

## THE PRODUCTION OF A NATIONAL RISKScape AND ITS FRACTURES: NUCLEAR POWER FACILITY LOCATION POLICY IN SOUTH KOREA

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With 1 figure

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**Summary:** This paper examines the ways in which the Korean developmental state has, until very recently, managed physical risks of nuclear power operations while also pursuing national economic growth. In the literatures on the East Asian developmental states thesis, developmental state deployment of nuclear power as an energy source has been implicitly assumed to be risk-free and insulated from diverse social forces. However, by adopting the concept of the ‘riskscape’ and examining four nuclear power plant sites (Gori, Uljin, Wolsung and Younggwang), we show how a national riskscape has been designed by the government and has been dynamically contested by diverse actors for various reasons. The nationalized riskscape imposed by the developmental state has landed in each site differently according to the geographical, historical, political, and economic backdrops of the sites. It is within the context of this internally differentiated and contested nuclear power riskscape that South Korean president Moon Jae-in has vowed to end the use of nuclear power.

**Zusammenfassung:** Der vorliegende Beitrag geht der Frage nach, wie bis in die jüngste Vergangenheit hinein, im Rahmen der staatsgelenkten Wirtschafts- und Entwicklungsstrategie Koreas, der Umgang mit den Risiken der Kernenergie bei gleichzeitigem Fokus auf eine fortschreitende wirtschaftliche Entwicklung erfolgte. In vorliegenden Studien zur Theorie ostasiatischer ‚developmental states‘ wird die Nutzung der Kernenergie üblicherweise nicht kritisch hinterfragt und von breiteren gesellschaftlichen Perspektiven und Belangen isoliert betrachtet. Das Konzept der ‚riskscape‘ eröffnet die Möglichkeit, am Beispiel von vier Kernkraftanlagen (Gori, Uljin, Wolsung und Younggwang) aufzuzeigen, wie die staatliche Seite eine ‚nationale riskscape‘ konstruierte, um die von unterschiedlichen Akteuren in einem dynamischen und kontroversen Prozess gerungen wurde. Das staatliche Konstrukt einer ‚nationalen riskscape‘ fand an jedem der Orte, in Abhängigkeit des spezifischen geographischen, historischen, politischen und wirtschaftlichen Hintergrunds, einen unterschiedlichen Widerhall. Aus diesem Kontext einer intern differenzierten und umstrittenen Kernenergie riskscape heraus, erwuchs die Ankündigung des Präsidenten Moon Jae-in, die Kernenergienutzung in Südkorea einem Ende zuzuführen.

**Keywords:** nuclear power facility, riskscape, developmental state, hegemonic project, South Korea

### 1 Riskscape and the Korean developmental state’s nuclear policy

This paper examines the ways in which the Korean developmental state has managed physical risks of nuclear power operations while pursuing national economic development. As many note, East Asian developmental states such as Japan, Taiwan and South Korea, realized the so-called ‘East Asian miracle’ (WORLD BANK 1994) during the 1970s and 1980s. Scholars such as JOHNSON (1982), AMSDEN (1989), and WADE (1990) have theorized the key factors behind these developmental miracles. Deploying the East Asian developmental state thesis (DST), they tend to emphasize the role of the state and its affiliated national bureaucrats, who promote long-term national economic plans while remaining insulated from private interests.

Existing literature on the DST has thus far paid little attention to the risk management involved in using nuclear power facilities to provide the stable electricity needed for industrialization. It tends to assume that the plan-rationality of national bureaucrats made for the safe and successful management of Korea’s nuclear plants. For example, CHOI et al. (2009, 5494) introduce Korea’s experience with nuclear power as a “successful nuclear power program” that promoted Korean nuclear power development projects elsewhere. Even after the Fukushima Daiichi Nuclear Power Plant disaster on 11 March, 2011, the Korean government made plans to construct more nuclear power plants at home, and to export reactors to countries such as the United Arab Emirates in the name of a ‘greenhouse gas emission (GHG)

strategy<sup>1)</sup>. This is in direct contrast to the actions of other countries such as Germany and Japan, which are considering shutting down their nuclear plants entirely (JOSKOW and PARSONS 2012).

A policy report titled *‘The future of nuclear power after Fukushima’* published by the MIT Center for Energy and Environmental Policy Research forecasts that “the accident at Fukushima will not ‘kill’ the much discussed renaissance of nuclear power, but it adds one more negative pressure on the rate of growth *globally*” (JOSKOW and PARSONS 2012, 13 italics added). Although this report reveals the variety of responses among countries at a global level after the Fukushima disaster, the report could not explain why some states made decisions that were in stark contrast to those of other states. Thus the problem should be researched and theorized not only at the global level but also at the national and local levels.

Dominant DST studies deploy a brand of methodological nationalism wherein the national state is ontologically and epistemologically regarded as the dominant and the most rational unit over other social units, such as civil society, while still recognizing social phenomena from the perspective of state-centrism (HWANG 2016a). Yet even during the height of developmentalism, the Korean state could not calculate or control all aspects of its economic development without producing social and political friction. Instead, dynamic interactions among diverse social forces act in and through the state.

Using an alternative approach, several scholars have attempted to prove that the Korean state has intentionally used hegemonic projects to legitimize its friction-inducing economic plans (CHO 2005; HWANG 2015). The Park Chung-Hee regime, which seized control of the country in a military coup in 1961, pursued the ‘modernization of the fatherland’ as political philosophy. As a hegemonic project, it was rhetorically meant to realize local interests through embedding national modernization project in local places to supplement the regime’s weak legitimacy that stemmed from a military coup (HWANG 2015, 1930–1931). Put simply, the rationale behind the Park regime’s use of a hegemonic project such as Modernization of the Fatherland was to disable local and national level critiques of the

regime’s economic plan and critiques of its weak legitimacy. Accordingly, to grasp the dynamics of a certain state policy, we should examine not only the state per se as a unit of analysis but also the diverse social forces that are located at various geographical scales.

Accordingly, the state needs concrete hegemonic practices for stable risk management of the critical national infrastructure (e.g., nuclear power plants) before possible opposition and resistance occur at the local and national levels. MÜLLER-MAHN and EVERTS’ (2013) concept of the ‘riskscape’ is useful for explaining spatially uneven risk management of the developmental state. MÜLLER-MAHN (2007), when explaining the concept of riskscape, emphasizes the relationship between risk and space. According to MÜLLER-MAHN and EVERTS (2013):

“[W]e propose to relate riskscapes to risks and the way they emerge through *practice*. This means riskscapes always have to be understood from *the perspective of individuals or groups*, and they may *overlap in space and time*, although they do not necessarily and do not always do so.... Depending on the viewpoint, the practices carried out and the risks attuned to, riskscapes can vary considerably, although they might refer to the ‘same objective spatial expense’” (pages 26–27, italics added).

Riskscapes are multiple and variegated. Although the Fukushima disaster, for example, is a *singular* event, individuals and groups’ perspectives of risk are *different* depending on the individual positionality of each entity (e.g., international organizations, experts, local people). Acknowledging the fruitfulness of the concept, it should be mentioned that the current embryonic debate on riskscapes did not pay much attention to the role of the state. One of the reasons is that their case studies mainly focused on interactions between local (e.g., endogenous people) and global actors (e.g., international organization’s expert) in the so-called predatory Third World states, where the role of the state is hollowing out (cf. MÜLLER-MAHN 2013).

On the other hand, in East Asia, the state is a dominant unit not only economically, but also politically, socially and culturally. The state could play a key role in constructing a *particular riskscape as a hegemonic project* for its politico-economic aims (HWANG 2016b, 292). Here, we suggest that the mechanism of a hegemonic project and practice of the developmental state could be applied to riskscapes, although the riskscapes produced by the state are uneven and work in and through chains of concrete sociomaterial relations.

<sup>1)</sup> A contract signed in 2009 with the UAE to build nuclear reactors on the shores of the Arab Gulf is a first fruit of this export-oriented engagement (HWANG et al. 2017). The premise that nuclear power does not emit GHG is still contentious (see SOVACOOOL 2008).

Riskscape are not only plural, or multiple, but also multi-scalar, hierarchical, and unstable. In other words, one riskscape could marginalize or engulf another riskscape meant to manage the same risk. During the height of developmentalism, the Korean state attempted to produce a national riskscape surrounding their nuclear power policy. From the perspective of the national riskscape, nuclear energy looks well managed by ‘rational’ national bureaucrats, and risk appears to be manageable and calculable. Following the government’s logic, even if radioactive pollution occurs in the vicinity of the nuclear facility, it would be assumed that the outcome of the national development in the name of the modernization of the fatherland exceeds that of any local risk. However, the well-established status of a national riskscape is not permanent; in fact, the dominant national riskscape could be eroded in the face of geographical, political, and economic contingency.

The more detailed research questions are as follows: 1) How and through what type of riskscape does the Korean state manage risks related to nuclear power operations, including both physical risks from the plants as well as political risks due to contestation against the plants? 2) How do non-state actors, such as local people and NGOs, impact the state’s nuclear policy orientation, and how does the nuclear policy change as a result of those impacts? What kinds of riskscape have been produced as a result of these impacts?

In investigating the case studies presented in this paper, we reviewed documents, including newspapers, official reports, statements, books, magazines, and other materials, and we conducted in-depth interviews with residents who recall the early phase of establishing nuclear power plants (NPPs) in the county. We also conducted field investigations of nuclear power plant sites (Gori, Uljin, Wolsung and Younggwang, see Fig. 1) to better understand the ways in which various kinds of actors contest riskscape at different scales.

## 2 The production of a national riskscape as a hegemonic project

In this section, we reveal that the discursive and material construction of a national riskscape as a hegemonic project surrounding nuclear policy.<sup>2)</sup>

<sup>2)</sup> Although conceptually divided into two parts, the discursive and material mechanisms are intermingled.

The Korean state considered nuclear power to be a significant power source since the beginning of industrialization. After Korea’s liberation in 1945, the government, under its first president Rhee Seung-Man, juxtaposed affirmative and utopian images of a ‘peaceful, liberal nuclear camp’ against a ‘destructive, communist nuclear camp’ scheme.<sup>3)</sup> Politicians, bureaucrats, researchers, and experts in Rhee’s governmental circle regarded nuclear power as a significant technological instrument to overcome underdevelopment by contributing to the economic development of the area (KIM 2012).

Following the Rhee regime, the Park Chung-Hee promoted nuclear policy in earnest. In the 1950s, Korean people already knew the risk of nuclear materials by observing the 1945 US atomic bombings of Hiroshima and Nagasaki and they did express concern over the government’s plan to construct nuclear power facilities (HWANG 2016b, 293–295). However, the government regarded nuclear energy as the nation’s main electrical supply, especially given that South Korea had been receiving most of electricity from North Korea before liberation in 1945 (DIMOIA 2010). Thus, the Park regime began to frame the development of nuclear energy as the development of the nation, using the slogan of “atoms for national development” (JASANOFF and KIM 2009, 133).

Meanwhile, the regime emphasized the role of nuclear scientists and technicians by arguing that they are the “motivational power behind national development” and the “pride of the nation” (JASANOFF and KIM 2009, 133). The expert-led, industry-oriented Park regime mobilized this socio-technological image beginning in the early 1970s.

Our fieldwork revealed that most of the local residents in the neighbourhoods of the nuclear power plants understood the plants to be ‘factories that produced electricity’ at that time (LEE et al. 2014). In general, because local residents considered that the factory is equivalent to regional development, local residents were mobilized by the government to attend ground-breaking ceremonies for the nuclear power plants rather than to raise questions about the nuclear plant.

<sup>3)</sup> South Korea has had security concerns regarding nuclear power due to the division of the organization and the antagonism between the two Koreas. It means that political and military security issues closely connected with NPPs in South Korea. Thus, NPPs were always treated as military facilities and any resistance or criticism against the construction of nuclear power plants has been regarded as threats to national security (KIM and BYRNE 1990; KU 2010).

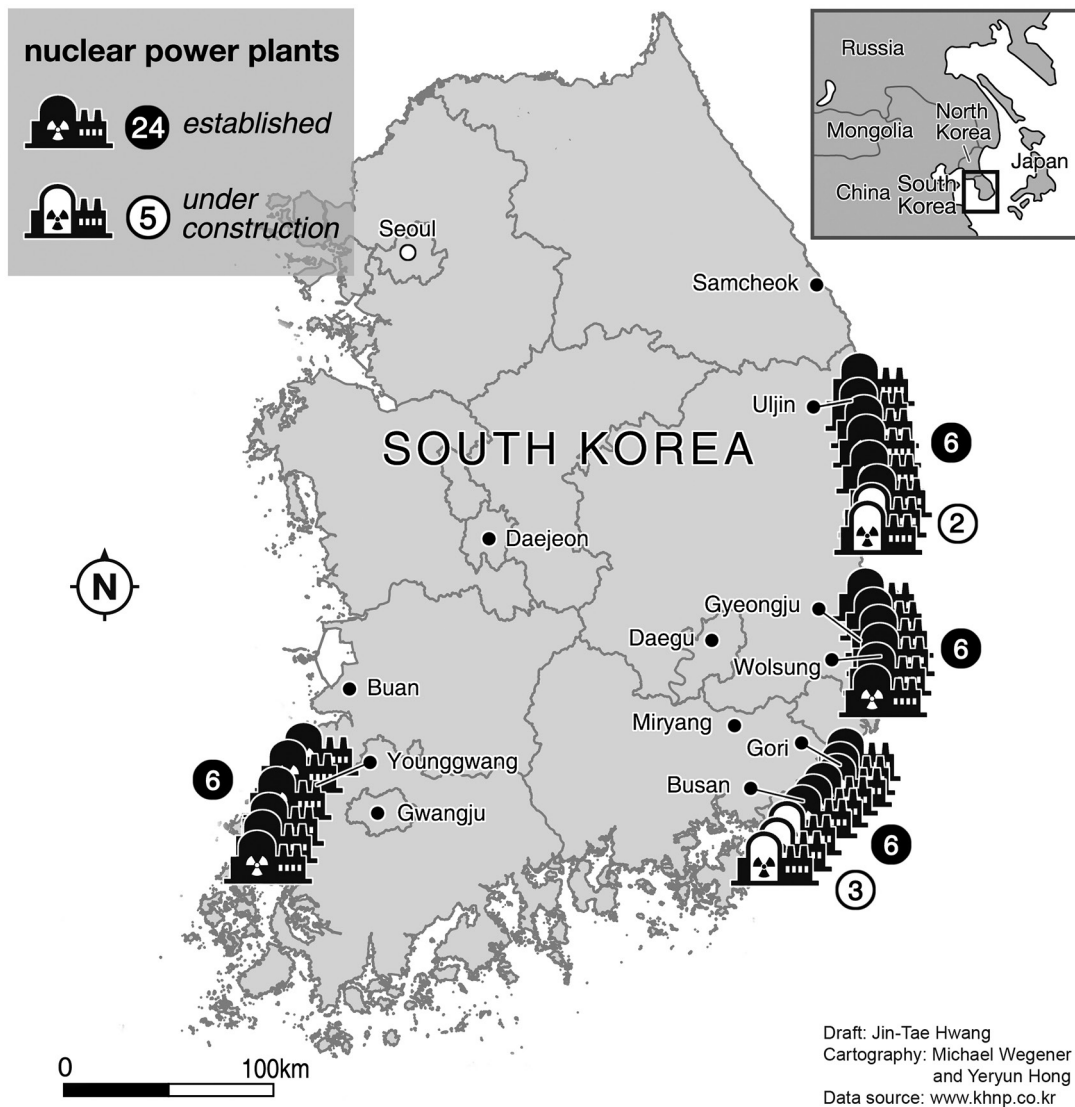


Fig. 1: Current locations of nuclear reactors in South Korea

Nuclear power technology, as the representative mega-technology, requires enormous capital investments and complicated bureaucratic systems for implementation and operation that comprise a complex sociomaterial assemblage (KU 2010). During the 1960s, all projects and studies related to nuclear power were pursued by the Office of Atomic Energy (OAE), which was established in 1959.

The Commission on Nuclear Power Generation (CNPG), under the OAE, was established in 1962 to study the feasibility of using nuclear power as a major power source. The location sites of nuclear power plants were then determined by the CNPG. The CNPG considered Kyunggi Province and the

Incheon area, as well as the areas around Busan, Ulsan, and Mokpo as appropriate locations for the construction of the NPPs. These sites shared the characteristics of having a high demand for electricity as well as access to waste treatment systems and cooling water supplies (KEPCO 1981, 305–306). Based on research on the location of the first NPP (150,000 kW) in 1965, the government chose three candidate locations, each of which was close to a large city, such as Seoul, Busan, and Ulsan.

Following this first study, experts regarded a few key factors to be critical when identifying appropriate locations for NPPs. These factors included population distribution, civil engineering policies, geo-



logical characteristics, climate conditions, oceanic conditions, and current industrial development. As a result of these specific factors, experts recommended two sites in Jangan Township near the city of Busan. However, in the Long-Term Electric Power Development Plan of 1967, the original location was changed to another site near Busan: Gori Village in Gijang County. The planned number and volume were also changed by the government, that is, two 500,000 kW nuclear power plants were to be built near Gori Village (KIM 2012, 171).

The general characteristics of a national riskscape led by the Korean state are not as transparent as expected. One could assume that the national riskscape was successful in terms of the way it allowed for the construction of nuclear facilities for the purpose of national economic development while concealing how vulnerabilities are actually produced.<sup>4)</sup> However, understanding the context at a national level is superficial and could be misinterpreted as methodological nationalism. As previously emphasized, riskscapes may take plural forms (e.g., local riskscapes constructed by local communities). This dominant national riskscape would not be perpetual because, as revealed in the next section, locally produced riskscapes may be juxtaposed with or they even threaten a national riskscape. Thus, we more specifically focus on the aspects of contested riskscapes at local sites.

### 3 Contested riskscapes at four nuclear power plant sites

In this section, by examining four nuclear power plant sites (Gori, Uljin, Wolsung and Younggwang), we argue that the national riskscapes shaped by the government were dynamically contested among diverse actors for various reasons from the 1970s to the present.

<sup>4)</sup> In the introduction of the paper, we introduced the perspective that Korean nuclear policy is depicted as a “successful nuclear power program” (CHOI et al. 2009, 5494). The accuracy of this perspective is debatable, however. According to an official report of the Korean Institute of Nuclear Safety, a total of 676 accidents in Korean nuclear power plants were recorded between 1978 and 2012 (Operational Performance Information System for Nuclear Power Plant homepage). While most of them were minor, some involved serious damage, such as broken pipelines and heavy water leakages. Thus, it could be explained that local riskscapes were *successfully* marginalized by the government until recently.

#### 3.1 Gori nuclear power plant

In 1968, the government chose Gori Village, a small fishing village located in Jangan Township in Kyungnam Province, as the site for the first NPP in South Korea. From 1971 to 1986, the NPP complex was established with the construction of four plants. Though Gori Village was chosen as the location for the NPP owing to its geological stability that would shield it from certain kinds of natural disasters, the residents of Gori Village and neighbouring regions were generally unaware of the NPP. Some residents whose lands were appropriated by the central government in order to build the plant (1,250 persons, 162 households) opposed the decision to build the NPP despite the authoritarian regime. However, as contestation was limited to the people of the village, they had no choice but to accept the state’s decision. Other residents in Jangan Township understood the nuclear power plant as an ‘electricity producing factory’ and thus welcomed it. Thus, while some argued that the NPP would destroy the rich fishery ecosystem, others thought it would provide a cornerstone for the modernization of the country and the growth of the national economy (LEE et al. 2014, 32-38).

Regarding the impact of the NPPs on the regional development of the location site, there were, again, two perspectives. In the course of constructing the plants, residents could enjoy the economic benefits derived from renting their houses and operating commercial businesses to support the workers. In fact, the government as well as some experts claimed that there would be economic benefits to the regional economy (YANG 1996; MOIE, 2005; HONG et al. 2010). However, after the short-term civil engineering process was completed, the neighbouring commercial zone again deflated. In the long term, the regional economy and development came to be dependent upon the NPPs. The level of satisfaction among the residents was low, as they were unable to rely on the support policies designed to protect the surrounding area of the NPPs. Moreover, deception and rent-seeking practices of local government leaders during the construction and operation of the plants gave rise to social conflicts among residents (Interview C; see also CHOI 2009, 237–238).

It can be concluded that the riskscape surrounding the Gori NPPs was constructed by the government for economic reasons as the economic significance of the NPPs for national economic development exceeded the economic cost to local residents. As discussed below, following the completion of the Gori NPPs, different riskscapes were constructed at other sites.

### 3. 2 Wolsung nuclear power plant

The Wolsung NPP complex shows the impact of national security in the nuclear development of South Korea. It adopted the CANDU (CANada Deuterium Uranium) reactor, a heavy-water-reactor which could be utilized for securing plutonium (HONG 2016, 58). This kind of reactor is unique and closely related to the fact that the Park Chung-Hee regime attempted to develop nuclear weapons, although with pressure from the U.S., South Korea became a member of the NPT (Nuclear Nonproliferation Treaty) in 1975 (CHUNG 2012, 253-264). The government explained the necessity for the nuclear power plant in terms of national security, specifically, the threat from North Korea. Thus, the residents of Wolsung County acknowledged that the NPP could produce a nuclear bomb to protect the country from North Korea. They regarded the locationing of the NPP as significant task for national security, and thus, they simply accepted the state project (Interview D).

In 1975, Yangnam Township of Wolsung County in Kyungbuk Province was chosen for the location of the Wolsung NPP No.1. In 1995, following a change in administrative districts, the Wolsung NPP complex belonged to Kyungjoo City. By the end of 1999, four NPPs had been constructed at Kyungjoo City and commercial operation had begun.

Similar to the Gori Village NPP complex, residents of Wolsung County had limited information about nuclear power, particularly with respect to risk. They assumed that their hometown had appropriate resources for the plant, for example, abundant cooling water, and thus, there was no significant social conflict outside of struggles over compensation for land expropriations.

As Wolsung County was a remote, economically vulnerable area, the local community held high expectations for regional economic development from the introduction of NPPs. However, local expectations waned as the evaluation of the contributions from the NPPs to the regional economy turned out to be unpromising. During the construction process, regional products, incomes and employment increased considerably (YANG 1996). Upon completion of the construction, a proportion of the agricultural population decreased while retail, restaurants, and accommodation businesses increased (HANKYOREH NEWSPAPER, 8 December 1988). Thus, the influx of commercial capital from outside the region resulted in short-term gains that reduced the positive economic effect of the NPP complex (Interview D; see also YANG 1996).

In 1982, one year before the commercial operation of the Wolsung NPP started, news of the closure of the CANDU type NPP in Canada owing to heavy water leakage accident was publicized (DONGA NEWSPAPER, 23 April 1982). Despite this news, public awareness of the risk associated with NPPs was not raised. However, after a series of accidents between 1984 and 1988, including heavy water leakage at the Wolsung NPP complex (KYUNGHYANG NEWSPAPER, 29 December 29, 1984; DONGA NEWSPAPER, 1 January 1985; KYUNGHYANG NEWSPAPER, 5 October 1988), collective actions occurred that were consistent with a nationwide anti-nuclear and compensation movement. In 1988, 300 residents of Yangnam Township held a sit-in demonstration demanding compensation and the relocation of the NPP to a safer place (HANKYOREH NEWSPAPER, 6 November, 8 December 1988).

After 1990, when the government began to provide official subsidies for areas hosting NPPs, the subsidies were granted according to the volume of the power generated by the plant. In case of the Wolsung NPP, which was a relatively old plant model with a small generating volume, the subsidies were small; moreover, it was regarded as more dangerous than other NPPs. Therefore, residents of Wolsung County felt that they were being treated unfairly and deprived of economic compensation due to the government's way of calculating the cost of the NPP compared with other complexes (Interview D).

A series of accidents from NPPs have contributed to the establishment of a nationwide framework for risk-safety regarding NPPs. In the mid-1990s, heavy water leakage accidents occurred, and the KHNP (Korea Hydro and Nuclear Power Co., Ltd.) attempted to conceal the accidents. Although some residents voiced strong dissatisfaction with the KHNP and the government, the overall local opinion was relatively cooperative. In 2000, a plan was established to locate the new Wolsung NPP in Yangbuk Township. After considerable social conflict, it was also decided, in 2005, that the plant's radioactive waste disposal site would be located at Yangbuk Township.

Compared to other areas, in the Wolsung area, national security was significant to the process of constructing a national riskscape. Also, local people began to construct their own riskscape that was sensitive to latent dangers of reactors after several heavy water leakage accidents occurred at the locality, although they did not completely or aggressively oppose the government's nuclear policy.

### 3.3 Younggwang nuclear power plant

Younggwang was not an appropriate site for an NPP due to its high tidal range and weak geological conditions. Nonetheless, the location was pursued by the government as a result of territorial local politics declaring the even development of national territory. In 1978, Younggwang County of Jeonnam Province was selected as a site for an NPP. The first and last NPP complex at the western seashore, which consisted of six plants, was established in 2002.

The local ruling groups had a positive attitude toward the NPPs, while ordinary residents were relatively ignorant about them (Interview A). In the case of the Younggwang NPPs, the local ruling group was able to take advantage of its latecomer status and thus able to gain considerable compensation for land acquisition, and thus, the residents were relatively cooperative (Interview A; see also CHAE 2003). Expectations of regional development as a result of the NPPs prevailed in the area (Interview A). However, after an initial boom from the construction of the NPP complex, a long-term depression and social conflict within the region arose, most notably due to the unfair distribution of subsidies and the failure of small rental companies to provide local accommodation for workers. As the construction of the third and fourth NPPs was delayed for a considerable time, the lodging business failed to return the invested money to the investors. Disputes regarding the subsidies were similar to those of other cases.

After the Chernobyl accident in 1986, the Younggwang NPP No.1 was the first plant to initiate a commercial operation. As a consequence, residents came to relate the Chernobyl accident to the Younggwang NPP on an emotional level; they began to see that the Younggwang NPP could also be dangerous (Interview A). Due to the democratization movement of South Korea in 1986, the campaign for compensation for the damage from NPPs and the anti-nuclear movement were also in full force, and regional coalitions and national networking against nuclear power were established. Between 1987 and 1989, several accidents occurred at Younggwang NPP involving, for example, seashore pollution by thermal discharge from the NPP and workers' exposure to radiation. Of even greater concern, there were increased cases of human and animal birth defects in the areas surrounding the NPPs. Therefore, in 1990, the first epidemiological survey had commenced to investigate the origins of these irregularities. While these issues were ini-

tially addressed at the local level, they soon became part of the national agenda and the idea that nuclear reactors are inherently unsafe spread throughout the country. After the National Centre for NPPs Expulsion Movement was established in 1989, the National Centre for Anti-Depository Facility for Radioactive Waste and Korean Anti-Nuclear Action was established. The Solidarity Action for a Nuclear Free World became the legacy of the anti-nuclear movement in South Korea.

Unlikely the early stage of construction of the Younggwang NPPs, a negative attitude at the local/national level towards NPPs after the construction of the third and fourth NPPs in 1989 was dominant, and the expectations of regional development had decreased. Particularly, a negative perception regarding regional industrial development, employment, and income of residents prevailed. Additionally, the locality saw negative impacts, such as a declining regional image, a decrease in fishery health, and a decrease in the viability of animal husbandry (Interviews B and E; see also KIM et al. 2005).

The ecological impacts from the NPPs were unique to the Younggwang case. The most significant issue was the thermal discharge from the Younggwang. One NPP with a volume of 1,000 MW emitted 50 to 60 tons of water per second, and the temperature of the emitted water was seven degrees Celsius warmer than from it was taken. As a result, the thermal discharge from the NPP created tremendous changes in the local marine ecosystem. Specifically, as the western coastal area of South Korea had affluent fish-raising industries, the damages from the thermal discharge could exceed those from any other NPP complex (LEE 2011, 229–230).

The compensation campaign against the thermal discharge damage began in 1988. While the state awarded compensation to the fish-raising industries within a 2 km radius of the NPP, the fish-catching industry that took their fishing boats further from shore did not receive such compensation. Therefore, the boat fishing industry sought a reassessment of damages and increased compensation. During the course of this struggle, the standard range for compensation was constantly changing. At one point, it was determined to be 9.9 km to the south and 11.3 km to the north (1995); this was modified to 12 km to the south and 13.2 km to the north (1998); and it was again changed to 20.2 km to the south and 17 km to the north (2005). These ongoing changes indicate that the state recognized that the local riskscape for residents was continually expanding (Interview B; KHNP 2008, 275–286).

Against the political and historical backdrop of the Kwangju massacre in 1980, there had been politically progressive religious groups (Catholic and Won Buddhism) and powerful social movement groups (farmers union, NGOs, people's organizations) in the region. Under this atmosphere, Kim Bong Ryol, the governor of Younggwang County, cancelled plans to construct Younggwang Nos. 5 and 6 NPP in 1996. However, the Board of Audit and Inspection of Korea declared the governor's decision to be illegal and inappropriate, and thereby overturned the governor's decision (CHAE 2003; HANKYOREH NEWSPAPER, 18 September 1996). Such actions clearly indicate that while the anti-nuclear movement had some impact on the local government, at the same time it also reveals that local governments were unable to publicize their concerns and stand against the state's decisions.

At the early stage of the Younggwang NPP construction, a national riskscape shaped by the government was dominant and it was actively supported by local people living in NPP host communities. However, following the Chernobyl accident, the birth defects of children and livestock, and national political democratization in the 1980s, local people began to problematize the government's riskscape while diffusing their local riskscape to the whole country.

### 3.4 Uljin nuclear power plant

In 1978, Uljin County of Kyungbuk Province was designated as the location for the Uljin NPP complex. By 2005, six NPPs had been constructed and were commercially operating. Similar to other communities hosting NPP complexes, the residents of Uljin County considered the location policy of the NPP by the authoritarian government to be inevitable and believed that Uljin County had the appropriate geological conditions. They also expressed high expectations regarding regional development and thus positively accepted the development of the NPP complex. Particularly, they were cooperative with respect to land acquisition and the high compensation price offered for the land. Therefore, the residents had few conflicts surrounding their relocation (Interview D; see also CHAE 2003).

Compared with the other complexes, the Uljin NPP complex had a positive, albeit limited, impact on the regional economy. The construction work of the NPP provided the residents with the opportunity to earn extra income through house rentals, res-

taurant business, and other commercial activities. According to the records of the KHNP, 6,700 workers were employed on daily basis, and approximately 80% of them were from outside Uljin County (KHNP 2008, 299-323). As Uljin County was a remote and isolated area, the workers were inclined to reside in and spend money in Uljin County. This meant they were renting houses, going to restaurants, and engaging in leisure activities (LEE et al. 2014, 90). Because the economic benefits from constructing the NPPs could remain in the region long term local residents held a generally favourable view of the complex. However, different discourses also existed. Some residents were concerned about the risk generated by NPPs and believed that the location policy as it pertained to NPPs was unjust. In essence, they felt that depressed, underdeveloped, sparsely populated, ageing regions were selected as locations for risky facilities due to the inherent conditions of the regions (Interview D).

Uljin County is a mountainous region that extends a length of 100 km wherein villages are scattered around low hills. Accessibility to Uljin County is difficult due to the lack of roads leading to it. Because of the lack of basic infrastructure, such as medical service and education, and the limited accessibility, the work forces of the KHNP avoided working at the Uljin NPP complex. This led to a lack of skilled workers, which increased concerns regarding the security and safety of the NPP. As of 2005, more accidents occurred at the Uljin NPP complex compared to the other complexes, and 60% of them were the result of unskilled labourer mistakes (KHNP 2008, 330).

Despite the risk, economic dependence on the NPP complex was not easily resolved as the economic basis of Uljin became vulnerable. With this backdrop, the location policy of the new Uljin NPP resulted in tremendous conflict among the residents. Residents in surrounding areas of the NPP, particularly trade people, such as retailers, rent lenders, and restaurant owners, welcomed the early commencement of the construction of the NPP because it created a boom in business. However, residents outside the surrounding area preferred to discuss compensation in an effort to maximize their benefits (CHAE 2009, 158). Additionally, the anti-nuclear resident compensation movement in Uljin during the 1980s was a small-scale, sporadic occurrence, and the local government of Uljin County did not actively attempt to protect the residents from the negative effects of the NPP (CHAE 2003).



The reason why local people in several areas (in particular, Younggwang and Uljin) attempted to attract the NPPs is that they believed that the NPPs will bring wealth to their areas. Due to Uljin's geographical characteristics as a small, isolated and economically vulnerable area, even in the wave of democratization of the 1980s, there was no severe conflict in contrast to Younggwang area. In this sense, the national government's riskscape was prevailing in this area.

#### 4 Conclusion: is the nuclear-free era really coming?

On 19 June 2017, at an event to mark the closure of South Korea's oldest nuclear plant, Gori-1, the new South Korean president Moon Jae-in vowed to phase out the country's dependency on nuclear power (THE GUARDIAN, 19 June 2017). Even after the Fukushima disaster, the previous governments were deeply invested in nuclear power policy, and they were exporting reactors to developing countries (HWANG et al. 2017). How can we account for this abrupt change between old and new regimes?

For about half a century, NPPs were regarded as inevitable options for the 'miraculous' economic growth of South Korea. A national riskscape made by the central government was successful in marginalizing locally produced riskscapes while amplifying the significance of nuclear energy in national economic development. In other words, people, who are influenced by a national riskscape, have long been believed that national economic benefit exceeds any local risk stemmed from the NPP operation. However, although there exists a dominant riskscape at a national level, locally produced riskscapes could make fractures at local and even national scales.

As explored in the cases presented above, owing to the different attributes of the regions, issues regarding risk management of NPPs and responses from the residents, different riskscapes have been produced. In the case of Gori Village, national economic development was emphasized by the government, while the basic rights of its residents were oppressed. As for Wolsung, national security convinced people to accept an NPP without serious dissent. In Younggwang, ecological damage from thermal discharge and ensuing social movements surrounding it played important roles in producing the riskscapes of the local residents. In the case of Uljin, geographical conditions (isolated and remote) and the underdevelopment of its infrastructure made for more vulner-

able than other regions. As these locally produced riskscapes have piled up and exposed the dangers of NPPs, Moon has promised to end use of nuclear power (REUTERS, 22 October 2017).

Is a nuclear-free era really coming in South Korea? Possibly. After president Moon's declaration, the government temporarily halted the construction of the Shin-Gori 5 and 6 nuclear reactors, which ignited local people's resistance because they believe that reactors will have a positive economic effect on the region. As witnessed above, in several nuclear power plant sites, not only government officials but also local people in economically vulnerable areas sought to attract NPP complexes. Local geographical, political and economic contingency makes the form of riskscapes more complicated today than during the developmental state era. In this paper, we ascertained that the concept of riskscapes is effective to deconstruct the myth of developmental states on risk management. This concept would also be fruitful to open black boxes containing complicated realities of other risks for a more just and sustainable future.

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#### References

- AMSDEN, A. H. (1989): *Asia's next giant: South Korea and late industrialization*. New York, Oxford.
- CHAE, J. H. (2009): Structural analysis of public conflict using social network analysis: case of public conflict on Uljin new NPPs construction. In: *Journal of Korea Public Administration* 43 (2), 147–176.
- CHAE, K. S. (2003): Policy metaphor and implementation responses of local governments to nuclear power plant construction (지방정부의 정책은유와 집행대응). In: *Local Government Studies (지방정부연구)* 7 (2), 25–39.
- CHO, H-Y. (2005): A study on the epistemological character and issues in the recent debates over re-evaluation of the Park Chung-Hee dictatorship (박정희 시대 재평가 논의

- 의 인식론적 성격과 쟁점들). In: *Economy and Society* (경제와 사회) 67, 298–333.
- CHOI, S. D. (2009): Problems of supporting policy for the surrounding areas of NPP and searching for improvement (원자력발전소 주변지역 지원정책의 문제점과 발전방향 모색: 고리원전 지역을 중심으로). In: *Local Government Studies* (지방정부연구) 13 (3), 223–244.
- CHOI, S.; JUN, E.; HWANG, I.; STARZ, A.; MAZOUR, T.; CHANG, S. and BURKART, A. R. (2009): Fourteen lessons learned from the successful nuclear power program of the Republic of Korea. In: *Energy Policy* 37 (12), 5494–5508. <https://doi.org/10.1016/j.enpol.2009.08.025>
- CHUNG, W. S. (2012): *A world history of nuclear*. Seoul
- DIMOLA, J. (2010): Atoms for sale? Cold war institution-building and the South Korean atomic energy project, 1945–1965. In: *Technology and Culture* 51 (3), 589–618. <https://doi.org/10.1353/tech.2010.0021>
- HONG, J. H.; PARK, J. H. and HYUK, M. H. (2010): Impact of location of NPP to regional economy (원전입지가 지역경제에 미치는 효과). In: *Journal of Policy Analysis and Assessment Association* (정책분석평가학회보) 20 (3), 27–53.
- HONG, D. H. (2016): *The formation and transformation of nuclear industry in Korea: focusing on the industrial structure and the modes of regulation of the nuclear power plant sociotechnical regime, 1967–2010*. PhD thesis. Seoul.
- HWANG, J.-T. (2015): *A study of the state-nature relations in a developmental state: the water resource policy of the Park Jung-Hee regime, 1961–79*. In: *Environment and Planning A* 47 (9), 1926–1943. <https://doi.org/10.1177/0308518X15594922>
- (2016a): Escaping the territorially trapped East Asian development state thesis. In: *The Professional Geographer* 68 (4), 554–560. <https://doi.org/10.1080/00330124.2015.1103657>
- (2016b): The production of riskscape in the Korean developmental state: A perspective from East Asia. In: *Journal of the Korean Geographical Society* 51 (2), 283–303.
- HWANG, J.-T.; LEE, S.-H. and MÜLLER-MAHN, D. (2017): Multi-scalar practices of the Korean state in global climate politics: the case of the Global Green Growth Institute. In: *Antipode*. 49 (3), 657–676. <https://doi.org/10.1111/anti.12288>
- JASANOFF, S. and KIM, S.H. (2009): Containing the atom: sociotechnical imaginaries and nuclear power in the United States and South Korea. In: *Minerva* 47 (2), 119–146. <https://doi.org/10.1007/s11024-009-9124-4>
- JOHNSON, C. (1982): *MITI and the Japanese miracle: the growth of industrial policy, 1925–1975*. Stanford, CA.
- JOSKOW, P. L. and PARSONS, J. (2012): *The future of nuclear power after Fukushima*. MIT Center for Energy and Environmental Policy Research working paper 2012-02. <https://doi.org/10.5547/2160-5890.1.2.7>
- KEPCO (Korea Electric Power Corporation). (1981): *20 years of Korea Power Electric Corporation*. Seoul.
- KHNP (Korea Hydro and Nuclear Power Co., Ltd.). (2008): *Dreaming energy beautiful future: history of nuclear development for 30 years Vol. 2*. Seoul.
- KIM, J. D. and BYRNE, J. (1990): Centralization, technicization and development on the semi-periphery: a study of South Korea's commitment to nuclear power. In: *Bulletin of Science, Technology and Society* 10, 212–222. <https://doi.org/10.1177/027046769001000405>
- KIM, S. J. (2012): *Establishment and change of nuclear technology system in Korea, 1953–1980*. PhD thesis. Seoul.
- KIM, T. K.; KOO, J. W.; LEE, S. H.; KIM, S. H. and JANG, D. K.. (2005): Survey results on the impact of Younggwang NPP on the residents of Younggwang County (영광원전이 영광지역에 미친 영향: 주민 설문조사 결과). In: *Study of Regional Development* (지역개발연구) 37, 1–41.
- KU, K. W. (2010): Green-peace state and peace system in Korean peninsula-state form and South-North Korean relationship (녹색, 평화국가론과 한반도 평화체제). In: *Reunification and Peace* (통일과 평화) 2 (1), 3–44.
- LEE, S. H.; LEE, B. A.; LEE, J. P. and PARK, B. G. (2014): *Dangerous cohabitation: enforced nuclear power and birth of riskscape*. Seoul.
- LEE, Y. J. (2011): Nuclear: the seed of social and environmental conflict. In: LEE, Y. J. (ed.): *Nuclear, the seduction of climate change*. Seoul, 222–243.
- MOIE (Ministry of Industry and Energy) (2005): *White paper of nuclear power 2005*. Seoul
- MÜLLER-MAHN, D. (2007): *Perspektiven der Geographischen Risikoforschung*. In: *Geographische Rundschau* 59 (10), 4–11.
- (ed.) (2013): *The spatial dimension of risk: how geography shapes the emergence of riskscape*. London and New York.
- MÜLLER-MAHN, D. and EVERTS, J. (2013): *Riskscape: the spatial dimension of risk*. In: MÜLLER-MAHN, D. (ed.): *The spatial dimension of risk: how geography shapes the emergence of riskscape*. London and New York, 22–36.
- SOVACOO, B. K. (2008): Valuing the greenhouse gas emissions from nuclear power: a critical survey. In: *Energy Policy* 36 (8), 2950–2963. <https://doi.org/10.1016/j.enpol.2008.04.017>
- WADE, R. (1990): *Governing the market: economic theory and the role of government in East Asian industrialization*. Princeton.
- WORLD BANK (1994): *The East Asian economic miracle*. Washington, DC.
- YANG, K. N. (1996): Analysis on impact of location of NPP on regional economy: focusing on Wolsung NPP area. In: *Study of Agricultural Economy* 37, 161–179.

## Newspaper and press releases

DONGA NEWSPAPER (23 April 1982): The CANDU type reactor in Canada was closed.

– (1 January 1985): Heavy water leakage in Wolsung NPP on the 25th of December last year.

HANKYOREH NEWSPAPER (6 November 1988): Wolsung residents had sit-in demonstration claiming compensation and relocation for the accident of NPP heavy water leakage.

– (8 December 1988): Residents nearby Wolsung NPP demand relocation measures

– (18 September 1996): Younggwang County Office changed to permit nuclear power plant.

KYUNGHYANG NEWSPAPER (29 December 1984): Heavy water leakage in Wolsung NPP.

– (5 October 1988): Another heavy water leakage in Wolsung NPP on last August.

REUTERS (22 October 2017): South Korea's president says will continue phasing out nuclear power.

THE GUARDIAN (19 June 2017): New South Korean president vows to end use of nuclear power.

## Interviewees

A: Former anti-nuclear activist in Younggwang County and present national assembly member aide, Younggwang County, 1 February 2013.

B: Former anti-nuclear activist in Younggwang County and present staff of Fishermen's counter measure committee, Younggwang County, 20 February 2013.

C: Present staff of committee for village relocation (Busan Metropolitan City), 19 April 2013.

D: Present staff of Nonghyup (agriculture cooperatives), Kyungjoo City, 20 April 2013.

E: Former anti-nuclear activist in Younggwang County and present staff of Farmers Association, Younggwang County, 19 February 2013.

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