

## **Chapter 3. Resilience Evaluation of the TEMM Cooperation:**

### **DSS and Air Pollution**

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#### **Abstract**

The purpose of this research is to review the history and achievements of the environmental cooperation focusing on the Dust and Sands Storms (DSS) and Air Pollution among Korea, Japan and China under the Tripartite Environment Minister Meeting (TEMM), and to suggest the challenges of promoting of the sustainable development of the TEMM. This research consists of three components: the history, achievements, and challenges of the TEMM. The evaluation of its achievements and challenges was carried out using the concept of ‘resilience’, and was focused on the areas of dust and sandstorms (DSS) and air pollution. The TEMM was launched in 1999 as the environmental cooperation mechanism to discuss and solve the environmental issues in Northeast Asia. Three countries have shared policies and experiences in main prominent environmental issues, such as dust and sandstorms, air pollution and, biodiversity conservation, also they have discussed the methods to address regional environmental problems. The TEMM is the most-widely-used active cooperation mechanism among a wide range of environmental cooperation mechanisms in Northeast Asia because it has the ability to promote sustainable cooperation based on the mutual trust among the countries. In particular, it has allowed for made a meaningful step in the cooperative efforts on focused on dust and sandstorms and, air pollution. However, for successful implementation and sustainable development of the TEMM, it is required to solve some challenges such as the securement of stable human and financial resources, improvement of the balance between cooperative on activities and, diversification of the cooperation method, etc.

Keywords: TEMM, environmental cooperation, resilience, DSS, air pollution

## Introduction

Korea, China and Japan have formed a pillar of the global economy after achieving remarkable economic development in a short time period. Korean economic development in particular has been praised to be the “Miracle of the Han River” and has become a center of global attention, while China has boasted an annual economic growth of more than 10% for many years. The Chinese economy grew by 6.9% in 2017, still maintaining a medium- and high-level growth momentum. However, its economic success, enabled by policy support for deregulation, has resulted in serious environmental impacts. A bigger problem is that such environmental impacts are not limited by the geopolitical borders of the country.

Northeast Asia suffered the international impacts of environmental problem, such as dust and sand storms (DSS) and marine pollution, and it began to realize the need for regional environmental cooperation after the 1990s. After the Rio Summit in 1992, Korea and Japan led consultation bodies such as the NEASPEC (North-East Asian Subregional Programme for Environmental Cooperation), the NEAC (Northeast Asian Conference on Environmental Cooperation), the NOWPAP (The Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region), the EANET (Acid Deposition Monitoring Network in East Asia), the LTP (Long-Range Transboundary Air Pollutants in Northeast Asia) and the TEMM (Tripartite Environment Minister Meeting). Among these, the TEMM is a comprehensive environmental cooperation scheme as well as the highest-level tripartite environment meeting that was established by the Korean initiative to design and implement cooperative solutions in order to successfully confront the regional environmental issues and improve the environmental conditions of the region. The scheme is recognized as one of the best working cooperative arrangements, compared to other three-country cooperation mechanisms in different fields (Ministry of Environment, Republic of Korea. No date).

The aim of this paper is to examine Korea-Japan-China environment ministerial meetings and to evaluate the sustainability of the cooperation with a focus on the response to DSS and air pollution, two of the various TEMM activities for regional cooperation. Sustainability of the cooperation was assessed with the concept of “resilience”, which is essential for sustainability and further development of TEMM activities in the future. With that in mind, this paper attempts to assess the resilience level of regional cooperation for a concerted DSS response and air pollution reduction at the tripartite environment ministers meetings based on six factors and proposed what the TEMM has to do in the future based

on the assessment outcomes.

## 1 History of the Tripartite Environment Ministers Meeting

Korea, China and Japan share their respective national policies and experiences through the TEMM channel for pressing environment issues such as climate change, air pollution, and biodiversity, and they promote environmental development by engaging in discussions on joint responses. Since the 1<sup>st</sup> TEMM event in 1999, three countries have selected and implemented cooperation projects by field, according to their national agenda.

**Table 1. History of the TEMM**

	Date and Venue		Date and Venue
1 <sup>st</sup>	13 January 1999, Seoul, Korea	11th	13-14 June 2009, Beijing China
2 <sup>nd</sup>	26-27 February 2000, Beijing, China	12th	22-23 May 2010, Hokkaido, Japan
3 <sup>rd</sup>	7-8 April 2001, Tokyo, Japan	13th	28-29 April, 2011, Busan, Korea
4 <sup>th</sup>	20-21 April 2002, Seoul, Korea	14th	3-4 May 2012, Beijing, China
5 <sup>th</sup>	13-14 December 2003, Beijing, China	15th	5-6 May 2013, Kitakyushu, Japan
6 <sup>th</sup>	4-5 December 2004, Tokyo, Japan	16th	28-29 April 2014, Daegu, Korea
7 <sup>th</sup>	22-23 October 2005, Seoul, Korea	17th	29-30 April 2015, Shanghai, China
8 <sup>th</sup>	2-3 December 2006, Beijing, China	18th	26-27 April 2016, Shizuoka, Japan
9 <sup>th</sup>	4-6 December 2007, Toyama, Japan	19th	24-25 August 2017, Suwon, Korea
10 <sup>th</sup>	1-3 December 2008, Jeju, Korea		

Source: Compiled by the author.

From 2010, they adopted and implemented the Tripartite Joint Action in a structured manner. The 1st Joint Action Plan was adopted and executed from 2010 to 2014, and the Tripartite Joint Action Plan on Environmental Cooperation (2015-2019) was underway from 2015 with 9 priority areas and 37 activities.

**Table 2. Tripartite Joint Action Plan on Environmental Cooperation 2015-2019**

Priority Cooperation Area		Cooperation Projects
1. Air Quality Improvement	Air Pollution	Tripartite Policy Dialogue on Air Pollution
		Working Group I (Scientific Research on Prevention and Control)
		Working Group II (Technology/Policy on Air Quality Monitoring and Prediction)
	DSS	DSS Directors General Meeting
		DSS Steering Committee Meeting
		DSS WGI & WGII and Related Meetings
		Tripartite Joint Workshop between WGI and WGII
2. Biodiversity	Biodiversity Conservation	Tripartite Policy Dialogue on Biodiversity
		Tripartite Cooperation on AP-BON, ESABII and Bio-Bridge Initiative
		Information Exchange, Best Practice and Experience Exchange
	ABS	Information Sharing to Prepare for Implementation of the Nagoya Protocol
3. Chemical Management and Environmental Emergency Response	Chemical Management	Tripartite Policy Dialogue on Chemical Management
		Tripartite Expert Seminar on Chemical Management
	Environmental Emergency Response	Tripartite Joint Research on Risk Assessment of Environmental Disaster (Accidents)
4. Circulative Management of Resources/3R/Trans-boundary Movement of E-Waste	Circulative Management of Resources/3R	Tripartite 3R and Transboundary Movement of E-Waste Seminar
	Transboundary Movement of E-waste	Tripartite Information Sharing Channel on E-Waste Transboundary Movement Management
		Information Sharing on E-Waste Transboundary Movement Flow among the Three Countries

5. Climate Change Response		Climate Change Mitigation Technology Research and Demonstration Experience Exchange
		Information Sharing on Co-Control Technology
		Climate Change Adaptation Experience Exchange
		Research on Low Carbon and Environment-Friendly Cities Construction
6. Conservation of Water and Marine Environment	Water Environment	Tripartite Information Sharing on Water Environment Management
		Underground Water Technology Cooperation
	Marine Environment	Tripartite Workshops on Marine Litter
		Cooperation under the Framework of NOWPAP
7. Environmental Education, Public Awareness and Corporate Social Responsibility	Environmental Education, Public Awareness	Tripartite Environmental Education Network (TEEN)
		Youth Forum
		Environmental Training for Officials
	Corporate Social Responsibility	Cooperation on CSR on the Environment for Business Sector
8. Rural Environmental Management		Tripartite Rural Environment Policy Dialogue
9. Transition to Green Economy	Green Economy	Information Exchange on Green Development/Economy
		Tripartite Joint Research on Green Economy and Low Carbon Society
	Environmental and Green Industry	Tripartite Roundtable on Environmental Business (TREB)
		Information Exchange on Tripartite Pollution Prevention and Control Technology
		Information Exchange on Evaluation, Certification and Verification of Environmental and Green Industry
	Green Supply Chain	Cooperation on Regional Green Supply Chain

Source: Compiled by the author.

## 1.1 Progress on DSS

The cooperative DSS response began to take shape at the 2<sup>nd</sup> TEMM held in 2000, after three ministers reached a consensus on the implementation of the “Ecological Conservation Project in Northwest China”, an area believed to be an origin of the DSS. From the late 1990s, the DSS blown from China and Mongolia wreaked havoc on Korea and Japan, and as the DSS damage increased over the years, the three countries reached a common understanding of the need for joint actions to combat the problem at the regional level.<sup>1</sup> The 3<sup>rd</sup> TEMM Joint Communiqué of 2001 reads, “The Ministers also shared the recognition that the three countries should promote cooperation for systematic studies on sand dust (yellow sand or kosa)”, laying the foundation for joint efforts by the three governments at the regional level to tackle the DSS issue. Since then, the DSS issue has been on the TEMM’s standing agenda, which made the TEMM a key regional cooperation regime to address the DSS concern (Kang et al. 2004, 39). At the 8th meeting, the three countries consented to hold and regularize the Tripartite Directors General Meeting on DSS among Korea, China and Japan, under which the Joint Research Group was to be formed (Chu et al. 2007, 22-23).

The Joint Research Group began their activities in 2008 and set up Working Group I for improvement of the DSS forecast accuracy and Working Group II for ecological restoration studies in desertification areas. Working Group I conducted “Analysis of selected DSS cases and capacity building for Dust and Sandstorm monitoring”, while Working Group II focused on “Identifying successful factors and developing an advanced model for ecological restoration of area”. At the 14<sup>th</sup> meeting in 2012, a tripartite agreement was made on enhanced cooperation for the DSS response, and a joint investigation for the DSS originating source area (Hulunbuir in Inner Mongolia, PRC) was launched according to the mid-term strategy and plan (2012-2014) of the DSS Joint Research Group. At present, Working Group I carries out the following projects: observation accuracy improvement through comparison of tripartite DSS (including fine particles) observation methods; data-sharing for DSS case studies; and DSS model enhancement in alignment with the WMO’s Sand and Dust Storm Warning Advisory and

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<sup>1</sup> 80% of the DSS that affected Korea blew from the Gobi Desert and the Loess Plateau. Since the mid-2000s, DSS originating from Manchuria have been arriving in the Korean peninsula at an increased rate. In spring, frequent DSS events, which begin in Northeastern China and travel through North Korea to South Korea, are witnessed.

Assessment System (SDS-WAS). Working Group II is currently working on a development project on how to recover devastated lands in desertification areas, as well as research projects for ecological restoration and fresh policy measures with social and economic impacts aiming at prevention of desertification and DSS.

## 1.2 Progress on Air Pollution Reduction

Tripartite cooperation for air quality improvement began at the 15<sup>th</sup> TEMM in 2013. The three countries agreed to hold the “Tripartite Policy Dialogue on Air Pollution” in the same meeting and selected priority areas for the “2<sup>nd</sup> TEMM Joint Action Plan (2015-2019)” at the 16<sup>th</sup> meeting in 2014, marking the first-ever consensus on the tripartite endeavor for air pollution prevention and reduction. The Tripartite Policy Dialogue is held annually by consensus. The 1<sup>st</sup> Dialogue was held in Beijing in March 2014, while the 2<sup>nd</sup> was held in Seoul in March 2015. The 3<sup>rd</sup> was held in Tokyo in March 2016 and the 4<sup>th</sup> in China in February 2017 (Yonhapnews. 2017, April 12). The 5<sup>th</sup> is scheduled to be held in Korea within the first half of 2018 (Mae kyong Media. 2017, April 26). Discussions of the Policy Dialogue are reported at the Directors General meetings under the TEMM, meaning that there is a mechanism to translate the tripartite discussions into real cooperation.

Under the Policy Dialogue is Working Group I for scientific research on air pollution prevention and management and Working Group II for technology and policy research on air quality monitoring and forecasting. At the 3<sup>rd</sup> Policy Dialogue held in 2016, Korea, Japan and China formulated an action plan (2015-2019) among working groups of the three countries. Working Group I was assigned to conduct policy sharing and research activities for reduction and management of air pollutant emissions, including VOC control and mobile source air pollution (roads and non-roads). Working Group II was to deliver policies and exchange information regarding air quality monitoring and forecasting, covering air pollutant monitoring techniques for O<sub>3</sub> and PM<sub>2.5</sub>, emission inventory technology and approaches, as well as remote measurement of air pollutants and modeling.

At the 18<sup>th</sup> TEMM, the three countries agreed to enhance trilateral cooperation for air quality improvement through a joint response to ultrafine dust and endorsed the action plan of the Tripartite Policy Dialogue on Air Pollution. At the 19<sup>th</sup> TEMM, the three countries shared the understanding of the significance of the air pollution issue as a major environmental challenge in the region and agreed to enhance their effort to reduce the air pollution. In addition, they agreed to share and review the report of the Long-Range Transboundary Air Pollutants in Northeast Asia (LTP) at the next TEMM Directors

General Meeting.

## 2 Assessment of Cooperation in terms of Resilience

One of the objectives of this paper is to assess the results of the trilateral environmental cooperation enabled through the TEMM, in particular for DSS and air quality, and for sustainability of the cooperation in the context of “resilience”. The concept of “resilience”, which is widely used in different fields such as ecology, business administration and social science, literally means “the ability to bounce or spring back into shape”. The concept is also used in the environmental field to discuss climate change and disaster risk mitigation. Lee Yeonho et al. (2014) defined it as a “capacity to create virtuous cycle to realize, prepare for, and respond to vulnerabilities of climate change”. That is, resilience can be understood as the ability to overcome a state of instability and return to or move toward a state of stability (Chu et al. 2017). With this definition in mind, this paper is intended to investigate whether the TEMM efforts to tackle DSS and air pollution have the resilience to drive the cooperation toward a more stable and sustainable state based on the track record. The resilience in environmental cooperation has 6 factors – financial base, organizational base, actors of cooperation and channel, mutual benefits, trust and externalities<sup>2</sup>. The following section deals with the 6-factor assessment for resilience of the cooperation in order to address the DSS concern and the air quality issue.<sup>3</sup>

### 2.1 Financial Base

The financial base of the TEMM is deemed vulnerable for undertaking and expanding their cooperative projects to respond to the DSS and air pollution.

With regard to the concerted response to the DSS, the three countries are supposed to finance the research activities of the Joint Research Group for DSS on a voluntary basis.

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<sup>2</sup> Kim and Kim (2005) suggested the success factors for environmental cooperation as the following: 1) regional closeness and ease of access, 2) agenda (expansion from current issues), 3) materialization of tangible benefits, 4) recognition of a leading power or an intermediary power by topic, 5) mutual trust building and separate approach by issue as well as long-term vision setting, 6) consensus on fair financial sharing and 7) binding force imposed on participating countries.

<sup>3</sup> The assessment method was used for analysis in the author’s research in 2017, “Strategy for regional environmental cooperation in response to changing international relations in Northeast Asia”. In this research, the same analytical method was employed to examine the level of resilience in Korea-China and Korea-Japan bilateral environmental cooperation.



However, this voluntary budget-sharing scheme gets in the way of stable and continued project undertaking. For example, one of the earliest projects, the Ecological Conservation Project in Northwest China, was discontinued due to limited funding. Furthermore, while Mongolia's participation in the cooperation projects is essential for accurately identifying DSS trajectories, it remains critical of the voluntary budget-sharing. For this reason, the three countries would have to provide financial support for Mongolian to join the regime (Chung, 2012).

For air pollution reduction, the cooperation barely goes beyond the policy dialogue and policy sharing, and it is expected to face the same financial vulnerabilities as the DSS efforts when cooperative projects are developed.

## 2.2 Organizational Base

The cooperative effort to tackle DSS and air pollution is on a stable and sustainable foundation as it has taken the shape of a consultation body under the TEMM regime.

At the DSS front, the “Tripartite Directors General Meeting on the DSS” was formulated to develop the trilateral mid- and long-term cooperation plan and to manage the projects. The “Steering Committee” and the “Joint Research Group on DSS” were installed under the Directors General Meeting. The Directors General Meeting has been held annually since 2008, and it has set the direction for their cooperation research and projects to address the DSS issue.

The Joint Research Group on DSS, with 10 experts from each country for a total of 30, is divided into two Working Groups, which conduct joint research activities on DSS. They work on research on a regional network for DSS monitoring and early warning systems (Working Group I) and prevention and control of DSS (Working Group II).

For air pollution reduction, the “Policy Dialogue on Air Pollution” has established. The Dialogue was created at the 15<sup>th</sup> TEMM in 2013, and two Working Groups were created for scientific study on air pollution prevention and control and for research on air quality monitoring and pollution prevention.

Separate consultation bodies for responding the DSS and Air pollution are up and running, contributing to their stable and sustainable cooperation under the TEMM regime. However, this does not mean that the system has binding force for the execution of cooperative projects. Because participation in project undertakings is not forced on the three countries, project effectiveness could be compromised.

### 2.3 Actors of Cooperation and Channel

The TEMM endeavor for DSS and air pollution control is, like other TEMM cooperation activities, led by the three governments. Therefore, participation goes hardly beyond the three countries and the environment ministries and their affiliated organizations within the three countries. For an effective DSS response, other Northeast Asian actors such as Mongolia and North Korea need to join in order to define the DSS trajectories accurately and to predict the damage.

While Mongolia participates in the TEMM meetings and Working Groups I and II as an observer, its project participation has yet to be made official and the country remains noncommittal due to financial burden (Chung, 2012). North Korea is not expected to join, even in simple information sharing, due to its social and political isolation. The need to engage other international organizations for a better trilateral cooperation with regard to DSS has been persistently advocated such that in 2002, a multilateral international cooperative project was launched. Participants included Korea, China, Japan and Mongolia, and the UNCCD, the UNESCAP, the UNEP, the ADB and the GEF. This effort led to the ADB-GEF project on Prevention and Control of Dust and Sandstorms (Ahn, 2011).

### 2.4 Mutual Benefits

There are clear mutual benefits that Korea, Japan and China would enjoy as a result of consorted efforts for the DSS issue.

China perceives DSS as a natural disaster and puts the focus of regional cooperation for the DSS issue on prevention of its land desertification. From the Korean and Japanese perspective as victims of DSS from China, it has been perceived as environmental pollution, and therefore, they try to minimize the damage by acquiring the DSS event forecast in advance through the regional cooperation channel (Won, 2003). Although mutual benefits for the three at the DSS front are clear, materialization of those benefits is another story. For years, the TEMM has undertaken a number of joint research projects in conjunction with the “Ecological Conservation Project in Northwest China” to prevent desertification in China. But no significant change has been detected in the desertified areas. The scale of desertification of China was as large as 2,622,000 km<sup>2</sup> (27.3% of the territory) in 1994 and 2,623,000 km<sup>2</sup> (27.3% of the territory) in 2009. Meanwhile, Korea was able to improve the DSS forecast accuracy from 73% in 2013 to 83% in 2015 due to

DSS observation data sharing (Ministry of Environment-Republic of Korea, 2015) but enjoyed little for mitigating the DSS frequency and concentration in containing the DSS damage to a minimum from the cooperation. According to a source (2012) from the Environment Ministry, the annual number of days of observed DSS events tripled to 9.8 days during the 2000s from 2.9 days during the 1980s.

As for air pollution mitigation, the three countries have reached a common understanding that air pollution is the most urgent environmental problem.<sup>4</sup> However, the aims and directions pursued by each country are not in sync, leaving mutual benefits from the trilateral cooperation in limbo. The cooperative benefits for Korea and Japan, the victims of transboundary air pollution, would be damage control and minimization. On the other hand, China is interested in the reduction of air pollution in Northeast Asia and capacity enhancement of its air pollution management. All in all, unless China first acknowledges its responsibility for transboundary air pollution, Korea and Japan will not be able to enjoy the cooperative benefits. The tripartite cooperation is far from effectively reducing air pollution and hardly exceeds rudimentary joint research for policy sharing. PM2.5, the most serious concern in this region, was not selected as a joint research topic due to China's opposition.<sup>5</sup>

For cooperation activities to deliver balanced and fair benefits to the three, solid scientific evidence is needed for the trans-border impact of air pollution that the three cannot deny. In the recent 19<sup>th</sup> TEMM, Korea, Japan and China decided to share the outcomes of LTP (Long-Range Transboundary Air Pollutants in Northeast Asia), which investigated the status of air pollutant emissions, trans-boundary movement and deposition of air pollutants in Northeast Asia at the next TEMM Directors General Meeting, expecting to gain an opportunity to take the cooperative activities for air pollution reduction to the next level (Lyu, 2017). It is also expected that it will help the three countries enjoy their fair share of cooperative benefits, respectively.

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<sup>4</sup> The 19<sup>th</sup> Joint Communiqué reads “The Ministers expressed their concern over the risks posed by ambient air pollution on human health and the environment, and recognized that air pollution is one of the most urgent environmental issues in Northeast Asia”.

<sup>5</sup> When action plans for the Working Groups of Policy Dialogue on Air Pollution were discussed, Korea proposed to include PM2.5 in the research agenda, which has bigger impacts on human health than the VOCs that China proposed as a research subject, but China held back from the discussion. Eventually, the members agreed to conduct research on VOCs, which do not carry much political significance.

## 2.5 Trust

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. Thus, it is fair to say that basic trust has been formed for the DSS cooperation through the TEMM. However, given that the TEMM system is not binding for cooperative implementation, the level of trust for sustained cooperation is not high enough. The same is true for cooperation on air pollution mitigation, as it is in the infant stage and the cooperative benefits on this front have yet to materialize. For that reason, the tripartite trust on the TEMM cooperation for air pollution mitigation has not been good enough.

## 2.6 Externalities

There are two external factors that might undermine the sustainability of cooperation among Korea, Japan and China on the DSS issue and air quality improvement. First, the trilateral cooperation activities have some overlap with those of other consultation bodies including the NEASPEC, the LTP and the EANET. The NEASPEC, initiated by Korea in 1993, is the only inter-governmental conference in which 6 regional players (South Korea, North Korea, China, Japan, Mongolia and Russia) participate, and it is a comprehensive environmental cooperative entity that sets environmental cooperation plans for the Northeast Asia region and undertakes cooperative projects. Its activities cover transboundary air pollution prevention, control of DSS and desertification and nature conservation across country borders. The LTP, also created by the Korean leadership of the National Institute of Environmental Research in 1995, conducts joint research activities regarding long-range transboundary air pollutants across Korea, Japan and China. Its trilateral joint research activities cover measurement of the concentration of air pollutants such as SO<sub>2</sub>, NO<sub>x</sub>, and Ozone at the surface and above, as well as their movement and deposition. Based on this, the members aim to build a joint research scheme for long-range transboundary air pollutants and to find solutions for air quality improvement in Northeast Asia. The EANET is a Japan-led consultation body that deals with acid deposition problems in East Asia. The World Meteorological Organization (WMO) also deals with the Sand and Dust Storm–Warning Advisory and Assessment System (SDS-WAS).

The second external factor is fluidity in international relationships. The three Northeast Asian countries continue to go through ups and downs in terms of their

relationship due to different history recognitions, territorial disputes between China and Japan and Korea-China conflict over deployment of the THAAD (Terminal High Altitude Area Defense missile). The environmental cooperation has been negatively affected at times when international relations turned sour. For example, the TEMM cooperation was seriously affected when China and Japan were engaged in disputes over Senkaku Islands/Diaoyudao Qundao, compromising their bilateral relationship. China sent the Vice Environment Minister instead of the Minister at the 15<sup>th</sup> and 16<sup>th</sup> TEMMs, and no bilateral meeting was held between China and Japan at the 16<sup>th</sup> TEMM. When the THAAD issue hurt Korea-China relations, the 19<sup>th</sup> TEMM was postponed from April until August. International relations are certainly a risk factor threatening the reliability and sustainability of the cooperation, although these events only have a limited impact on the carrying-out of individual projects of the TEMM.

### **3 Challenges of the TEMM**

This section endeavors to present some of the challenges to overcome in order for the TEMM system to carry forward with resilient and sustainable cooperative activities with regard to the DSS issue and air pollution cutback. Resilience, by nature in environmental cooperation, comes only after the financial base, the organizational base, actors of the cooperation and channel, mutual benefits, trust and externalities are brought to maturity. Hence, the future focus for the TEMM should be on the development of the 6 factors.

#### **3.1 Stabilization and Institutionalization of the Financial and Organizational Bases**

Taking lessons from past cooperative projects that were discontinued due to financial constraints, future cooperation within the TEMM framework should be driven toward stabilization of financial and organizational bases in the short term and institutionalization of the cooperation in the long term. To this end, the three countries should at first secure and stabilize financial sources and create or support a funding scheme for the cooperation programs by linking with international organizations and international financial organizations, including the United Nations (UN) and the Asian Development Bank (ADB) (Chu et al. 2017). In addition to financial security, the financial base should be made more stable and reliable by regularizing the Tripartite Directors General Meeting on DSS and the Tripartite Policy Dialogue on Air Pollution, by aligning and fostering exchange between working groups and by expanding the human resource pool of the Joint Research Group on

DSS.

### 3.2 Diversification of Actors and Channels for Cooperation

It is essential to invite Mongolia to the TEMM projects for real gains from the cooperation activities such as an accurate understanding of the DSS trajectories and effective air pollution reduction in Northeast Asia. North Korea should also be encouraged to be part of the system as an observer, so that the TEMM can grow into a cooperative body covering the entire Northeast Asian area. In addition, international organizations should also be brought in to ensure sustainability of the regional cooperation and so that it will be immune to external factors. Lastly, the scope of participation, currently limited to the Ministry of Environment and its affiliated entities, should be expanded to municipal governments, companies and NGOs for diversity.

### 3.3 Realization of Mutual Benefits and Enhancement of Trust

For expansion of mutual benefits through cooperation activities, the focus of these activities should be shifted from current information sharing, joint research and policy dialogues to technology collaboration and science & research cooperation. The existing cooperation programs should be restructured to a needs and output-oriented one for the creation of mutual benefits, and the economic and environmental co-benefit programs should be explored and tested. Particularly for cooperation over air pollution reduction, the initiative by a specific member country should be recognized and their interests should be ensured and protected in one way or another (Chu et al. 2017). Moreover the tripartite trust on the cooperation should be strengthened by fulfillment of existing arrangements and agreements and tangible mutual benefits, and consensus on the needs for cooperation should be continuously built upon.

### 3.4 Consolidation with Other Consultative Bodies and Response to International Relations

To address the concern over activity overlap with other consultative bodies and to enhance the effectiveness of the cooperation, it would be better to regularly engage with those institutions that have similar projects and to attend meetings with each other in order to share cooperation outcomes and discuss future directions. Strategies are needed to continue environmental cooperation regardless of any twists in international relations and

international trends.

## 4 Conclusion

This paper is written with the intention to assess, based on its track record, whether the TEMM cooperation for the DSS issue and air pollution reduction is resilient enough to outgrow its current state into a more stable and sustainable state and presents major challenges ahead to ensure that the TEMM cooperation is carried forward with resilience and sustainability. The TEMM is one of the most vibrant consultative bodies in the region with multiple projects in action. In the form of a highest level tripartite meeting for the environmental domain in Northeast Asia, the TEMM promotes cooperation at a comprehensive level in the field of the environment. Given the fact that the Northeast Asian region, particularly Korea and China, has been suffering from disaster-grade air pollution, the importance of cooperation in tackling DSS and air pollution cannot be stressed enough.

As was reviewed before, more efforts are needed for continued cooperation at the TEMM. First, the financial and organizational bases, which are currently deemed less stable, should be solidified. The system should grow beyond Korea, China and Japan to embrace all participants in Northeast Asia, and it should reach out to local governments, businesses and NGOs. In addition, the three countries should be ensured of enjoying a fair share of cooperative benefits and, in terms of the cooperation on air quality improvement, the initiative of a certain country should be recognized such that rewards for its contributions would be taken into consideration. Only when positive outcomes of such cooperation are materialized can trust among the three countries in the tripartite cooperation be strengthened. Lastly, strategies on how to align with other cooperative bodies such as NEASPEC, EANET in the region should be envisioned, as there are overlaps with them in terms of role and activity.

It is imperative that undeniable scientific evidence of the transboundary movement of air pollutants be shared among the members. It is a way to achieve meaningful progress in the tripartite environmental cooperation for air quality improvement. As the LTP outcomes are to be shared at the 20<sup>th</sup> TEMM, 2018 is expected to be a fresh turning point for the tripartite cooperation for air pollution mitigation. We look forward to a robust TEMM standing intact despite externalities, carrying out various projects reliably and more effectively and solidifying the foundation for further cooperation.

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