Effectiveness of International Environmental Institutions: How to Build an Analytical Framework?[1]

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Abstract This paper aims to understand and compare the development paths of European and Asian regional environmental institutions, based on the variation of expected value with/without legal commitment. It seeks to answer why most Asian environmental institutions lack any significant enforcement on participants and are not legally binding, as Asian countries are reluctant to establish any significant legal commitment. The hypothesis of this paper is that for Asian countries, the expected value of establishing legal commitment in Asian regional environmental institutions is less than the expected value of not establishing legal commitment. The argument would also explain why European countries are more willing to set formal conventions and treaties in European regional environmental institutions. The Net Present Expected Value (NPEV) of establishing legal commitment in regional environmental institutions is affected by the total benefits and total costs expected by the participants, probability, and Social Discount Rate (SDR). The case studies of Acid Deposition Monitoring Network in East Asia (EANET) in Asia and Long-Range Transboundary Air Pollution (LRTAP) in Europe were analyzed in detail to test the argument. The results of analysis show that the NPEV of establishing legal commitment in Asian regional environmental institutions is relatively low. Asian countries prefer not to commit legally to any collective action for environment, in contrast to European countries whom have developed higher environmental awareness and have a higher NPEV from establishing legally binding regional environmental institutions.

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Introduction

In order to reduce the cost to society in tackling and solving environmental issues, environmental institutions are formed to concentrate efforts, increase consistency and effectiveness, and ensure expedient actions are taken when such environmental problems escalate. Realizing such benefits of forming such environmental institutions, European countries and Asian countries have formed and participated in several regional environmental institutions. However, there is a wide difference between European environmental institutions and Asian environmental institutions in terms of legal commitment. Most Asian environmental institutions are not legally binding, as Asian countries are reluctant to establish any significant legal commitment.

Foreign policy is often made after serious consideration and discussion by each government. If we assume that Asian countries made a rational choice about not establishing legal commitment in regional environmental institutions[3], then it follows that by not being legally bound, Asian countries are maximizing benefit and minimizing the cost. In other words, the hypothesis of this paper is that the expected value of establishing legal commitment in Asian regional environmental institutions is less than the expected value of not establishing legal commitment. This hypothesis can also explain why European regional environmental institutions set formal conventions and treaties, as European countries deem the expected value of establishing legal commitment in regional environmental institutions is more than the expected value of

[3] International cooperation is realized through institutions, regimes, and organizations. The term institutions are "Sets of rules or codes of conduct that serve to define international practices assign roles and guide the interactions to the participants." (Young, 1989) It has formal or informal institutions depend on having convention and treaties or not. Regimes are "social institutions governing the actions of those involved in specifiable activities or sets of activities." Organizations is "material entities possessing offices, personnel, budgets, equipment, and more often than not, legal personality" (Young, 1994)

not establishing legal commitment.

Most previous studies focused on the causal relationship between variables relating to participants and the effectiveness of international environmental institutions. Young (1996), Haas, Keohane, and Levy (2000), and Miles (2004) explained the causal relationship based on cases in the United States and Europe. Young highlighted endogenous and exogenous variables, using cases such as OILPOL and MARPOL. Haas, Keohane, and Levy discovered that the institutions boosted governmental awareness and concern, helped building national capacity, and facilitated agreements in environmental issues, by using cases like Vienna Convention and Montreal Protocol. Miles saw regime effectiveness as a function of two main sets of independent variables – the malignancy of the problem and problem-solving capacity.

Studies on East Asian regional environmental institutions deal primarily with primitive questions. Such studies focus on the problems that arise in environmental cooperation among Asian countries, such as difficulties in cooperation due to diversified economic systems and political struggles (Kim, Kim, Ahn, and Lee, 1998), lack of legal conventions and standards (No, Seng, Choi, and Seo, 1999), difficulties in balancing between environmental cooperation with the economic cost which follows (Choi, 2003), and scientific uncertainties (Won, 2007). There have also been efforts to study the countermeasures to those problems - establishing legitimate and institutionalized systems, building national environmental capability, separately considering each issue and the different levels of each problem (Choi, 2008), and the importance of establishing an environmental information cooperation system (So, 2009). There are also some comparative studies which compared regional environmental institutions such as LRTAP and EANET (Matsuoka, 2009), and EANET, TEMM, and NESPECT

(TEMM, 2007). Aid policy studies for East Asian regional environmental cooperation have also been conducted by JICA (2001) and the House of Councilors, Japan (2005). There is almost no published academic study on Asian regional environmental cooperation in China.

Papers and studies on Asian regional environmental institutions generally reflect the views of each country towards the current situation in cooperation, and how they seek to position themselves within the cooperative effort. The common problem mentioned is that Asian regional environmental institutions lack legal foundation and legal commitments such as conventions, treaties and standards. Member countries are not legally bounded to act collectively. As mentioned above, studies on East Asian regional environmental cooperation have highlighted the need for legal commitment and countermeasures to problems, but such studies have not examined in depth why member countries are reluctant to be legally bounded and why such regional environmental institutions lack any significant collective action.

This paper contains five sections:

Section 1 is an introduction to the study of regional environmental institutions. By reviewing previous studies, the author seeks to gauge how much legal commitment is emphasized in the study of regional environmental institutions. Section 2 gives an overview and understanding of both global and regional contexts of environmental issues and cooperation. This section will shed light on the importance of having effective regionally-focused cooperation in a certain environmental issues and areas. Section 3 outlines the analytical framework in which to find the expected values of establishing and not establishing legal commitment in regional environmental institutions. Expected value is based on expected cost and benefit of environmental

quality improvement and the probability. Net present expected value of establishing legal commitment can be explained by the following equation:

$$\mathbf{NPEV} = \sum_{t=0}^{n} \frac{(B_t - C_t)(P_t)}{(1+r)^t} \qquad (1)$$

In the equation (1), "t" refers to Time, "B" refers to Benefit, "C" refers to Cost, "P" refers to Probability, "r" refers to Social Discount Rate. Section 4 examines the case studies of EANET and LRTAP to test the argument and hypothesis, using the analytical framework that was formed in Section 3. Section 5 consists of the conclusion and interpretation of the analysis.

1. Global and Regional Environmental Issues and Cooperation

Since the 1970s, after the United Nations Stockholm Conference, the activities of international environmental institutions and the amount of attention given to them increased rapidly over the past few decades. Several efforts promoting international cooperation and networks have been put in place to address a wide range of environmental issues including climate change, whaling, fisheries, marine pollution, river and lake management, deforestation, and protection of endangered species. There are more than 500 global, regional and bilateral environmental treaties that together demonstrate international commitment to environmental protection (UNEP, 2004).[4] The number of ratifications of such conventions has also grown steadily, as shown in Figure 1 below where more than 60 per cent of the potential ratifications have been made in 13 major multilateral environmental agreements.[5]

4 www.unep.org/.../International_environmental_governance_p30-35.pdf
5 Global Environment Outlook Year Book 2004/5, United Nations Environment Programme (UNEP) http://www.unep.org/geo/yearbook/yb2004/117.htm

The scope of environmental issues affects several levels – local, national, regional and global. Multilateral environmental cooperation exists due to the cross-border nature of environmental issues which knows no boundaries. Global environmental institutions such as the UNEP help organize international efforts in tackling global environmental issues such as climate changes and CO_2 emissions. Regional efforts are also necessary, as the environmental problems of one country are most likely to affect its surrounding countries, whether connected by land or sea. Regional environmental issues consist mostly of problems of air pollution, and marine and basin pollution such as acid rain and yellow wind, which have severe impacts on both host and neighboring countries due to them sharing land and marine borders. Habitat and ecosystem conservation for wild animals and plants have also increasingly become a regional issue, due to both cross-border mobility of such animals (e.g. bird migration) and human economic and social activities (e.g. tourism).

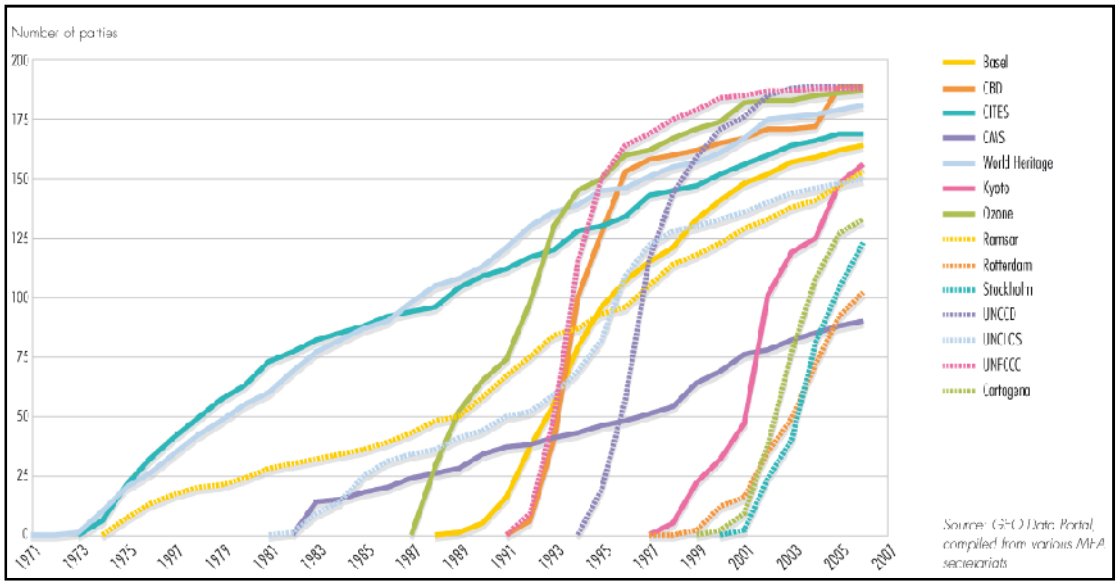

Figure 1. Number of parties to multilateral environmental agreements, 1971–2007

Source: *GEO Data Portal (2007)), compiled from MEA Secretariats*

Regional environmental cooperation started much earlier in Europe, compared to Asia. European countries have developed high environmental awareness, and the regional integration process which culminated in the establishment of the European Union (EU) contributed towards increasing awareness of common interests in environment issues as well as the economic sphere. This increasing awareness resulted in Europe becoming strongly attached in environmental policies as well as economical relations. Environmental issues started to become a hot issue from the 1960s in Europe. Due to this long and sustained awareness and attention to environmental issues, most European environmental institutions have established treaties, conventions and defined protocols that show the legal commitments of the institution and its members.

Regional environmental cooperation among Asian countries only started significantly in the 1990s, as Asian countries began to be aware of the severity of various environmental problems arising in the midst of rapid economic growth. Although Asia has 60% of the world's population and takes up 29.9% of the earth's total land area, regional environmental cooperation efforts are still at a relatively small scale. Rapid increase of urban and industrial areas has raised serious concerns about the high level of CO_2 emissions and destruction of ecological habitats. Several Asian countries are also still highly dependent on coal for energy, resulting in the emission rate of SO_2 and NOx (primary causes of acid rain) in Asia to become higher than emission rates in Europe and North America in 2020, like showed in Figure 2. Since the 1997 Asian financial crisis, cooperative initiatives involving Asian countries have become more visible and ambitious, and it looks to have spilled over to the environmental sector as well. These initiatives reflect incentives for regional cooperation in Asia that are the product of prior levels of regional integration and international developments. Such

regional cooperation can be organized into formal institutions to create more systematic and effective cooperation. However, while many countries in the region stand to gain from more systematic and effective environmental cooperation, the effectiveness and influence of such regional environmental institutions have been questioned. As a result, certain collective goals remain difficult to achieve, and policies become superficial or get stuck at the planning stage.

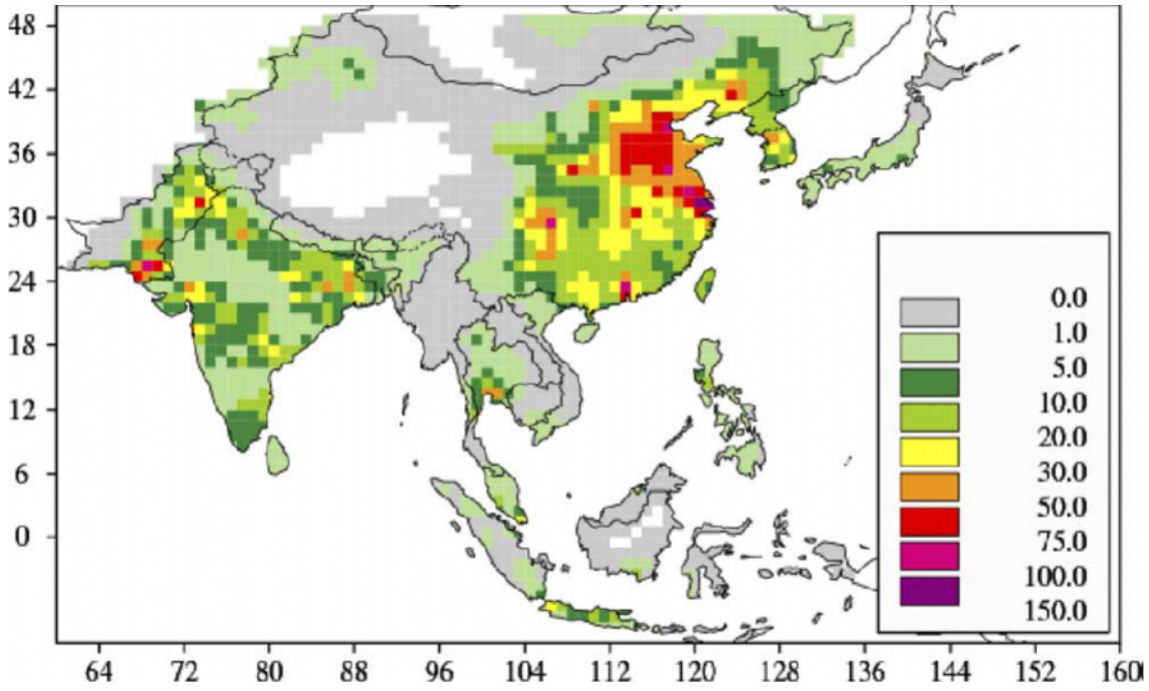

Figure 2. 2020 Emission in 2020 based on BAU scenario (Unit: μ g/m3)

Source: *GEO-4 Report*[6]

[6] http://www.unep.org/geo/geo4/media/graphics/index.asp

2. Analytical Frameworks

The expected value of establishing legal commitment is the combination of the net benefit and the probability, with consideration of time scope, and social discount rate of the committed countries. The net present expected value (NPEV) of establishing legal commitment can be expressed by the following equation as already introduced earlier in this paper:

$$\mathbf{NPEV} = \sum_{t=0}^{n} \frac{(B_t - C_t)(P_t)}{(1+r)^t} \qquad (1)$$

In determining the expected value, we need to identify the key items/categories which make up the benefits and costs of establishing legal commitment in environmental institutions.

The overall goal of environmental institutions is to improve environmental quality. Increase in technological innovation is also an expected benefit of forming environmental institutions, and establishing legal commitments would further promote the sharing and pooling of technical knowledge, skills and information resources. Establishing legal commitment would also increase social capital by strengthening social networks between the participants, facilitating collective action, and promoting reciprocity, trust, and social norms.

The expected improvement of environmental quality has a causal relationship with the cost to build adequate capability as shown in Figure 3 below. By paying the cost to develop environmental management capacity, participants expect to have improvement of environmental quality.

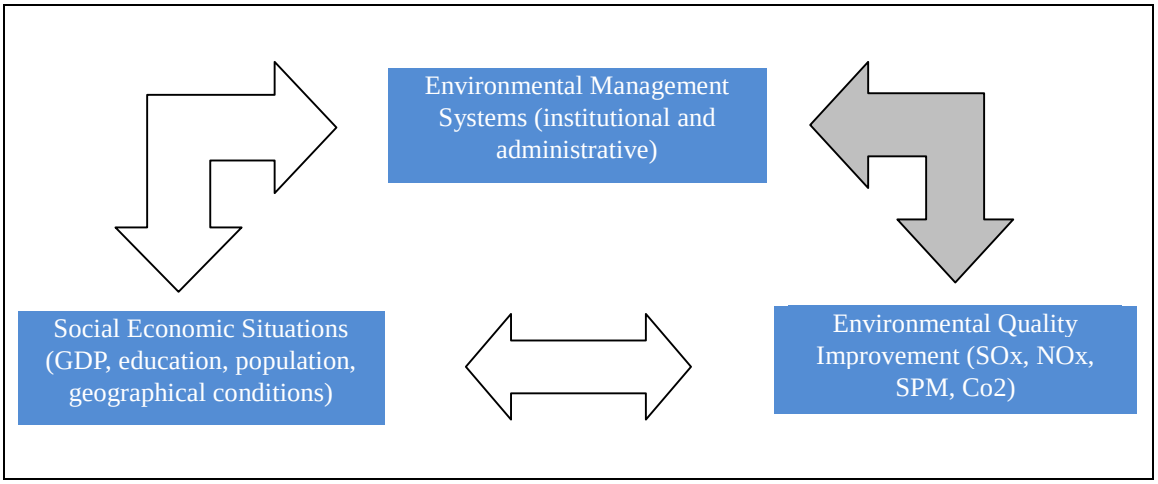

Figure 3. Social Environmental Management System

Source: *The author modified a figure in Matsuoka, 2000*

Different environmental issues have specific requirements when developing environmental management capacity. In the case of air pollution, the necessary capabilities for air quality management are - air quality measurement, assessment and availability of data, emissions estimates, and air quality standards and controls, as shown in Figure 4 below.

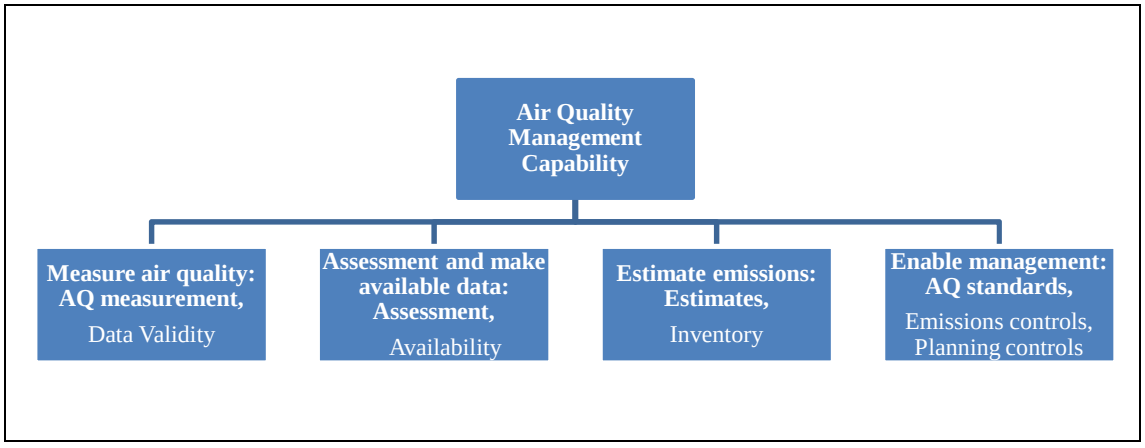

Figure 4. Indexes of Environmental Management Capabilities

Source: *The author modified a figure in Environment Assessment Report (UNEP, 1996)*

Using the key benefits and costs mentioned above and the formula for NPEV, the author developed an analytical tool to estimate the expected value of establishing and not establishing legal commitment. A schema of this 'expected value comparison analytical tool' is shown in Table 1 below.

Table 1. Expected Value Comparison Analysis

	Categories	**Establishing Legal Commitment**	**NOT Establishing Legal Commitment**
Benefit	Environmental Improvement		
	Technological Innovation		
	Social Capital		
	Total Benefit		
Cost	Monitor Pollution		
	Build Data Assess and Availability		
	Estimate and Evaluate Current Situation		
	Plan and Implement Standard Environmental Goal		
	Operation and Management Cost		
	Total Cost		

Benefit and Cost Balance (Bt-Ct)		
Probability (Pt)		
Social Discount Rate (r)		
Timeline (t)		

Expected Value (NPEV)		

Source: *The Author*

Using the above analytical tool, two cases will be examined - the Acid Deposition Monitoring Network in East Asia (EANET) in Asia, and the Convention on Long-Range Transboundary Air Pollution (LRTAP) in Europe. For each regional environmental institutions, we will estimate the profitability and probability, and determine the expected value of establishing legal commitment and the expected value of not establishing legal commitment.

3. Regional Environmental Institutions – Europe and Asia

4.1 European Environmental Institutions[7]

1972 the United Nations Conference on the Human Environment in Stockholm shed light the growing concern among policy makers with the issues of environmental protection in European countries. There were not yet enough policy to measure such kind of concerns in environmental protection before 1960s or early 1970s. Many countries in Europe started to build national environmental policy during the times, as well as European regional level of policies have set up in various kinds of environmental issues: 1970 noise and exhaust emissions for vehicles issue, 1973 standards on solvents in paints, 1975 standards for the quality of surface drinking waters.

In 1980s, Germany, the Netherlands, and Denmark already started to have high environmental standards, and most of European countries also rushed to build environmental standards during 1980s. It was also the time that environmental

[7]Weale, A., G. Pridhan, M. cini, D. Konstadakopulos, M. Porter, B. Flynn (2000) *Environmental governance in Europe: an ever closer ecological union?,* Oxford

governance were growing in European Community level. German government moved in cooperation with international action to deal with acid rain issues in 1982 at the Stockholm Conference on the Acidification of the Environment.

4.1.1 LRTAP

Acidification was already an international issue in many countries during the early 1980s, especially in European countries. The Nordic countries had put it on to the international agenda in various ways, particularly in the convention on Long Range Trans-Boundary Air Pollution (LRTAP) that has established in 1979 and the offices of the UN Economic Commission for Europe (UNECE).

LRTAP started from scientists and ministerial level concerns on sulphur emission in continental Europe and the acidification of Scandinavia lakes. After the United Nations Conference on Human Environment in Stockholm ended, they implied that cooperation at the international level was necessary to solve problems such as acidification. Ministerial level discussions on the issue in 1979 resulted in the signature of the Convention on Long-Range Transboundary Air Pollution by 34 governments and European Community. This convention entered into force in 1983 and can legally bind participants. [8] The Convention, which now has 51 parties, identifies the Executive Secretary of UNECE as its secretariat.

[8] http://www.unece.org/env/lrtap/lrtap_h1.htm

Table 2. Protocols to the Convention

- The 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone; 25 Parties. Entered into force on 17 May 2005. (Guidance documents to Protocol adopted by decision 1999/1, Revised guidance document on ammonia).
- The 1998 Protocol on Persistent Organic Pollutants (POPs); 29 Parties. Entered into force on 23 October 2003.
- The 1998 Protocol on Heavy Metals; 29 Parties. Entered into force on 29 December 2003.
- The 1994 Protocol on Further Reduction of Sulphur Emissions; 28 Parties. Entered into force 5 August 1998.
- The 1991 Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes; 23 Parties. Entered into force 29 September 1997.
- The 1988 Protocol concerning the Control of Nitrogen Oxides or their Transboundary Fluxes; 32 Parties. Entered into force 14 February 1991.
- The 1985 Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent; 23 Parties. Entered into force 2 September 1987.
- The 1984 Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP); 42 Parties. Entered into force 28 January 1988.

Source: *UNECE homepage*

LRTAP's objectives are: (1) Implementation and further development of the cooperative program. (2) Research and Monitoring. (3) Information exchange.[9] The convention on LRTAP is one of the main international efforts to combat acidification and other damages to ecosystems, buildings, and human health in Europe and North America. Since 1979, eight protocols on different pollutants and procedural matters of the convention have been signed under the auspices on the UNECE. The convention has set up a multi-layer organization to include scientific assessments on the numerous technical and scientific questions of air-pollution.

[9] http://www.unece.org/env/lrtap/full%20text/1979.CLRTAP.e.pdf

One of the main success factors for the LRTAP convention and its assessments certainly was the continuity of a large percentage of its personnel especially in the first decade of its existence. In comparison to the others, the heterogeneity of participants in the LRTAP process was significantly lower as there were no developing countries participating. LRTAP assessments only deal with Northern industrialized countries. The three main subsidiary bodies - the Working Group on Effects, the Steering Body to EMEP and the Working Group on Strategies and Review - as well as the Convention's Implementation Committee, report to the Executive Body each year.[10]

It is reasonable for European countries to establish legal commitment. This comparison is based on 1979, when LRTAP was first established with 32 countries. It has consideration of the timeline and historical background of participating countries and the institutions.

[10] http://www.unece.org/env/lrtap/

Table 3. Expected Value Analysis - LRTAP

	Categories	Establishing Legal Commitment	NOT Establishing Legal Commitment
Benefit	Environmental Improvement	High	Low
	Technological Innovation	High	Low
	Social Capital	High	Low
	Total Benefit	High	Low
Cost	Monitor Pollution	High	Low
	Build Data Assess and Availability	High	Low
	Estimate and Evaluate Current Situation	High	Low
	Plan and Implement Standard Environmental Goal	High	Low
	Transition Cost (Administrative Cost)	High	Low
	Total Cost	High	Low

Benefit and Cost Balance (Bt-Ct)	High B - HighC	Low B – Low C
Probability (Pt)	High	Low
Social Discount Rate (r)	Approximately 3% (31 Dec. 2008)	
Timeline (t)	1979 – 1994 (establishment – 15years)	

Expected Value (NPEV)	High	Low

Source: *The Author*

3.2 Asia

Most Asian environmental institutions were established in the 1990s and some even in the 2000s. Most of these institutions have mainly monitoring and information sharing functions, as opposed to regulating and control functions. There are several bilateral and multilateral cooperation in environment, whereby most of the multilateral cooperation have China, Japan and Korea as participant countries. Such institutions include TEMM (Tripartite Environmental Ministers Meetings) which is a ministerial level meeting between China, Japan, and Korea; NEASPEC (North-east Asian Sub-regional Program of Environmental Cooperation) – six Northeast Asian countries cooperation; and NEAC (Northeast Asian Cooperation); EANET (Acid Deposition Monitoring Network in East Asia) which deals with the problem of acid rain and air pollution; many marine pollution institutions, such as NOWPAP (Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the North east Pacific Region); and institutions on desertification, such as DSS-RETA (Regional Technical Assistance on Dust and Sandstrom). (Figure 4) Since China, Japan and Korea participate in almost all Asian environmental institutions, the analysis in this paper will focus on these three countries' cases.

Table 4. Asian Regional Environmental Institutions

Institutions	Issue	Established	Participants	Overall Institutional Goals
North Pacific Marine Science Organization (PICES)	Marine Management	1992	Canada, China, Japan, Korea, Russia, USA	To promote and coordinate marine scientific research in the North Pacific Ocean in order to advance scientific knowledge of the area concerned and of its living resources
North-East Asian Regional Global Ocean Observing System (NEAR-GOOS)		1993	China, Japan, Korea, Russia	Improve ocean services and provide information and data sets in the region
North-West Pacific Action Plan (NOWPAP)		1994	China, Japan, Korea, Russia	The wise use, development and management of the marine and coastal environment; securing the region's sustainability for future generation
Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)		1994	11 countries 14 non-state partners GEF, World Bank, UNDP, IMO	Sustainable Development Strategy for the Seas of East Asia (SES-SEA)
Global International Waters Assessment (GIWA) -Subregion project:		1999	66 transboundary water areas worldwide	To develop a comprehensive strategic assessment of international waters.
Northeast Asian Conference on Environmental Cooperation (NEAC)	Asian Environmental Network	1992	China, Japan, Mongolia, korea, Russia, UNEP, UNDP, ESCAP	Exchange of information and policy dialogue regarding advanced environmental conservation efforts.
North-East Asian Subregional Programme for Environmental Cooperation (NEASPEC)		1993	China, Japan, DPRK, ROK, Russia	Reviewed to reflect the changing needs of the region and to endow the mechanism with a stronger raison d'être and a clear focus to harness its full potential.
Tripartite Environment Ministers Meeting(TEMM)		1993	China, Japan, Korea	The three countries exchange views on the current environmental conditions, discuss how to promote environmental cooperation
Asia-Pacific Network for Global Change Research (APN)		1996	21 countries	For the promotion of global change research and links between science and policy making in the Asia-Pacific Region
Asia-Pacific Forum for Environment and Development		2001	Experts in institutions of Japan, Thailand, Mongolia, Kazakhstan, Korea, China, etc.	Address critical issues facing Asia and the Pacific region and to propose new models for equitable and sustainable development

Asia-Pacific Environmental Innovation Strategy Project(APEIS)		2002	Individuals and organizations in the region	Environmental innovation, including technological, social and policy innovation
Acid Deposition Monitoring Network in East Asia (EANET)	Acid Rain	1997	13 Asian countries	To create a common understanding of the state of the acid deposition problems in East Asia

Source: *Adapted by Author*

3.2.1 EANET

EANET is a regional cooperative mechanism that aims to promote efforts to prevent atmospheric pollution, and thus to contribute to the protection of the ecosystem and human health. It was established in 1998 under the initiative of the Japanese government, which held serious concerns on the effects of acid rain deposition from trans-boundary air pollutants.[11] In Europe, it was successfully achieved through the activities under the Convention on Long-Range Transboundary Air Pollution.[12] EANET was modeled after LRTAP.

Three objectives for EANET have been stated: (1) To create a common understanding of the state of the acid deposition problems in East Asia. (2) To provide useful inputs for decision making at local, national and regional levels aimed at preventing or reducing adverse impacts on the environment caused by acid deposition. (3) To contribute to cooperation on the issues related to acid deposition among the participating countries.[13]

The IG2 held in October 2000 in Niigata, Japan concluded that the preparatory

[11] http://enviroscope.iges.or.jp/modules/envirolib/upload/2253/attach/nea_report_final.pdf
[12] http://www.eanet.cc/eanet/outline.html
[13] http://www.eanet.cc/eanet/backg.html

activities of EANET had been successful, and decided to start EANET activities on a regular basis from January 2001 based on the *Joint Announcement on the Implementation of EANET* and the *Tentative Design of EANET*.

Under the Regular Phase Activities, the initial ten countries agreed to establish an institutional framework comprising of the Intergovernmental Meeting, the Scientific Advisory Committee, the Secretariat and Network Center to support the network and promote its activities in close communication, coordination and collaboration with the participating countries. Cambodia and Lao PDR joined in 2001 and 2002 respectively and Myanmar joined in 2005. There are now 13 member countries joining EANET: Cambodia, China, Indonesia, Japan, Lao P.D.R., Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Russia, Thailand, Viet Nam.

The major activities and achievements for EANET since 1998 are: (a) acid deposition monitoring; (b) compilation, evaluation, storage and provision of data. (c) promotion of quality assurance and quality control (QA/QC) activities. (d) implementation of technical support and capacity building activities. (e) promotion of research and studies related to acid deposition problems. (f) promotion of public awareness activities.

Table 5. Expected Value Analysis - EANET

	Categories	Establishing Legal Commitment	NOT Establishing Legal Commitment
Benefit	Environmental Improvement	High	Low
	Technological Innovation	High	Low
	Social Capital	High	Low
	Total Benefit	High	Low
Cost	Monitor Pollution	High	Low
	Build Data Assess and Availability	High	Low
	Estimate and Evaluate Current Situation	High	Low
	Plan and Implement Standard Environmental Goal	High	Low
	Transition Cost (Administrative Cost)	High	Low
	Total Cost	High	Low

Benefit and Cost Balance (Bt-Ct)	High B - HighC	Low B – Low C
Probability (Pt)	Low	Low
Social Discount Rate (r)	10% -12% (ADBI project based rate)	
Timeline (t)	1993-2008 (establishment – 15years)	

Expected Value (NPEV)	Low	Low

Source: *The Author*

4. Conclusion

The case studies of LRTAP and EANET show the different development paths of regional environmental institutions in Europe and Asia. According to the analysis, the total benefits and costs are high for both Europe and Asia when they establish legal commitment. However, the probability and SDR could cause changes in calculating the final expected value. The measure of probability is influenced by participating countries' awareness, sense of collective duty, and capacity to the environmental issue.

In the case of LRTAP, the probability is positive enough, since the institution was organized by participating countries in order to solve the acidification environmental problem of Scandinavia lakes. The participating countries have low social discount rate (approximately 3%) that explains their expectation of value is not very much different between present and the future. They are aware of sustainability problems in environment, and have had sufficient economic growth which has raised their sustainable environmental capacity.

EANET, on the other hand, though also having high total benefit and costs, the final expected value of establishing legal commitment was decreased by low probability and high SDR. The low probability is caused by low environmental awareness and imbalanced capacity development among participating countries in the region. The low SDR of most of participating countries shows the high probability that the domestic strategy on economic development and environment is focused on future issues that need early preventive actions, such as environmental pollution.

The historical background of both regions explains the trend of environmental issue highlighted in the regions. However, the two institutions chose different ways to start -

LRTAP with legal commitment, and EANET without legal commitment. The result of this is shown in the NPEV analysis of this paper. Based on the result of analysis, suggestions can be made for the future direction of the institutions, especially to Asian regional environmental institutions that have comparatively short history and experience, and generally low effectiveness.

This paper suggests that the important strategy for the Asian region is to increase the environmental awareness of the participating countries, and the institutional capacity and environmental management capacity of the institutions. There should also be a long term plan to increase mutual understanding of each country's environment as well as shared environment, and increase expectation and optimism for sustainable development in the region. Establishing trustworthy relationships by introducing small and primary regulations first is a good way to promote constructive environmental governance in Asia.

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