The Structure of Cooperation and Non-cooperation: 
Negotiations Concerning Transboundary Air Pollution in Asia and the Pacific

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Introduction

In autumn 2016, the Secretariat of the Acid Deposition Monitoring Network in East Asia (EANET) became the Regional Office for Asia and the Pacific (UNEP/ROAP) from the former Asian Institute of Technology / UNEP Regional Resource Centre for Asia and the Pacific (AIT/UNEP RRC.AP, currently the RRC.AP/AIT). Two years prior, Indonesia had signed the “Instrument for Strengthening the Acid Deposition Monitoring Network in East Asia” as the final signatory among all 13 member countries. This was an additional change in 2014, which was a pivotal year for the EANET. EANET began in 1993 as an assembly of experts and officially started operating in 2001. It is now in its 17th year. The issue of acid rain was first exposed in Japan in 1972 by an acid rain investigation conducted by the Ministry of the Environment. Japan then began to take a proactive diplomatic stance on global environmental issues starting in the early 1990s. The topics of why and how regional cooperative frameworks were formed, how they progressed, and whether or not they have issues, have been addressed in many studies (including some on Japan’s case) from a variety of standpoints.

The bulk of international relations research on EANET\(^1\) takes the form of studies that focus

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\(^1\) Research on EANET has largely been conducted by officials/staff working in an organization, and is beneficial for understanding the progress of EANET. However, these studies are descriptions or introductions of specific periods of EANET by Japanese policy staff or EANET administrative staff, and do not amount to systematic descriptions or analyses of cases that can answer the research questions posed in this study. Ono, H. 1998a. Higashi ajia sanseiu monitaringu nettowaaku no kochiku [Formulation of the Acid Deposition Monitoring Network in East Asia]. *Kankyo Gijutsu [Environmental Engineering]*
on the regulatory aspects of institutions, centered on comparisons between EANET and the EU Convention on Long-Range Transboundary Air Pollution (LRTAP). Previous research has


constituted the mainstream method for analyzing the institutional effectiveness of EANET according to late international regime theory, which emphasizes effectiveness. This has influenced analyses by scientists using the idea of Epistemic Community. As with discussions on international relations’ (IR) institutional theory, the majority of these studies assume that Europe’s institution formation process is advanced because it is “scientific,” “neutral,” and “effective.” For that reason, the studies focus on comparisons, and institution-making relating to transboundary air pollution in East Asia has been assessed as “immature,” because unlike Europe (LRTAP and Baltic Sea Coastal Zone Environmental Policy), Asia has not formed any environmental treaties. Also, regional institutionalization issues and “failures of Japanese diplomacy” have been pointed out. However, some have expressed the opinion that the Asian institutionalization process, including EANET, is “difficult to acclimate” to European institutions, or that it is “unique.” Also, some have pointed out that East Asia shares negotiation models and institution formulation processes in an “ASEAN way.”

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4 Looking at the methodology, there are many places in which case comparisons are inadequate. See the following for information on comparisons in case analysis: King, G., Keohane, R. O., and Verba, S. 1994. Designing social inquiry. Princeton: Princeton University Press.

5 In addition to footnotes 2 and 3, see Matsuoka, S. 2014. Japan’s Asian strategy: Japan’s Asian environmental strategy and a soft power of the 21st Century. Public Policy Review 10 (1, March): 189-226. However, when considering the institutionalization of scientific knowledge, comparisons with EANET, LRTAP, and EMEP are useful.

Taking a look at quasi-regional cooperation on air pollution in East Asia as a whole, rather than individual institutionalization and venue-seeking (as discussed in international regime theory), it features the stratification of various cooperative forms at a similar quasi-regional level to ensure regional environmental cooperation in concerned regions.\textsuperscript{7} This also includes non-regimes like EANET.\textsuperscript{8}

This could be for two reasons. One is that many Asian environmental institutions are structured, which is itself a general feature of Asian regionalism.\textsuperscript{10} Even looking only at international consensus, cooperation, and research networks for transboundary air pollution like EANET, the ASEAN Haze Agreement, the Malé Declaration on Control and Prevention of Air Pollution and Its Likely


\textsuperscript{9} The author has a paper on EANET as a non-regime. Miyazaki, \textit{op. cit.}, 2013: 2-3; Miyazaki, A. 2011c. Filling the gap via “loose institutions”: A case study from the Acid Deposition Monitoring Network in East Asia (EANET). Paper presented at annual conference of ISA, held in Montreal, Canada on March 19, 2011.

Transboundary Effects for South Asia (Malé Declaration), and the joint research Long-Range Transboundary Air Pollutants in Northeast Asia (LTP), whereas the Haze Agreement is the only one international law which is in effect. Furthermore, most of the cooperative frameworks at the quasi-regional level coexist with one another.\textsuperscript{11} The Joint Forum on the Atmospheric Environment in Asia and the Pacific, as a “clearing house” for these, is of a style that does not negate the functions of individual frameworks.\textsuperscript{12} This forum, which has continued from 2009 to present, if it were to be classified using international regime theory, would be an implantable regime comprising the above international consensus or cooperative framework (non-regime or a mixture of regimes), and this is also structive.\textsuperscript{13}

Another reason is that even if we focus on institutions for the time being, an analysis of negotiations by the actors originally involved is also essential. The focus of studies on the effectiveness of institutions is not just the features and designs of the institutions themselves. The main driving force of effective institutions includes each nation’s proactive participation in and contribution to negotiations.\textsuperscript{14} The choice by scholars to focus on institutions or actors is one of the significant topics of discussion in IR. In environmental research (international regime theory and international institutional theory in particular), the focus of actor-centered research has been placed on limited discussions of the roles of actors, such as the idea of Epistemic Community.\textsuperscript{15} The main meetings on

\textsuperscript{11} Taking this point, considering the “competition” of cooperative frameworks between quasi-regional levels is a bit arbitrary. For the time being, if this discussion continues, there will be concerns about “the politicization of science” among researchers.

\textsuperscript{12} The fifth conference was held in 2014. UNEP, Near-term Climate Protection and Clean Air Benefits: Actions for Controlling Short-Lived Climate Forcers, 2011, p. 37.


\textsuperscript{15} Haas, P. M. 1990. \textit{Saving the Mediterranean: The politics of international environmental cooperation.}
the institutional design of EANET include the Intergovernmental Meeting (IG), the Scientific Advisory Committee (SAC), and the Working Group on Future Development (WGFD). At these meetings, government officials, scientists, scholars, and other specialists and concerned parties participate in discussions; some participants have been involved in negotiations for many years and from different standpoints. In Asia, particularly East Asia, there are no treaties or regional regimes, so what are the relationships in which the negotiators search for regional cooperation?

This study uses the example of EANET, defining the negotiator and participant relationship structure at 2012 IGs as a network, and studies this using social network analysis (SNA). Specifically, I used a survey for SNA that was distributed and collected at IGs, digitized the data with UCINet, a model analysis tool, and used NetDraw to make graphs from the results. Based on this analysis, I made a visualization of the relationship structure between the actors at recent EANET IG meetings and showed the cooperative and non-cooperative relationships. Because the results on cooperation and non-cooperation in this case would remain unclear if I presented only numerical explanations, I also used qualitative data, including reports, interview surveys, and my own observation notes and considered these as supplementing the state of negotiations at that time.

1. Analytical Framework
   (1) EANET Historical Development

   EANET has been officially in operation since 2001, but it also had a two-year period of preparatory activities from 1998–2000. Furthermore, from 1993–1997, scientists and government

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New York: Columbia University Press. This can be considered as an important study observing the effect that diverse actors have on international politics, but this concept is eventually adopted as an explanation of international regime theory in subsequent studies.

16 EANET itself also has other meetings like STM and other WGs. EANET, “Meeting Reports,” available at: http://www.eanet.asia/meeting/list.html.

officials conducted expert meetings before active operations started. The factors that propelled the expert meetings were the idea of establishing an air pollution monitoring method in Southeast and Northeast Asia and sharing data, and one of Japan’s diplomatic strategies that avoided initiatives limited to Northeast Asia, which arose from understanding of and countermeasures to China’s border-crossing acid rain in 1992. It is said that the establishment of the preparatory phase took some time, mainly due to the participation arrangements for the Southeast Asian countries. At the time of its establishment, EANET was more strongly influenced by Japan’s leadership than it is today (or rather, its environmental diplomacy aligned with environmental ODA), so conflicts over policy understanding concerning regional cooperation with LTP (Northeast Asia’s international collaborative research led by South Korea) occurred in the early 2000s. At EANET’s 2003 IG meeting, Japan reiterated to South Korea that LTP and EANET were in coexistence, and avoided a negotiation divide on the topic of EANET’s future development at that time.

When the WGFD was established in 2005, discussions about an instrument intended to strengthen EANET began on an ad hoc basis. As a result, the “Niigata Decision” was adopted at the 10th IG meeting two years later. From this point on, negotiations at the headquarters were focused on

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22 Interview with Mr. Tokuya Wada (a former Assistant Director at the Office of Environmental Protection), Ministry of the Environment (conducted September 3, 2004).
23 However, the South Korean side asserts that there were some who did not approve of this.
discussing a regional agreement that included a widening of scope. This covered the pros and cons of stipulating the enforcement of atmospheric pollutants other than acid rain, and specific details of financial contribution methods for each nation after the agreement. Both legally binding and non-binding documents were discussed at the beginning, but signing and ratification processes differed within each participating country, and many problems arose with transparency and accountability for securing funds; the discussion involved countries backing one document or the other. The document that was not legally binding was eventually adopted, and signing and domestic formalities following that were set as “signing in accordance with procedures and by representatives appropriate to each nation,” in consideration of domestic decision-making processes in China and Malaysia.

At the IG meeting in the autumn of 2010, Cambodia, Japan, Mongolia, Myanmar, the Philippines, South Korea, and Thailand signed the document; the following year, China and Malaysia signed, and in 2012 Russia also became a signatory. While signatures were received from relatively cautious countries like Malaysia, China, and South Korea, Indonesia wanted to continue participating even though it could not sign at that time. Thus, activities were for a time discussed with non-signing nations, but it was decided that Indonesia would host an IG meeting and also become a signatory in the autumn of 2014. Accompanying this, EANET’s WGFD was focused on discussions of future activities, particularly expanding headquarters and the scope of EANET. Starting last year in particular, discussions on increasing funding contributions by China and expanding the network center commenced, and they might bring big changes to EANET’s design.

24 For example, Thailand was trying to explore new activities like the creation of an emissions inventory, and Russia was aiming to secure funds domestically, and they were emphasizing the presence of a legally binding document. Interview with Mr. Sergey Gromov (Head of Scientific Sector, Institute of Global Climate and Ecology), Pattaya (Thailand) (conducted July 30, 2009).
(2) SNA Adoption in EANET

My case subject is EANET’s IG meetings. From 2012 to 2014, I distributed and collected questionnaires for SNA to all participating nations, offices, and organizations relevant to these meetings. This study also used UCINet for the analysis of international relationships. UCINet has gained popularity worldwide because of its functionality and user-friendliness. It also publishes many analysis results on the internet.\textsuperscript{25} UCINet includes analysis software Pajek and drawing software NetDraw, and data can be mutually shared (additionally, there is also STRUCTURE\textsuperscript{26} and Negopy\textsuperscript{27}).

The case for this study, the EANET IG meeting, is somewhat limited in terms of the number of countries and participants (13 countries [35 members] and offices and NC [10 members], international organizations [10 members], specialists [5 members], and observers [5 members], for a total of about 65 members).\textsuperscript{28} For this reason, of the two overall SNA objectives, I aimed to comprehend the entire network as well as the key actors, and first drew items related to SNA from the questionnaires from the 13 countries and made an analysis matrix.\textsuperscript{29} I then used the UCINet analysis results to draw graphs with NetDraw.

The question about the kinds of relationship in which negotiators seek regional cooperation can be answered by first revealing the relationship structure of the negotiators. Until now, the IG meeting itself had only partially clarified this through meeting documents and interviews. Through this analysis I could grasp the negotiation structure and gain a more concrete visualization of the relationships between actors. By doing this, cooperation and non-cooperation between actors, which

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{25} UCINet, “UCINet Software,” available at: https://sites.google.com/site/ucinetsoftware/home.
\item \textsuperscript{27} Richards, W. D. 1995. NEGOPY 4.30 manual and user’s guide. Burnaby, British Columbia, Canada: School of Communication, Simon Fraser University.
\item \textsuperscript{28} The numbers vary slightly for each meeting.
\item \textsuperscript{29} I later sent and collected the same questionnaire from international organizations, offices, and NCs. Please see the reference materials at the end of the paper for the questions.
\end{itemize}
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had been unclear, were defined at the time of analysis.

2. Case Analysis
(1) EANET Analysis through SNA

The negotiation structure of EANET’s IG meeting was shown via SNA. Specifically, it showed which actors played central roles, and whether the actors were cooperative or uncooperative (non-participation or passive participation in negotiations). How much of an influence do certain actors have on other actors? Which actors are influential? Which actors connect isolated actors? The indicators clearly showed these in the quantitative analysis. First, taking a look at the 2012 EANET IG meeting as a network, from the figure made with NetDraw (directed graph), one can see that Japan, the network center (NC), and the headquarters are central in the network (hubs) (Figure 1). In particular, the NC and headquarters are largely involved with the subgroups mentioned in the next paragraph. Japan is connected with many countries, but its reach does not extend to the formation of subgroups. Within the network, the actors that do not have directed relationships (arrows) with other actors are Indonesia, Malaysia, and South Korea.

Next was a search for the subgroups that have directly binding relationships within the network (Figure 2, see “designated cliques”). Of the six subgroups that have directly binding relationships within the network detected by UCINet, five connect the NC, headquarters, and another main national actor ([1] Russia, [2] Thailand, [3] Vietnam, [4] Cambodia, [5] Mongolia). It can also be understood that the NC and headquarters, which participate in all subgroups, create another subgroup with resource persons (Figures 2 and 3). Looking at the participation rate within each subgroup (inter-nodal adjacent value) for the 8 countries (out of 13) with high values, it can be read that the closer their value to one in any of the subgroups (6 countries directly and indirectly, 2 countries indirectly only), the more they participated in that subgroup. On the other hand, the countries not participating in any
Subgroup were Indonesia, Laos, Malaysia, Myanmar, and South Korea (Figure 4). Combining these results with the results of the above-mentioned directed graph, one can see that Indonesia, Malaysia, and South Korea were isolated within the IG meeting as of 2012. Certainly, when the participants were discussing signing documents and expanding the IG’s scope, Indonesia was not on board (South Korea and Malaysia, which felt the same at first, signed in 2010 and 2011, respectively), and South Korea frequently changed its participating official.30

Let us now take a look at the relationships between each of the actors. A few indicators measuring solidarity between actors become key to this. First, if we look at the dyadic redundancy of the relationships of each pair of actors, each actor has a strong connection with Japan, the NC, and headquarters, and they are linked to other actors through their relationships with these hubs (Figure 5). Next, let us look at the dyadic constraints of each actor pair (Figure 6). In this indicator, higher values indicate greater mutual influence; for example, for Indonesia (influenced by the NC and headquarters [0.37], Japan [0.25]), we can see that it is more greatly influenced by the NC and headquarters than by Japan. Certainly, the party who tried to change Indonesia and Malaysia’s stance at this time (neither wanted to sign) would have been headquarters. This is also substantiated by the betweenness mentioned in the latter half of this section.

Taking into consideration the NetDraw results, subgroups, and the dyadic redundancy of relationships, Japan is positioned as a hub but does not form subgroups like other hubs; its adjacent value with the headquarters and NC, which have high rates of participation in subgroups, is about one-third (0-1), and approximately half (0-0.333) the minimum value of Cambodia, Mongolia, Russia,

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Thailand, and Vietnam. Looking at the SNA, it is implied that Japan was not able to exercise the influence to show leadership as of 2012 (Figure 4). This differs from the argument that Japan showed “wrong” leadership as a broker, which has been criticized in other recent studies.\(^{31}\) Of course, in 2003, considered to be the time at which Japan’s leadership changed to an intermediary (arbitration) model, a separate SNA will be needed to discover whether Japan showed such “wrong” leadership.\(^{32}\) The recent relationship between Japan and South Korea in EANET may be different than it was at that time, but at the point of analysis Japanese leadership was not shown. To that extent, it was also understood that South Korea was one of the isolated actors. Taking a look at the relationships of each pair of actors, South Korea is influenced by resource persons (relationship dyadic redundancy 0.75, dyadic constraint 0.27), the NC and headquarters (relationship dyadic redundancy 0.68, 0.21), and Japan (0.16) (Figure 6). As can be seen from this, there is a connection between South Korea and Japan. However, Japan is in close contact with the NC and headquarters, and some of the resource persons are former Japanese government officials and are influenced by the country. Japan had shown long-running cooperation (with Thailand in particular) up until this point. This can also be seen from the connections between Japan and other countries and organizations (Japan is influenced by the NC and headquarters [0.08]; Thailand and resource persons [0.02]; and Laos, Mongolia, the Philippines, Russia, and Vietnam [0.01]).

Thailand is influenced by Japan; the NC and headquarters (0.13); and Cambodia and resource


\(^{32}\) Looking at the contents of interviews by the author with Japanese government officials from that time (Miyazaki, *Ibid.*, 2011a) and interviews with South Korean researchers in a previous study (Kim 2014), it seems that the awareness of the negotiation stance of both countries was different. However, when considering it from the aspect of political competition between nations, the decline of the political priority of EANET for South Korean government officials could be foreseen, if the priority aspects of its own nation’s leadership policies are considered.
persons (0.04). Russia is influenced by headquarters (0.18); the NC (0.16); Japan, Vietnam, and resource persons (0.07); and China (0.04). Russia, which has enthusiastic participants with many years of service, has a lot of influence on countries and persons that it has long-term relationships with.

China is influenced by headquarters (0.34); the NC and Russia (0.19); and Japan (0.10). Vietnam is influenced by the NC and headquarters (0.17); Japan (0.13); resource persons (0.11); and Russia (0.08). Vietnam, which has contributed to advancing discussions for a while now, is influenced by Japan, resource persons, and Russia (in which it has many acquaintances), in addition to headquarters and the NC. The Philippines is influenced by the NC (0.38), Japan (0.28), and headquarters (0.21). This country, as one that advances discussions and plays the important role of moderator, is significantly influenced by the three hubs.

The NC, one of the hubs, is influenced by headquarters (0.10); Japan (0.08); Russia, Thailand, and resource persons (0.02); and Cambodia, Mongolia, the Philippines, and Vietnam (0.01). Headquarters is influenced by the NC (0.10); Japan (0.07); Russia, Thailand, and resource persons (0.02); and Cambodia, China, Mongolia, and Vietnam (0.01). Resource persons are understood to be influenced by the NC and headquarters (0.13); Japan (0.11); Vietnam (0.05); Russia and Thailand (0.04); and South Korea (0.02). Myanmar, which held the local IG meeting in 2013, is influenced by Japan (0.27); Thailand (0.22); and the NC and headquarters (0.15). Cambodia is influenced by the NC and headquarters (0.26); Thailand (0.18); and Japan (0.10). Laos is influenced by Japan (0.27); Thailand (0.22); and the NC and headquarters (0.15). Mongolia is influenced by the NC and headquarters (0.30) and Japan (0.22) (Figure 6).

The connections with mutual close relationships (high dyadic redundancy in the relationship) are as follows: Japan, the NC, and headquarters (degree value: 15); following that are Thailand and resource persons (7); Russia (6); Vietnam (5); Cambodia, China, Laos, Myanmar, and South Korea (4); and Indonesia, Malaysia, Mongolia, and the Philippines (3). Looking at the degree of binding to
ego (hierarchy), Japan, the NC, and headquarters have great influence on individual actors, but resource persons and Thailand also have a high degree of influence (Figure 7).

Finally, on the betweenness of actors, let us try to grasp the binding relationships with specific actors from the three perspectives of direction toward actors, direction from actors, and bi-directionality. The actors (brokers) with many indirect connections with other actors (those with high modularity and betweenness) are as follows: the NC (39.58), headquarters (38.69), Mongolia (33.33), the Philippines (33.33), Japan (32.31), China (25), and resource persons (25) (Figure 8). The actors with indirect connections to such actors are Japan (52.65), the Philippines (50), Mongolia (33.33), Vietnam (33.33), the NC (18.69), and headquarters (15.6) (Figure 9). The actors for which indirect connections are bi-directional are Mongolia (33.33), the Philippines (33.33), China (25), Japan (23.21), headquarters (18.69), and the NC (15.6) (Figure 10). These actors with high betweenness values act to create subgroups, improve knowledge within those subgroups, and raise the likelihood for feedback on monitoring; they prevent the isolation of actors within the network.33 In that sense, the role that these actors play is quite large. Certainly, although they did not create any subgroups, Japan and China were the top speakers, and there were several instances in which they tried to bridge the differences in their stances. However, the Philippines and Vietnam (subgroup creation) not only proactively spoke during the negotiations, they played the role of moderator like Mongolia, and made efforts to mediate arguments that would lead to an agreement.

When both betweenness and density were high, the negotiating positions of those actors became fixed, and it became difficult to agree or seek an accord. The actors that had these two conditions from the three perspectives listed above were mainly China, Mongolia, and the Philippines (slide, bi-directionality, direction from and toward other actors). China, which showed remarkable numbers for these, has continued to maintain its own standpoint even in discussions that advanced EANET’s scope of activity, including foundation-strengthening documents.

(2) The Relevance of the SNA Results to the Outcomes

In the previous section, I explained the negotiation structure at the time, centered on the analysis results, and provided a partial background for these results. The structure of actors’ relationships at EANET’s IG meetings on the one hand had the NC, headquarters, and Japan as central actors in the network, but, on the other hand, demonstrated that South Korea, Indonesia, and Malaysia were isolated within the network. Furthermore, if considering the point of influence, Japan was not on the same level as the NC and headquarters, not having formed any subgroups; it also did not demonstrate leadership at the time of the analysis. Rather, Japan played the part of broker. Brokers connect different fixed networks, remove rigidity from discussions, and present solutions that consider both stances.

Furthermore, I verified a few hypotheses used in environmental research that used SNA. Regarding betweenness in particular, it plays the role mentioned above of raising the likelihood of

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feedback on monitoring, and I found that it contributes not only to participation in negotiation discussions, but also to bridge-building. Most of all, the Philippines’ and Vietnam’s roles as brokers were striking. However, when observing participation, the role of headquarters showed remarkable contributions and was also significant in the SNA, but its numbers were not as obvious as the other actors with high numerical values. Additionally, when an actor had both high density and high betweenness within the group, it had close connections within the group. However, groups were distinct from one another, and the connections between groups were insufficient. Therefore, actors’ stances became fixed, and shared efforts aiming for a consensus became limited. This flexibility in one’s negotiation stance was also demonstrated by China’s preservation of its stance.

Moreover, the analysis results seemed to be related to the results of some of the actors’ behaviors. For example, Indonesia, which was the last country to sign the EANET foundation-strengthening document, had no connections to other actors. On Japan’s leadership, which has often been discussed in previous research, in this analysis it was no greater than that of headquarters or the NC, and, at the time of analysis, its influence was also low. It was a network hub on NetDraw, so its mutual relationships should conceivably continue to be analyzed and studied going forward. This is a foreseeable point, but countries with long-term participants on the whole had greater participation and also connections with other countries. On the policy side, I would like to observe the role of brokers in the future in order to maintain the participation of countries whose officials frequently change.

From the above, as an application in IR using SNA, regarding the possibilities and issues of this analysis method, the following three points can be made. The first is that SNA is suited to uncovering cooperative structures and influence (namely, grasping the present situation). As I have already noted, the direct and indirect relationships between negotiators were revealed as “aspects” in a way that could not be found in existing official negotiation records and interviews with concerned

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36 Borgatti and Foster, op. cit., 991-1013; Bodin et. al., op. cit., 2006: r2.
parties. SNA is capable of elucidating relationship structures, discovering principal actors that have roles inside and outside of networks (the so-called “neighborhood”), and discovering isolated actors and groups. As such, it can work to develop negotiations, stimulate the distribution of resources, or reduce stagnation. From this analysis, it is also possible to study complementary factors such as the kinds of conduct (results) that actors and relationship structures actually lead to, and furthermore, how this behavior took place using a different method from tracing the case process. Related to this point, the second point that can be made is that research bias decreases when SNA and qualitative data are combined and analyzed. Thinking of the reasons for the results, it is not possible to have a discussion on the aspects of influence on the results of structure using SNA alone. Naturally, in SNA there are various opinions on the relationship between structure and the results brought about, and conclusions should not be drawn immediately. However, it does seem that the negotiator relationship structure that includes these has no small effect on outcomes. The question of whether SNA itself is suited to an analysis of causal relationships is beyond the scope of this study. However, if one considers theoretical predictions based on several SNA indicators, perhaps it would be possible to explain causal relationships. In doing so, the power of proof would likely be reinforced if it were considered in combination with qualitative data. The third point is about issues with SNA methodology. SNA is fundamentally no more than a snapshot of relationship structures at the time of the survey. Analysis is needed of the 2003 meeting that was the impetus for an analysis of Japan’s leadership. Furthermore, it would be preferable to conduct an analysis over time in order to follow the big picture of negotiations; but, in reality, this would be difficult. This is because there are issues with the feasibility of research and social surveys. Of course, unlike qualitative analysis methods, quantitative ones excel at grasping big trends, so it is safe to say that combining these two methods would be worthwhile.
(3) SNA and IR

The word “network” is not new in IR, but it was assigned many meanings up until the early 2000s. The way of thinking about networks used in this paper is also partially used in neorealism structure analysis and IPE structure discussions. At the time, SNA was not a mainstream method, but these days security research has become commonplace, such as analyses of the networking of terrorist groups. Furthermore, there are two branches of network research (as with IR) in neighboring fields like policy research.

SNA began to be explicitly used in IR after the year 2000. There have been some attempts to solve a few conceptual problems. In addition to the actors and systems mentioned in the introduction, there are issues with cooperation in IR. The nature of actors is frequently pointed out in IR problem-solving, and in game theory in particular, in order to change a situation with a rational and difficult to cooperate (non-cooperative games) nature; until now, systems (here, the establishment of and adherence to treaties), repeated games, power, and models have been discussed. However, in reality, the processes that bring forth cooperation or conflict are not isolated from one another. Furthermore, the behavior of actors is fluid (sometimes rational, sometimes altruistic), so it does not always conform

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39 See footnote 44.


to the posture of a nation. Additionally, how should the structure of negotiations that assemble countries that embrace diversity, and the relationships of actors in changing situations, be analyzed? In this way, network analysis is concerned with IR issues.

SNA is a separate concept from actor attributes. As with the context in which SNA is used in sociology, in IR studies as well, the effect of relationship structures that are unaffected by actor attributes on real-world changes is gaining attention. This study is positioned in that context. As an IR theoretical study, perhaps it can be used to discuss the relationship with neorealism and IPE structure theory, and case studies can be used in the analysis of coalitions, alliances, terrorist groups, and environmental NGOs. Regarding the research question of how the structure of actors and changes to that structure create cooperative and non-cooperative relationships, a few practical attempts to answer it are underway.

This study uncovered key actors, isolated actors, and mediating actors in order to grasp a specific negotiation structure. It also considered the connections between actors participating in EANET and their correlations with cooperation and non-cooperation. When considering this in combination with IR research (for example, the learning mechanisms mainly discussed in social constructivism until now [Ruggie 2000]) or when doing process analysis of changes to standards, it seems that in combination with qualitative data, it would be possible to analyze the direct and indirect

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relationships of the actors involved. In the same way, in fields like security, human rights, and resource governance, SNA would be applicable. Because SNA on its own cannot show all of the outcomes that arose from various sources, it should be paired with qualitative results observed in practice. SNA is useful as a method for verification. This is because the understanding of the structure is never more than a snapshot of a fixed point in time; there is controversy over the correlation between structure and outcomes in sociology as well, and this has not reached a conclusion. On the topic of EANET, the results from 2012 may change in 2017. Following changes over the years would be ideal, but because the possibility of constraints on social surveys is unavoidable, the likelihood of actually conducting a survey to capture such changes is low. Furthermore, even if the relationship structure temporarily has an effect on outcomes, the point in time and extent of the effect of structure cannot be understood with SNA alone. For that reason, when verifying results, qualitative research methods like participant observations, interviews, and case descriptions through process tracing will be essential. When these are conducted, not only will the features of the structures be comprehensible, it will also be possible to demonstrate hypotheses in network theory that are discussed in SNA.

Concluding Remarks

This study analyzed EANET’s IG meetings using UCINet, created graphs with NetDraw, and combined these with qualitative data to reveal the cooperative and non-cooperative structures of related actors. EANET’s IG meeting was comprised of three hubs, and, of those, the influence of the headquarters and the NC on other actors was strong. Rather than leader, Japan played the role of arbitrator, similar to headquarters, the NC, the Philippines, and Vietnam. Arbitrating actors work to

45 Aside from being a snapshot, there are doubts about the very existence of networks, and the degree of formality of analysis methods is a point of debate.
deflect non-cooperation and improve negotiations. When revealing the relationship structure of EANET’s IG meeting using SNA, several hypotheses in the SNA research field were also proven, because SNA indicators were used. The explanation of the direct and indirect relationships between these related actors is new knowledge that had only been partially grasped by previous research that only used IG meeting documents and interviews.

As with discussions in sociology, which is the original field of SNA, it is thought that the discussion of structure and outcomes will need more analysis beyond this study, along with progress in other fields. Nevertheless, by partially proving hypotheses from the SNA research field in this case analysis, SNA was sufficiently proven to be applicable not only in resource governance, but in other IR research like security and human rights. Going forward, we can expect academic research in the environmental field, including EANET, to continue to progress.

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Miyazaki, A. 2011c. Filling the gap via “loose institutions”: A case study from the Acid Deposition Monitoring Network in East Asia (EANET). Paper presented at annual conference of ISA,
held in Montreal, Canada on March 19, 2011.


**Interviews**

Interview with Mr. Sergey Gromov (Head of Scientific Sector, Institute of Global Climate and Ecology), Pattaya (Thailand) (conducted July 30, 2009).

Interview with Mr. Tokuya Wada (a former Assistant Director at the Office of Environmental Protection), Ministry of the Environment (conducted September 3, 2004).

**Webpages**


UCINet, “UCINet Software,” available at: https://sites.google.com/site/ucinetsoftware/home.

Figures
Figure 1: Structure of negotiation in EANET/IG (directed graph)

Figure 2: Identification of cliques
6 cliques found:
1: Russia Network Center Secretariat
2: Thailand Network Center Secretariat
3: Vietnam Network Center Secretariat
4: Cambodia Network Center Secretariat
5: Mongolia Network Center Secretariat
6: Network Center Secretariat Resource Persons
Figure 3: Interpretation of cliques

Actor-by-Actor Clique Co-Membership Matrix:

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Figure 4: Adjacency of nodes

Clique Participation Scores: Prop. of clique members that each node is adjacent to

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Figure 5: Redundancy in dyadic relation of actors

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Figure 6: Degree of constraint in dyadic relation of actors

Figure 7: Degree of binding to ego

Figure 8: Betweenness of actors (directional from each actor)
PLEASE DO NOT CITE THIS ARTICLE WITHOUT AUTHOR’S PERMISSION AS IT IS AN ONGOING PAPER AND TO BE UPDATED WITH NEW DATA.

Figure 9: Betweenness of actors (directional to each actor)

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</table>

Figure 10: Betweenness of actors (bi-directional)

QUESTIONNAIRE for Acid Deposition Monitoring Network in East Asia (EANET) 46

1. You have been engaging in EANET since... (month/year)

2. Of the following environmental issues, please indicate the THREE that are the most important theme to your organization. (Please tick only 3 boxes in total)
   a) Acid rain issues □

46 This questionnaire was used for NFPs of EANET. Other questions identifying their affiliation and follow-up questions were omitted from the original document.
b) (Other) transboundary air pollution (e.g. ozone, PM, POPs, mercury) □

c) Domestic/local air pollution (e.g. from factories or cars) □

d) Haze issues □

e) Climate change □

f) Biodiversity □

g) Hazardous Waste □

h) Others (Please specify - e.g. MOs) □

3. How often does your organization …

   a) Contact the Secretariat of EANET?
      Daily □  Weekly □  Monthly □  Less than monthly □  Never □

   b) Receive contact from the Secretariat of EANET?
      Daily □  Weekly □  Monthly □  Less than monthly □  Never □

   c) Contact the Secretariat of EANET by the following means?
      Daily  Weekly  Monthly  Less than monthly  Never
      Ordinary mail □ □ □ □ □
      Email □ □ □ □ □
      Fax □ □ □ □ □
      Telephone □ □ □ □ □
d) Send staff to the Secretariat to carry out EANET-related business (including attendance at meetings)?  (if never, please go to question 4)
At least weekly☐ At least monthly☐ At least annually☐ Rarely☐ Never☐

4. How often does your organization …

a) Contact the Network Center of EANET?
Daily☐ Weekly☐ Monthly☐ Less than monthly☐ Never☐

b) Receive contact from the Network Center of EANET?
Daily☐ Weekly☐ Monthly☐ Less than monthly☐ Never☐

c) Contact the Network Center of EANET by the following means?

<table>
<thead>
<tr>
<th></th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Less than monthly</th>
<th>Never</th>
</tr>
</thead>
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</table>

d) Send staff to the Network Centre of EANET to carry out EANET or other air pollution-related business (including attendance at meetings)?  (if never, please go to question 5)
At least weekly☐ At least monthly☐ At least annually☐ Rarely☐ Never☐

5. How many members of staff in total have travelled to other countries to discuss EANET, or acid rain/atmospheric issues in the past 12 months?

a) Intergovernmental (IG) Meetings
More than 10☐ 6-10☐ 2-5☐ Only one☐ None☐

b) Meetings of Scientific Advisory Committee (SAC)
c) Meetings of Senior Technical Management (STM)
More than 10 □ 6-10 □ 2-5 □ Only one □ None □

d) Meetings of Working Group of Further Development (WGFD) of EANET
More than 10 □ 6-10 □ 2-5 □ Only one □ None □

e) the other formal/ Informal Meetings of EANET
More than 10 □ 6-10 □ 2-5 □ Only one □ None □

f) Meetings of Malé Declaration in South Asia
More than 10 □ 6-10 □ 2-5 □ Only one □ None □

g) Meetings of Environmental Congress in Central Asia
More than 10 □ 6-10 □ 2-5 □ Only one □ None □

h) Meetings on South Asia Cooperative Environmental Programme (SACEP)
More than 10 □ 6-10 □ 2-5 □ Only one □ None □

i) Meetings on ASEAN HAZE Agreement
More than 10 □ 6-10 □ 2-5 □ Only one □ None □

j) Meetings on Joint Forum on Atmospheric Environment(al Issues) in Asia and the Pacific
More than 10 □ 6-10 □ 2-5 □ Only one □ None □

k) Meetings on LRTAP and/ or other atmospheric issues-related meetings of Europe
More than 10 □ 6-10 □ 2-5 □ Only one □ None □

l) Meetings on Acid Rain/ Atmospheric Issues of Africa (e.x. Southern African Development Community (SADC) Regional Policy Framework on Air Pollution; Eastern Africa Regional Framework Agreement on Air Pollution; West and Central Africa Regional Framework Agreement on Air Pollution; North African Air Pollution Framework Agreement and its intergovernmental network)
More than 10 □ 6-10 □ 2-5 □ Only one □ None □

j) Meetings on Acid Rain/ Atmospheric Issues of the North and/or South America (e.x. Intergovernmental Network on Air Pollution in Latin America and Caribbean)
More than 10 □ 6-10 □ 2-5 □ Only one □ None □
k) **Global Meetings on Acid Rain/ Atmospheric Issues** (e.x. Global Atmospheric Pollution (GAP) forum, Atmospheric Brown Clods (ABC) meeting)
   More than 10 □ 6-10 □ 2-5 □ Only one □ None □

l) **Meetings on Acid Rain/ Atmospheric Issues except 5. a) - 5. k)**
   More than 10 □ 6-10 □ 2-5 □ Only one □ None □

6. Besides contact at the Secretariat of EANET, which of the following types of contact has your organization had with the following participating countries and/or other organizations (including their members of staff) **over the past 12 months**?
   *(Please tick as many boxes appropriate; please go to next box if your organization is listed)*
<table>
<thead>
<tr>
<th>Country/Organization</th>
<th>Provided information</th>
<th>Received information from</th>
<th>Discussed political issues on EANET with</th>
<th>Provided resources to</th>
<th>Received resources from</th>
<th>Collaborated in at least one project with</th>
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<td>Cambodia</td>
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<td>UNEP</td>
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<td>Resource Persons</td>
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<td>Others in Asia and the Pacific</td>
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<tr>
<td>Others in Europe and North and South America</td>
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<tr>
<td>Others in Africa (please specify in the name of country or organization)</td>
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7. Please list …

(For questions 7a-7b you may list fewer than five organizations if appropriate. Please provide the FULL NAME of the organizations – i.e. avoid acronyms)

a) The five most important international organizations/ agencies including environmental groups and research institutes with which your organization collaborates.

   i.  
   ii. 
   iii.  
   iv.  
   v.  

b) The five most important national organizations/ agencies including states, environmental groups, and research institutes with which your organization collaborates.

   i.  
   ii. 
   iii. 
   iv.  
   v.  

8. Generally speaking, what kind of relationship does your organization have with the following types of organizations and associations? (Please tick only one box per row)

<table>
<thead>
<tr>
<th>Has no contact</th>
<th>Deliberately avoids</th>
<th>Only contacts if necessary</th>
<th>Actively exchanges information and</th>
<th>Works in partnership</th>
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<tbody>
<tr>
<td>UN or UN system</td>
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</table>
9. In the meetings...who of your organization does initiate the discussion on the following occasion? (If more than one category applies, please tick the one reflecting the most common practice)

(i) internal/domestic level

a) Initiate discussion/ Take most important decisions in the every-day practice of your organization

- Director / president /secretary
- Executive committee or similar body
- Thematic/specialized groups
- Any of staff
- Other bodies (Please specify)

b) If it is different in case of EANET, please tick one of the following boxes. (If not, please proceed to the 8(ii))

- Director / president /secretary
- Executive committee or similar body
- Thematic/specialized groups
- Any of staff
- Other bodies (Please specify)

(ii) International/regional level (At the inter-governmental/ inter-agencies’ meeting of EANET)
10. During the following meetings, do you regard WHICH COUNTRIES/ ORGANIZATIONS as most important initiators/activators of the discussion? (Please write the name of participating country, organizations, or person in each column to rate the features of participation)

a) IG meeting: most likely 1. 2. 3. 4. 5. least likely
b) SAC meeting: most likely 1. 2. 3. 4. 5. least likely
c) WGFD: most likely 1. 2. 3. 4. 5. least likely
d) other EANET meetings: most likely 1. 2. 3. 4. 5. least likely

11. During the following meetings, do you regard WHICH COUNTRIES/ ORGANIZATION as most important mediator/cooperator of the discussion?

a) IG meeting: most likely 1. 2. 3. 4. 5. least likely
b) SAC meeting: most likely 1. 2. 3. 4. 5. least likely
c) WGFD: most likely 1. 2. 3. 4. 5. least likely
d) other EANET meetings: most likely 1. 2. 3. 4. 5. least likely

12. According to your organization, what should be the priorities of EANET development?

(You may list fewer than five priorities if appropriate)

1.
2.
3.
4.
5.