

This river engineering practice illuminates the precarious status of hydrological engineering in modern South Korea. Engineers relied on colonial data and knowledge, but also maintained a distance from colonial measures so as to argue that rivers in South Korea necessitated a complete reform from the colonial past. South Korean engineers ardently introduced TVA river development models while also learning from American engineers. Yet, they were also wary of simply bringing Western techniques into the Korean environment. To this end, South Korean engineers asserted that the nation should implement its own development methods considering the distinctive environmental conditions. This tug-of-war kind of development and research activities reflected the unstable status of Korean engineers and their efforts to position themselves in postcolonial and Cold War South Korea. Korean engineers

aspired to achieve this goal by establishing themselves as legitimate contributors to nation-building in South Korea, which also pursued identity-building with a developmentalist and anti-communist agenda.[382]

To this extent, river engineering was not the result of the authoritarian state power reinforced by modern science and engineering. Rather, river basin development was a highly tricky path trodden by engineers to demonstrate their contributions to modern state-building. Through river engineering practices, including river basin surveys, development planning, engineering research, and construction, hydrological engineers projected that the rivers should be manipulated by their hands, those who understood the nation's distinctive environmental conditions. River engineering was challenging, but the crucial process for Korean engineers to establish their own (and national) identity overcoming colonial legacy and the American hegemony upon which they stood. State power as a form of social and environmental rearrangements in the river basins did not emerge from an individual leader, such as Park Chunghee, but rather manifested through engineers' identity-building efforts.

The uncertainty of this source of state authority appears more glaring if we consider internal tensions within an engineering community and the actual disorderliness of river development. American engineers, who joined a six-year collaborative river basin survey with their Korean counterparts, prioritized the installation of water measurement stations in order to overcome the lack of reliable data in South Korea. However, the survey actually focused more on excavating and utilizing colonial data to meet the demand of Korean state engineers who aspired to expedite the development process with an eye toward contributing to the national

[382] Kyonghee Han and Gary Lee Downey, *Engineers for Korea* (San Rafael, CA: Morgan & Claypool Publishers, 2014), 54-55.

modernization scheme. State engineers' indulgence in accelerating river basin development and dam construction also gave rise to a dispute with academic engineers who argued for a careful approach to development based on rigorous research outcomes. Further, river basin development planned from this dissonance was repeatedly challenged by recurring floods and the unexpected impacts of dam construction on the rural environment. From planning to implementing river basin development, engineers had to deal with a significant stream of contingencies.

This haphazardness does not necessarily mean that state power on the riverine environment was limited. On the contrary, the ambiguity of river engineering provided a certain extent of flexibility which allowed engineers to include more natural forces and social activities into the components of their agenda. Research engineers did not interpret floods as the limitation of river basin development, but rather the validation for investing additional resources in hydrological research. State engineers legitimized rural sacrifice throughout a process of dam-building under the name of national development. What lay behind the quantification techniques and neutral numbers was the dynamics of engineers' position-making in developing South Korea.

Shadows of River Infrastructure

The standard history of water resources development policy tells that large dam construction enjoyed a golden age during the 1970s and 1980s, and then it demised after the 1990s due to the emerging environmentalism in South Korea.[383] All the large multi-purpose dams in the nation having more than a billion tons of water storage capacity, including the Soyanggang Dam,

[383] Korea National Committee on Large Dams, "Han'guktaedaemhoe 40nyŏnsa [40 Years History of Korea National Committee on Large Dams]" (Daejeon, Korea, 2012), 236.

Chungju Dam, Andong Dam, and Daecheong Dam, were completed between the early 1970s and the mid-1980s. After this period, the dam construction business confronted a growing anti-dam movement that vilified damming as a serious cause of environmental problems.[384] The rescindment of the Youngwol Multi-purpose Dam in 2000 was an iconic moment. Korean Water Resource Corporation planned to build another large multi-purpose dam in Youngwol, Gangwon Province, for the purpose of securing water resources and preventing floods, but strong environmental movement forced the plan to be nullified.[385] This triumph of environmental preservation over development exemplified that the era of dam-building had ended in South Korea.

Yet, vestiges of the *dammed nation* still remain and impact today's water policy. When President Lee Myung-bak initiated the Four Major Rivers Restoration Project (FMRP), the government intentionally called a structure that would be built in the rivers as a "weir (*po*)" instead of a "dam" to avoid its negative implications.[386] Arguably, what the FMRP called "weirs" are different from traditional dams in that the structures were built across main streams to control the flow of the dredged rivers rather than constructing artificial reservoirs. However, environmentalists argued that considering their sizes, we should call the structures "dams" rather than "weirs." Whether the structures should be called dams or weirs, the underlying rationale for the construction project was to make a bigger "water container (mulgŭrŭt)."[387] The Lee

[384] Yeotaek Kim, "Naŭi Insaenghaengnoesŏ Mannan Hach'ŏn'gwa Taem [Rivers and Dams I Met in My Life's Journey]," *Hach'ŏn'gwa Munhwa [River and Culture]* 2, no. 1 (2006): 15.
[385] Eun Hye Kim, "Kaebalchuŭiwa Kungnibyŏngsangŭi Kwejŏng Taem Kŏnsŏrŭl Chungshimŭro [The Trajectories on the Developmentalism and National Films in Dam Construction]," *Toshiyŏn'gu [Korean Journal of Urban History]* 15 (2016): 149–50.
[386] Sun Jin Yun, "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," *Development and Society* 43, no. 1 (2014): 109–41, https://doi.org/10.21588/dns.2014.43.1.005.
[387] Ministry of Land Transport and Maritime Affairs, "4taegangsalligi Masŭt'ŏp'ŭllaen [Four Major Rivers Restoration Project Master Plan]," 2009.

government proclaimed that the FMRP would lead South Korea to "an advanced country in water management" by enhancing water storage capacity. The key was to dredge river beds and build artificial structures so that the rivers could retain more water in their main streams.

This mission of making the river a "bigger water container" resembled what hydrological engineers argued for water resources development. The project headquarters led by hydrological and civil engineers presented that the FMRP would add 1.3 billion tons to the nation's water storage capacity.[388] The main task of the FMRP was to renovate rivers into bigger water tanks to handle floods and droughts expected to happen more frequently in the future. If we just look at the master plan, the FMRP was an eco-friendly project to buffer threats of climate change. The plan envisioned that the FMRP would prevent floods, secure affluent water during the dry season, improve water quality, and provide natural recreation places for citizens. The fundamental condition to realize these visions was to maintain the appropriate amount of water in the rivers all the time.

The notion of rebuilding rivers to have more water capacity has dictated water policy in South Korea. This national aspiration to control the amount of water has stemmed from quantifications of rivers led by hydrological engineers. Since 1962, state engineers have published an annual hydrological report that compiles hydrologic data collected from water measurement stations across the nation every year.[389] The measurement methods have significantly improved with mechanization, automation, and computerization, but the basic principle remains the same: quantifying rivers by gathering hydrologic data. If hydrological engineers in the 1960s and 1970s had calculated the amount of water for modernizing South

[388] Ibid, 357.
[389] Ministry of Construction, "Han'guksumunjosayŏnbo [Korea Annual Hydrological Report]" (Seoul, 1962).

Korea, they calculated it again to rationalize the FMRP for the nation in the era of climate change.

To some extent, this nation-scale quantity-driven approach is necessary, but it also hampers alternative possibilities of water management. The quantifications of rivers allowed hydrological engineers to calculate available water resources at the national scale, but this input-oriented water management policy sacrificed discussion on the distribution of water resources. While emphasizing the increase of water storage capacity in the nation, the FMRP barely considered who enjoys limited access to water resources, where the extra amount of water should be provided, whether water resource is fairly used, and how water management should be varied depending on the local conditions. More water secured by construction is not an additional resource coming from the natural world to society; it is more of a redistribution of resources in that construction only influences on the ways in which human interacts with nature. Some people benefit from the rebuilding of the environment while others lose their access to resources.

Quantification techniques abstracted the messy riverine system and allowed bureaucrats to control rivers from distance, but the pitfall was that they often viewed hydrological representations "as some higher form of order to which observed realities must conform."[390] With hydrological descriptions, bureaucrats idealized the territory dividing it into the sectors where water is stored, where economic activities happen, and where people live. In this abstracted world, rivers are the natural environment where water is contained. These rivers exist to provide water to the large industrial complexes and urban areas and also drain water during heavy rains. The state arranged all sorts of hydrological infrastructure—water measurement

[390] Jacob Eyferth, *Eating Rice from Bamboo Roots: The Social History of a Community of Handicraft Papermakers in Rural Sichuan, 1920-2000* (Cambridge, MA: Harvard University Press, 2009), 3.

stations, hydrologic data, maps, and structures constructed in rivers—to make rivers serve social and economic activities sanctioned by the national scheme. Local populations who did not fit well into the imagined ideal types were ultimately marginalized. From a large dam construction to the FMRP, inland fisheries people lost their jobs due to the changing riverine environment. Farmland near the rivers was inundated as the groundwater level increased after the construction. Riversides were turned into "ecological parks" for imagined middle-class tourists from cities in an industrial nation to enjoy leisure life and the beauty of nature. River engineering was not only to secure more water resources but reform social arrangements.

Innumerable sets of tedious data and tables in policy reports often obscure how river engineering shapes the ways in which everyday people imagine, interact, and live with the natural environment. River engineering is a process of recreating human relationships with the environment to concentrate resources according to the aspirations of authorities who possess political and technical capital. The operation of river infrastructure was such a challenging work that should perform the contradictory tasks: to retain water for stable supply as well as to empty rivers when floods are expected in populated downstream regions. This difficult mission, almost impossible to be perfectly accomplished, was legitimized for the purpose of making rivers serve modern and industrial South Korea. Hydrological engineering was not only a matter of "how to represent and understand rivers" but a matter of "whose rivers are these?"

Beyond the National Boundary

As colonial river management and TVA outlived their eras, South Korean river engineering prospered beyond its national boundary. Since the 1990s, damming has become less of a promising business in South Korea due to the emerging environmentalism and lack of remaining

prospective dam sites. Responding to this changing circumstance, Korean engineers have turned to a global market, especially Southeast Asia. In the late 1990s, the Korea Water Resources Corporation initiated the extensive survey project on the Mekong River basin as a form of official development assistance and later created the Southeast Asia Business Cluster.[391] South Korean conglomerates, such as Hyundai, Daewoo, and Sunkyong, to name but a few, also rushed to Southeast Asia for water infrastructure projects with support from the South Korean government's economic development and cooperation funds.

International infrastructure-building projects in the Southeast Asian environment entailed economic nationalism in multiple ways. In order to compete with strong economic powers in the overseas market, South Korean agencies mythicized their experiences of developing the poor postwar nation, propagating that South Korea is the first nation in the world to transform itself from a recipient country to a donor country. This narrative is aligned with a vision of national economic development in Southeast Asian countries, like Laos's declaration of being the "battery of Asia." In South Korea, the slogan of "earning foreign money" legitimized governmental support of South Korean corporations' presence abroad. The promise of economic development through construction projects accelerated collaboration between Southeast Asian governments and the South Korean agencies.

The expansion efforts of South Korean engineering in Southeast Asia dates back to early Cold War Asia where the colonial development infrastructure was being reformulated into postwar international development.[392] After the Korean War (1950-53), South Korea remade its

[391] K-Water, *Kwater 50Nyŏnsa [Fifty-Year History of K Water]*.
[392] Hiromi Mizuno, "Introduction: A Kula Ring for the Flying Geese: Japan's Technology Aid and Postwar Asia," in *Engineering Asia: Technology, Colonial Development and the Cold War Order*, ed. Hiromi Mizuno, Aaron S Moore, and John DiMoia (London, UK: Bloomsbury Publishing, 2018), 5.

connections with Southeast Asian countries. And the Vietnam War (1955-75) actually opened an opportunity for South Korean engineers to the pioneer Southeast Asian market through militarized construction projects.[393] In 1974, the Korea Water Resources Development Corporation (KWRDC) dispatched its personnel to South Vietnam as part of the "Korea Water Resources Mission" that aimed to establish a Đồng Nai river basin development plan.[394] The KWRDC was supposed to lead the three-year survey that would cost 1.1 million dollars although the plan was blown apart due to the fall of South Vietnam in 1975.[395]

When South Korean engineers engaged Southeast Asia, their compass to navigate through the unfamiliar environment was the quantification technique. Resembling the US-Korea collaborative river basin survey in Cold War South Korea, the KWRDC engineers first planned to study past reports on water resources, investigate available hydrologic data, produce annual hydrologic reports, and examine the water measurement network. The eye-numbing numbers and tables in engineering reports were a good place to hide political ideologies while carving economic nationalism onto the environment. Numerical representations of nature were vehicles for South Korean engineers to expand their profession both domestically and globally.

Of course, hydrological abstractions of the riverine environment often collapse with uncontrollable contingencies on the ground. The most recent disaster for instance was Xe Pian-Xe Namnoy Dam collapse happened in Laos. On July 23, 2018, during the night, 175 billion cubic feet of water burst out from the collapsed dam killing 71 people and displacing 14,400

[393] John P. DiMoia, "In Pursuit of 'Peace and Construction': Hyundai Construction and Infrastructure in Southeast Asia, 1965-73," in *Engineering Asia: Technology, Colonial Development, and the Cold War Order*, ed. Hiromi Mizuno, Aaron S. Moore, and John P. DiMoia (London, UK: Bloomsbury Publishing, 2018), 209–39.
[394] K-Water, *Kwater 50Nyŏnsa: Iyagip'yŏn [Fifty-Year History of K Water: Stories]* (Daejeon, Korea: Kwater, 2017) 33-37.
[395] Ibid, 36.

people from 19 villages downstream in Attapeu province.[396] The investigation commission blamed the Laos government and SK Engineering and Construction—a Korean conglomerate and the lead contractor of the project—for their faulty process of construction and corruption. If we instead position this disaster in the history of extensive infrastructure-building in the Southeast Asian environment, the Laos Dam collapse tells more than a fragmentary tragedy. The disaster was not just an outcome of recklessness or corruption; but resulted from the inevitable mismatch between the real world and its abstractions, which tends to be silenced in the pursuit of carrying on political visions in building the environment.

[396] Radio Free Asia, "Survivors of Laos' Worst Dam Disaster Still Struggling Two Years Later," July 22, 2020.

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