Co-optation in Co-production: Maintaining Credibility and Legitimacy in Transboundary Environmental Governance in East Asia

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Abstract

This article challenges the prevailing discourse on regional environmental governance in East Asia, emphasizing the risk of co-optation among scholars and other experts through state authority in the transboundary co-production of knowledge and action. By collecting first-hand materials through the participatory observation of related events, organizing workshops, and conducting interviews, the research identified 15 transboundary cooperative networks in various fields of environmental sustainability issues and the involvement of 25 nonstate actors, including academics and practitioners. Using a comparative ethnographic approach for interpreting a nuanced sense of their experiences at the backstage of transboundary co-production, the study found several strategies for boundary management to maintain credibility and legitimacy and to remain involved in transboundary co-production with broad partners, including public and private actors. The nonstate actors have to be careful to engage in transboundary co-production without eliminating any existing legitimacy of regional governance. In this sense, nonstate actors employ an ad-hoc strategy of boundary management in determining a contingent situation surrounding the legitimacy of their initiatives and themselves and maintain their credibility to avoid co-optation.

Keywords: environmental sustainability, epistemic community, transboundary co-production, credibility and legitimacy, boundary management, regional governance, East Asia

1. Introduction

In East Asia, the development of transboundary cooperation initiated by state and nonstate actors has lagged two decades behind those in western countries (Matsuoka, 2014; Mori, 2013; Otsuka, 2018). Scholars have pointed out that transboundary governance institutions are non-binding (i.e., they lack a relevant regional treaty), overlap without synergy, and allow only limited spaces for the participation of nonstate actors; these factors lead to weak governance in East Asia (Elliot, 2017; Komori, 2010; Matsuoka, 2014; Mori, 2013; Reimann, 2014; Takahashi, 2017). To overcome such regional disadvantages, scholars in East Asia have proposed various policy recommendations, such as the development of a "multilateral cooperative network uniting independent scholars and non-governmental organizations

(NGOs)" (Teranishi, 2003), an "epistemic community" (Ishii et al., 2016; Matsuoka, 2014), and "track 1.5 networks[1]" (Choi, 2018) to integrate science, policy, and practices for addressing transboundary environmental securities in the region. If such development requires the involvement of additional nonstate actors in transboundary environmental cooperation in the region, as these scholars advocate, what roles can be expected for nonstate actors to play, and how can nonstate actors cooperate with state actors to configure better regional governance?

Recently, an emerging role of nonstate actors has attracted scholarly attention in the literature on global environmental governance. Scholars have argued that nonstate actors, including NGOs, independent researchers, and businesses, can form private governance that provides rules, standards, and guidelines as a private authority (Andonova, 2017; Green, 2014). This initiative can be realized under the transformation of global environmental governance by shifting the means from a command-and-control type of regulation to more flexible measures (Coglianese & Starobin, 2020), typically called *goal setting* (Kanie & Bierman, 2017; Sachs, 2015; Young, 2017). Alternatively, as discussed in the field of political science, the state remains an inevitable player in forming jurisdictional and institutional borders involved in governance at all levels, that is, from local to global (Kooiman, 2003; Sørensen, 2004). In East Asia in particular, there has been persistent and intense expression of sovereignty by nation-states; various dimensions of asymmetry in terms of geography, economic development, political systems, historical legacies that originated from World War II, and continued tension surrounding national security in the region (Pekkanen et al., 2014). These factors form inflexible boundaries that lead to tension between states and between states and nonstate actors compared with those observed in western countries in terms of transboundary cooperation.

Even under these complex regional contexts in East Asia, cases emerge of private governance initiated by scientists and research-oriented NGOs in cooperation with various types of public and private actors involved in the struggle for environmental sustainability. Indeed, such initiatives related to private environmental governance are in their embryonic stage. Nevertheless, they provide useful information and practices with vast expertise and sufficient capacity for stakeholders in the field of transboundary air pollution, green supply chain, and energy transition through a broad range of partnerships with state and international stakeholders in the region (Otsuka & Cheng, 2020). However, studies that explore the interaction between state and nonstate actors to configure transboundary environmental governance in the co-production process of knowledge and action under the current complex situation in the region are lacking.

According to the "epistemic community" perspective developed by Haas (1992), knowledge-based experts may exert a significant influence on policy makers through a transnational network, where members share a set of normative and principled briefs, causal briefs, notions of validity, and a common policy enterprise. In addition, scholars purport that

such experts can "speak truth to power" before bureaucrats formulate policy to respond appropriately to the uncertain and complex problems of environmental sustainability. By examining 30 cases of international environmental governance, Haas & Stevens (2011) conclude that they can succeed in transmitting scientific evidence to policy makers if scientists reach a consensus before the occurrence of policy debates. Conversely, the epistemic community approach is criticized as focusing only on the formal process of decision making from the standpoint of science and technology studies (STS). It overlooks informal (i.e., backstage) interaction among scientists and policy makers, where science and policy are intertwined as a process of *co-production* (Lidskog & Sundqvist, 2015). For example, the International Panel on Climate Change is considered successful in connecting science to policy in the co-production process of knowledge and action from the STS perspective. However, it exhibits limited social learning through "speak truth to power" from the epistemic community perspective (Lidskog & Sundqvist, 2015; Haas & Stevens, 2011). Notably, both approaches focus on "the importance of credibility, the mechanisms for disseminating scientific knowledge, and understanding science in terms of process rather than product" (Lidskog & Sundqvist, 2015) despite their different points of view on the manner of connection between science and policy.

In the context of East Asia, however, an epistemic community is underdeveloped in regional environmental issues such as transboundary air pollution (Yarime & Li, 2018) despite continued research exchanges and collaborations among scholars beyond the borders of countries in the region. In general, the autonomy of scholars who may exert an influence on power is called into question at track two diplomacy, which is frequently formed as a dialogue or forum that involves a wide range of stakeholders, including scholars and other experts, to discuss sensitive issues related to official diplomacy, such as regional security. Moreover, diversity in political regimes can be observed, including democracy (Japan and India), a transition from authoritarianism to democracy (South Korea, Taiwan, and a few Southeast Asian countries), and authoritarian socialism (China and some Southeast Asian countries), which lends complexity to collaboration among scholars and experts across borders in this region (Acharya, 2011). This scenario causes *entrapment without engagement* (Acharya, 2011) or *co-optation* (Feng, 2018) among scholars and experts if the state authority directly or indirectly constrains their voices and behaviors. Therefore, scholars advocated that transnational governance requires "a free flow of policy ideas and agenda-setting" to transform its manner of gatekeeping into a critical one (Acharya, 2011). In an authoritarian regime, however, scholars proposed that the autonomy of scholars and NGOs would be threatened, which could pose complex tasks for nonstate actors in terms of the free flow of policy ideas and agenda-setting without interference from state authority (Komori, 2010).

These insights on the manner of connection among knowledge, action, and policy in

transboundary governance should be revisited when considering the recent emergence of private environmental authority in East Asia. How can nonstate actors *speak truth to power* or co-produce knowledge and action among stakeholders? Are they easily co-opted by state authority? If not, what strategies should they take under complex and uncertain scenarios in the region?

This article aims to fill this research gap in the configuration of nonstate and state actors in international environmental governance from the recent East Asian perspective. The remainder of the paper is structured as follows. Section 2 provides an overview of the regional context of international environmental governance in East Asia and explores how nonstate actors, including academics and NGOs, connect their knowledge and action with a policy from the literature. Section 3 focuses on the backstage of transboundary cooperation and introduces the concept of *boundary management* as an analytical tool. Section 4 outlines the international workshops held in Seoul (South Korea), Beijing (China), and Chiba (Japan) as the main materials and the method for its analysis. Section 5 presents an analysis of texts from academics and practitioners involved in regional environmental cooperative initiatives and characterizes the method of boundary management by nonstate actors at the backstage of transboundary co-production. Lastly, Section 6 concludes and addresses the need for further research.

2. Connection between knowledge, action, and policy in environmental governance in East Asia

2-1. State-led initiatives

In the 1990s, the epoch-making United Nations (UN) Conference on the Environment and Development was held in Rio de Janeiro, where a series of regional environmental institutions, in addition to bilateral agreements, were developed in East Asia and beyond. Transboundary air pollution has been an environmental issue in the region for a long time. As a sub-region of East Asia, China in Northeast Asia has become the largest emitter of sulfur dioxide, which threatens public health in the country as well as raises public concern in its neighboring countries, such as Japan and South Korea (Otsuka, 2018; Otsuka & Cheng, 2020; Matsuoka, 2014).

Since the 1990s, Japan, as the first mover of economic development in the region, has focused on improving air quality through its official development aid to China. Beyond bilateral cooperation, Japan initiated a monitoring network on acid deposition pollutants named the Acid Deposition Monitoring Network in East Asia (EANET: https://www.acap.asia/en/) across 13 countries in East Asia to date. EANET has been producing monitoring data on

precipitation chemistries, particulate matter (PM), and ozone for scientific research on atmospheric model simulation in the region.

In addition to EANET, South Korea has initiated a regional cooperative research network on transboundary air pollution called Long-Range Transboundary Air Pollutants in Northeast Asia (LTP) with Japan and China since the late 1990s. The LTP project aims to provide science-based information to policymakers by monitoring transboundary pollutants, such as acid rain and other pollutants and modeling their spatial distribution in the region. The LTP project disseminates monitoring data and modeling results to policymakers in three countries (Secretariat of the Working Group for the LTP Project, 2015).

Apart from these issue-specific initiatives, the Tripartite Environment Ministers Meeting (TEMM; https://www.env.go.jp/earth/coop/temm/introduction_j.html), which is the highest-level intergovernmental platform jointly organized by environmental ministries in Japan, China, and South Korea, was launched in 1999. It addresses a broad range of issues, including air pollution; dust and sand storm (DSS); biodiversity; chemical management; waste management, water environment; rural environment; green supply chain; and environmental education. Air pollution has been a top priority issue at TEMM in the past decades. The recent meetings in TEMM have focused on volatile organic compounds and particulate matter less than 2.5 μm ($PM_{2.5}$) to promote scientific research and information sharing of related technology in each country (Chu, 2018).

Notably, the major activities in these state-led initiatives remain in the field of monitoring, modeling, policy dialogue, and related information exchange. No legally binding regional framework, such as the Convention on Long-Range Transboundary Air Pollution in Europe, exists for air pollution control or other issues in Asia. In addition, these alternatives feature overlapping functions, whereas coordination mechanisms remain unclear among the countries in terms of air pollution issues (Takahashi, 2017).

Scholars and experts can play their role in these state-led initiatives through certain channels, although they exert a limited impact on policymaking. For example, a research network across countries can be developed as an epistemic community for reaching a consensus on scientific evidence and common policy measures. By investigating a scientific research network related to EANET, however, the study found that collaboration among scientists is extremely fragmented, such that reaching a consensus as an epistemic community in the region is difficult (Yarime & Li, 2017).

Another example is using an official channel to form an expert group designated by each member state under the initiative. For example, two working groups for the DSS issue have been established under the TEMM since 2008 (CAECC, IGES, & Korea Environment Institute [KEI], 2015; Chu, 2018). Scholars reported that the DSS cooperation has “a relatively well-established track record with tangible outcomes, including enhanced DSS forecast

capacity for each country, enabled by the establishment of a monitoring network, information sharing and joint research activities"; however, "the level of trust for sustained cooperation is not high enough" (Chu, 2018). Why the trilateral international cooperation on DSS impedes high levels of trust-building among the countries remains unclear.

2-2. Private initiatives

In addition to these state-led institutions, nonstate actors have launched a few initiatives since the 2000s. Examples of these nonstate actors are NGOs (also known as civil society organizations), researchers, and volunteers, which have contributed to education, advocacy, and research on these issues within and between countries in the region. No statistics exist regarding the exact number of transnational civil society networks addressing the issues of environmental sustainability in East Asia (Igarashi, 2013). However, several transboundary networks led by NGOs and researchers independent of the government have been reported (Otsuka & Cheng, 2020; Igarashi, 2013; Teranishi, 2003).

Recently, as a new type of initiative for a wide range of issues related to air pollution in Asia and the Pacific region, the United Nations Environmental Program (UNEP) has supported the establishment of the Asia Pacific Clean Air Partnership (APCAP; https://www.unenvironment.org/asia-and-pacific/asia-pacific-clean-air-partnership) in 2015. In 2019, APCAP, the UNEP, and the Climate and Clean Air Coalition (CCAC) collaborated and published the first comprehensive assessment report on air pollution in Asia and the Pacific region. The report entitled *Air Pollution in Asia and the Pacific-Science-Based Solutions* has been co-written by more than 100 contributors, including scientists from the academia and experts from governments and international organizations in the Asia Pacific Region and beyond. The report proposes a solution package using 25 measures beyond conventional emission control. It addresses multiple benefits in health, which follow the Air Quality Guidelines of the World Health Organization, and sustainable development, which refers to the Sustainable Development Goals (SDGs) by assessing key pollutants and greenhouse gases in the region (UNEP, APCAP, & CCAC, 2019).

Apart from this scientific network, research-type NGOs and private think-tanks have emerged to play unique roles in environmental governance across countries in East Asia. The East Asia Climate Network (EACN) is an example of a research-based network organized by NGOs across three countries, namely, Japan, China, and South Korea, in the region. EACN has formed a network that unites NGOs from the said countries to synthesize and advocate climate change-related knowledge and action. This network was initiated by the Japanese environmental NGO, East Asia Environmental Information Center. In 2018, EACN published a policy report entitled *Coal Power Sector in China, Japan, and South Korea: Current Status*

and the Way Forward for a Cleaner Energy System. At the 24th Conference of the Parties (COP24) of the UN Framework Convention on Climate Change in December 2018, Rock Environment and Energy Institute (REEI; China), Kiko Network (Japan), and the Korean Federation of Environmental Movement (KFEM), with the relevant scholars jointly released a report. The objectives were to provide up-to-date information on coal power plants in the three countries and advocate for a social transition toward renewable and cleaner energy in the region (REEI, Kiko Network, & KFEM, 2018).

These initiatives, organized by scientists and NGOs, are characterized as private environmental entrepreneurship (Andonova, 2017; Green, 2014) with a broad range of stakeholders as follows. First, they provide expertise on environmental sustainability issues not only in conducting scientific research but also in directly disseminating production via an open website or a forum in international conventions. Second, they take not only a standalone form but also a hybrid form with broad partnerships between public and private actors, including scholars, NGOs, governments, and international organizations. Although these initiatives remain in an embryonic form of private environmental authority in establishing private standards and practices, they have the potential to develop an influential network where they can attract broader adherents to follow (Otsuka & Cheng, 2020).

In summary, these types of private environmental governors are seemingly independent of state authority and establish partnerships with public and private actors simultaneously. Does this tendency indicate that they intend to render their expertise more influential to each member state and maintain their autonomy simultaneously? Thus, an investigation should focus on whether and how they can avoid the risk of co-optation by state authority under the dominance of state-led policymaking in regional environmental governance.

3. Boundary management at the backstage in transboundary co-production in East Asia

3-1. Boundary management

To further investigate the act of nonstate actors in state-led and private environmental governance in East Asia, inspecting the front (formal)-stage of knowledge production and actions as well as the back (informal)-stage of transboundary co-production (Lidskog & Sundqvist, 2015) is necessary. Scholars from various disciplines, such as public administration, STS, and sustainability science have long discussed the concept and practice of co-production (Miller & Wyborn, 2018; Wyborn et al., 2019). Governing sustainability needs to put different knowledge systems into action to facilitate social change (Kates et al., 2001), and such a process frequently occurs in an iterative manner (Wyborn et al., 2019). The case in which

diverse participants contest and negotiate with one another regarding their interests is consistent. For such interactions among stakeholders, the literature, where scholars on STS and sustainability science mainly contributed, has focused on the science-policy interface (SPI) to explore the co-production process (Cash et al., 2003; Djenontin & Meadow, 2018; Gustafsson & Lidskog, 2018; Hoppe et al., 2017; Lemos & Morehouse, 2005; Lidskog & Pleijel, 2011; Lidskog & Sundqvist, 2015; Meadow et al., 2015; Miller, 2001; Miller & Wyborn, 2018; Orsini et al., 2017; Spence, 2017; Tuinstra et al., 2006; Wyborn et al., 2019).

Boundary work has been one of the key concepts used to explore such research on SPI. Gieryn (1983) invented this concept to reveal a demarcation between science and non-science disciplines by stating that scientists too, struggle for authority, power, and resources. Jasnoff (1987) took an example of policymaking across the environment and health sectors to discuss the political nature embedded in the process of knowledge production and pointed out that policy makers as well as "scientists have to impose their boundaries between science and policy, thereby coming into potential conflict with policymakers pursuing opposing interests." In this sense, boundary work is essential to the manner of governing power among the centers of scientific and political authorities.

The recent literature reports that empirical studies have discussed additional operational and visible concepts related to the derivations of boundary work to bridge boundaries between science and policy, including objects (boundary objects; Star, 2010; Star & Griesemer, 1989; Wyborn, 2015), organizations (boundary organizations; Cash et al., 2003; Cash et al., 2006; Guston, 2001; Miller, 2001; Orsini et al., 2017), and persons (boundary spanners; Bednarek et al., 2018; Posner & Cvitanovic, 2019). These extended concepts of boundary work, collectively referred to as *boundary management* (strategy) in this article, are essential for the investigation because they demonstrate how co-production can solve or mitigate contested boundaries between science, policy, and practices in a real-world setting.

Notably, the boundary between science and policy "is only one of several boundaries that hinder the linking of scientific and technical information to decision making" (Cash et al., 2002) in terms of the co-production of knowledge and governance for environmental sustainability. A few articles on co-production have applied the concept of the boundary not only to the relationship between science and non-science but also between various types of social worlds, including disciplines, sectors, and organizations (Cash et al., 2003; Spence, 2017; Swedlow, 2017). However, the literature that provides insights into international settings is scarce.[2] Given the context of environmental governance in East Asia, which was previously mentioned, examining how scholars and experts can manage the risk of co-optation in the co-production of knowledge and action with a broad range of actors at the boundaries not only between science and policy but also between state and nonstate actors could be worthwhile.

3-2. Credibility and legitimacy

From the abovementioned perspectives of STS and sustainability science, the study proposes three key attributes, namely, credibility, relevance (salience), and legitimacy (CRELE), as important factors in bridging contested boundaries that appear in the SPI presented by Cash et al. (2002; 2003) and developed by other scholars (Gustfasson & Lidskog, 2018; Heink et al., 2015; Lang et al., 2012; Sarkki et al., 2014).

According to Cash et al. (2003) and Sarkki et al. (2013), CRELE attributes are defined as follows. Credibility refers to the scientific adequacy (quality and validity) of knowledge exchanged at the SPI in terms of knowledge production and producers. Relevance (or saliency) denotes responsiveness to policymaking needs and subsequent practical solutions. Legitimacy pertains to fair, unbiased, and transparent processes in SPIs, which are respectful and inclusive of diversified values and beliefs among stakeholders with different interests. Scholars pointed out that synergies and trade-offs exist among the three attributes (Cash et al., 2003; Heink et al., 2015; Sarkki et al., 2014). In addition, an existing assumption is that trade-offs can be mitigated through "timely submissions of scientific advice and thorough quality assessment procedures" (Sarkki et al., 2014), such as boundary management by scientists and policy makers (Tuinstra et al., 2006), boundary organizations (Cash et al., 2003), or boundary objects (Heink et al., 2015).

Another fact, however, is that the concept of CRELE has been characterized by ambiguities in its definitions and interpretations in the existing literature. Criticism that the implications of individual CRELE attributes are occasionally exchangeable with one another in terms of empirical analysis and connotations also exists (Heink et al., 2015). Therefore, identifying the contested boundaries of co-production under the context of governance to be discussed is essential.

In terms of the risk of co-optation of nonstate actors in the process of co-production, this article focuses on credibility and legitimacy in analyzing boundary management by nonstate actors. First, credibility is crucial not only for scientific activities but also for a wide range of other activities by nonstate actors as knowledge-based experts. Especially for NGOs, a *chain of delegation* (Gourevitch & Lake, 2012) and networks (Starobin & Weinthal, 2010) of engaging persons and organizations secure credibility instead of a single institute. This notion remains the same for scientists working in a web of relations with their peers as well as employers, funders, regulators, and the public. In other words, if the state authority co-opts them, they would quickly lose the trust of other concerned actors. In this sense, the premised would be that nonstate actors will try to defend the credibility of their expertise and avoid co-optation as much as possible.

Second, legitimacy is essential for such nonstate actors in a manner that is more

complex than that assumed by the SPI perspective. In the context of the plurality of authority as the focus of this article, legitimacy can be defined "as a sense of obligation or willingness to obey authority" (Levi et al., 2009), which leads to not only compliance with government laws and regulations but also adherence to the standards and rules provided by experts (Green, 2014, pp. 27–35). "Willingness to obey authority" would be enhanced through a more transparent and accountable manner, as assumed by the literature on SPI. However, the state authority under an authoritarian regime in the context of East Asia may occasionally discourage such a democratic manner of intervention. In addition, the interconnection between credibility and legitimacy in terms of value and behavior for nonstate actors should be recognized as more credible, more legitimate, and vice versa (Thaut et al., 2012). Thus, if they intend to maintain their credibility and legitimacy at the same time, then they would endeavor to find a means for avoiding co-optation by and confrontation with state actors. Otherwise, they would lose not only the trust of concerned actors but also their position as experts in the co-production process.

In summary, nonstate actors as knowledge-based experts could intend to avoid co-optation as much as possible in terms of the credibility and legitimacy perspectives. As previously mentioned, this assumption challenges the prevailing discourse on East Asian governance in the literature. If this case is true, then the strategies that nonstate actors will take to avoid co-optation are worth investigating.

4. Seeking the backstage of transboundary co-production on environmental sustainability in East Asia

Determining the events at the backstage of co-production among stakeholders is difficult for external researchers because the informal process of such interactions would not be recorded and open to the public. To examine the backstage interaction in transboundary co-production, this research mainly refers to the recorded data and handout materials of three rounds of international workshops in Seoul (South Korea, October 2017, hereafter WS-S), Beijing (China, October 2018, WS-B), and Chiba (Japan, December 2018, WS-C), which were held as a part of a research project entitled "Approaches to Address the Increasing Complexity of Sustainability Challenges in East Asia," which was coordinated by the author. In an effort to collect and explore the experiences in and challenges to transboundary cooperation on sustainability issues in East Asia, the workshops invited scientists (e.g., natural, social, and interdisciplinary scientists) and practitioners (government and NGOs), who have been engaging in a transboundary cooperative network or project on sustainability issues in the region. To complement these workshops, the author conducted semi-structured interviews jointly with members of the research team or independently. The process of this research is

described in detail as follows.

4-1. Literature review and participatory observation

To determine the transboundary cooperative networks and critical issues for investigation, the author reviewed the previously mentioned literature earlier and conducted participatory observation in 11 events on transboundary environmental sustainability issues in Northeast Asia from 2012 to 2019 (Appendix 1)[3]. These participatory observations enabled the author to identify the invited participants at the workshops and understand the ongoing processes in transboundary cooperation.

4-2. Organizing workshops

The outline of the three workshops initiated by the research project is summarized in Table 1 and described briefly below.

[Table 1]

4-2-1. Workshop in Seoul

The workshop was co-hosted by the Sejong Institute, Korea Environment Institute (KEI), Institute of Developing Economies (IDE), Japan, and the Ministry of Foreign Affairs (MOFA) of the Republic of Korea. This workshop was initiated by IDE with the Sejong Institute and KEI based on a research project of the IDE and the initiatives of the Northeast Asia Peace Cooperation Initiative (NAPCI) conducted by the Sejong Institute and MOFA of South Korea. The workshop was attended by 23 participants from research institutes, universities, and NGOs in Korea, Japan, China, and Mongolia and one official from the MOFA of South Korea.

The workshop consisted of three sessions. The first session was composed of three cases on multilateral networking on non-traditional security issues in East Asia. The second session consisted of 12 cases about transboundary networks on environmental sustainability issues in the region. The third session was facilitated by the IDE team to discuss the potential and challenges of these networks.

4-2-2. Workshop in Beijing

This workshop was held at the Chinese office of the Japan International Cooperation Agency (JICA) and organized by a joint research team between the IDE and the Center for Northeast Asian Studies (CNAS) of Tohoku University with generous support from the Chinese office of JICA. The workshop was attended by 15 participants from NGOs and research institutes in

China and Japan and one staff from the Chinese office of JICA. At the workshop, five participants from Chinese NGOs narrated their experiences and shared their views on transboundary activities on environmental sustainability issues following three presentations from the joint research team. After each presentation, the participants held interactive discussions.

4-2-3. Workshop in Chiba

This workshop was organized by a joint research team between the IDE and CNAS research projects, which was attended by 18 participants from research institutes, universities, and NGOs from Japan, China, South Korea, and Taiwan. This workshop was open to researchers and NGOs, where approximately 10 observers listened to the discussions.

This workshop consisted of three sessions that focused on the roles of nonstate actors in transboundary networks on environmental sustainability issues in Asia. The first session focused on transboundary issues regarding air pollution. At this session, one air environmental scientist gave a keynote presentation on historical developments and a new international cooperation initiative in this field. After three distinguished commentators, the participants held interactive discussions. The second session focused on energy transition in Northeast Asia with four presenters from Japanese, Chinese, and Korean NGOs and a Taiwanese university, followed by interactive discussions. The third session was devoted to transboundary practices by nonstate actors. At this session, the participants also held interactive discussions after two presentations from a Chinese NGO and one research institute from Japan.

4-3. Complementary interviews

To complement these workshops and participatory observation, the author conducted interviews from 2017 to 2019 in Seoul, Beijing, and Tokyo with the joint research team or independently. A total of 30 people were interviewed, including scholars, bureaucrats, and the founders and staff of NGOs. A few of the interviews were conducted to prepare for the abovementioned workshops while others were conducted as a follow-up to the workshops and participatory observation.

4-4. Transboundary networks and actors identified for analysis

Through a series of participatory observation, workshop organization, and complementary interviews, the research identified 15 transboundary networks, where 25 nonstate actors were involved, relevant to the issues discussed in this paper. The fields covered air pollution, climate change, energy transition, nuclear safety, disaster prevention, desertification, and ecological

conservation (the outline of these networks is summarized in Appendix 2).

As Table 2 reports, one of the groups identified is five state-led networks formed by government and inter-government organizations, whereas the others are 10 initiatives by nonstate actors, including research institutes, universities, and NGOs.

[Table 2]

Table 3 provides the composition of 25 nonstate actors identified in these transboundary cooperative networks. The results indicate the mix of actors in terms of academic and practitioner background as well as countries. The workshops and interviews clearly revealed that a few academics have a background as practitioners, whereas a few practitioners have a research background and that drawing a demarcating line between them is difficult.

[Table 3]

4-5. Multiple qualitative methods to collect data: potential and limitation

The collected data, which include presentations, transcriptions, and field notes taken from the events, workshops, and interviews, are first-hand materials that hold the potential to enhance the understanding of the backstage interactions among the involved actors.

First, as previously mentioned, diversified organizations and persons exist in terms of organizers, countries, issues, and the manner of involvement of expertise. Second, recorded data of interactions among these actors from different backgrounds during the events, workshops, and interviews could provide a nuanced sense of their experiences in the configuration of boundaries between different types of social contexts. This aspect may be challenging for outsiders to access through a questionnaire survey and other methods for social research. Third, most participants in the workshops and interviews were invited by a research team member or introduced by a person familiar with the participants. Building trust between organizers and the participants in the workshops and between interviewers and interviewees would have been easy through such a personal connection. They became confident in narrating their nuanced experiences as actors engaged in co-production.

Conversely, these data have certain limitations. The collected data would not be comprehensive because controlling all variables optimally in organizing international conferences was difficult due to limitations in time arrangement, fund management, and visa application. In addition, some invitees refrained from exchanging their experiences as insiders, as doing so would be typically sensitive in terms of diplomacy. Others may have lacked the

willingness to participate in such a workshop or interview for the same reason.

This study uses multiple qualitative methods to collect data that have often been adopted in recent problem-driven studies of global environmental governance (GEG) (O'Neill et al., 2013). First, the author conducts participatory observations of events and co-organizes workshops in several cities in East Asia, as part of multisited research. These workshops can overcome the limitations of a lack of diversity across networks when it is difficult to observe the numerous networks often found at mega events such as the World Conservation Congress (Brosius & Campbell, 2010) and the Climate Summit (Suiseeya & Zanotti, 2019). Second, the author organizes an international research team and collaborates with other research institutes to organize workshops and conduct interviews in the form of collaborative research. This collaborative approach is helpful for organizing multisited workshops that cross national borders. Third, the author collects narratives from insiders involved in transboundary cooperation in the region not only "through participant observations" but also in active "interactions" with participants to discuss how to improve transboundary cooperation at the workshops, in a way that is characterized as participatory action research in the literature of GEG and other studies.

4-6. Comparative ethnographic approach to narratives in the texts

Through the facilitation and observation of interactions among the participants from different professional backgrounds, organizational forms, countries, and activity fields, the research identified the contextual and nuanced processes of *backstage activities* (Lidskog & Sundqvist, 2015) in transboundary co-production in the texts recorded. This type of interactive communication among heterogeneous actors is expected to elicit narratives (Polletta et al., 2011) not only about their professional experiences but also about their struggles in facing difficulties and obstacles to problem-solving (Pohl, 2008; Sarkki et al., 2014; Schmidt & Proper, 2017; Toomey, 2016).

A comparative approach with ethnographic sensitivity would be appropriate in analyzing the narratives collected through the above research methods (Simmons & Smith, 2017; 2019). Comparative ethnography presents an advantage in terms of elucidating the aspects addressed by actors in different contexts. It focuses on the "meanings of their lived experiences and the political processes in which they are enmeshed" (Simmons & Smith, 2017, p.126) through the analysis of several cases by "tacking back and forth between cases to identify either similarities or differences in the processes, meanings, or events" (Simmons & Smith, 2019, p. 341). This qualitative approach would be helpful for case studies where controlling for the parameters of the research conditions is difficult but with relatively rich context-specific nuanced information, similar to the materials collected in this research. Such

an ethnographic approach has also been taken in the recent GEG research as collaborative event ethnography at mega events (Brosius & Campbell, 2010; Suiseeya & Zanotti, 2019), those of which have the collaborative characteristics as identified in this research.

In the subsequent section, the author extracted the critical words and phrases uttered by the scientists and practitioners related to boundary management to address the interrelations between credibility and legitimacy. Afterward, the texts were restructured for analysis of contextual interpretation with comparison among some salient networks as case studies using ethnographic sensitivity. For the abbreviation of each network mentioned in the analysis below, see Appendix 2.

5. Analysis and discussion: Boundary management in the maintenance of credibility and legitimacy

5-1. Separation of knowledge production from official channels of co-production

As previously mentioned, transboundary air pollution has been a persistent, contested issue in East Asia for decades. EANET, the first initiative among the three intergovernmental initiatives in the region, has been focusing on acid rain, which was assumed to have originated mainly from China. However, scholars pointed out that "no evaluation of the observed data related to the emissions, and no discussion on reducing air pollutants has been made" in EANET activities (WS-C).

Underlying this contestation between science and policy in EANET, a Japanese atmospheric scientist (the then-director-general of ACAP, the network center of EANET) revealed that a consensus has not been reached for extensions of the target of EANET activities among member countries. He claimed that Japan previously proposed to extend the range of monitoring targets in addition to acidification chemicals and to evaluate the transboundary distribution of air pollutants through modeling using a comprehensive inventory. However, South Korea and China refused the proposal because they claimed that it deviated from the original mission of EANET (interview, April 2019). According to his on-the-job observation of the operation of EANET, a gap would exist in understanding the range of targets of the joint project between the three countries. This result demonstrates the different views between Japan and the two other major countries in Northeast Asia on the expected function of this initiative for transboundary governance.

On the contrary, the LTP project has wider-ranging missions than EANET. The LTP project aims to conduct scientific research on LTP in the region and provide science-based information to policymakers in the three countries. Although LTP has conducted intensive

research on the monitoring and modeling of various air pollutants, it has not shared research results regarding the spatial distribution of these pollutants with the public thus far.

An environmental policy scholar from South Korea who has been involved in international environmental cooperation in Northeast Asia for many years pointed out an asymmetry in geography between China as the upwind country and Japan and South Korea as downwind countries (WS-S). This view suggests that obtaining any consensus on the burden of pollution among these countries would be difficult. On the contrary, an environmental expert from South Korea engaged in the LTP project claimed that "it is controversial in disclosing the result of modeling which can reveal how much pollutants transfer from one area to another quantitatively. Such kind of data is sensitive. China is questioning whether such data is correct and credible" (WS-S). This notion suggests that the contestation regarding the credibility of scientific data could be related to the different geographical positions and the consequently varied interests of these countries (Lee & Paik, 2020).

In terms of the initiative of scientists, APCAP made advances in the co-production of scientific knowledge and in addressing air pollution control by focusing on the multiple benefits of climate change mitigation and other SDGs. In the case of APCAP, the Science Panel, which is composed of atmospheric scientists and other scholars in the related research field, played an essential role in organizing the first science-based solution report published in 2019. The idea of a science panel was initially proposed by a five-year interdisciplinary research project on transboundary air pollution in East Asia. This project was funded by the Ministry of the Environment in Japan and was established to provide policy recommendations for science-based solutions for air pollution issues in the region when APCAP was founded (interview, June 2018).

The abovementioned Japanese atmospheric scientist, who was involved in the research project and later became the vice-chair of the Science Panel, says that "There is a strong need to give clear messages and suggestions in a single voice from the scientific community to policymakers to take proper actions because now every scientist says different things to policymakers" (WS-C). He also points out that a gap exists between scientists and policymakers in terms of views and actions on economic development and environmental protection. He opines that this case occurs because "most of the industries, and even the government, are concerned about very short-term, very immediate economic interests." Upon this recognition, he claims that an "intermediate group is necessary to do a translation for the scientists' proposal to interpret to policymakers" (WS-C).

In addition, he states that the Science Panel should be composed of scientists who are credible in academics:

> Scientists are just judged by the quality of science, by the published papers; otherwise, we

> cannot believe [them]. Science is based on the proof […] if they were hired by a company, they might stick to the company … but those scientists are not very respected by other real scientists (WS-C)

Notably, the Science Panel has been composed of various scholars not only from atmospheric science but also from energy policy, environmental economics, and health science. Furthermore, they originate from multiple countries, such as China, Japan, South Korea, Singapore, Thailand, Nepal, India, and Austria.[4]

As seen above, the Science Panel has been endeavoring to bridge scientific research and policy recommendation by maintaining credibility in the co-production of knowledge as well as legitimacy to become an embryotic private authority in providing guidance for the formulation of solutions to the control of air pollutants in Asia and the Pacific region (Otsuka & Cheng, 2020). Apart from the Science Panel, APCAP also established the Joint Forum as another institution to "bring together governments leaders, experts, and private sector and civil society organizations in a series of events focused on solutions for better air quality in the Asia Pacific Region" (https://cleanairweek.org/). However, this institution has failed to produce any scientific solution report. Therefore, evaluating whether a new science and policy interface can develop through this publication is difficult. Instead, the report was distributed via the APCAP website and seminars open to the public. The first policy brief was also created via the website by the vice-chair of the Science Panel.[5]

Arguably, credibility (contested in the LTP modeling result) and legitimacy (argued in the EANET target expansion) have been secured by decoupling scientific knowledge production from governance arrangements in the case of the APCAP. Atmospheric scientists in the region initiated this aspect. The vice-chair of the Science Panel says that "the Science Panel must recruit 'real' scientists who are not delegated by any government" and that "the Science Panel recruited those who published academic papers in peer-reviewed international journals … but EANET did not" (interview, April 2019). This solution resonates with the principle of "speaking truth to power" in the discourse on epistemic community (Haas & Stevens, 2011; Lidskog & Sundqvist, 2015). In this sense, the study infers that the Science Panel facilitates boundary management to maintain credibility and legitimacy in the process of knowledge production without interference from state authority. In addition, scientists in the Science Panel have endeavored to draw authority from open platforms, such as the APCAP website and seminars. This separation strategy can be interpreted as a form of boundary management to avoid possible contestation in precedent state-led initiatives in its objective to maintain its credibility and legitimacy.

5-2. Complementing an incomplete co-production via informal networks

Dust and sand storm (DSS) has captured public attention as one of the most visible transboundary environmental issues in Northeast Asia. DSS is considered transmitted through the atmosphere from China and other inland countries with widespread desertification. Monitoring climate and atmospheric changes and intervening in on-site social-ecological systems is necessary to control DSS. For this reason, ecological conservation is one of the main techniques employed in mitigating DSS.

Two working groups at TEMM and an environmental ministry dialogue mechanism between Japan, China, and South Korea have been established to address DSS. Working Group I is responsible for forecasting sand storms via atmospheric monitoring stations located in the three countries. This group is involved in pure scientific activities that only employ standardized technological equipment without political intervention. In contrast, Working Group II conducts on-site field research on preventing sand storms. The trilateral team of scientists in this working group is required to investigate vegetation and other factors that underlie desertification and consequent sand storms (Chu, 2018). However, one of the experts in South Korea reported that they face various challenges in field research. For instance, when the joint research initiative was launched in 2018, a consensus was not reached on ecological conservation policy recommendations to prevent DSS (interview, October 2017).

A Japanese ecological scientist involved in the working group also revealed that they are facing two significant challenges in joint field research activities. The first is the discipline of scientists in the joint research team. He explained that he could not convince the experts delegated from South Korea in the second round in terms of matching their disciplines. Nevertheless, he collaborated well with those delegated in the first round. Eventually, he discovered that a few of the experts delegated in the second round had not conducted any field research on desertification.

The second pertains to the time and opportunity for conducting fieldwork in areas where DSS is likely to occur in China. Notably, any research in a foreign scientific field requires authorization from the Chinese government well in advance. The scientist also pointed out that Chinese officials in meetings have been reluctant to acknowledge the burden of DSS at the initial stage. After several years of deliberation, the trilateral team finally settled on a field site in Inner Mongolia, China. However, the scientist discovered that the site is not located at the center of DSS outbreaks but only in its path (interview, June 2018). In other words, the field site permitted by the Chinese government is less relevant in terms of scientific and policy research. Furthermore, an important task remains for the working group: to submit policy recommendations to prevent DSS based on their fieldwork and the results of Working Group I. Consequently, the glaring challenge remains in securing credibility in this co-production process.

Interestingly, the Japanese scientist has continued to collaborate with colleagues from China and South Korea for many years despite the challenges faced in the process of knowledge production. On the basis of the interview with the scientist, he clearly understands the asymmetry in the geography between China (as the upwind and source country) and Japan and South Korea (as downwind and affected countries). Therefore, he is sufficiently aware of the difficulties he may encounter in building a field-based DSS control platform for the three countries. Fortunately, the scientist also has another research network of Chinese scientists, including students with a keen interest in the DSS issue in China. However, they are not funded by the TEMM-DSS project. Therefore, he can also utilize a credible network to obtain related field information (interview, June 2018). Thus, his informal network contributes to maintaining scientific credibility and refrains from spoiling the legitimacy of the intergovernmental initiative.

5-3. Building a multistakeholder platform by the NGOs

In terms of field science and action for ecological conservation, the case of the transboundary field project operated by GEI is worth examining because it presents a sharp contrast with the abovementioned case. The Community Conservation Concession Agreement (CCCA), operated by GEI, is a community-based ecological conservation model. GEI introduced the model developed by an international NGO and modified the model to become CCCA in China. After 12 years of practice in eight provinces in the western part of the country, it was adapted to operate in Myanmar (i.e., WS-B and WS-C).

The CCCA model has successfully achieved the needs of local communities in terms of addressing the multiple benefits of environmental, economic, and social sustainability. Through this model, they can utilize environmentally sound tools, such as clean cooking stoves and solar-powered lighting systems. In addition, they can conduct sustainable earning activities, such as animal husbandry, handicraft, and ecotourism, instead of cutting trees for daily survival. Notably, these local sustainable activities can be secured by the pilot project donated by the NGO and their community fund, which locals set up. Through these community-based projects, GEI has succeeded in enabling the Chinese government to donate an official aid of up to 3.3 million USD to Myanmar to establish clean cooking stoves and solar-powered lighting systems, which lead to less or no emission of CO_2 (WS-B). In other words, this community-based program satisfied the sustainable needs of the local communities and the sustainable development policy of both governments.

In addition, GEI has brought scientific knowledge into their on-the-ground activities to collaborate with universities and research institutes on feasibility studies. One program officer claims that they *combine or integrate* professional expertise with practice. Furthermore,

the officer stated that "all research will be transferred to the pilot-sized practice" and that they can "go back to the government" by combining their experiences and lessons through their research (WS-C). This is one means of securing credibility in integrating different types of knowledge and practice in their project. Furthermore, they established a *platform* to bridge different types of stakeholders.

> This platform just focuses on two problems. How they, local people or local community, [can] have the opportunity to dialogue with the companies. That is the first step. And [the] second step is, we think how we [can] help the companies [to communicate] with their local governments or local NGOs. So, for these two purposes, we build up a communication platform between China and the Southeast Asian country... Based on this platform, we encourage the scientists and the other high[-level] officials to come here and share their knowledge [among] the different stakeholders. (WS-C)

Lastly, trust-building based on practices is of importance. He states:

> We need practice. We never give up … we give demo again and again and never give up [trying to achieve] the best practice … It also needs a demo [to] show people how we can just build trust and also share our knowledge and experience [with one another]. (WS-C)

Thus, through interactive and iterative practices on-site in the process of building a platform with multistakeholder, the NGO built trust in local communities to facilitate community-based ecological conservation.

To compare the case of the GEI initiated by the NGO with the case of the TEMM-DSS initiated by the three countries, the results indicate that GEI has succeeded in co-production by ushering academic science into the pilot project. This initiative meets not only conservation goals but also poverty alleviation and decarbonization goals. It facilitates dialogue and trust-building among stakeholders through a multistakeholder platform. This platform is seemingly effective as a boundary organization to secure the credibility of knowledge and action initiated by the NGO and brings legitimacy to the initiative through support not only by local communities but also by governments.

5-4. Maintaining autonomy while avoiding confrontation with state authority

Maintaining autonomy as nonstate actors under the state-interest-driven governance regime is difficult. In the case of the LTP project, the expert from South Korea involved in the project mentioned the difficulty of disclosing the modeling results of air pollutants without consensus from all member countries. She further said:

> At the Chinese research institute, like our research institute supervised by the environmental ministry, I think any researcher could not disclose their data without the permission of the government (under this project) …. Even in South Korea, we have to consult with the environmental ministry [on] whether the data can be open to the public or not. So do the Japanese researchers, I suppose. I suppose Chinese researchers can not disclose their data beyond the state interest because they receive the state budget for their research …. Some cases prohibit anyone from disclosing information based on state interests, but it should not be overlooked [in] other cases in which researchers refrain from disclosing the data themselves when they consider the state interest. (WS-S)

On the contrary, another means for mitigating the contested situation of the autonomy of nonstate actors in the joint initiatives by NGOs and scholars in this study is worth examining. The project by EACN is such a case. It has succeeded in publishing a policy-oriented research report at the COP24 of the UNFCCC. However, it did not discuss the controversial issue of nuclear energy policy.

Notably, the three countries employ different national policies regarding nuclear power energy. The South Korean government has shifted its energy policy to reduce nuclear power. Alternatively, the Japanese government has been reluctant to explicitly shift its national policy of pro-nuclear power for decades despite the difficulty in maintaining all existing plants under the anti-nuclear power sentiment of the public after the severe accident of the Fukushima-Dai-Ichi nuclear power plant in 2011. Lastly, the Chinese government plans to build additional nuclear power plants (Otsuka & Cheng, 2020).

In addition to heterogeneity in national energy policies, these countries exhibit different attitudes toward nonstate actors. For example, Japanese NGOs and scholars advocate anti-nuclear power energy development, although the Japanese government is reluctant to comply. On the contrary, Chinese NGOs hesitate to do so due to the fear of repression by the Chinese authority because any anti-nuclear power action could be repressed as a non-legitimate action by the government under the Chinese authoritarian regime. For this reason, the network of NGOs in the three countries was forced to refrain from addressing this politically sensitive issue in its advocacy (interview, April 2019). The same situation for nuclear energy policies among three countries in Northeast Asia was observed in the context of transboundary activities initiated by nonstate actors. A staff of a Japanese NGO revealed that 17 forums were held to advocate for no-nuclear Asia from 1993 to 2016. Most of the forums were held in Japan, South Korea, and Taiwan, except for three forums in Southeast Asian countries. However, no forum was organized in China (WS-S).

In addition, maintaining autonomy in grassroots activities is a common concern among

nonstate actors, which is frequently contentious in China. For example, program officer of a Chinese NGO replied to one question on the autonomy of their activities at the workshop by emphasizing the following:

> … we must be very, very careful because we are an NGO, and we must be very independent. So, that means we cannot just follow the Chinese government and the host of countries … we must think about more [practical] issues or problems [rather than the state interests] (WS-C)

This statement suggests that they are cautious about the risk of co-optation by the government(s).

Another contentious issue in NGO activities in China is registration as a formal organization. During the workshops, a debate emerged regarding whether and how a foreign NGO working in China should or can register through its formal regulation system. One foreign NGO staff revealed that they could not find any governmental bureau to support their grassroots activities in China. They had no choice but to register as a private company (WS-B). Another foreign NGO staff who collaborated with a broad range of stakeholders, including the government in China, said that they had to register as a formal organization according to the new regulation by the Chinese government. However, "it took much time, and we had a hard time until the success of our registration" (WS-S). Thus, no panacea exists in terms of maintaining legitimacy as an independent NGO while adapting to the regulations for NGOs in China.

In summary, the NGO network has employed an ad-hoc boundary management strategy to maintain the autonomy of their activities in research and advocacy on energy and environmental issues and to avoid political sensitivity to and co-optation by the government under the current regime same time. In this manner, they can uphold the sustainability of co-production. Moreover, this research found that this strategy has successfully maintained autonomy in a sense; however, it could narrow the range and potential of co-production in the region.

6. Conclusion

This article challenges the prevailing discourse on regional environmental governance in East Asia, emphasizing the risk of co-optation among scholars and experts by the state authority in the transboundary co-production of knowledge and action. The research collected first-hand materials through a participatory observation of events, workshops, and interviews. It identified 15 transboundary cooperative networks in various fields of environmental sustainability issues

in East Asia and 25 nonstate actors, including academics and practitioners involved in these networks. Through the comparative ethnographic approach for interpreting a nuanced sense of their experiences at the backstage of transboundary co-production, the study noted several strategies for boundary management to maintain the credibility and legitimacy of their involvement in transboundary co-production with a broad range of partners, including public and private actors.

This article highlights that nonstate actors in East Asia intend to avoid co-optation to maintain their credibility and legitimacy; otherwise, they would lose the trust of concerned actors. Lastly, they could lose their position in co-production. Maintaining credibility and legitimacy requires a form of boundary management such as separation (in the case of APCAP), complementation (the informal network external to the official SPI in the case of the working groups for DSS under the TEMM), and building a multistakeholder platform as a boundary organization (in the case of the community-based conservation project of the GEI). In addition, maintaining the autonomy of nonstate actors is indispensable for maintaining their credibility. They have to be careful in preserving autonomy while engaging in transboundary co-production without spoiling any existing legitimacy of regional governance. In this sense, they carefully employ an ad-hoc strategy for boundary management in determining the contingent situation regarding the legitimacy of their initiatives or themselves.

These insights shed light on the flexible boundary management of nonstate actors to avoid confrontation with state authority in the context of East Asia. Understanding such an ever-unrevealed backstage process would contribute to further discussions on improving regional environmental governance in East Asia and beyond. Presenting additional cases using the comparative ethnographic perspective would be necessary to enrich empirical and theoretical knowledge, which can lead to meaningful actions for its betterment.

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[1] 1.5 track diplomacy or dialogue means a conversations among government officials (as an informal status) and non-governmental experts (Staats, Walsh, & Tucci, 2019).

[2] Based on several case studies from various parts of the world, including the United States, the Pacific, Africa, Europe, and North Atlantic, Cash et al. (2003) identified the role of boundary management as "communication," "translation," and "mediation" to manage boundaries between experts (generally) and decision makers through means that "simultaneously enhance the salience, credibility, and legitimacy of the information they produce." Taking the Arctic Council as a case of boundary organization, Spence (2017) argues the transformation of the Council into a boundary organization to bridge the boundary "between technical experts, indigenous peoples, and policy makers" at multi-level interactions.

[3] The author was invited to some events and made presentations on relevant issues. See details in Table 1.

[4] The scientist from Austria belongs to the Institute for Applied Systems Analysis (IIASA; https://iiasa.ac.at/), which is an independent international research institute based in Laxenburg, Austria. He is expected to advise the panel using information gained from his experience in Europe (interview, June 2018).

[5] The brief aimed to not only analyze but also to "justify the need to co-control $PM_{2.5}$ and photochemical oxidant represented by ozone (O_3)" (Akimoto, 2019).

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Table 1. Workshops initiated by the research project

Time	Place	Main topics	Host organizations	Participants
October 2017	Seoul	Multilateral networking on non-traditional security issues; transboundary networks in environmental sustainability issues in East Asia	the Sejong Institute, KEI, IDE, and MOFA of the Republic of Korea	23 participants from research institutes, universities, and NGOs in Korea, Japan, China, and Mongolia; one official from MOFA of Korea
October 2018	Beijing	Transboundary activities on environmental sustainability issues in China	IDE and CNAS of Tohoku University	15 participants from NGOs and research institutes in China and Japan; one from the Chinese office of JICA
December 2018	Chiba	Roles of nonstate actors in transboundary networks on environmental sustainability issues in Asia; transboundary air pollution; energy transition; transboundary practices by nonstate actors	IDE and CNAS of Tohoku University	18 participants from research institutes, universities, and NGOs from Japan, China, South Korea, and Taiwan; 10 observers from Japan

Table 2. Type of transboundary cooperative initiatives

Form	Location of focal organization/secretariat				Total number
	Japan	China	South Korea	Others	
Intergovernmental organizations	3 (1*)	1*	3 (1*)	0	7 (2*)
Research network initiated by the government	0	0	1	0	1
Research network initiated by non-governmental research institutes	2	0	0	1	3
NGO initiative	3	3 (1**+1***)	1***	1**	8 (1**+1***)
Total number	8 (1*)	3 (1**+1***)	6 (1*)	2	19 (2*+1**+1***)

Note: *TEMM has secretariats in three countries.

**NRDC has offices in China and the United States

***EPA has offices in China and South Korea.

The total number of the initiatives identified is 15.

Table 3. Background of nonstate actors

Nationality	Academics	Practitioners	Total
Japan	3	6	9
China	1	5	6
South Korea	4	2	6
Others	2	2	4
Total	10	15	25

Appendix 1. Events for participatory observations

Time	Place	Name of events	Host organizations
September 2012	Tokyo	East Asian Climate Forum	East Asian Climate Network
March 2015	Osaka	International symposium by the Green Access Project	Osaka University
October 2016	Osaka	International symposium by the Green Access Project	Osaka University
September 2016	Hiroshima	Northeast Asia Peace Cooperation Initiative (NAPCI)*	The Sejong Institute and Hiroshima Peace Institute
September 2017	Taipei	Asia Democracy Forum*	Democratic Progressive Party, Taiwan Environmental Protection Union
October 2017	Seoul	Second Network of Trilateral Cooperation Think-Tanks Conference*	China Foreign Affairs University, Korea National Diplomatic Academy, The Japan Forum on International Relations
July 2018	Yokohama	Tripartite Carbon Pricing Forum, International Forum for Sustainability Asia and the Pacific (ISAP)	Institute of Global Environmental Strategies (IGES)
October 2018	Beijing	Green Supply Chain Alliance	Institute of Public and Environmental Affairs (IPE)
July 2019	Yokohama	Tripartite Carbon Pricing Forum, International Forum for Sustainability Asia and the Pacific (ISAP)	Institute of Global Environmental Strategies (IGES)
February 2019	Tokyo	Energy Transition and Energy Democracy in Asia	Institute for Sustainable Energy Policies (ISEP)
June 2019	Taipei	Workshop on Local Energy Policy in Asia	Industrial Technology Research Institute (ITRI)

Note: *indicates the event where the author was invited to make his presentation.

Appendix 2. Transboundary networks

Network	Focal organization	Type of organization	Initiative	Secretariat	Major actors	Major issues
Tripartite Environment Ministers Meeting (TEMM)	Three ministries	IGO	State	Japan, South Korea, and China	Ministries, scholars, businesses, and schools in Japan, South Korea, and China	Environmental issues in Northeast Asia
Acid Deposition Monitoring Network in East Asia (EANET)	Asia Center for Air Pollution Research	IGO	State	Japan	Ministries and scientists in East Asia	Transboundary acid rains issues in East Asia
Long-Range Transboundary Air Pollutants in Northeast Asia (LTP)	National Institute of Environmental Research	IGO	State	South Korea	National research institutes from South Korea, Japan, and China	Transboundary air pollution in Northeast Asia
Asian Disaster Reduction Center (ADRC)	ADRC	IGO	State	Japan	Ministries, scholars, local communities in 31 member countries, and international organizations	Disaster response and resilience in Asia
Northeast Asia Peace Cooperation Initiative (NAPCI)	Sejong Institute	IGO+RN	State	South Korea	Governments and research institutes in South Korea, China, Japan, Russia, Mongolia, and the United States	Non-traditional security issues (environment and nuclear power) in Northeast Asia
Science Panel in Asia Pacific Clean Air Partnership (APCAP)	APCAP	RN	Nonstate	Thailand	Environmental scientists in Asia	Transboundary air pollution in Asia

Green Access Project	Osaka University	RN	Nonstate	Japan	Scholars and legal experts in Asia, Europe, the United States, and Latin America	Access to information, justice, and policymaking in Asia
Future Earth	Research Institute for Humanity and Nature	RN	Nonstate	Japan	Scientists, businesses, and cities	Transdisciplinary research networks in Asia and beyond
East Asia Climate Network (EACN)	East Asia Environment Information Center	NGO	Nonstate	Japan	Environmental NGOs and scholars in Japan, China, and South Korea	Mitigation against climate change in Northeast Asia
Energy Transition and Energy Democracy in East Asia	Institute for Sustainable Energy Policies	NGO	Nonstate	Japan	NGOs and scholars from Japan, South Korea, and Taiwan	Energy transition toward renewable energy in Asia
No Nukes Asia Forum	Citizens' Nuclear Information Center	NGO	Nonstate	Japan	Environmental NGOs in Asia	Anti-nuclear actions in Asia
National Resources Defense Council (China)	Natural Resources Defense Council	INGO	Nonstate	United States	Central and local governments in China and research institutes and universities in China and the United States	Energy and environmental issues in China
EPA	EPA (China office)	NGO	Nonstate	South Korea	Korean volunteers, businesses, and local communities	Prevention of desertification in Inner Mongolia
GEI CCCA model	Global Environmental Institute (GEI)	NGO	Nonstate	China	Central and local governments, research institutes, NGOs, businesses, and communities in China, Southeast Asia, and Africa and INGOs	Community-based sustainable development in China, Southeast Asia, and Africa
ZX	ZX	NGO	Nonstate	China	Chinese volunteers and NGOs, INGOs	Disaster response in China and abroad

Note: IGO: Intergovernmental organization; RN: Research network; INGO: International NGO. Some of the NGOs are anonymized.