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International Workshop on Strengthening the International Cooperation Framework and Science-Policy Interface to Promote Air Pollution Control in East Asia 2013

Proceedings

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Institute for Global Environmental Strategies

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Institute for Global Environmental Strategies (IGES) is an international research institute conducting practical and innovative research for realising sustainable development in the Asia-Pacific region.

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International Workshop on Strengthening the International Cooperation Framework and Science-Policy Interface to Promote Air Pollution Control in East Asia 2013

Feb. 1, 2013, National Children's Castle, Tokyo, Japan

Programme

Note: For each session, presentations are 15 min. , discussants about 5 min. each, then general discussion

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Session 2 9:15-11:30	**Strengthening the Science Policy Interface for Air Pollution in East Asia**
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	• *Importance of Strengthening the Science Policy Interface – Proposal for Asian Epistemic Scientists Community (Asian Scientific Panel on Air and Climate) Part 1* by Hajime Akimoto, Director General, Asia Centre for Air Pollution Research
	• *Importance of Strengthening the Science Policy Interface – Proposal for Asian Epistemic Scientists Community (Asian Scientific Panel on Air and Climate) Part 2* by Katsunori Suzuki, Professor, EPC, Kanazawa Univ.
	• *What We All Know & What We Can Try- to Strengthen International Cooperation on Air Pollution in East Asia-* by Young Sunwoo, Professor, Department of Environmental Engineering, Konkuk University
	• *Building & Institutionalizing the Epistemic Community for Regional Air Pollution Cooperation: Lessons from Europe & North America* Stacy VanDeveer, Associate Professor, University of New Hampshire
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	• Min Hu,Director of State Key Laboratory of Environmental Simulation and Pollution Control, Peking University
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	• *Strengthening Regional Cooperation on Air Pollution in Asia: the perspectives of EANET and the ASEAN Haze Agreement* by Supat Wangwongwatana, Coordinator, EANET

	• *Future Activity of LTP Project Toward International Cooperation in Asia* by Cheol-Hee Kim, Associate Professor, Department of Atmospheric Sciences Pusan National University
	• *Integrated Approach for Air Pollution Issues* by Iyngararasan Mylvakanam, Project Coordinator, UNEP
	• *International Cooperation to Advance AQM in Asia: Clean Air Asia Experience* by May Antoniette Ajero, Air Quality Program Manager
	• *The Contribution of Regional Inter-Governmental Air Pollution Networks to Strengthening Global Cooperation on Air Pollution: Implications for Asia* by Richard Mills, Director, International Union of Air Pollution Prevention Associations
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	• *Opportunities to Improve Air Pollution Policies In Unified ASEAN* by Noppaporn Panich, Associate Professor, Environmental Research Institute, Chulalongkorn University
	• *VOC Emission Reduction Policy in Japan through the "Best Mix" of Policies* by Naoko Matsumoto, Fellow, Institute for Global Environmental Strategies
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	Chair: Katsunori Suzuki, Professor, EPC, Kanazawa Univ.
From 18:45	**Reception**

International Workshop on Strengthening in the International Cooperation Framework and Science-Policy Interface to Promote Air Pollution Control in East-Asia 2013

Report of the Workshop

1. The International Workshop on Strengthening in the International Cooperation Framework and Science-Policy Interface to Promote Air Pollution Control in East-Asia was held on February 1st, 2013 at Tokyo, Japan.

2. The participants of the Workshop included experts from China, Japan, Republic of Korea, Thailand, Philippines, Norway, United Kingdom, Sweden, United States, the United Nations Environment Programme (UNEP), Regional Resource Centre for Asia and the Pacific, Clean Air Asia, Asia Center for Air Pollution Research, S-7-3 project researchers, and other IGES researchers.

3. In Session 1, Prof. Katsunori Suzuki (Kanazawa University) made an introductory presentation on the S-7-3 project, including the project's background, objectives, and a few research outcomes which were obtained through the project so far. Given the developments and challenges in existing air pollution networks in Asia, he stressed the need to seek for better regional cooperation and regional framework for better air quality/ transboundary atmospheric management, including more attention to the linkage between air pollution and climate change.

4. Session 2 was chaired by Dr. Mark Elder (IGES). Prof. Hajime Akimoto (Asia Center for Air Pollution Research) introduced the session by discussing the importance and possibilities of establishing an interdisciplinary scientific epistemic community for atmospheric management in Asia. He noted that S-7 was the first project in Japan with cooperation between natural and social scientists in relation to air pollution management, and that the project will come to a close in a year. He drew distinctions between scientific cooperation in air pollution management and other transboundary issues like climate change, as well as differences between cooperation in Asia and Europe, highlighting Europe's success with LRTAP. He noted the lack of a common understanding of air pollution issues among scientists as well as between scientists and policy makers in East Asia, and no framework for synthesising scientific knowledge. Yet there is reason for optimism with a growing frequency of international scientific conferences on air quality management held in East Asia. In order to encourage the development of a scientific epistemic community he proposed an Asian Science Panel on Air and Climate (ASPAC) to help develop a common understanding among scientists and policy makers. In addition, the panel would

develop an international initiative for an integrated approach to air pollution and climate change management reflecting the views of Asian scientists. Finally, he stressed that though the panel will be trans-national, it must retain a regional Asian focus to reflect the differences in priorities compared to European or North American scientific communities.

5. The discussion of the proposal for establishing ASPAC was continued by Prof. Katsunori Suzuki . He began by emphasising the importance of strengthening the scientific epistemic community, and elaborated on the comparison between Asia and Europe, noting that the lack of strong connections within the Asian scientific community makes it difficult to establish a consensus and deliver a strong message to policy makers. Issues relating to the potential structure of ASPAC were identified including; 1) nature of the body (governmental or intergovernmental), 2) scope of activities (atmospheric science, impact studies, and/or reduction strategies), 3) research options, 4) geographic scope, 5) selection of members, 6) organizational structure (a step-wise approach is recommended due to financial constraints), 7) secretariat, and 8) funding mechanisms. Finally, the Regional Resource Centre for Asia Pacific (RRC.AP) was suggested as a candidate to be the secretariat for ASPAC based on its establishment of the Regional Centre of Excellence on Atmospheric Resources (CLEAR).

6. Prof. Young Sunwoo (Konkuk University) discussed various issues relating to the strengthening of international cooperation on air quality in East Asia. First, he provided an overview of the LTP project and some existing research on long range transport of air pollution in East Asia. He noted that emissions inventories are a key issue, and that there are still discrepancies in current inventories between China, South Korea, and Japan. If current emissions cannot be correctly addressed, then setting future reductions may be difficult, so a major goal of the next LTP phase should be to resolve these inventory differences. Regarding existing cooperation frameworks, Prof. Sunwoo noted some overlaps between EANET and LTP, stressed the need for discussions between LTP and EANET about consolidation of resources or possible integration. He suggested that the models of the European Monitoring and Evaluation Programme (EMEP) and the Northwest Pacific Action Plan (NOWPAP), a regional cooperative framework for marine and coastal environmental management, could be good examples to consider for strengthening the institutional structure of cooperation. In particular, NOWPAP's structure might be readily adapted to transboundary air pollution management, even though its focus is on oceans rather than air pollution, because its goals of data collection, mutual support, and collaboration are similar. Prof. Sunwoo also discussed possible obstacles to strengthening international cooperation such as differences in political/economic systems and levels of development, perceptions, and interests; weaknesses in scientific knowledge, and the exclusion of Mongolia

and North Korea from discussions. Basic principles for stronger regional cooperation include a focus on health impacts, differential responsibilities among countries depending on their situations, mutual respect of differing perceptions, inclusion of North Korea and Mongolia, and basing policies based on sound science. He suggested to set up a steering body to strengthen environmental cooperation, which could be an "international cooperation panel" representing a union of atmospheric science societies in East Asia. The final objective could be the creation of a convention on long-range transboundary air pollution in East or Northeast Asia.

7. Prof. Stacy VanDeveer (University of New Hampshire) made a presentation on seven main lessons for building and institutionalising epistemic communities for regional cooperation on air pollution from an interdisciplinary perspective. 1) Epistemic communities should have independence from political control. 2) Knowledge and network institutions are less costly compared to policy action and regulation, but they still need consistent funding support by leading states and societies that care most about the outcomes. 3) Community diversity in terms of disciplines and expertise, types of organisations involved, etc., is crucial in maintaining the integrity and legitimacy of an epistemic community. The community should be transnational not intergovernmental. 4) Participation must be built from the ground up and will have many asymmetries. 5) Trust and respect are built over time, including transactional data, monitoring, assessment & research projects. 6) Political, social, and scientific order is co-produced simultaneously by governments and the epistemic community, based on the criteria of credibility, salience, and legitimacy. 7) There is an unavoidable asymmetry of participation with downwind states doing and paying more than upwind states, and downwind states should engage domestic stakeholders including scientists in upwind countries transnationally (not in international negotiations). Prof. VanDeveer noted that there were many difficulties during the early negotiations of LRTAP. The development of the transnational epistemic community was a major reason for the success of LRTAP. The epistemic community was difficult to form, but it was able to effectively communicate with governments although not under the control of governments.

8. Session 2 was concluded by remarks of the discussants, Prof. Oran R. Young (University of California), Prof. Steinar Andresen (Fridtjof Nansen Institute) and Prof. Min Hu (Peking University), in addition to general discussion focusing on the development of the science policy interface and the epistemic community on air pollution in Asia. The major points included:
    - Based on science-policy literature, development of an epistemic community with a high level of consensus or a science panel is neither necessary nor sufficient to solve the problems. In the Montreal Protocol, when it was signed, there was not agreement among

the scientists. In contrast, in the case of climate change, there is a high degree of consensus in the IPCC but that has not been sufficient.

- We need to examine the conditions for success for an epistemic community of science, which are 1) salience, 2) credibility and 3) legitimacy. Does ASPAC meet these criteria? Also, scientific bodies are likely to be effective if they are closer to consumers (policy communities and the public).Science panels often fail, although not always.
- It is important for science panels to be interactive with policymakers, although this is labor intensive.
- A science panel could raise funds more easily if it were closer to governments.
- Even if we have consensus, there are other factors to taken into account. Especially to amplify and simplify the scientific message, NGOs and the private sector have roles to play.
- In the case of LRTAP, the epistemic community focused primarily on the atmospheric science side, but technology and economics were also important for LRTAP's success, and also important for climate change.
- It is also critical to take into consideration importance of domestic politics since scientists tend to have high expectation on the international framework. The source of policy change is usually from domestic politics.
- An epistemic community on air pollution would be useful for East Asia, though it would take time. Now is a good time to begin. China is suffering from very serious air pollution, but it is also strengthening standards and other policies.
- It may be difficult to make headway on air pollution issues in developing countries unless it can be linked to economic development.
- For air pollution, the domestic political interest may be more related to health, not climate change, especially for developing countries like China.
- It may be better to try to avoid focusing the discussion on upwind/downwind countries. Asia does not have much of a history of negotiation and discussion on mitigation strategies, so a science panel should include policy and social science, not just natural science.

9. Chaired by Prof. Katsunori Suzuki, Session 3 started with a presentation by Dr. Mark Elder (IGES), who discussed why greater international cooperation on air pollution is desirable in Asia, and what kinds of functions, scopes and options may be incorporated in possible international framework to strengthen international cooperation. He pointed out that the main roles of international cooperation are to 1) facilitate a common understanding resulting in policy actions and 2) coordinate actions to enhance effectiveness and efficiency. Given existing different

frameworks have problems such as duplication and overlapping, insufficient funding and limited effectiveness, he noted that there are emerging common views among countries on the importance of strengthening international cooperation, but the views on what is the best way are different. Regarding desirable scope of pollutants, he maintained that the multipollutant-multieffect approach is desirable and expandability to add new pollutants is important. At the regional or subregional level, some efforts to strengthen existing frameworks or improve cooperation among them have been attempted before, but they have not been very successful so far. Therefore, he said that it may be better to consider other options such as merging existing frameworks or creating a new framework (such as an Asian or east-Asian LARTAP), or even some options at the global level, although those options have different challenges. The presentation laid out some of the main advantages and challenges of the main options. Regarding an Asian or East Asian LRTAP option, it does not necessarily mean the European version should be simply copied. LRTAP has several different dimensions such as structure, geographic scope, pollutant scope, science panel, monitoring, modeling, capacity building scope, reduction strategies. The appropriate geographic scope is a key issue that needs more consideration. Then, he surveyed a few recent trends in international discussions in existing frameworks. He concluded that in order to further analyze the relative merits of various options, several points need to be clarified such as what are the priority pollution problems, to what extent is international cooperation necessary or desirable to solve these problems, what form of international cooperation is more desirable, and what functions international cooperation should perform?

10. Dr. Supat Wangwongwatana (EANET/RRC.AP) made a presentation on 1) development/future development of the Acid Deposition Monitoring Network in East Asia (EANET) and 2) development and challenges of the ASEAN Haze Agreement. For the future development of the EANET, he pointed out that the expansion of the scope of the EANET should be done in a stepwise manner including 1) O_3 and PM2.5 monitoring should be added to the monitoring items at the EANET sites with high priority, 2) technical support and capacity building for air concentration monitoring including O_3 and PM2.5 should be strengthened, and 3) inter-linkage between acid deposition, air pollution, climate change, and co-benefits/co-control approach should be investigated. Challenges of the ASEAN Haze Agreement include development and implementation of appropriate measures and strategies for specific areas, full implementation by all ASEAN member states, and stronger bilateral, subregional, and regional international cooperation including funding and technical support. He noted that there are many existing networks, programs and initiatives in East Asian region addressing issues of atmospheric environment, with some overlap and inefficiency, and same national agencies are assigned as

national focal points to these networks which strains their human resource capacity. However, dissolving or merging any of these networks may be politically difficult. The Joint Forum on Atmospheric Environment in Asia and the Pacific was designed to help to coordinate these networks, but it is still operating on an ad hoc and informal basis without any official support from any international organization. Despite the existence of several networks, he noted that there is currently no formal technical or scientific forum on atmospheric environment in the region. It would be desirable to conduct a comprehensive assessment of the current status of atmospheric environment in the region which would be recognized by governments. He concluded that a Regional Centre of Excellence on Atmospheric Resources (CLEAR) established at RRC.AP could help to address the challenges facing existing networks.

11. The presentation by Professor Cheol-Hee Kim (Pusan National University) focused on the current state of long-rage transport of air pollution (LTP) in Northeast Asia and its possible future activities. LTP has completed projects on transboundary transport of sulfur (2005-2007) and monitoring and modeling nitrogen compounds (2008-2012). Research subjects for future activities may cover “column aerosol study” which is essential to validate satellite data, and “radiation budget study” which is an area of increasing importance since it is now recognized that emissions of air pollutants affect climate change as much as air quality. He emphasized it is important to take into account changes in research environment—such as Asian dust, which is one of the most important phenomena in Northeast Asia. Other future activities may include long-term monitoring based on publicly-available data of each country and data from various networks; establishing annual emission inventories; establishing monitoring networks for additional pollutants such as ozone, PM, heavy metals, Mercury, and POPs; developing a standard model tailored to Northeast Asia and related manuals, improving the accuracy of S-R calculation methods for long range transport of O3 and PM, and improving the accuracy of simulated behaviors of long range transport of air pollutants. He concluded that while further efforts are necessary to institutionalize LTP, it is important to consider other options for international cooperation as well.

12. Dr. Iyngararasan Mylvakanam (UNEP) made the case for an integrated approach for air pollution issues. First, he recalled that efforts to address air pollution take place in the overall context of discussions on sustainable development dating back to Stockholm and reaffirmed at Rio+20. Regional international cooperation frameworks originated from these global discussions on sustainable development. He focused on a 3D Integrated Approach with integration in 3 areas: Pollutants Integration (PI), Sectoral Integration (SI) and Temporal Integration (TI). PI refers to the multi pollutant approach in the context of sustainable development including human

health. He noted that WHO estimates that 2 million people a year die from indoor air pollution, and an additional 1.3 million premature deaths are caused by urban air pollution. He observed that air pollution is also related to food and water security as well as climate change. SI calls for integration of response measures for air quality, climate change and socio-economic targets, including improvements of human health, agriculture production, regional climate, water security, living standards and economy. This will contribute to global efforts to achieve both the Millennium Development Goals and the Rio+20 outcome document. TI requires linking actions, strategies and goals over time to strengthen capacities. Dr. Mylvakanam emphasized, by integrating all three dimensions of integrations, integrated response could be possible which leads to sustainable development. He concluded, in terms of response in East Asia today, while EANET and LTP addresses TI part, PI and SI are not covered by them yet. On the other hand, the co-benefit concept addresses PI but not SI or TI.

13. Ms. May Ajero (Clean Air Asia) discussed the role of NGOs for an international cooperation framework. Based on Clean Air Asia's experiences, she listed key considerations for international cooperation and science-policy framework where NGOs can contribute, 1) NGOs provide agility, flexibility and less bureaucracy, 2) greater local presence/partnerships, 3) more engagement with multiple stakeholders, 4) to provide opportunities for interaction and participation by various stakeholders, 5) to make more use of NGOs and experts, and 6) to provide knowledge management and data that are policy-relevant. She mentioned the local presence of NGOs in China (specifically the Clean Air Asia case), which provides insights into scaling up approach in China. The Clean Air Asia is a UN recognized Type II Partnership with over 230 members including cities, government ministries and departments, development agencies and foundations, NGOs, research institutes, as well as the private sector. CAA acts as a catalyst for collaboration between government, research institutes, and civil society, and engages in various networking and partnership opportunities including Better Air Quality (BAQ) conferences, stakeholder workshops, and governmental meetings on urban air quality in Asia organized with UNEP. Specific projects with notable international cooperation include the Blue Skies Exchange Program, China Green Freight Development, Green Freight Asia Network, Clean Fleet Management Toolkit, and the Clean Air Help Desk.

14. Mr. Richard Mills (International Union of Air Pollution Prevention Associations) made a presentation on the role of regional networks in global atmospheric governance and implications for Asia. The two main issues of concern regarding current international cooperation processes for air pollution are 1) that there are no international mechanisms for the most harmful pollutants – ozone and particulates, particularly black carbon, and 2) inadequate links between

climate and air pollution. SLCPs have the potential to link climate and air pollution, and may be the catalyst for faster progress towards global cooperation on air pollution. He noted that there are a variety of different types of regional networks based on treaties, science-based assessments, regional strategies/action plans, and policy declarations. LRTAP is the leading model with increasing regulatory sophistication. New developments in LRTAP include the inclusion of black carbon and the Task Force on Hemispheric Transport of Air Pollution (HTAP). Asia has been following the LRTAP approach in part, but Africa and Latin America have followed a different approach emphasizing more voluntary and flexible approaches. These different approaches have different advantages and disadvantages, but convergence will enable more cooperation on hemispheric/global issues. Based on his analysis of regional air pollution networks, LRTAP convention, and lessons from emerging networks in Africa and Latin America, he provided possible implications particularly for Asia: 1) the Joint Forum on Atmospheric Environment in Asia and the Pacific may be right scale for framework agreement, including monitoring, reporting, public access to information and shared research; 2) Regional networks could consider scope for supplementing current plans with possibility of voluntary initiatives of CCAC; and 3) Regional networks could explore scope for taking account of climate issues and interactions. He concluded that strengthening of regional networks and cooperation between them is the best way forward, emphasizing that progress may be slow but catalysts, such as climate/air pollution link and recognition of benefits from integrating regulatory and voluntary approaches, could help in the efforts. The most important point was that a common model for networks is needed which links voluntary and regulatory approaches. This could be coordinated through a framework convention with mandatory reporting and access to information but voluntary mitigation actions. There could also be a regional implementation role on climate strategy.

15. Session 3 was concluded by remarks of the discussants, Prof. Steinar Andresen (Fridtjof Nansen Institute) and Prof. Oran R. Young (University of California), in addition to general discussion on the question of how to strengthen the international cooperation framework:
    - Air pollution has a tendency in being framed the in a asymmetric way emphasizing source-receptor issues, which tends to discourage cooperation. Therefore, it is important to restructure the discussion to illustrate a multi-dimensional complex system in which the benefits for all parties are easier to see.
    - Importance of domestic politics needs to be taken into account to move the whole system forward. For example, it became easier for the US to cooperate with Canada after the Clean Air Act amendments in 1990. It is important to recognize that different stakeholders in each country have different views.

- It is essential to consider opportunities to link several issues in packages to make deals. This includes consideration of the broader political environment. For example, LRTAP was linked to national security issues, and was seen as a way to promote détente between the East and West Blocs during the Cold War.
- Each case needs to be considered separately. There are no general recommendations. But the choice of strategy is very important. For example, the framework protocol strategy was not the best for the climate change discussion. The question of the best strategy needs careful consideration of political dynamics. Choice of strategy would be very crucial from a long-term perspective.
- Political feasibility of various options could be analysed by mapping the perceptions and interests of key actors. The case of the Law of the Sea treaty could also be examined for ideas.
- The question was raised whether the science is advanced enough to support further development of cooperation frameworks in East Asia.
- The process in Europe took a long time too, and there were many meetings. It is important to generate political motivation domestically.
- In case of LRTAP, both hard law and soft law have worked. A combination of hard and soft law could also be considered for East Asia. Starting incrementally and involving others seems to be a good idea. Japan should probably play a leadership role.
- NGOs are important in agenda setting as well as implementation.
- Bottom-up linking (not global but regional) may be feasible.
- External factors such as climate change may lead to new developments –not guaranteed but has possibilities.
- It is probably better not to overburden the global climate regime by adding air pollution to it. Moreover, climate change is energy related, but the Montreal Protocol is not, so this would be an obstacle to integrating climate and air pollution at the global level. Moreover, the Montreal Protocol included new low cost technology, but new low cost technological solutions are not available for other air pollution issues.

16. Chaired by Mr. Hideyuki Mori (President, IGES), Session 4 with the focus on country perspectives began with a presentation by Prof. Min Hu (Peking University). She provided an overview of her recent research project on long-range transport of air pollution in Northeast Asia which is schedule to be conducted from August 2010 through July 2013. The study consists of monitoring a comprehensive list of air pollutants including SO_x, NO_x, CO, CO_2, O_3, PM and VOCs. The data was collected from mobile air and sea monitoring sites. This is one of the first research projects on long range transport undertaken by China. She explained while this study

lays the groundwork for establishing a comprehensive emissions inventory, future studies will develop a model of transboundary pollution transport based on this data and other studies. During discussions, responding to questions regarding policy-making vs. policy-implementation in China, she emphasized that public awareness is increasing, and that actions are being taken from both top-down and bottom-up.

17. Prof. Noppaporn Panich (Chulalongkorn University) made a presentation on opportunities to improve air pollution policies in a unified ASEAN. ASEAN has a wide range of air pollution problems including typical urban pollution in large cities, pollution from large industrial activities including mining and electric power, as well as natural wildfires which may be intensified by agricultural and other human activities. Some air pollution is domestic, and some is transboundary. Haze from forest fires is the most serious transboundary air pollution problem in ASEAN. One key point is that strengthening economic integration among ASEAN members may lead to situations such as intercountry transport of goods, increased purchases of raw materials, goods, and electricity (for example, by Thailand from Laos PDR). As conventional trade and investment barriers are lowered, different social and environmental costs could themselves become trade barriers. Therefore, ASEAN economic integration will result in pressure to harmonize environmental policies to ensure that free trade is based on equal social and environment costs. Overall, it is important to see this as an opportunity to strengthen air pollution policies throughout the region. However, she also emphasized that the economy is still the priority of most countries in the region, and the marginalization of environmental concern is also visible in ASEAN's organisational structure as the environment is grouped under the 'socio-cultural community' rather than the 'economic community'. Co-benefit (economy and environment) solutions could help to encourage more emphasis on environmental issues. Regarding the role of science in ASEAN, scientific capacity on environmental issues in the region is not well advanced, so environmental policies are not influenced by scientific results as in developed countries, and are also appeared to be influenced by trade and investment relations with developed countries. For example some ASEAN countries are automobile exporters to countries that have prioritized air pollution reductions in vehicle emissions. Since they already have the capacity and technology to produce products that meet developed country standards, it was quite easy for ASEAN countries to raise their own related domestic standards. Also, if the rest of the international community agrees to higher standards (international pressure), this also makes it easier for ASEAN countries to follow.

18. Dr. Naoko Matsumoto (IGES) made a presentation on VOC emission reduction policy in Japan, with the focus on Japan's reduction from stationary sources by 30% (from 2000 to 2001)

through "best policy mix" of legal control and voluntary approaches. She pointed out the successful reduction in VOC emissions were realized through efforts by stakeholders and positive participation by the industry. The factors which motivated industry to cooperate with the efforts include 1) the motivation to avoid legal regulation, 2) ownership felt by the industry due to its participation in overall scheme design to employ a voluntary approach, and 3) experience with existing schemes related to voluntary management, chemical release inventory and green procurement. On the other hand, barriers that hindered the reduction in concentration in photochemical oxidants included lack of scientific knowledge regarding ozone formation and limitations in computer simulation capability. She concluded that Japan's VOC control policy can be considered as an initial step towards the multi-pollutant, multi-effect approach as it aims to reduce PM and O_3 through reduction of their common precursor. Discussants raised questions regarding the capacity of the Ministry of the Environment to carry out the related policy and how the reduction target was set. Dr. Matsumoto responded to them by saying the collaboration between the Ministry of the Environment and Ministry of Economy, Trade and Industry seemed to have been effective, and the 30% reduction target was suggested in the opinion report by the Central Environment Council based on a computer simulation study to reduce ozone and suspended particulate matter. Dr. Akimoto added that he found the quality of the quoted study to be low and one of the problems was the lack of consultation with atmospheric chemists.

19. Ms. Xinyan Lin (IGES) presented her research on recent trends in China's air pollution policies and related administrative structures. First, she noted that $PM_{2.5}$ has become a new high policy priority. Major recent policy measures include stronger ambient air quality standards, expanded monitoring network (to expand to every city in China by 2015) and public information disclosure system. Beijing implemented or plans to implement additional measures such as real time monitoring, $PM_{2.5}$ emission limits for automobiles, upgraded gasoline and diesel standards, and development of an Emergency Response Plan for Heavy Air Pollution. Emission standards for other air pollutants are also becoming more stringent and coordinated including ambient air quality, vehicle emissions and industrial emission standards. In addition, air pollution control strategies (including the National Total Emission Control Program, Regional Air Quality Management Program, etc.) have been incorporated into various Five-year plans (FYP) as part of the overall development of the 12^{th} Five Year Plan. These plans include not only Environmental Protection Planning and Prevention and Control of Air Pollution in Key Regions, but also the plan for Science and Technology Development for Environmental Protection, Comprehensive Work Plan for Energy Conservation and Emission Reduction, Energy Saving and Environmental Protection Industry, Special Plan of Blue Sky Science and Technology Project, and others. She indicated that regional control of air pollution is becoming a priority and

related administrative structure is being developed; legally binding reduction targets for several pollutants will be allocated to key regions. This will help to address domestic transboundary pollution across administrative boundaries. The key regions cover most polluted regions, include over 13,000 key projects, and will receive investment of about 350 billion RMB. The key regions policy marks the shift from total quantity pollution control to overall improvement of ambient air quality, and it aims to implement an integrated strategy for multi-pollutant control. She also pointed out during the discussion:

- The State Council of China coordinates different government sectors (e.g. Ministry Environmental Protection, Ministry of Science and Technology, Ministry of Finance) to execute air pollution control programs in the process of policy implementation in China.
- China's rapid energy structure transformation led by the booming clean energy industry (targeting at producing 20% of the nation's energy from renewable sources by 2015 with a budget of $290 billion), will help to support China's planned rapid and substantial changes in air pollution control.

20. Session 4 was concluded by remarks of the discussants, Prof. Oran R. Young (University of California) and Prof. Steinar Andresen (Fridtjof Nansen Institute), in addition to general discussion:
    - For China, it is important to distinguish between the stages of policy-making and policy-implementation.
    - It is clear that Chinese government is aware of environmental issues but there are other competing demands such as economic growth. The question is which of these policies are prioritised. It important to fold environmental issues into larger policy perspective (e.g. low carbon development). Low Carbon Society is also a national strategy.
    - China's air pollution problems are increasingly complex and need to be addressed simultaneously. There is no time to solve problems one by one.
    - Development of monitoring capacity for ozone and $PM_{2.5}$ in China will take about 4 years.
    - China has many large projects to implement air pollution reduction.
    - For China, development of accurate emission inventories is one of the highest research priorities.
    - In terms of ASEAN's relations with China, international environmental cooperation has just started and needs to see but some coordination are important to solve issues.
    - In South Korea, in the past five years, there has been a shift to consider health and other impacts when developing air pollution policies.

- With regard to international cooperation framework, it needs to be taken into account that Asian countries generally prefer soft law rather than legally binding commitments compared to Europe.
- For regulation of VOCs, it is important to involve other ministries in addition to environment ministries.
- For developing national emission targets (which is related to Dr. Matsumoto's comment on 30% reduction setting in Japan), the following factors should be taken into consideration: 1) whether they are politically negotiated; 2) whether they are possible/feasible; 3) whether it involves risk assessment; and 4) if it is possible for a long time.
- Regarding the science policy interface in East Asia, it is important to consider the capacity across the region in both natural and policy science. Capacity development efforts may be necessary.

21. The concluding discussion was chaired by Prof. Katsunori Suzuki, and the major views expressed by participants include the following:
    - An epistemic community is needed in Asia. It should include not only the natural science community but also the policy related science community. Joint work is very much needed.
    - Co-production of knowledge beyond the boundaries of scientific disciplines and sectors is critical.
    - ASPAC should be transnational rather than intergovernmental, and should include social and policy scientists.
    - Domestic policies should be taken into account in designing an international framework.
    - ASEAN economic integration is an important opportunity. There are similar problems in many Asian countries. Stronger international cooperation will be helpful.
    - It is important to have a cross linkage between air pollution control and climate issues.
    - National focal points are too busy to attend so many meetings and engage in similar initiatives for different networks, and national budgets are becoming increasingly constrained throughout the region. These should be good motivations to rationalize existing networks.
    - One caution about creating a new framework – the governments in a new framework will be the same ones in the existing frameworks, so it is not clear why better results might be achieved simply by creating a new framework.
    - The roles of NGOs and private sectors should be understood better in Asia.

- It is important to look at specific sectors such as transport. There has been a great deal of research already on road transport but not much on shipping. A sector-based approach may be helpful for some policies.
- The kind of discussions at this workshop could not have occurred 10 years ago, so this workshop is a good sign of progress. It is time for the countries in Asia to work together.

International Workshop on Strengthening the International Cooperation Framework and Science-Policy Interface to Promote Air Pollution Control in East Asia 2013

1 February 2013,Tokyo, Japan

Introductory Presentation

Research on Regional Framework and Co-benefit Approach to Promote Air Pollution Control in East Asia

Katsunori Suzuki

Kanazawa University

Background
Need to improve current air quality management framework in East Asia

- **Simultaneous occurrence of various air pollution problems**
  - Traditional local air pollution, acid deposition and other transboundary air pollution, climate change etc.
- **Lack of inter-linkages between different air pollution problems**
  - Separate approaches for different air pollution problems and no regional framework for inter-linkage
- **Need to address newly emerging problems**
  - Hemispheric transport of air pollutants
  - Need to pay attention to SLCF/SLCP

S－7Project Framework
Comprehensive Research on Improved Regional Air Quality Management through Analysis of Regional Air Pollution and Co-benefits Approach

5-year research project funded by the Ministry of the Environment, Japan

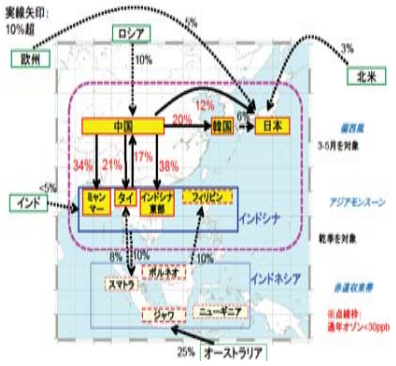
- Theme 1: Research on East Asian/hemispheric level ozone/aerosol pollution by integration of mathematical model and observation
- Theme 2: Improvement of emission inventories and development of emission scenarios for air pollutants in East Asia
- **Theme 3: Policy development for regional framework and co-benefit approach to promote air pollution control in East Asia**

Need for regional cooperation

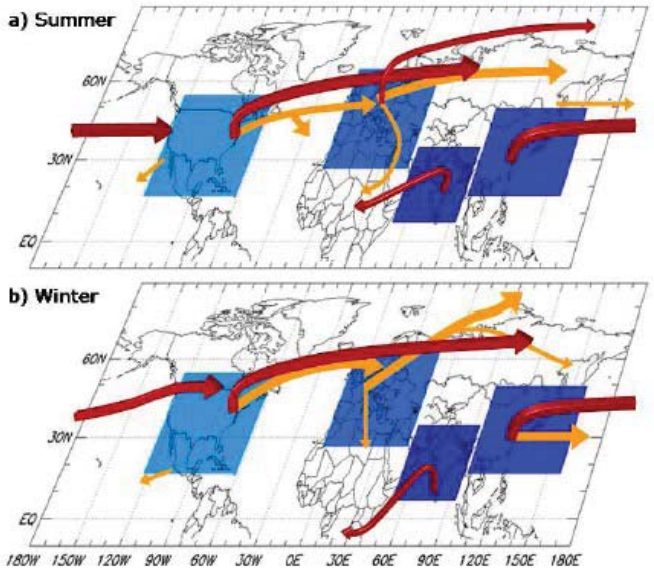
◆Transboundary transport of air pollutants

◆More effective actions through exchange of info. and experience

◆Better achievements through regional approach on policy measures



Transport of air pollutants in Northern Hemisphere



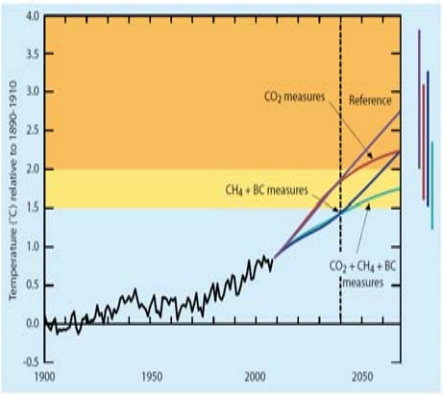
TF-HTAP Report

Objectives of the Project

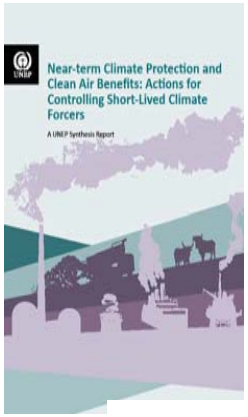
- To develop a proposal on an environmental regime for comprehensive atmospheric management in East Asia and identify major issues for consensus building on such a regime;
- To identify major factors towards comprehensive atmospheric management strategy with emission targets: and
- To analyze costs of major damages by air pollution and prevention measures for better understanding of policy makers on this topic

Need for more attention to SLCF/SLCP

UNEP/ WMO Assessment



Synthesis Report



"Near-term Climate Protection and Clean Air Benefits: Actions for Controlling Short-Lived Climate Forcers".

The Report is directed primarily at policy makers and other stakeholders who have an interest and possible impact on policy decisions in respect of air quality and near term climate protection.

www.unep.org/publications/ebooks/SLCF/

A Few Research Outcomes (1)

- Consensus on the need for better science-policy interface in East Asia and establishment of epistemic scientific community
- -Proposal on Asian Scientific Panel on Air and Climate (ASPAC)

A Few Research Outcomes (2)

- Possible global vs regional frameworks towards better air quality/atmospheric management

- ◆Global principles to harmonize regional initiatives
- ◆Regional initiatives to better fit regional conditions

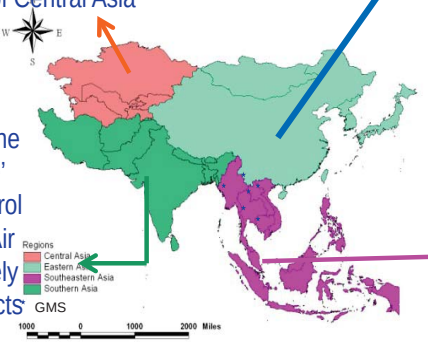
Existing air pollution networks in Asia

Central Asia

5 Central Asia countries formulated the Framework Convention on Preservation of Environment for Sustainable Development of Central Asia

South Asia:

8 countries are cooperating under the framework of Male' Declaration on Control and Prevention of Air Pollution and Its likely Transboundary Effects for South Asia



East Asia:

13 countries, which includes Northeast and Southeast Asia, working under the framework of East Asia Network on Acid Deposition

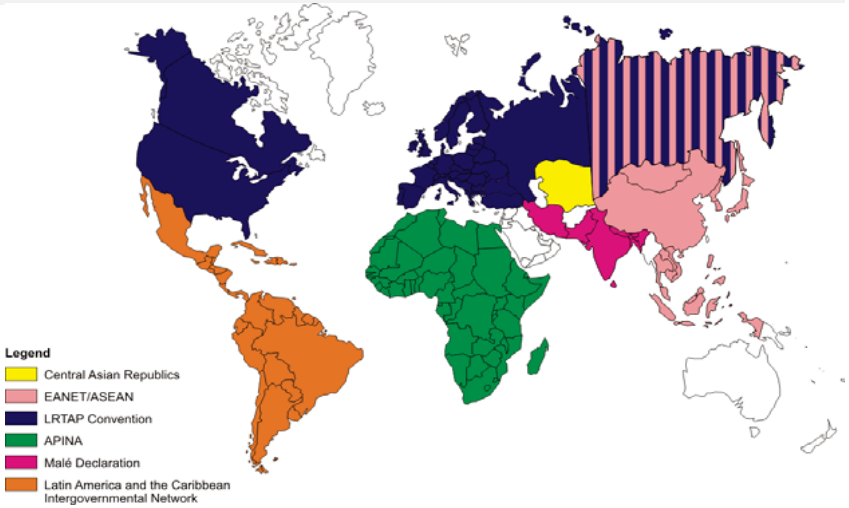
Southeast Asia:

ASEAN member countries are working under the framework of ASEAN Haze Agreement

UNEP-related regional/sub-regional initiatives

Global vs Regional Initiatives

Existing regional initiatives on air pollution control

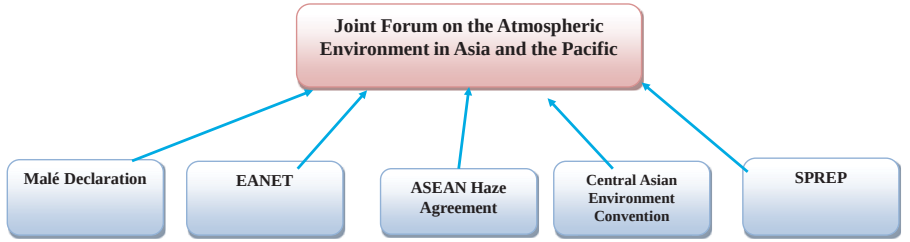


Types: - Binding International Treaty
- Regional Inter- governmental Co-operation Agreements and Declarations
- International Research Initiatives and Programmes

Joint Forum on the Atmospheric Environment in Asia and the Pacific

Integrated Response

Closer cooperation among regional/sub-regional air pollution networks to enhance harmonization and sharing of good practices



Meeting of the Joint Forum on Atmospheric Environment in Asia and the Pacific, 10-11 March 2010

Asian Co-benefits Partnership (ACP)

www.cobenefit.org

- A platform to improve **information sharing** and **stakeholder dialogue** on co-benefits in Asia.
- Goal: to support the **mainstreaming of co-benefits into decision-making processes** in Asia.

13

Objectives of this workshop

- To present a proposal on a regional epistemic community – Asian Scientific Panel on Air and Climate (ASPAC) and discuss the views and comments on it; and
- To discuss views and comments on possible regional framework for better air quality/ atmospheric management.

14

International Workshop on Strengthening the Internatioanl Cooperation Framework and Science Policy Interface to Promote Air Pollution Control in East Asia 2013
1 February 2013, Tokyo, Japan

Importance of Strengthening the Science Policy Interface Proposal for Asian Epistemic Scientists Community (Asian Scientific Panel on Air and Climate)

Katsunori Suzuki, Professor, Kanazawa University
suzukik@staff.kanazawa-u.ac.jp

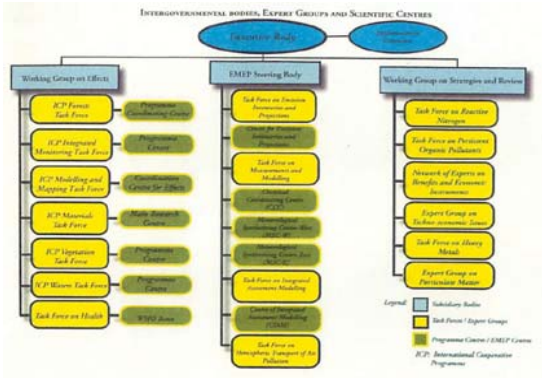
Science-policy interface

There has been consensus view that **Regional Epistemic Scientific Community** is desired for creating solid scientific basis of and facilitating policy dialogue.

- More research and cooperative research
- Common understanding on air and climate problems
- Institutional framework to provide scientific advice to policymakers

Existing epistemic scientific community on atmospheric issues

- IPCC
  - WG1 (Science)
  - WG2 (Impacts)
  - WG3 (Mitigation)
- MP Ozone Assessment Panel
  - Scientific assessment
  - Environmental effects
  - Technology and economic assessment
- LRTAP
  - EMEP
  - Effects
  - Strategies and review



Case of LRTAP Convention

Proposal to create an epistemic scientific community in (East) Asia

Asian Scientific Panel on Air and Climate (ASPAC)

(i) to establish an epistemic community of Asian scientists;

(ii) to develop a common understanding among scientists and policy makers; and

(iii) to develop an international initiative for an integrated approach to air pollution and climate change reflecting views of Asian scientists.

Factors to be considered on ASPAC

Items	Options	Advantages/disadvantages
Nature of the body	Intergovernmental Intergovernmental but not binding Independent	Closer linkage with policy decisions More flexible but some link with policy making More reliable on science bu tless influencial for policy making
Scope of activities	Atmospheric science Impacts study Reduction strategies/ technologies	Consensus for the first priority No special objection, resource availability Most controversial, step-wise adoption ?
Research options	Review of existing literature New collaborative joint research	IPCC-type literature review, no new research Might be more attractive for researchers
Geographical scope	Asia East Asia Smaller sub-regions	Better from scientific viewpoint but more difficult for consensus Moderate level Might be too small for effective actions **Multi-layer approach may be considered.**

Factors to be considered on ASPAC (2)

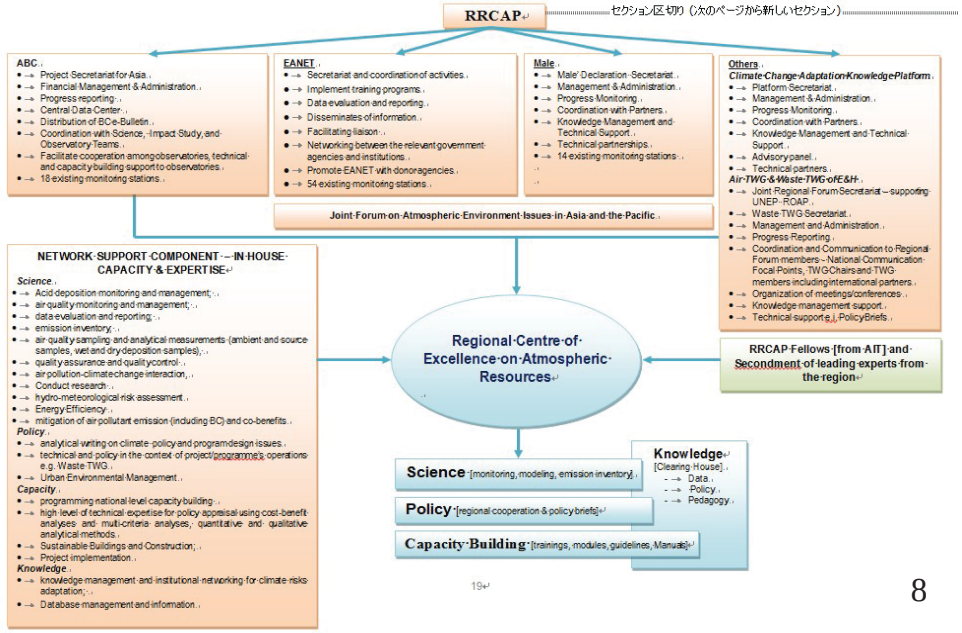
Item	Options	Advantages/disadvantages
Selection of members	Government nomination Selection by science committee	Stronger link with policy, country balance, Good for capacity building Better quality of scientists, country inbalance **Combination of Government nomination + eminent scientists**
Organizational structure	Plenary Meeting Steering Committee Specialized Panels Secretariat	May not have big debates in principle All from the beginning or step-wise expansion? **Step-wise approach may be recommended in Asia due to financial vulnerability**
Potential candidates for the Secretariat	UNEP/ROAP ESCAP AIT/RRC.AP Clean Air Asia Initiative IGES	Ozone Unit experience NEASPEC Has established CLEAR Previous CAI-Asia
Funding mechanism	National contributions International funding	Difficult to get consensus Easier for the time being, may not be secured for longer term

Consultation with various stakeholders

- EANET: Intergovernmental Meeting, Scientific Advisory Committee, Working Group on Future Development of EANET, Capacity Building Workshop etc.
- Male Declaration:
- Acid Rain June 2011
- Joint Forum on Atmospheric Environment in Asia and the Pacific Capacity Building Session July 2011
- ABC-Asia Scientific Committee, Sep. 2012
- IGAC Meeting, Beijing, Sep. 2012
- Better Air Quality (BAQ) Conference Dec. 2012

- TF-HTAP
- Global Atmospheric Forum
- IUAPPA Meetings

Possibility of RRC.AP to host ASPAC



Possibility of RRC.AP to host ASPAC (2)

Advantages

- RRC.AP has Regional Centre of Excellence on Atmospheric Resources (CLEAR).
- RRC.AP serves as the Secretariats of EANET, Male, ABC-Asia, Joint Forum and has better position to coordinate with them.
- Functions of CLEAR include science, policy, capacity building and knowledge management, suitable for present and future ASPAC activities.

Funding

- RRC.AP may join executing organizations for regional SLCP assessment and host scientific meetings

Panel structure

- One nomination from each member country and some eminent scientists to be selected by regional scientists committee.

9

Summary and conclusions

- There is consensus on the need for regional epistemic community of scientists to provide solid scientific basis for policy decisions.
- To this end, an Asian Scientific Panel on Air and climate (ASPAC) was proposed. Possible functions, modalities etc. have been discussed and views and comments were explored from various stakeholders at many relevant conferences/meetings.
- Modality of ASPAC will be further discussed and elaborated, taking into account the views and comments of relevant stakeholders.
- UNEP/ROAP, ESCAP, RRC.AP, Clean Air Asia (CAA) Initiative, IGES, for instance, might be possible candidates to host ASPAC.
- A case study was made if RRC.AP could host ASPAC.

10

Importance of Strengthening the Science Policy Interface – Proposal for Asian epistemic scientists community (Asian Scientific Panel on Air and Climate) - Part 2 -

Hajime Akimoto

Asia Center for Air Pollution Research (ACAP)

When we started our project four years ago:

Establishment of Epistemic Community in East Asia was of our concern

Common understanding among scientists in this area on the issues of the transboundary air pollution and on the air pollution-climate interaction is the prerequisite condition for international policy discussion on these matters.

However, there has been no opportunity for East Asian atmospheric scientists to get together to discuss these matters face to face, i.e. there was no epistemic community on these matters .

Science and Policy

S-7 is the first project in Japan, in which natural scientists and social scientists join hands to tackle "science and policy" on air pollution issue.

One of the aims of the policy related research in S-7 is to propose regional framework of atmospheric management in East Asia

Establishment of scientific epistemic community of atmospheric environment research has been identified in the S-7 project as a prerequisite condition to achieve an international agreement for a framework of atmospheric management.

Situation of Scientific Information sharing on Regional Air Pollution in Asia

Different from:

Climate Change/Global Warming

Framework Convention on Climate Change (FCCC)

IPCC (Intergovernmental Panel for Climate Change)

Air Pollution/Air Quality in Europe/North America/FSU

Convention on Long-range Transboundary Air Pollution (CLRTAP)

EMEP, HTAP, etc.

No Framework Convention on Air Pollution in Asia

No framework for synthesizing scientific knowledge

1) among scientists

2) between scientists and policy makers

However, the situation has been changing at least among scientists.

More International Scientific Conferences has been held in East Asia and the scientific research has reached to the matured level in the last few years.

ASAAQ (Atmospheric Sciences and Applications to Air Quality)

1986-1998		Seoul, Tokyo, Shanghai, Beijing, etc.
2002	8th	Tsukuba
2009	11th	Jinan
2013	12th	Seoul

Acid Rain

2000	6th	Tsukuba
2011	8th	Beijing

IGAC (International Global Atmospheric Chemistry)/IGBP

1994	2nd	Fujiyoshida
2012	12th	Beijing

Our Initiative:

International Workshop on
Atmospheric Modeling Research in East Asia
(Organized by JICAM-IAP/ACAP)

March, 2010	1st	Dalian
December, 2010	2nd	Sanya
September, 2011	3rd	Chengdu
March, 2013	4th	Kunming

Output:

MICS-Asia Phase III
(A model inter-comparison study in Asia)

Topic 1: Multi-scale CTM
Topic 2: Asian Emission Inventories
Topic 3: Air Quality-Climate

However,

There is still no international framework for dialogue between scientists and policy makers.

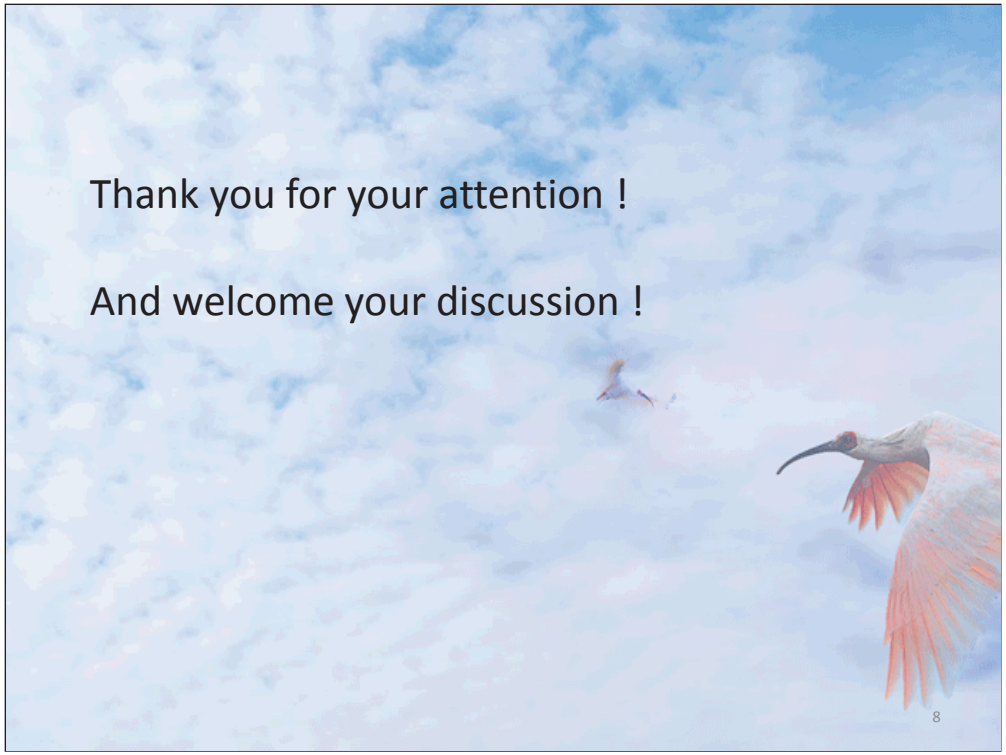
We came to :

Proposal of
Asian Science Panel on Air and Climate

To establish an epistemic community of Asian scientists;

To develop a common understanding among scientists and policy makers;

To develop an international initiative for an integrated approach to air pollution and climate change reflecting views of Asian scientists.



What We All Know and What We Can Try

- to Strengthen International Cooperation on Air Pollution in East Asia-

Workshop on Strengthening International Cooperation on Air Pollution in East Asia

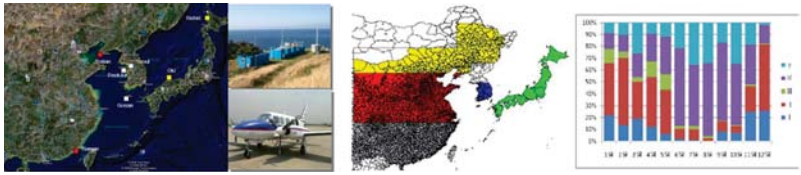
1 Feb. 2013,
Tokyo, Japan

Young Sunwoo

KU KONKUK UNIVERSITY

History of LTP project

- The LTP Project is a joint research project on long-range transboundary air pollutants to improve air quality in NE Asia
- Started in 2000 by S. Korea, China, and Japan and consisted of 3 stages
  - Stage 1 : 2000~2004
    - Established a foundation for joint research
    - Established database on concentrations, emissions of air pollutants and modeling system
  - Stage 2 : 2005~2007
    - Estimated emissions by/for the three countries
    - Research on particulate matter and gaseous pollutants concentration at background sites in each country
    - Research on S-R relationship for sulfur
  - Stage 3 : 2008~2012
    - Research on impacts of NOx, O_3, and PM



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Background

Night view of NE Asia during last 2 decades

Long-range transport of air pollution in NE Asia is big issu ⇨ international cooperation is needed

There are various on-going efforts for improving Long-range transport of air pollution in NE Asia, but…

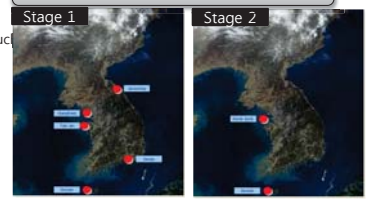
Discussion of plan for future of a project and strategies/measures to improve air pollution in NE Asia is needed

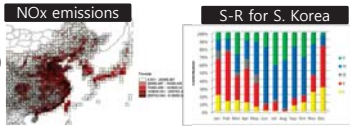
KU KONKUK UNIVERSITY

Role in LTP project

- Stage 1 and 2 (2000~2007)
  - Participated in monitoring part as P. I.
    - Intensive monitoring at background monitoring site in S. Korea
    - Analyzed conc. of ions, metals, and EC/OC for PM and various gaseous pollutants such as DMS, VOCs, etc.
    - Estimated source region and source contribution using HYSPLIT, PMF, and PSCF
  - Participants in Stage 1
    - Prof. J.-P. Cheoung(Kyungsung Univ.) for Geojae site
    - Prof. C.-H. Kang(Jeju Nat. Univ.) for Gosan site
    - Prof. Y.D. Kim(Kwandong Univ.) for Goseong site
    - Prof. J.-H. Kim(Hanseo Univ.) for Tae-an site
  - Participants in Stage 2
    - Prof. C.-H. Kang(Jeju Nat. Univ.) for Gosan site
    - Prof. K.W. Lee(Hankuk Univ. of Foreign Studies)
- Stage 3 (2008~2012)
  - Participated in emissions and modeling part as P. I.(2008~2010)
    - Developed emission inventory to estimate S-R relationship for total nitrate in 2006 with prof. J.-H Woo (2008)
    - Estimated S-R relationship for total nitrate in 2006 (2009~2010)
  - Conducted a project to develop suggestions for future plan of LTP project and international cooperation framework as P. I.(2011~2012)
    - Reviewed the current environment in NE Asia, the research methods and results of the LTP project and other relate studies, and major exiting international and regional cooperation programs

Intensive monitoring sites in S. Korea





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Development of Roadmap for Protecting and Improving Air Quality in Northeast Asia

- **Research period : Dec. 2011 ~ May 2012**
- **Scope**
  - Target region : S. Korea and China (plus Japan and N. Korea)
  - Review and analysis of long-range transport of air pollution in NE Asia
  - Propose best desirable and applicable options/alternatives for regional/national cooperation mechanism to improve air quality in NE Asia
- **Main contents of the study**
  - Status and prospects of NE Asia atmospheric environment
    - Status, trend, and prospects of social-economic and natural environment
  - Status of long-range transport of air pollution in NE Asia
    - Status and trends of air pollutants concentrations in ambient air, and emissions
    - Effects of long-range transport of air pollution
  - Review major international/regional policies and programs for improving environment
  - Propose road map for protecting and improving air quality in Northeast Asia
- **Participants**

This presentation is based largely on contents from above project

Studies on Long-range Transport of Air Pollution in East Asia

Studies on emission inventories

Comparison of emission inventories

TRACE-P vs. REAS for 2000

(Unit : kton/yr)

Chemicals	TRACE-P	REAS
SO_2	33,939	42,780
NOx	22,854	27,320
CO	211,349	305,700
NMVOC	40,172	40,238
NH_3	26,615	28,160
OC	7,081	8,880
BC	2,084	2,730

Source : NIER, 2009

Overall, emissions from REAS are higher than TRACE-P by 120~140%

Regionally, emissions from REAS are higher than TRACE-P for some cases by 120~340%

Regionally, emissions from TRACE-P are higher than REAS for some cases by 120~150%

(Unit : kton/yr)

Chemicals	Region	TRACE-P	REAS
SO_2	China	20,385	27,590
	Korea	829	926
	Japan	801	987
NOx	China	11,347	11,484
	Korea	1,322	1,967
	Japan	2,198	1,564
CO	China	115,749	137,440
	Korea	2,824	2,660
	Japan	6,806	4,630
NMVOC	China	17,440	14,700
	Korea	1,164	1,880
	Japan	1,925	1,130
NH_3	China	13,570	10,778
	Korea	172	307
	Japan	352	170
OC	China	3,385	2,560
	Korea	28	45
	Japan	74	57
BC	China	1,049	1,090
	Korea	22	75
	Japan	53	33

Source : NIER, 2009

Studies on emission inventories

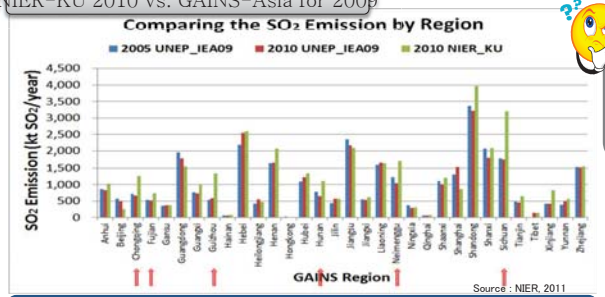
Comparison of emission inventories

INTEX-B vs. REAS 2006 for 2006

Chemicals	INTEX-B	REAS2006 (prediction)	Ratio (INTEX-B/REAS2006)
SO_2	46,811	52,710	1.1
NOx	35,975	34,350	1.0
CO	296,869	350,400	1.2
NMVOC	53,965	50,620	0.9
OC	6,484	9,310	1.4
BC	2,841	2,943	1.0

Source : NIER, 2009

NIER-KU 2010 vs. GAINS-Asia for 2009



Source : NIER, 2011

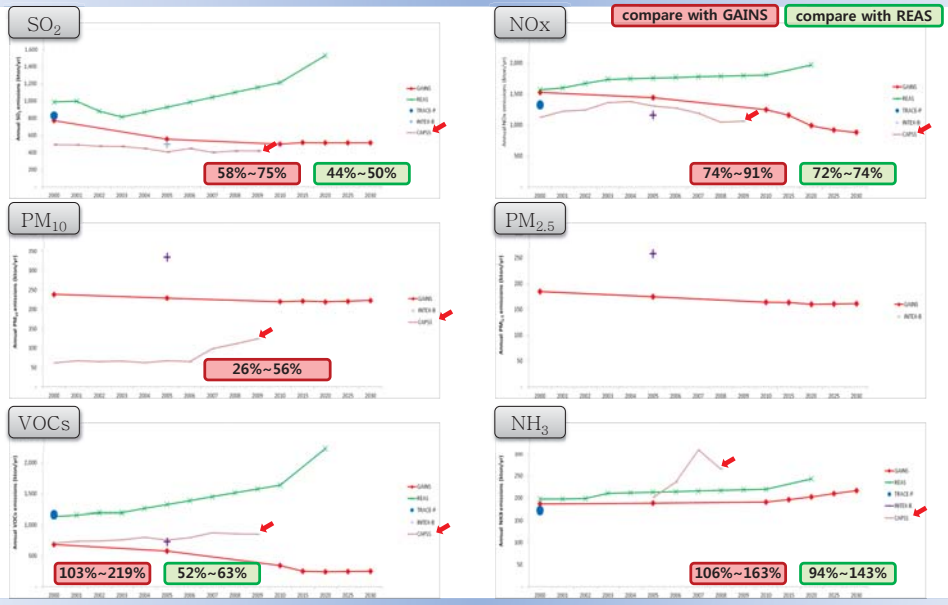
Regional contribution of total emissions may change depending on the emissions inventory, and it will affect the S-R relationships

Which is the most reliable emission inventory?

Study on uncertainty of emission inventories are needed...

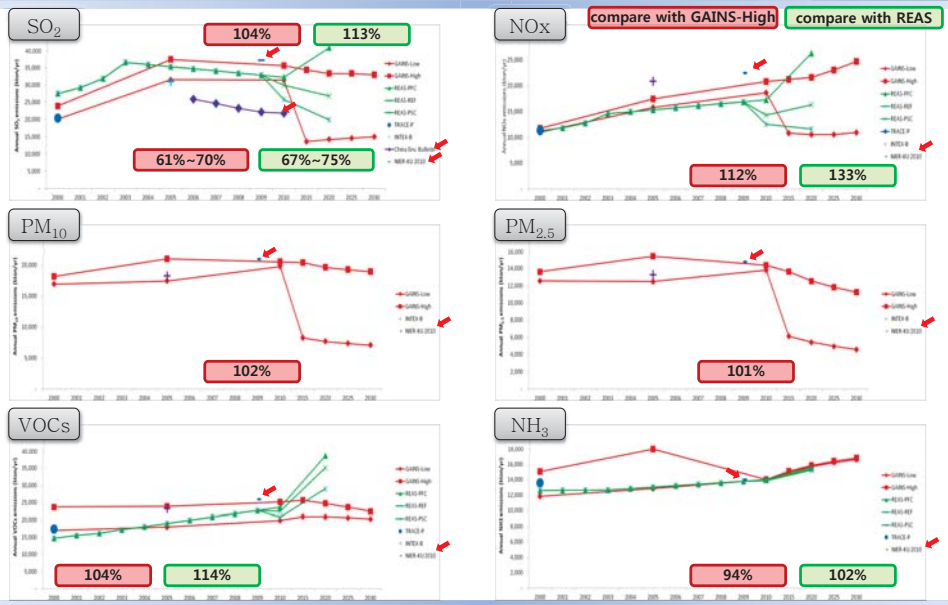
Studies on emission inventories

Comparison of projected emissions-S. Korea



Studies on emission inventories

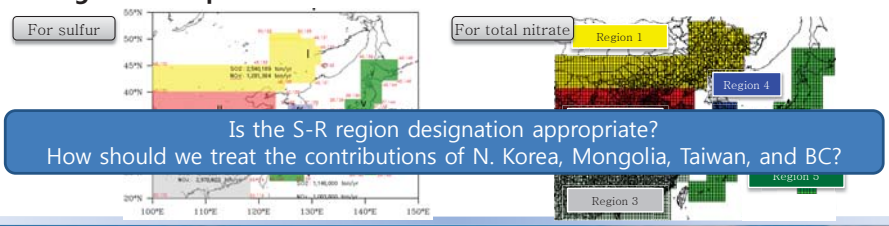
Comparison of projected emissions-China



Studies on S-R relationship

LTP Source-receptor relationship study

- **S-R relationship of sulfur for 2002 and total nitrate for 2006**
- **Modeling framework**
  - For sulfur
    - Korea : CSU-RAMS-CADM ; China : MM5-CMAQ ; Japan : MM5-RAQM
  - For total nitrate
    - Korea : MM5-CMAQ ; China : MM5-CMAQ ; Japan : WRF-RAQM2
  - Initial and Boundary conditions
    - Korea and China : Only O_3 40ppb (5 days of spin up)
    - Japan : from observation data(Camichael et al., 1998) for sulfur, from MOZART4 for nitrate
- **Calculation methods for S-R relationship**
  - Brute-force method(on/off method) for sulfur
  - Modified Brute-force method with 20% reduction of NOx emissions by region for nitrate
- **S-R region description**

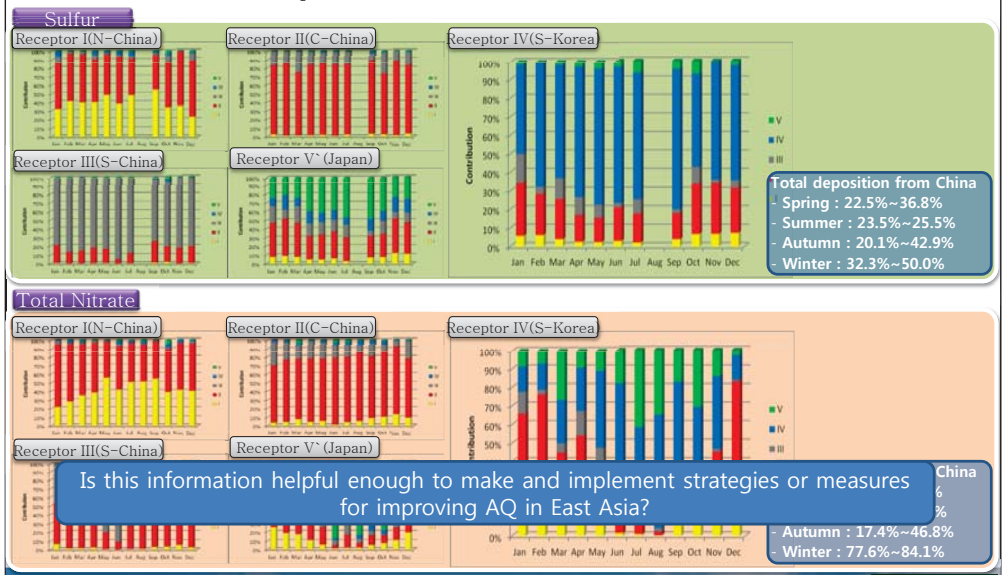


Is the S-R region designation appropriate?
How should we treat the contributions of N. Korea, Mongolia, Taiwan, and BC?

Studies on S-R relationship

LTP Source-receptor relationship study

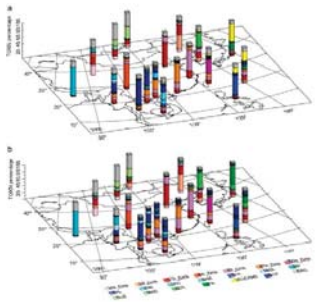
- **S-R Relationship for sulfur and total nitrate** (from results S. Korean research team)



Is this information helpful enough to make and implement strategies or measures for improving AQ in East Asia?

Other case studies

- **M. Lin et al.,(2002)**
  - **East Asia is divided into 18 geographical regions**
  - **Adopted results of MOZART as BC**
  - **Anthropogenic, biogenic, biomass burning, and volcanic emissions were included**
  - S-R relationship of total sulfur for 2001
    - Korea(North and South)
      - Self contribution is 42.5%, 40% from China, and 5% from Japan
      - Residual from other regions, ships, and boundary condition
      - Contribution of boundary condition is 9.4%
    - China
      - Self contribution is 84.5%, 1.8% from India, and 1% from Thailand
      - Contribution of boundary condition is 9.6%
    - Japan
      - Self contribution is 69%, 15.4% from China, and 3.5% from Korea
      - Contribution of boundary condition is 8.9%
  - S-R relationship of total reactive nitrogen for 2001
    - Korea(North and South)
      - Self contribution is 47 %, 39% from China, 5% from Japan
      - Contribution of boundary condition is 4.3%
    - China
      - Self contribution is 79.7%, 2.6% from Korea, and 1.6% from Taiwan
      - Contribution of boundary condition is 8.1%
    - Japan
      - Self contribution is 56%, 21% from China, and 15% from Korea
      - Contribution of boundary condition is 2.7%



Review of Existing Environmental Cooperation Programs and Suggestions for International Cooperation to Improve AQ in East Asia

Recommendations

- Monitoring
  - More monitoring sites or application of satellite data are needed to estimate the amount of inflow, deposition, and outflow of air pollutants with respect to region in East Asia
  - Discussion needed for combining LTP and EANET
- Emissions
  - Uncertainty analysis of existing emissions inventory and emission projection for Asia are needed
  - Much research on development and updating of state-of-the-art air pollutant emission inventories, emission projection scenarios, and uncertainty estimations through cooperation between S. Korea, China, and Japan is needed
    - Guide-line for developing emission inventory is need
    - More detailed source categories are needed, preferably the CORIANAIR source category because CAPSS (S. Korean national emission inventory) and GAINS already use this
- Modeling for S-R relationship
  - Expanding modeling domain and adding N. Korea, Mongolia, etc. to source-receptor region and adopting results of global model simulations as initial conditions and boundary conditions should help increase reliability of source-receptor relationship studies
  - More detailed source-receptor region description(at least, province level), source-receptor relationship analysis with respect to source sectors(at least tier 1 level), and expanding target pollutants to include PM and O_3 should greatly enhance development of sound policy for air quality improvement in NE Asia

Regional/International programs

- **Regional cooperation programs for East Asia**
  - TEMM, NEAC, NEASPEC, LTP, EANET, NOWPAP, etc.
- **Regional cooperation programs and conventions for other regions**
  - CLRTAP, EMEP, Espoo convention, NAAEC etc.

NOWPAP(Northwest Pacific Action Plan)

Overview

- Addresses marine and coastal environmental issues in NE Asian region as a part of the UNEP regional seas programme
- Adopted by China, Japan, S. Korea, and Russia in 1994 and intergovernmental meetings have been held annually
- Overall goal is "the wise use, development and management of the atmospheric environment so as to obtain the utmost long-term benefits for the human populations of the region, while securing the region's sustainability for future generation"

Objectives

- to assess regional marine environmental conditions by coordinating and integrating monitoring and data-gathering systems on a regional basis
- to collate and record environmental data and information to form a comprehensive database and information management system
- to develop and adopt a harmonious approach towards the integrated management of the coastal and marine environment and its resources and marine environmental planning
- to develop and adopt effective measures for mutual support in emergencies, collaboration in the management of contiguous bodies of water, and cooperation in the protection of common resources as well as in the prevention of coastal and marine pollution

EMEP(European Monitoring and Evaluation Programme)

Overview

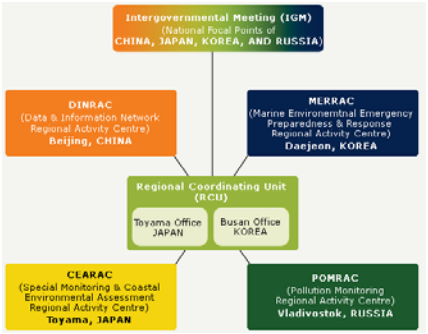
- A scientifically based and policy driven programme under the Convention on Long-range Transboundary Air Pollution (CLRTAP) for international co-operation to solve transboundary air pollution problems
- Initially focused on assessing the transboundary transport of acidification and eutrophication, but now the scope has widened to address the formation of ground level O_3 and POPs, heavy metals and PM
- Main elements are collection of emission data, measurement of air and precipitation quality and modeling of atmospheric transport and depositions of air pollutions
- Collaboration with a broad network of scientists and national expert that contribute to the systematic collection, analysis and reporting of emission data, measurement data and integrated assessment results

Objectives

- to regularly provide qualified scientific information to support the development and further evaluation of the international protocols on emission reductions

NOWPAP(Northwest Pacific Action Plan)

Structure



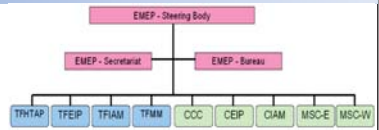
History and Activities

Year	Event
1994	**1st Intergovernmental Meeting/IGM (Seoul, Korea):** - adopted NOWPAP and three supporting Resolutions including five priority projects
1999	**4th IGM (Beijing, China):** - agreed to establish four Regional Activity Centres (RACs)
2000	**6th IGM (Tokyo, Japan):** - agreed in principle to establish a co-hosted NOWPAP Regional Coordinating Unit (RCU) in Toyama, Japan, and Busan, Korea
2003	**8th IGM (Hainan, China):** - adopted the NOWPAP Regional Oil Spill Contingency Plan (RCP)
2004	**9th IGM (Busan, Korea):** - inaugurated co-hosted NOWPAP RCU - enforced the NOWPAP RCP
2005	**10th IGM (Toyama, Japan):** - approved new directions of work for RACs - expanded geographical coverage of the NOWPAP RCP - approved the Marine Litter Activity (MALITA)
2006	**11th IGM (Moscow, Russia):** - adopted NOWPAP Policy of Data and Information Sharing - decided to evaluate NOWPAP RACs performance
2007	**12th IGM (Xiamen, China):** - approved the draft Regional Action Plan on Marine Litter
2008	**13th IGM (Jeju, Korea):** - adopted the NOWPAP Regional Oil and Hazardous and Noxious Substance Spill Contingency Plan - approved the new directions of work for NOWPAP Regional Activity Centres for 2008-2011
2010	**15th IGM (Moscow, Russia):** - adopted the revised NOWPAP Resources Mobilization Strategy, NOWPAP Public Awareness Building Strategy and the Terms of Reference for NOWPAP RCU
2011	**16th IGM (Beijing, China):** - adopted the revised Terms of Reference of NOWPAP RCU - reviewed the NOWPAP Medium-Term Strategy (2012-2017) - appreciated the Russian Government for increased contribution to the NOWPAP Trust Fund

Source : NOWPAP web page

EMEP(European Monitoring and Evaluation Programme)

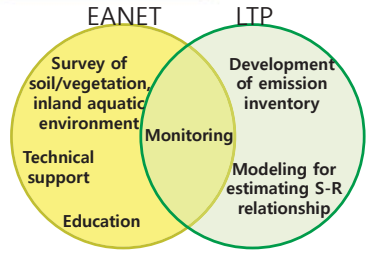
Structure



- Consists of 4 task force teams and 5 centers
- Task force teams
  - **TFHTAP**(Task Force on Hemispheric Transport of Air Pollutants), **TFEIP**(Task Force on Emission Inventories and Projections), **TFIAM**(Task Force on Integrated Assessment Modeling) and **TFMM**(Task Force on Measurements and Modeling)
- Centers
  - **CCC**(Chemical Coordinating Centre)
    - –Coordination and inter-calibration of chemical air quality and precipitation measurement
  - **CEIP**(Center for Emission Inventory and projections)
    - –Maintain and further develops emission database and provides support to the Parties, modelers and UNECE secretariat
  - **CIAM**(Center for Integrated Assessment Modeling)
    - –Prepare technical background material for the annual meetings of the TFIAM
  - **MSC-E**(Meteorological Synthesizing Centre-East)
    - –Modeling development for heavy metals and POPs
  - **MSC-W**(Meteorological Synthesizing Centre-West)
    - –Modeling assessment of sulfur, nitrogen photo oxidant pollutants and atmospheric paricles

Overlapping functions among existing programs

EANET and LTP

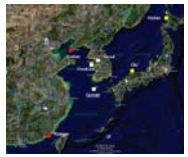


EANET and LTP are individual international cooperation projects having similar objectives

EANET and LTP could be integrated/modified to avoid overlap

Barriers against integration of these projects
- Steering bodies
  - EANET : UNEP (Japan MOE)
  - LTP : Korea MOE (NIER)
- Difference in coverage area
  - Coverage area of LTP is a subset of EANET

Continuous discussion is needed



Obstacles in strengthening international cooperation

- **Difference of social-political system and economic level**
  - Difficulty of establishing common goals caused by coexistance of capitalism and socialism, substantial difference in economic level among countries in East Asia
  - In case of China, people have relatively weak volition for improving air quality due to relatively low economic growth level (GDP per 1 person)
- **Perception gap w.r.t differences of interest between the countries in East Asia**
  - China is source, S. Korea and Japan are receptors
- **Weakness of scientific knowledge for improving environmental quality in East Asia**
- **Exclusion of N. Korea, Mongolia, and Russia in discussion for improving air quality in East Asia**

Evaluation of perception about cooperation mechanism

- **Results of questionnaire survey on the most significant current and future environmental issues in Northeast Asia (KEI, 2005)**
  - S. Korea : **1st long-range transboundary air pollution**, 2nd yellow sand, 3rd marine environment
  - China : **1st long-range transboundary air pollution**, 2nd biodiversity loss, 3rd yellow sand
  - Japan : **1st long-range transboundary air pollution**, 2nd transboundary movement of waste, 3rd marine environment
  - Mongolia : 1st desertification, 2nd transboundary movement of waste, 3rd international river pollution
- **Results of questionnaire survey on main causes of rising environmental issues in Northeast Asia(KEI, 2005)**
  - 1st : Indiscriminate development and economic-growth-first policies

Total number of responses mentioning the absence of a regional binding governance was 50 / 23 of 50 were from Chinese respondents

Chinese stakeholders also agree with legal binding cooperation mechanism

Basic principles of regional cooperation

Minimization of adverse impact to public health and properties through improvement of atmospheric environment in East Asia

Applying differential responsibilities and duties w.r.t the situation of participating countries

Mutual respect of differing perceptions among countries in East Asia, and recognizing this when making and implementing policies

Bring N. Korea, Mongolia, and Russia into cooperation mechanism for improving and protecting air quality in East Asia

Development and implementation of policies based on sound environmental scientific knowledge

Necessary steps for improving AQ in East Asia

- **Developing a convention on long-range transboundary air pollution is needed to improve air quality in East Asia**
- **Consideration about decision-making and steering bodies for the convention is needed**
- **Some potential steps for developing a convention on long-range transboundary air pollution in East Asia**
  - Resolution of visions, goals, plans, and each participating country's roles to improve long-range air pollution
  - Expert and policy makers meetings and discussions on long-range transboundary air pollution in East Asia
  - Developing a convention and protocol on long-range transboundary air pollution, and adoption of environmental impact assessment methods for long-range transboundary air pollution
  - Developing an organization, procurement of manpower and financial resources, and carrying out various projects to implement the convention

Potential steering body

- **Potential 2-stage approach to form steering body**
- **1st stage**
  - "Framework setup" and "scientific data accumulation" stage to develop environmental cooperation mechanism in East Asia
  - Acquiring and accumulation of basic scientific knowledge
  - Possible steering body is an "International Cooperation Panel" representing a Union of Atmospheric Science Societies in East Asia
- **2nd stage**
  - "Realization" stage to develop environmental cooperation
  - Setting targets for AQ improvement, actually forming the structure of cooperation mechanism, and signing the Convention on Long-range Transboundary Air Pollution in East Asia
  - Possible steering bodies are UN ESCAP and UNEP Regional Office for Asia and the Pacific

Requirements to strengthen international cooperation

- Acquiring and accumulating scientific knowledge
  - through LTP (with cooperation with EANET]
  - through continuous production of technical and political data
- Forming a consensus about international cooperation in East Asia
  - announcing environmental issues and problems to media, international conventions, etc.
  - suggesting visions and forming a consensus among participating countries through discussion about other technologies and political alternatives to environmental issues
  - inducing a perception change of policy makers and citizens about international and regional cooperation to improve environmental issues through continuous education and public relations
- Political determination to realize this vision and political alternatives to protect the atmospheric environment in East Asia
  - build up of political resolution to realize this vision and other political alternatives for improving and protecting the atmospheric environment by decision makers in participating countries

→ Convention on Long-range Transboundary Air Pollution in NE Asia

Thank you for your attention

Time to discuss
how we can try to improve
Air Quality in East Asia

Building & Institutionalizing Epistemic Communities for Regional Air Pollution Cooperation: 7 Lessons Boldly

Prof. Stacy D VanDeveer
University of New Hampshire
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#1 Epistemic Communities NOT Inter-state politics

- Effective Epistemic communities (knowledge & influence) are NOT the same as inter-state and intergovernmental politics.
- If states approve everything & everyone, you have politically based, not knowledge based, community
- Lead actors shape, fund and support **transnational** Epistemic community

#2 Knowledge and Network Institution are Cheap -- NOT FREE

- S&T research is cheap, compared to policy action & regulation
- Lead states & societies need to fund both the research & the networking & institution building (meetings, communications, conferences, issue & disciplinary based institutions, etc.)

#3 Community Diversity

- Epistemic community diversity
  - Disciplines & expertise
  - Public, private, think tanks, research centers, universities
  - Transnational, not intergovernmental

#4 Participation is built, not assumed

- Participation will have many asymmetries
- When reflected upon & altered over time, community knowledge & impact are improved
- Capacity building, training, discourses, demonstration, transnational exchange

#5 Trust & Respect Built Over Time

- Inter-subjective & iterated: Meetings, conference, personal interaction
- Transnational data, monitoring, assessment & research projects
- S&T and social research included

- The basis for co-production of S&T, social and political knowledge and 'order'

#6 Embrace Co-production of Knowledge

- Political, social, and scientific 'order' constructed at the same time
- Consensus on data, language, procedures, research questions co-constructed
- Domestic & transnational Credibility, salience & legitimacy ALL build (or damaged) at the same time

#7 Downwind states and societies pay more & do more

- Downwind states and societies must change domestic politics and knowledge in upwind states TRANSNATIOANALLY (not in international negotiations)
- Dense, policycentric, transnational and multilevel epistemic communities must be built, funded and supported
- Invest in data, monitoring & standardization with willing partners (not always other states)

Options and Considerations for Strengthening International Cooperation on Air Pollution in Asia

Mark Elder, IGES

International Workshop on Strengthening the International Cooperation Framework and Science-Policy Interface to Promote Air Pollution Control in East Asia 2013

Tokyo, Japan
February 1, 2013

Why Greater International Cooperation is Desirable

Key problems to solve:

- Overall air pollution is increasing in East Asia
- Transboundary movement is becoming more important
- Need to address multiple issues simultaneously
  - Local air pollution
  - Transboundary aspects
  - Linkage with climate change
- Need to reduce costs of control measures (e.g. through cobenefits)
- Need to strengthen capacity building
- Need more research on air pollution problems
- Strengthen the links between science and policy
- Greater emphasis on reduction/mitigation measures
- Desirable to engage less developed countries like Myanmar before serious pollution

ROLE OF INTERNATIONAL COOPERATION:	1. Facilitate a common understanding resulting in policy actions 2. Actions should be coordinated to enhance effectiveness and efficiency

Existing Selected Cooperation Frameworks

GEOGRAPHIC SCOPE	FRAMEWORKS
Global/hemispheric	UNFCCC, GAPF, ABC, **CCAC** (New)
More than one subregion	EANET, Joint Forum
Subregional	ASEAN Haze Agreement, Male Declaration, TEMM, LTP, NEASPEC

PROBLEMS WITH EXISTING FRAMEWORKS

- Duplication & overlap, extra cost
- Insufficient funding
- Limited effectiveness
- Insufficient scope: need more emphasis on mitigation, linkage between air pollution & climate change
- Should strengthen linkage to policy & implementation

Past Efforts to Strengthen International Cooperation in Northeast and Southeast Asia

- **Focused on strengthening each framework individually**
  - Different countries had different priorities or reservations
  - Results limited: small changes, no significant expansion of scope, no focus on reduction measures
    - EANET: New Instrument
    - NEASPEC: New review study
    - LTP: Currently discussing new stage
- **Possibility to merge some frameworks**
  - Differences in geographic scope and focus
  - Administrative differences and complexity

- Emerging common view among countries on the importance of strengthening international cooperation
- But: different views on the best mode of cooperation

Desirable Functions of an International Framework

FUNCTIONS	CURRENT SITUATION	PROSPECTS
Monitoring	• Covered in EANET, LTP • Room to expand scope, number of stations, quality	• Countries generally interested • More capacity building needed ➢ Int'l cooperation helpful
Modeling	• MICS, LTP • Needs to be expanded	• N.E. Asia interested • SE. Asia needs more capacity ➢ Cooperation framework is an issue.
Assessment	• EANET will do; ABC has done • More is needed	• Japan & Korea strongly favor ➢ Difficult to object?
Research	• EANET & LTP limited; some under TEMM • More is needed	• Most willing, depends on funds ➢ Some differences on participants and which research in which framework
Emissions reduction	• Not covered by EANET, LTP • More action is needed	• Most difficult aspect • China already making strong efforts ➢ Key issue for international framework
Capacity building	• Existing CB is important, but limited in scope • Wide range of CB needs	➢ This may be a good key focus

5

Desirable Scope of Pollutants: Options

Multipollutants-Multieffect Approach is Desirable

- Comprehensive, integrated approach
- Based on scientific modeling to maximize cost effectiveness

Key Point: EXPANDABILITY (easily add new pollutants in the future)

SHOULD THESE BE INCLUDED?

Climate/SLCF (Air P. Cobenefit Appr.)	• Linkage would facilitate a cobenefit approach • But already existing frameworks for climate (UNFCCC, CCAC)
DSS/Haze/ Yellow Sand	• Natural & man-made air pollution usually considered separately • Existing frameworks in N.E. & S.E. Asia • Any benefits to combining?

Note

- PM seems to be of interest to all/most countries
- Ozone of increasing interest; China will be in the future

6

Global/Hemispheric Level Options

RATIONALE

- Many pollutants are now global or hemispheric: GHG, Ozone, Aerosols
- Desirability of linking & coordinating regional frameworks
- Global scope addresses trade competitiveness concerns of mitigation measures more comprehensively

OPTIONS	COMMENTS
1. Global Convention on Atmosphere (Vancouver Declaration 2010, IUAPPA)	• Would be comprehensive • Difficult to agree, long time to negotiate • Linkage/ division of responsibility w/ climate • Structure, focus? Modeled after LRTAP? Binding/Voluntary? Principles/Action?
2. Global standards to link to regional/subregional conventions	• Easier to agree • Could be weaker than a global convention • Would build on existing mechanisms and promote cooperation among them

7

Regional/ Subregional Level Options

RATIONALE

- Regional linkage of air pollution is clearer, especially to local aspects
- Easier to reach agreement due to fewer countries

OPTIONS	ADVANTAGES/CHALLENGES/COMMENTS
1. More coordination among existing frameworks (e.g. strengthen Joint Forum	• Good in theory, difficult in practice • Does not solve overlap & duplication • Information sharing could be main benefit
2. Stronger efforts to strengthen existing frameworks	• Seems easiest, but limited past effectiveness • Does not solve overlap & duplication • Hard to increase efficiency & cost effectiveness
3. Merge existing frameworks	• Better chance to reduce overlap & duplication • Challenges: differences in functions, geographic scope, administrative procedures
4. Create new framework (Asian LRTAP?)	• More optimal scope (more ambitious) • How to relate to existing frameworks • Cost sharing? Secretariat?

8

Discussion of Geographic Scope

- Regional / subregional focus more realistic in short/medium term.
- Advantages & disadvantages of regional/subregional focus

Northeast Asia (subregional)
- Quicker focus on reduction measures is possible
- Which countries to include - 3, 4, 5?

N.E. Asia + Southeast Asia (2 subregions)
- May need to emphasize capacity building
- Trans-subregional aspects (haze, ABC, ozone)

Northeast + Southeast + South Asia (3 subregions)
- Trans-subregional aspects (haze, ABC, ozone)
- May need to emphasize capacity building
- More differences in priority pollutants, emissions sources

Fewer members:
- Easier to reach agreement, quicker actions
- Advantage for subregional but not regional scale

More members:
- More difficult to reach agreement, slower
- Better for larger scale problems
- Fewer frameworks may be more efficient

- **Asian participation in global air pollution frameworks should be strengthened (e.g. GAPF, HTAP, etc.)**

9

Asian or East Asian LRTAP Option – Main Elements

Key Components	Sub-options	Suggestions
Structure	• Legal format (Framework/protocol?) Legally binding or not? Voluntary (with reporting)) • Secretariat (UNEP, UNESCAP, RRC.AP?) • Funding (Voluntary? Mandatory? UN Scale of Contributions?)	• Voluntary at start • Stepwise approach?
Geographic scope	• Which subregions? NEA+SEA? S. Asia?	• At least 2 subregions
Pollutant scope	• Multipollutant & flexible • Consider: climate, DSS, metals?	• May need network center
Science panel	• Scope, organization, etc.	• Link to network center?
Monitoring	• Scope, coordination? • EMEP structure?	• Suggest EMEP structure?
Modeling	• Joint model? Network center? • Review existing ones (science panel)?	• Capacity building needed for some
Capacity building	• Scope? • Organization	• Very important for some countries
Reduction strategies	• Compile existing measures • First voluntary, with manatory reporting • Later, legally binding if agreed	• Voluntary at start • Report & compile existing ones

Northeast Asia LRTAP Option

Additional considerations regarding geographic scope

- Rationale: fewer countries to negotiate; transboundary problems more severe
- NEASPEC sub-option
  - Maybe better for including Russia
  - Mongolia emerging as major emitter
  - DSS (Yellow Sand) is a key issue, could be integrated.
  - Use environment as vanguard of détente (same as LRTAP/cold war)
  - North Korean air pollution could get quickly and significantly worse if détente occurs unexpectedly and the economy develops rapidly. Easier for NK to join before more economic development occurs.
- TEMM sub-option
  - Institutionalization is relatively advanced, easy to use (convenient for environment ministries)
  - May be difficult to include other countries as necessary

11

Option to Merge Existing Frameworks: EANET & LTP

Main benefits
- Reduce burden of maintaining and participating in 2 separate networks
- Already proposed by Korea (politically feasible?)

Merging Procedure
- Needs decision by all members of EANET & LTP (not just Japan & Korea)
- Korea & Japan could make joint proposal

Political analysis
- Key issue is geographic scope. Without LTP, there is no major Northeast Asia framework with a broad focus on air pollution.
- Key issue is not the substance/details. Countries can simply decide to combine/reorganize monitoring, modeling. Existing overlap & duplication
- Name change is required. Both LTP and EANET parts must be visible.
- Key point is Japan recognizes Korea as a partner (e.g. name change, joint proposal to other networks)
- Ok to encourage Korea to refine its proposal, but Korea already took the first step.

12

Recent Trends in International Discussions

Existing Frameworks

NEASPEC

- Completed review of existing frameworks (Russian study)

LTP

- Discussing new phase

EANET

- Will conduct assessment
- Will expand monitoring scope

Selected Countries' Perspectives

RUSSIA

- Initiated NEASPEC study
- Russian proposal suggests exploring NE Asia LRTAP-style

KOREA

- Official focus on new LTP phase
- LTP has funding and management issues
- Discouraged by limited results of international cooperation
- Position on international cooperation is in internal discussion

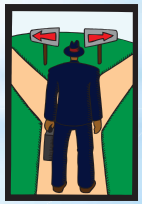
CHINA

- Not making new proposals, but not objecting either
- CRAES supports more research, publishing
- Published research is easier than official reports which need government approval
- Strengthening cooperation w/Southeast Asia & ASEAN

13

Way Forward: Decision Process

1. What are the priority air pollution problems?
   - ❑ To what extent do countries agree?
2. Is international cooperation necessary or desirable to solve these problems?
   - ❑ Are they transboundary? Collective action problem?
3. If so, what kind of cooperation is best?
   - ❑ Bilateral?
   - ❑ Informal/bottom up/ NGOs?
   - ❑ Multilateral intergovernmental framework/organization?
4. If an international framework is desirable, then:
   - ❑ Geographic scope?
   - ❑ Functions?
   - ❑ Legal status?
   - ❑ Secretariat?
   - ❑ Organizational structure
   - ❑ Financing?



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International Workshop on Strengthening the International Cooperation Framework and Science-Policy Interface to Promote Air Pollution Control in East Asia 2013

1 February 2013, Tokyo, Japan

1

Strengthening Regional Cooperation on Air Pollution in Asia: the Perspectives of the EANET and the ASEAN Haze Agreement

Dr. Supat Wangwongwatana

Coordinator of the Secretariat for the EANET
Regional Resource Centre for Asia and the Pacific (RRC.AP)
Asian Institute of Technology (AIT)

What is EANET?

2

- **EANET : Acid Deposition Monitoring Network in East Asia**
- It is the regional network of countries in East Asia, among others, jointly and cooperatively implementing routine monitoring of acid deposition.
- At present, there are 13 East Asia Countries participating in the EANET, namely Cambodia, China, Indonesia, Japan, Lao PDR, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Russia, Thailand, and Vietnam.

Development of the Acid Deposition Monitoring Network in East Asia (EANET)

3

1. Step-by-Step Approach
2. Objectives of the EANET
   - to create a common understanding of the state of the acid deposition problems in East Asian region.
   - to provide useful inputs for decision-making at local, national and regional levels aimed at preventing or reducing adverse impacts on human health and the environment due to acid deposition.
   - to contribute to cooperation on the issues related to acid deposition among the participating countries.
3. Other future activities
   - Establishment of guidelines for emission inventories of air pollutants.
   - Development of numerical models for simulating mid/long-range transport and transformation of air pollutants.
4. Research on adverse impacts of acid deposition on the environment including collection of data related to critical loads

Development of the Acid Deposition Monitoring Network in East Asia (EANET)

4

- Started from 4 Expert Group Meetings between 1993 – 1997.
- The 1st Session of the Intergovernmental Meeting on the EANET in March 1998 agreed to implement the Preparatory Phase of the EANET for 2 years from April 1998 to the middle of 2000.
- The 2nd Session of the Intergovernmental Meeting on the EANET in October 2000 issued the Joint Announcement on the Implementation of the EANET to cooperatively start the activities of the EANET on a Regular Basis (Regular Phase) from January 2001.
- The 12th Session of the Intergovernmental Meeting on the EANET in November 2010 adopted the Instrument for Strengthening the Acid Deposition Monitoring Networks in East Asia (EANET) which was operational on 1st January 2012.

Development of the Acid Deposition Monitoring Network in East Asia (EANET)

5

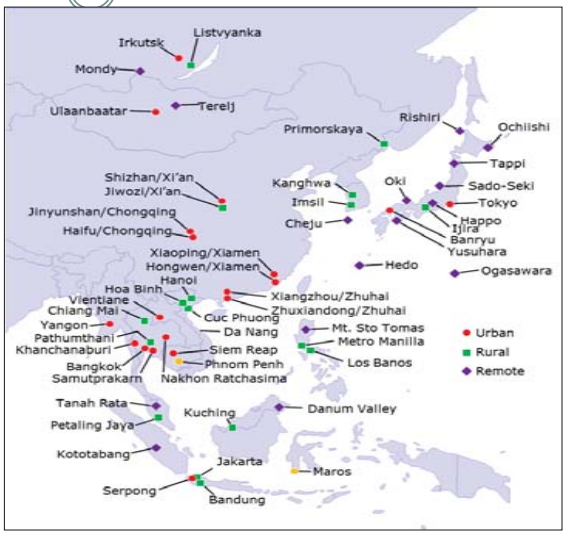
- The scope of the Instrument may be extended, as decided by the Intergovernmental Meeting of the participating countries.
- The EANET monitoring activities cover five environmental media
  - Wet deposition
  - Dry deposition
  - Soil and vegetation
  - Inland aquatic environment
  - Catchment

Development of the Acid Deposition Monitoring Network in East Asia (EANET)

6

EANET monitoring sites in 13 East Asian participating countries classified by types of environmental media.

- Deposition monitoring sites :
  - 54 wet deposition sites
  - 45 dry deposition sites
- Ecological survey sites :
  - 20 soil survey sites
  - 18 forest/vegetation survey sites
  - 18 inland aquatic environment (lakes/rivers) sites
- Catchment scale monitoring sites : 2 sites



Development of the Acid Deposition Monitoring Network in East Asia (EANET)

7

Institutional Arrangement of the EANET

- Intergovernmental Meeting (IG) : decision-making body
- Scientific Advisory Committee (SAC) : providing advises and assisting the IG with various scientific and technical matters related to the EANET activities.
- Secretariat : providing administrative supports to the EANET with UNEP by UNEP ROAP designated as the Secretariat under which RRC.AP at AIT in Pathumthani, Thailand is the implementing agency.
- Network Center : providing scientific and technical supports to the EANET with ACAP in Niigata, Japan designated as the Network Center.

Development of the Acid Deposition Monitoring Network in East Asia (EANET)

8

Financial Arrangement of the EANET

- Based on voluntary financial contributions from the participating countries and burden sharing practices in the United Nations system.
- EANET is also open to financial and in-kind contributions from other sources including international and regional organizations and non-governmental organizations (NGOs).

Development of the Acid Deposition Monitoring Network in East Asia (EANET)

9

Main Responsibilities of Participating Countries

- Responsible for national monitoring activities within each country in close communication, coordination and collaboration with the Secretariat and the Network Center through the National Focal Points (NFPs), National Centers, and National Quality Assurance and Quality Control (QA/QC) Managers.
- Providing national monitoring data for the EANET to the Network Center.
- Voluntary financial contribution to support the EANET activities of the Secretariat and the Network Center.

Future Development of the EANET

Rationale for Future Expansion of the Scope of the EANET

10

- Although, acid rain and continued acidification remain prevalent across East Asia, the impacts of acid deposition on eco-system functions and human health have not become so clear yet in the region. As a result, acid deposition may have been marginalized now a day.
- Some other air pollutants, i.e. O_3 and PM2.5, have been highlighted as either a domestic, regional, or hemispherical problem.
- There are strong links between acid deposition and climate change. Air pollutants causing acid deposition (such as O_3 and aerosols) contribute to climate change, while climate change affects acid deposition through influences such as precipitation variations.
- The present scope of the EANET covers monitoring of major acidifying species and related chemical substances.

Future Development of the EANET

Possible Future Expansion of the Scope of the EANET

11

- Future development of the EANET should be in a stepwise manner.
- O_3 and PM2.5 monitoring should be added to the monitoring items at the EANET sites with high priority.
- Technical support and capacity building for air concentration monitoring including O_3 and PM2.5 should be strengthened.
- Inter-linkage between acid deposition, air pollution, climate change, and co-benefits/co-control approach should be investigated.

Future Development of the EANET

Possible Future Expansion of the Scope of the EANET

12

- Extended assessment of the state of acid deposition and air pollution and associated impacts, including climate impacts, should be made with the aid of monitoring, modeling and emission inventory.
- Public awareness activities and the establishment of epistemic community, including information dissemination should be promoted to achieve a common understanding among different stakeholders on acid deposition and its inter-linkage with other atmospheric pollution and climate change.

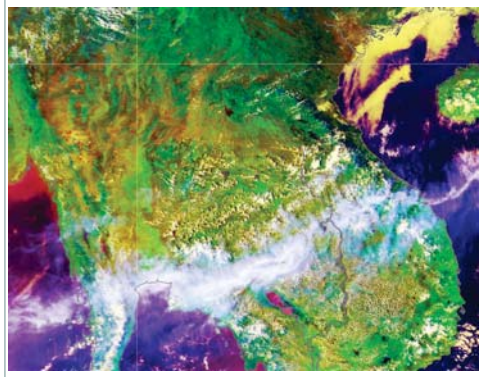
What is ASEAN Haze Agreement?

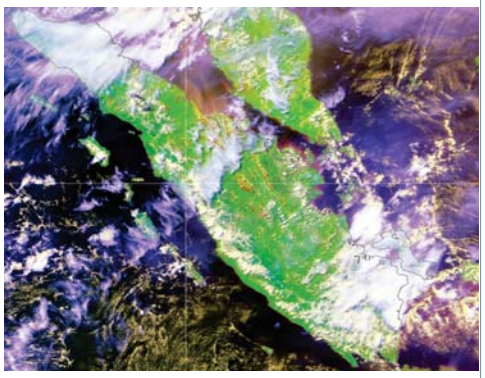
- **HAZE** : Atmospheric moisture, dust, smoke and vapor suspended in the air to form a partially opaque condition and impair visibility.
- **HAZE** pollution can be “transboundary” if its density and extent is so great at source that it remains at measurable levels after crossing into another country’s air space.

What is ASEAN Haze Agreement?

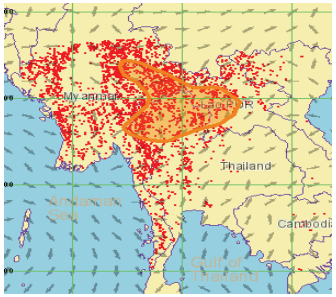
Satellite Images in 2012

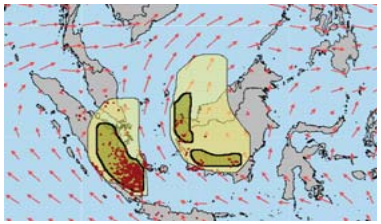
Northern ASEAN **Southern ASAEN**





What is ASEAN Haze Agreement?





Haze Situation in Southeast Asia

During dry season in the Northern Hemisphere (January - April), hotspots (fires) in Mekong Sub-Region was found to increase. These burning activities result in transboundary haze pollution which can be seen clearly in the satellite images

On the other hand, fires in the Southern part of the Southeast Asian Region are found to be more intense during June – September (dry season), particularly in Sumatra and Borneo.

What is ASEAN Haze Agreement?

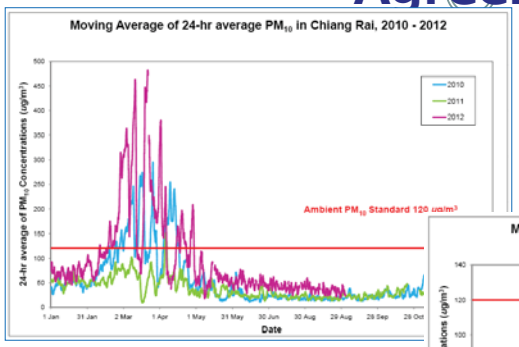
Effect of Haze on Visibility

Photographs taken from Chiang Mai Airport

29 March 2005
PM-10 Concentration 149 µg/m³

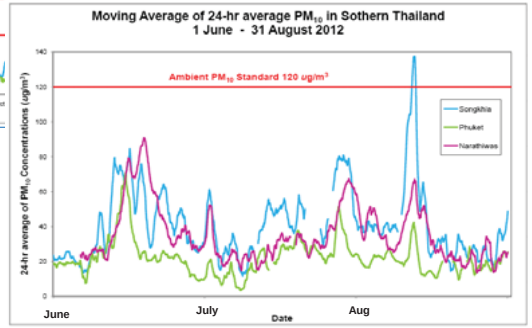
11 June 2005
PM-10 Concentration 20 µg/m³

What is ASEAN Haze Agreement?



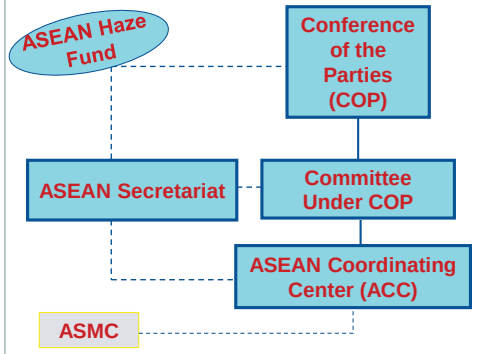
Northern Thailand

Southern Thailand

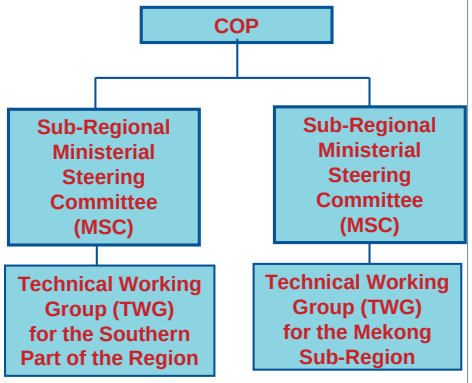


What is ASEAN Haze Agreement?

Mechanism under ASEAN Haze Agreement



Sub-Regional Arrangement



What is ASEAN Haze Agreement?

- ASEAN started addressing transboundary haze pollution in early1990.
- In 2000, ASEAN Environment Ministers agreed to formulate an ASEAN Agreement on Transboundary Haze Pollution to prevent and monitor transboundary haze pollution as a result of land and/or forest fires.
- After 4 meetings of the Intergovernmental Negotiating Committee, the Agreement was completed and signed by 10 Member States on 10 June 2002.
- The Agreement entered into force on 25 November 2003 after 6 Member States ratified and became legally binding.
- At present, 9 Member States ratified the Agreement.

What is ASEAN Haze Agreement?

Challenges

- To achieve successful fire and haze control, appropriated measures/ strategies for specific area should be developed and implemented
- ASEAN Agreement on Transboundary Haze Pollution should be fully implemented by all ASEAN Members States as the main mechanism to mitigate transboundary haze pollution
- Bi-lateral, Sub-regional, Regional and International Cooperation including funding and technical support are also required to mitigate transboundary haze pollution

EANET vs ASEAN Haze Agreement

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EANET	ASEAN Haze Agreement
• Non-legally binding, no ratification required	• Legally binding, ratification required
• Cooperative instrument	• Cooperative instrument
• 13 East Asian countries, including 8 ASEAN Member States (could be more)	• Limited to 10 ASEAN Member States
• Atmospheric Environment (Acid Deposition, could be expanded)	• Atmospheric Environment (Haze/Particulate Matter)
• Monitoring/Research/Capacity Building (could be expanded)	• Monitoring/Prevention/ Research/Capacity Building

EANET vs ASEAN Haze Agreement

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EANET	ASEAN Haze Agreement
• IG, SAC, Secretariat, NC	• COP, COM, ASEAN Secretariat, ACC, ASMC
• Voluntary financial contribution and open to other sources	• Voluntary financial contribution (ASEAN Haze Fund) and open to other sources
• No Protocol	• Could have Protocols
• Not enforceable/No sanction or penalty	• Not enforceable/No sanction or penalty
• Secretariat : UNEP	• Secretariat : ASEAN Secretariat

Some Considerations

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- There are many existing networks/programs/initiatives in East Asian region addressing issues related to atmospheric environment, for example, EANET, NEASPEC, LTP, and ASEAN Agreement on Transboundary Haze Pollution, Ministerial Regional Forum on Environment and Health, Clean Air Asia, Asian Co-benefit Partnership with overlapping scopes and activities.
- Same national agency being assigned repeatedly by most countries as National Focal Points of these networks/programs/initiatives

Some Considerations

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- Inefficient use of resources, including human, financial and natural resources, in particular their availabilities are limited.
- It will be most likely not possible to dissolve any well established networks/programs/initiatives.
- Current organization of Joint Forum on Atmospheric Environment in Asia and the Pacific is still on an ad hoc and informal basis without any official support from any international organization.
- No formal technical or scientific forum on atmospheric environment established in this region.

Some Recommendations

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- Assessment of the status of atmospheric environment, including acid deposition, air pollution, and climate change, should be coordinated.
- Scientific information, assessment and knowledge should be used as a basis to support the policy development to address problems related to atmospheric environment in an integrated and holistic manner. As such, a formal **scientific forum on atmospheric environment** should be established in the region.

Some Recommendations

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- Current organization of Joint Forum on Atmospheric Environment in Asia and the Pacific should be upgraded to a formal **Joint Governmental Forum on Atmospheric Environment in Asia and the Pacific** officially and formally supported by international organizations, i.e. UNEP, UNESCAP, AIT, IGES, and etc., similar to the Ministerial Regional Forum on Environment and Health which is supported by UNEP and WHO.
- RRC.AP is proposing to establish itself as a **Regional Center of Excellence on Atmospheric Resources (CLEAR)** in the region and is looking for collaboration and supports.

Some Recommendations

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Regional Center of Excellence on Atmospheric Resources (CLEAR)

MISSION :

To provide high quality technical support for the capacity building, expand knowledge base, and informed decision - making required by governments and other stakeholders in the region.

GENERAL OBJECTIVE :

To provide services and encourage partnerships for the effective use of best available air pollution management tools, preventing harmful effects of air pollution to human beings and ecosystems, and enhancing the capacity of countries to address atmospheric issues in Asia and the Pacific region under in integrated framework.

Some Recommendations

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Regional Center of Excellence on Atmospheric Resources (CLEAR)

SPECIFIC OBJECTIVES :

a) Empower countries in the region to strengthen their scientific understanding of air pollution mitigation in the context of addressing atmospheric issues.

b) Provide science-based information for policy formulation and facilitate intergovernmental cooperation.

Some Recommendations

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Regional Center of Excellence on Atmospheric Resources (CLEAR)

ACTIVITIES :

a) **Science :**
Strengthen the understanding and application of air pollution science on impact assessment (such emerging issue as regional climate change, role of air pollution in glacier melting, and as agriculture and health impacts) and design of mitigation measures.

b) **Policy :**
Develop science-based policy briefs, promote regional cooperation, and facilitate regulatory, technological and fiscal measures and strategies to prevent and abate air pollution.

Thank you for your attention

Some Recommendations

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Regional Center of Excellence on Atmospheric Resources (CLEAR)

ACTIVITIES :

c) **Capacity Building :**
Strengthen both human and institutional capacity for monitoring, analysis, modeling, impact analysis, and mitigation of air pollution.

d) **Knowledge :**
Develop a knowledge base and provide a clearinghouse functions for atmospheric issues in the region.

Future activity of LTP project toward international cooperation in East Asia

1, February, 2013

Cheol-Hee Kim

Pusan National University, Busan, Korea

Outline

1. Objectives of LTP Project
2. History and Organization of LTP
3. Results of LTP
4. Future Activities
5. Tentative Research Topics

Objectives of LTP

- To present and discuss the research results of the preceding year in the form of national report submitted by each country
- To discuss the needs of scientific research required to clarify uncertainties and gaps in our knowledge.
- To improve the understanding on long-range transport of air pollutants (LTP) in Northeast Asia.
- To contribute to laying the foundation for the research on LTP
- To provide policy-makers with science-based information aiming to prevent or reduce adverse impacts on the environment of Northeast Asia

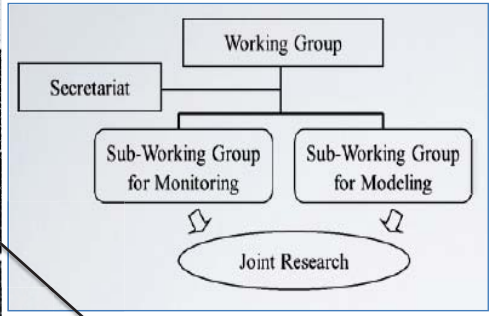
History & Organization of LTP

1999: The 1st sub-working group meeting
launching the LTP project

2000-2004: The 1st stage LTP activity
building an International Co-operation Platform

2005-2007: The 2nd stage LTP activity
transboundary transport of sulfur

2008-2012: The 3rd stage LTP activity
model inter-comparison



Sulfur S-R

Total nitrate S-R


The 8th Expert Meeting for Long - range Transboundary
Air Pollutants in Northeast Asia
(The 8th Working Group and the 7th Sub-Working Group Meeting)
November 8~10, 2005 Jeju, Korea


LTP Project 2007
The 10th Expert Meeting for Long-range Transboundary
Air Pollutants in Northeast Asia
November, 6, 2007
Paradise Hotel, Busan, Korea


The 9th Expert Meeting for Long-range Transboundary
Air Pollutants in Northeast Asia
(The 9th Working Group and the 8th Sub-Working Group Meeting)
Daegu, Korea Global Environment Research Center / National Institute of Environmental Research

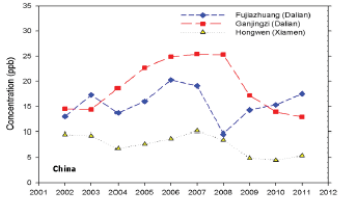

The 11th Expert Meeting for Long-range Transboundary
Air Pollutants in Northeast Asia
November 11~13, 2008, Incheon, Korea
National Institute of Environmental Research, Ministry of Environment

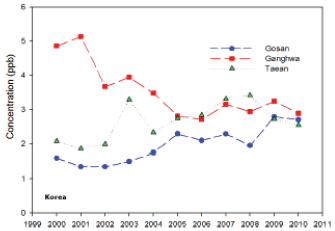
Year	LTP Project	Selected Large-scale International Studies[b]	CLRTAP Protocols	NARSTO Assessment
1985			Sulfur reduction	
1988			NO_x control	
1991		PEM-West A (Sep.-Oct.; O_3 and sulfur budgets)	VOCs control	
1993				
1994		PEM-West B (Feb.-Mar.; O_3 and sulfur budgets)	Further reduction of sulfur	
1995				
1996	Expert meeting			
1997				
1998			Heavy metals and POPs	
1999			Acidification, eutrophication and ground-level ozone	
2000	Foundation for joint monitoring and modeling works			Tropospheric ozone
2001		TRACE-P (Feb.-Apr.; outflow and chemical evolution), ACE-Asia (aerosols and radiative forcing)		
2002				
2003				
2004		PEACE-A, B (Jan., Apr.-May; photochemistry and aerosols)		Particulate matter
2005	Monitoring and modeling of sulfur compounds	EAST-AIRE (Apr., column aerosols), EAREX 2005 (Mar.-Apr.; aerosol forcing)		Emission inventory
2006				
2007				
2008	Monitoring and modeling of nitrogen compounds			
2009				
2010				
2011				Multipollutant management
2012				

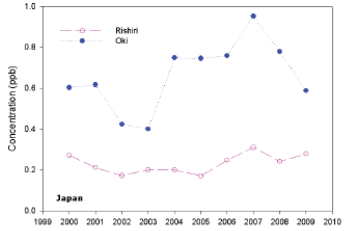
[Results]

Long-term Monitoring of SO_2

- China: Decreased during the past several years except Fujiazhuang
- Korea: Increased at two sites with lower concentrations but decreased at a site with higher concentrations
- Japan: Lower levels but increasing trend since the early 2000s

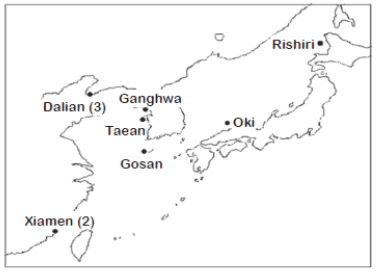






[Results]

Long-term Monitoring



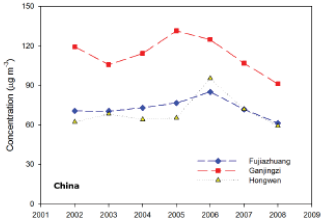
- SO_2, NO_2, O_3, PM_{10}
- Depositions

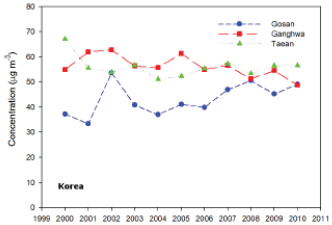
Item	Parameter	Frequency
Wet Deposition Monitoring	pH	Daily or when precipitation
	Conductivity	
	Rain amount	
	Anions	
	Cations	
Dry Deposition Monitoring	SO_2	Continuous
	NO_2	
	PM_{10}	

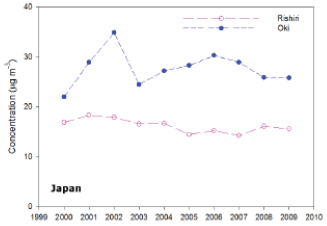
[Results]

Long-term Monitoring of PM_{10}

- China: Decreased during the past several years
- Korea: Increased at a site with lower concentrations but decreased at two sites with higher concentrations
- Japan: Lower levels without distinct trends in the 2000s

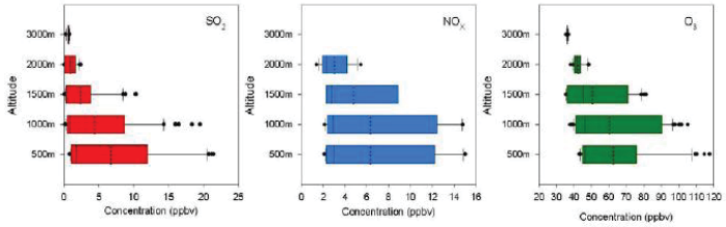






[Results]

Aircraft Measurements in Korea (April 2005)



- SO_2: Decreased with altitude
- O_3: Peak at ~1 km and lower at ~500 m due to titration with fresh NO
- NO_x: In between
  - Model analysis could be helpful to understand the variation in detail.

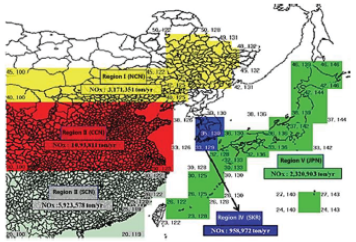
[Results]

Source–Receptor Relationship

$$R_{i,j} = \frac{H_{i,j}}{\sum_{i=1}^{n} H_{i,j}}$$

$R_{i,j}$ = contribution of i^{th} source to j^{th} receptor
$H_{i,j}$ = deposition amount over j^{th} receptor when the emissions are only from the i^{th} source

- Contribution of the emissions from source i
  - (model run with all emissions) – (model run with all emissions except emissions from source i) till the 9th annual report (2009)
  - 5 × [(model run with all emissions) – (model run with all emissions except 80% emissions from source i)] from the 10th annual report (2010)

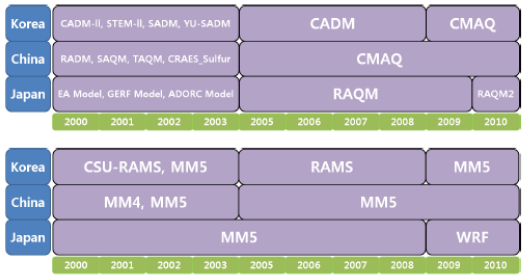


Region 1, NCN (northern China)
Region 2, CCN (central China)
Region 3, SCN (southern China)
Region 4, SKR (south Korea)
Region 5, JPN (Japan)

[Results]

Models and Emission Data

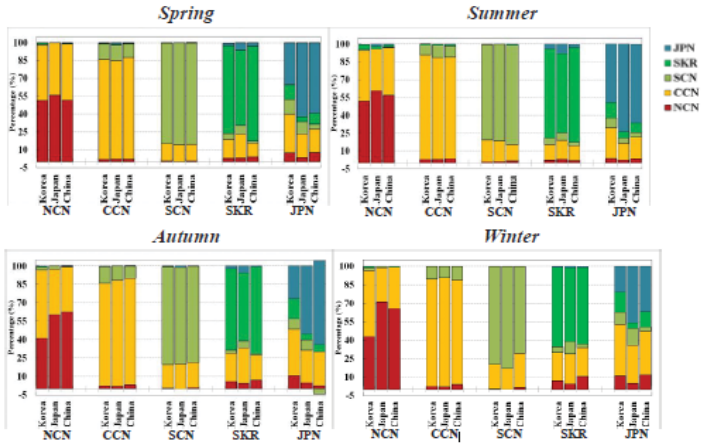
- Air quality models – CADM, CMAQ, and RAQM, in general
- Meteorological models – MM5, WRF, and RAMS
- Emission data – mostly prepared by the LTP project



[Results]

S–R Relationship for Sulfur (2002)

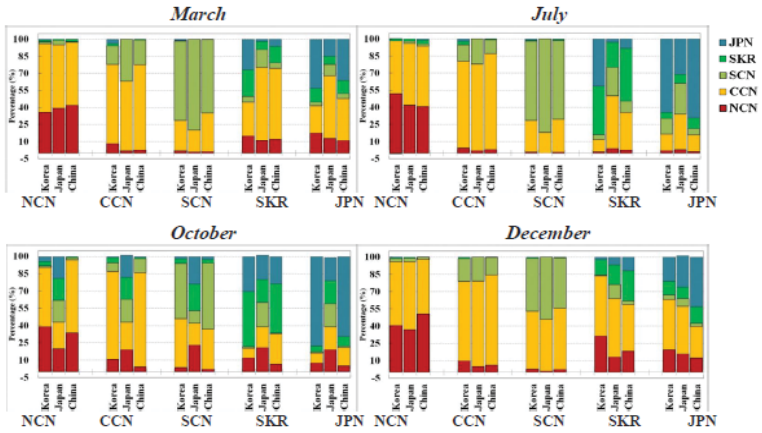
- Self-contribution is generally important for all regions
- JPN – largest seasonal variation and disagreement in the modeling results among three countries



[Results]

S–R Relationship for Total Nitrate (2006)

- China – similar variations in March, July, and December
- SKR and JPN – mostly affected by CCN, SKR, and JPN
- JPN – large variations among periods and countries



Future activity of LTP project

for international cooperation

Suggestions from Self Evaluation (2012)

(Future activities)

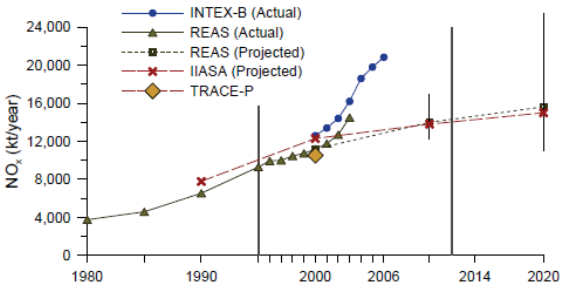
Research Subject

- LTP project – investigated the S-R relationship for sulfur compounds over two stages for eight years from 2000 to 2007
- Research subjects of the large-scale international studies targeting East Asia during the same period
  - characterization of chemical outflow and process study of chemical evolution including gases and aerosols – prerequisite to verify the reliability of the modeling for the S-R relationship
    - emission inventory – the data for the year of 2000 were extensively evaluated in TRACE-P and ACE-Asia and INTEX-B data for the year of 2006 was prepared
  - column aerosol study – essential to validate satellite data
  - radiation budget study – an area of increasing importance since it is revealed that emissions of air pollutants considerably affect climate change as much as air quality.

(Future activities)

Study Period

- Northeast Asia – changing at the fastest pace in the world
- NO_x emissions in China
  - Increase in the 2000s – controversial in the beginning but universally accepted through verification using satellite data
  - Projected emissions based on emission data from the late 1990s – not valid because their rate of increase is slower than that in the 2000s
  - A possibility that the trend in the current variation in China's emissions would change in the short term is highly unlikely



(Future activities)

Changes in Research Environment

- Asian dust – one of the most important phenomena that characterize the atmospheric environment in Northeast Asia
  - The number of papers dealing with Asian dust whose primary author is Chinese greatly increased between 1997 and 2001 and accounted for about 45% of papers in this field throughout world in 2005.
  - During the period of 2000 to 2005, papers written in Chinese accounted for about 25% of all published papers.
- Atmospheric Environment – an international journal that specialize in air pollution and its impacts
  - Searching under the keyword "China" resulted in 196 papers for six years of 1994 to 1999.
  - For the same six years of 2006 to 2011, the number of papers increased by about nine times to 1,751.

(Future Researches – Tentative Topics)

–Establishment of Emission Inventory by Year

–Establish monitoring network for ozone, particulate matter, heavy metals, mercury, and POPs

–Develop a standard model tailored to Northeast Asia and prepare modeling and monitoring manual

–Improve the accuracy of the S–R calculation method to identify emission sources contributions for long–range transport of O3 and PM.

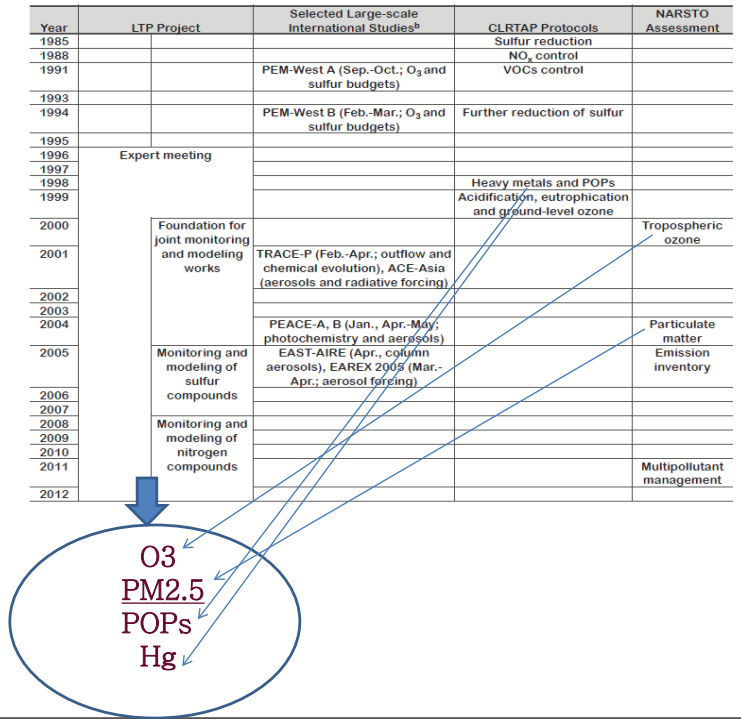
–Improve the accuracy to simulate the behaviors of long–range transport of air pollutants

(Future activities)

Suggestions – Long–term Monitoring

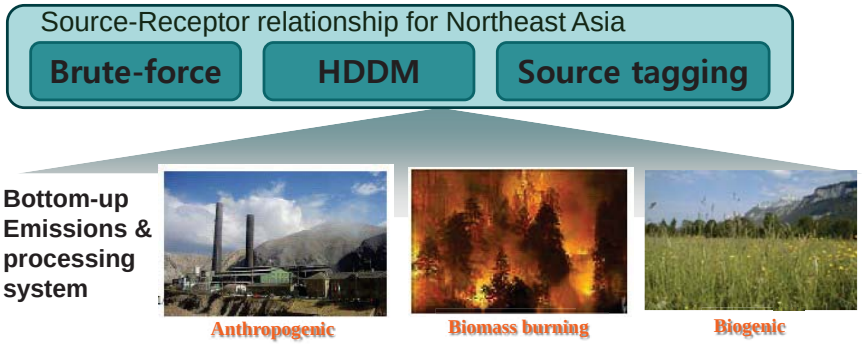
- publically-available monitoring data of each country and data from various networks including EANET will be analyzed

- AERONET (Aerosol Robotic Network, http://aeronet.gsfc.nasa.gov/), SKYNET (Skyradiometer Network, http://skyrad.sci.u-toyama.ac.jp/), and various lidar networks in addition to EANET
- Satellite data
- W/SWGs – review the results from an analysis of a variety of monitoring data that are grouped by period or by region



(Future Researches – Tentative Topics)

- Source-Receptor relationship calculation Methods for O3 and PM
- Emission Inventory



Thank You for Your Attention

Last Slide

LTP Science – Policy

↓

Strengthening the International Cooperation Framework

INTEGRATED APPROACH FOR AIR POLLUTION ISSUES

Stockholm to Rio+20

Human wellbeing within the limit of human wellbeing

- Transboundary Air Pollution: Concept
- Need for intergovernmental cooperation
- Establishment of UNEP

Transboundary Air Pollution networks (Regional/Sub-regional)

Air Pollutants
- Food Security
- Water Security
- Climate Change

1. Political Commitment for SD: Poverty
2. SDGs + Build on MDGs ➔ Post 2015 Development Framework
3. Gender Equality & Women's Empowerment
4. Partnerships: Governments + Civil Society
5. IFSD: High Level Political Forum and UNEP
6. SCP: 10 Year Framework. Metrics – beyond GDP. Role of Green Economy
7. Right to Food: food and nutrition for all: sustainable agriculture

Stockholm (1972) | **Rio+20 (2012)**

Contents

1. Stockholm to Rio+20
2. 3D Integrated Approach
   - Pollutants Integration
   - Sectoral Integration
   - Temporal Integration
3. East Asia Today

Contents

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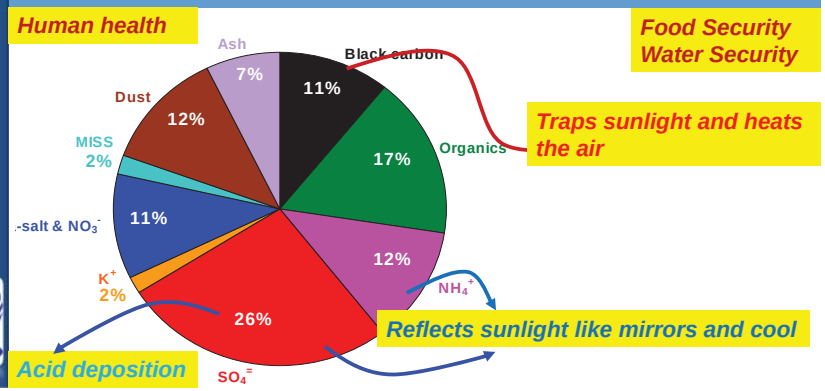
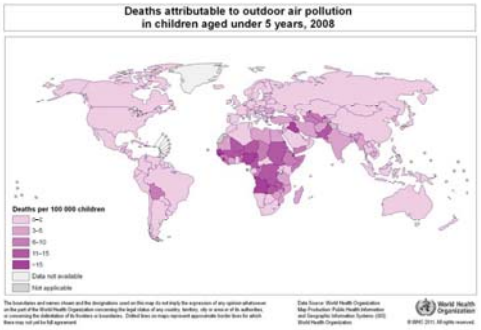
Pollutants Integration

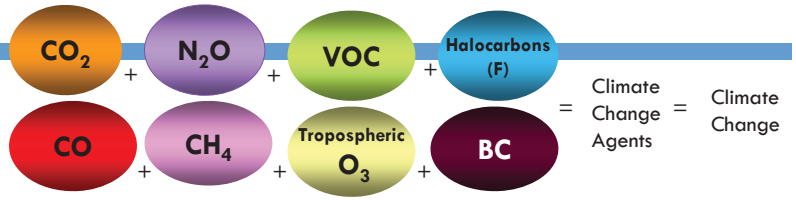


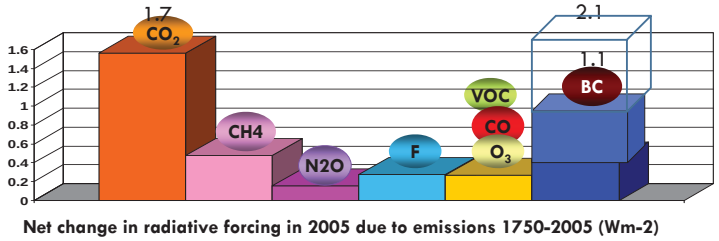
Human Health

- WHO estimates 2 million people a year die from indoor air pollution.
- Additional 1. 3 million premature deaths are caused by urban air pollution



Dirty Order

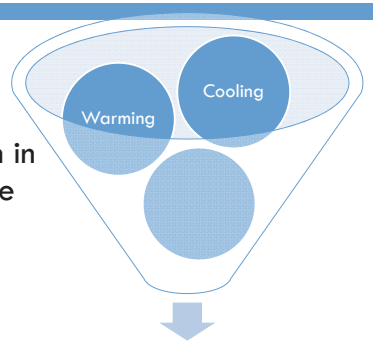




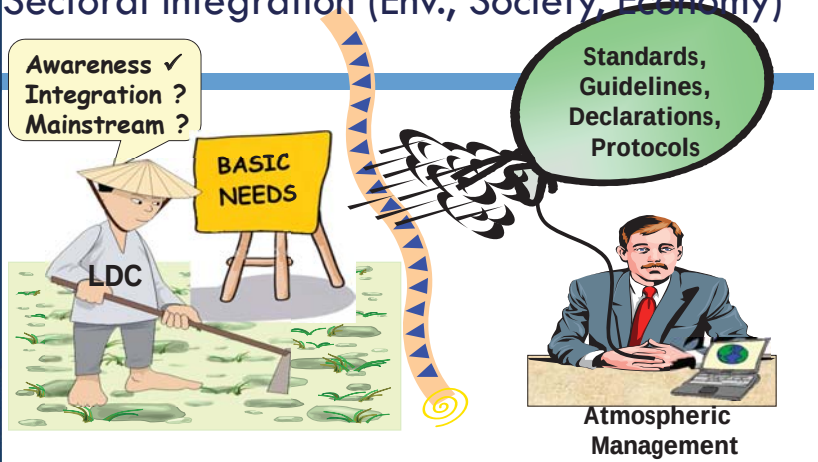
Net change in radiative forcing in 2005 due to emissions 1750-2005 (Wm-2)

Pollutants Integration

- Multi pollutant approach in the context of sustainable development



Sectoral Integration (Env., Society, Economy)



Project Surya

50% less energy cost

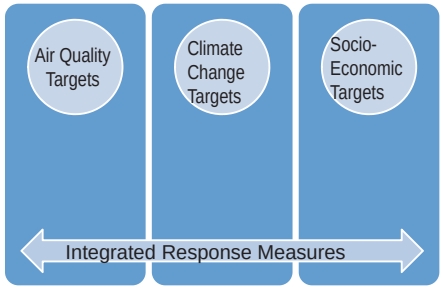
50% less fuel wood collection time

50% less cooking time

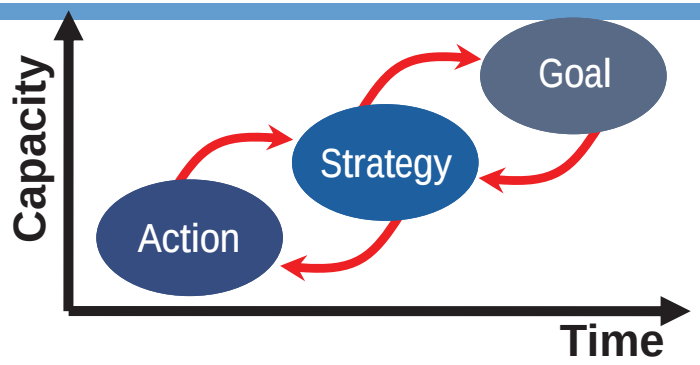
70% less air pollution

Sectoral Integration

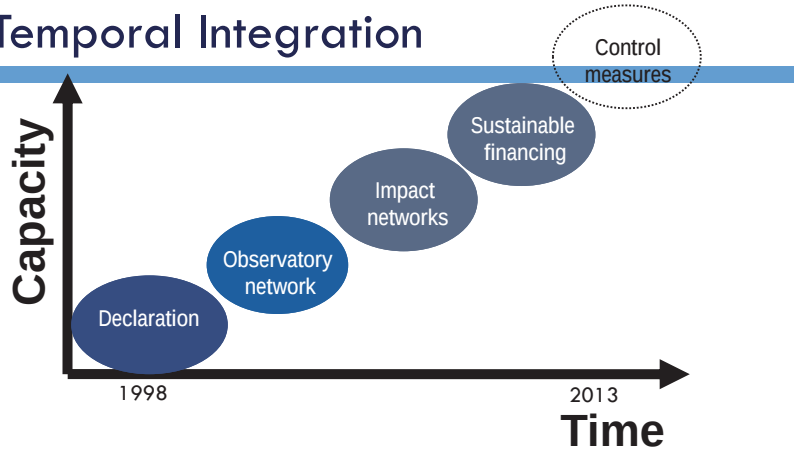
- Integrated response in the context of sustainable development will improve human health, agriculture production, regional climate, water security, living standards, and economy
- Contributes to global efforts to achieve both the Millennium Development Goals and the Rio+20 Declaration



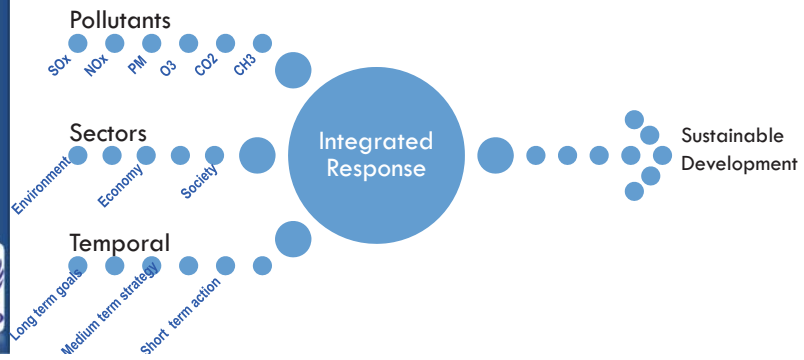
Temporal Integration

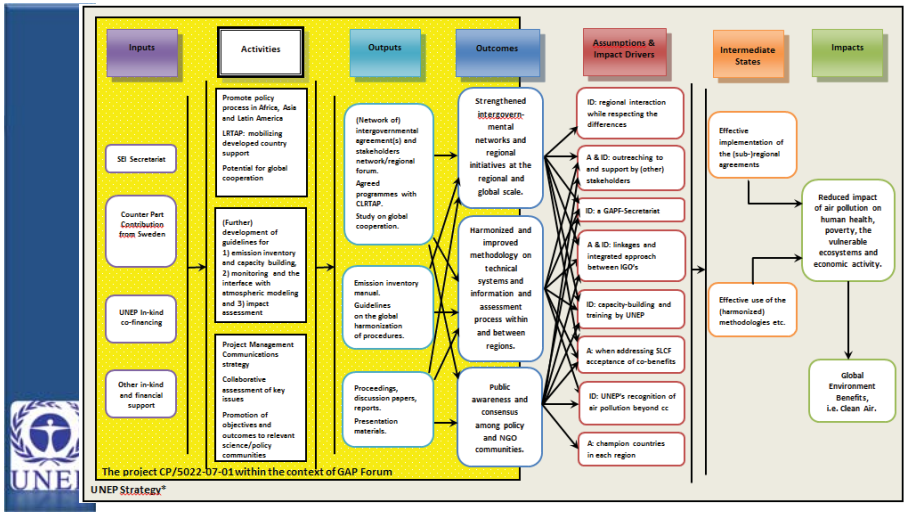


Temporal Integration



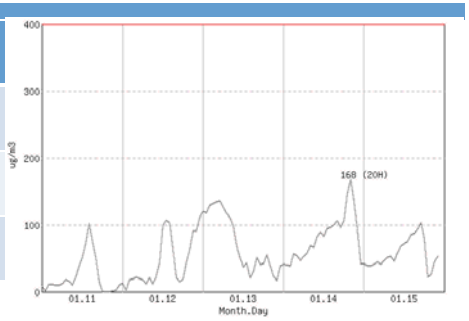
Integrated Response





East Asia Today

	PI	SI	TI
EANET			√
LTP			√
Co-benefit	√		



PM10 Mass Concentration at Gosan ABC Observatory
Jan 2013

Strengthening International Cooperation on Air Quality

May Ajero
Air Quality Program Manager

International Workshop on Strengthening the International Cooperation Framework and Science-Policy Interface to Promote Air Pollution Control in EastAsia
1 February 2013, Tokyo, Japan

CLEAN AIR ASIA

Clean Air Asia Programs

Air Quality and Climate Change Program

Low Emissions Urban Development Program

Clean Fuels and Vehicles Program

Green Freight and Logistics Program

About Clean Air Asia

Clean Air Asia's mission is to promote better air quality and livable cities by translating knowledge to policies and actions that reduce air pollution and greenhouse gas emissions from transport, energy and other sectors.

Clean Air Asia (formerly Clean Air Initiative for Asian Cities) was established by the Asian Development Bank, World Bank and USAID in 2001 and operates since 2007 as an independent non-profit organization.

About Clean Air Asia

OUR AIM

Clean Air Asia leads efforts to enable Asia's

1,000+ CITIES

to reduce both air pollution and CO_2 emissions, and thereby contribute to more livable and healthy cities with blue skies and a low carbon footprint. Emissions can be reduced through policies, plans, programs, and concrete measures that cover air quality, transport and industrial emissions, and energy use.

OUR ROLE

Decision makers use **reliable analysis, knowledge, data and effective tools** to understand the program and identify solutions.

Stakeholders at the city, national and regional level **cooperate better through networks and partnerships.**

Policies and programs are in place that are **science-based, stakeholder-inclusive and effective.**

Key considerations for Strong International Cooperation and Science-Policy Framework

- Involve NGOs as they have **agility, flexibility and lesser bureaucracy**
- Important to have **local presence/partners** on the ground
- Inclusive **multiple stakeholder** partnership
- Conduct targeted activities for specific target groups but also provide **opportunities for interaction**
- We do not have all the expertise ourselves. We engage the **help of experts**.
- Providing basic services and analysis **– knowledge management** and data that are **policy-relevant**

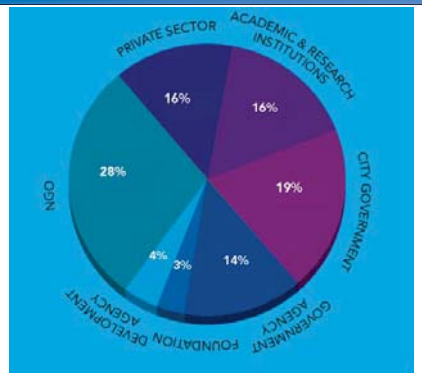
Inclusive Multi-stakeholder Partnership Clean Air Asia Partnership Members

Cities (45)

- Bangladesh: Chittagong, Dhaka
- Cambodia: Phnom Penh
- Hong Kong, China
- India: Hyderabad, Mumbai, Pune
- Indonesia: Jakarta, Palembang, Surabaya, Yogyakarta
- Mongolia: Ulaanbaatar
- Nepal: Kathmandu
- Pakistan: Islamabad, Karachi, Lahore, Quetta
- Philippines: Cagayan de Oro, Cebu, Iloilo, Lipa, Makati, Mandaluyong, Naga
- China: Changsha, Chengdu, Chongqing, Guangzhou, Guiyang, Hangzhou, Harbin, Jinan, Lanzhou, Luoyang, Qingdao, Suzhou , Tianjin, Urumqi,
- Sri Lanka: Colombo
- Thailand: Bangkok, Chiang Mai
- Vietnam: Danang, Haiphong, Hanoi, Ho Chi Minh City

Environment Ministries and Departments (19)

- Department of Environment (Afghanistan)
- Department of Environment (Bangladesh)
- Ministry of Environment (Cambodia)
- Ministry of Environment Protection (China)
- Andhra Pradesh Pollution Control Board (India)
- Department of Forest Ecology and Environment (India)
- Central Pollution Control Board (India)
- The State Ministry of Environment (Indonesia)
- Environmental Management Bureau, Ministry of the Environment (Japan)
- Department of Environment (Malaysia)
- Environmental Protection Agency (Maldives)
- Ministry of Environment, Science and Technology (Nepal)
- Pakistan Environmental Protection Agency (Pakistan)
- Department of Environment and Natural Resources (Philippines)
- Supreme Council for Environment and Natural Reserves (Qatar)
- National Environment Agency (Singapore)
- Pollution Control Department (Thailand)
- Ho Chi Minh City Environmental Protection Agency (Vietnam)
- Ministry of Natural Resources and Environment (Vietnam)



Government Agencies (13)

Development Agencies/Foundations (17)

Non-Government Organizations (67)

Academic & Research Institutes (38)

Private Sector (37)

Country Networks and Partnership Linkages

UN recognized CAI-Asia Partnership with over 230 Members

8 Country Networks

Government agencies | Cities | Development agencies

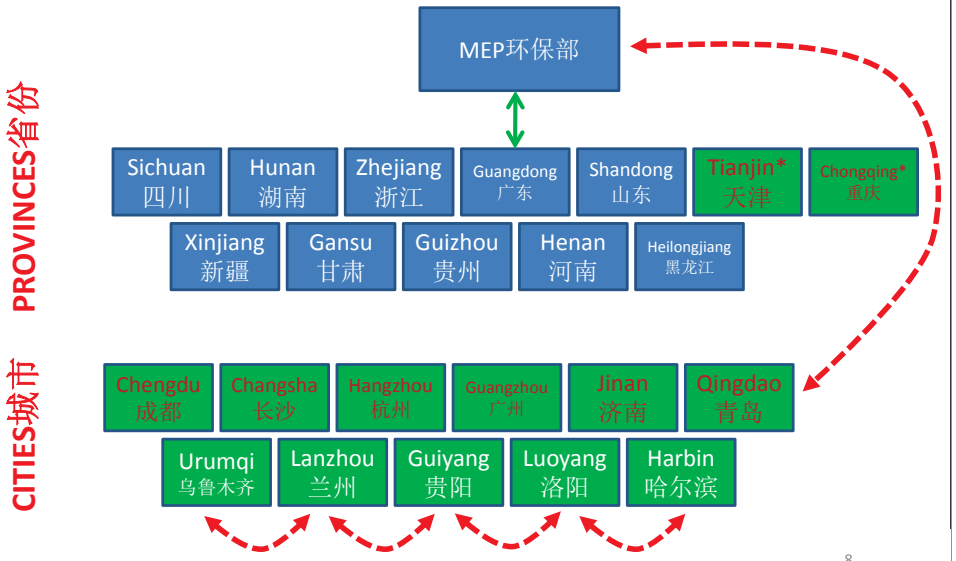
India, China, Indonesia, Clean Air Asia Center, Vietnam, Nepal, Sri Lanka, Pakistan, Philippines

NGOs, academic & research institutions | Private sector

Network of City Networks

- Asian Cities Climate Change Resilience Network
- Cities Development Initiative for Asia
- CITYNET
- Earthquakes and Megacities Initiative
- Global City Indicators Facility
- Global Energy Network for Sustainable Cities
- ICLEI-Local Governments for Sustainability Southeast Asia Secretariat
- Kitakyushu Initiative (IGES)
- Metropolis
- Sustainable Cities International
- Sustainable Mobility & Accessibility Research & Transformation (SMART)
- Union of Cities and Local Governments Asia Pacific (UCLG-ASPAC)
- Urban Age Institute

Local Presence Provides Insight into Scaling up approach in China



Networking and Partnerships Opportunities

Better Air Quality (BAQ) Conferences

- **Biggest gathering on air quality in Asia,** covering air quality, climate change, transport, energy, and industry
- It has grown into a **community of practitioners , policy makers and businesses** who meet every two years for **networking, learning and sharing experiences**
- BAQ has proven to **influence policies, initiate new projects and establish partnerships**

Governmental Meetings on Urban Quality in Asia

Organized with UNEP since 2006, bringing 18 Asian environmental ministries together to discuss national air quality management plans and climate change co-benefits.

Stakeholder Workshops

CAI-Asia organizes local, national and regional workshops with government, companies and other stakeholders to advance policies and programs:

- Air quality workshops with 14 Chinese member cities, SE Asian cities, and 6 Indian cities
- Consultation workshops on Low Carbon Transport Action Plans
- Green Freight Seminars in China and India and with multinationals
- Walkability Roundtables in India

- Consultation workshops on fuel quality, fuel economy and vehicle emissions standards and management across Asia

Green Freight Asia Network

Platform for shippers, carriers and 3PLS to

•Share practices, tools and methodologies to reduce fuel, costs and emissions from freight transport

•Ensure active participation of the private sector in the development of national green freight policies and programs

Adopted: "Private Sector Declaration on Green Freight in Asia towards a Green Economy"

Founding members:

TNT, DHL, UPS, sure we can, IKEA, Schneider Electric, DIAGEO, Keppel Logistics, 東立物流股份有限公司 Tonglit Logistics Co., Ltd., TCA

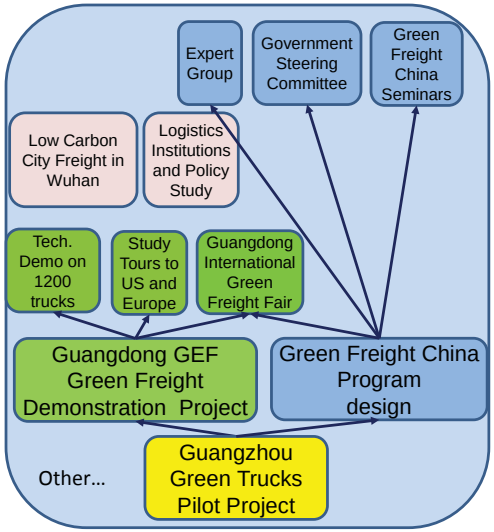
Secretariat:

The Sustainable Supply Chain Centre Asia Pacific

CLEAN AIR ASIA

www.greenfreightandlogistics.org

China Green Freight Development

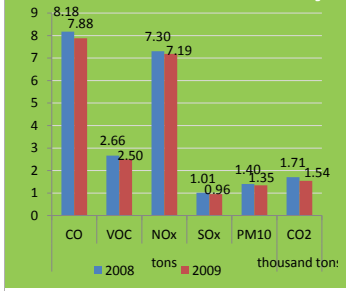


CLEAN AIR ASIA, CRTA China Road Transport Association, Guangdong Province, Ministry of Transport, Ministry of Environment, 中国广州政府 www.gz.gov.cn, ESMAP, The China Sustainable Energy Program 中国可持续能源项目, Australian Government AusAID

http://cleanairinitiative.org/portal/projects/GreenFreightChinaProgram

Clean Fleet Management Toolkit

MERALCO Case Study



16.5% improvement in fleet-wide fuel efficiency during case study period

Training on toolkit:

- **Philippines, Indonesia (Thailand, India)**
- **Latin America, Middle East, Eastern Europe**

New toolkits planned:

- **Bus fleets**
- **Truck fleets**

Roll out in Philippines

BEST

Corporate Fleets

Conveners: Clean Air Asia Center
Philippine Business for the Environment

Bus Transport Fleets

Convener: Pilipinas Shell

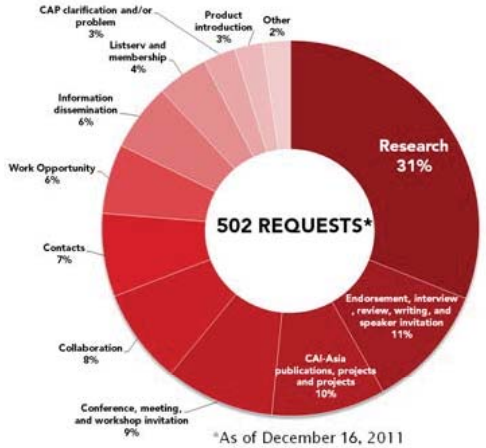
Government Fleets

Convener: Honda Foundation, Inc.

bayan, CLEAN AIR ASIA, Globe, Holcim, HONDA, Manila Water, Maynilad, MERALCO, save the air, Philippine Airlines, PBE, SKYCABLE, San Miguel Yamamura Packaging Corporation, Shell

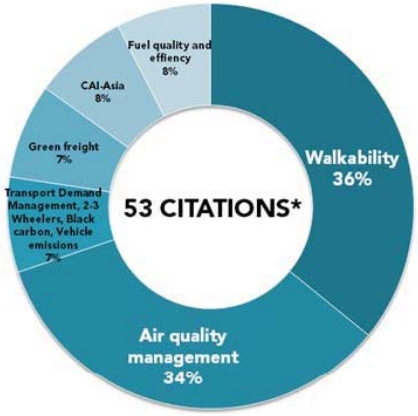
Clean Air Help Desk

Clean Air Asia's Help Desks answers over 500 queries per year covering research information and data, information on CAI-Asia's projects and publications, interviews, contacts, collaboration on projects or events and others.



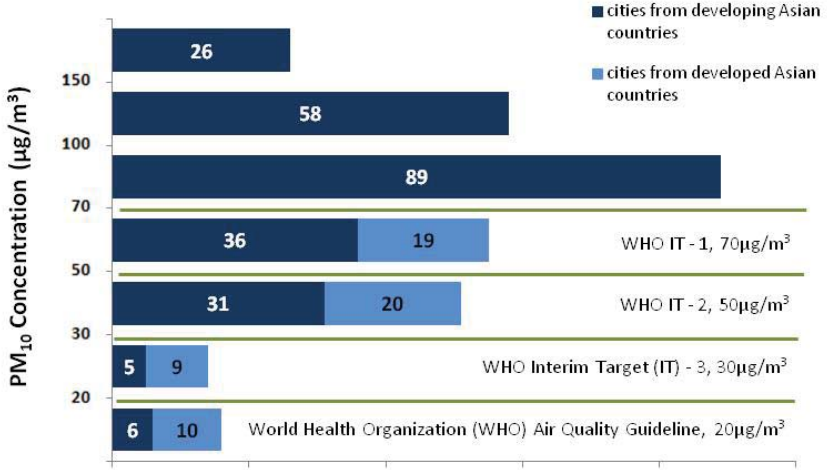
*As of December 16, 2011

Clean Air Asia's work is regularly cited in publications, presentations and speeches



*As of December 16, 2011

7 of 10 cities in Asia have harmful air quality levels



Emission standards for new LDVs

Country	95	96	97	98	99	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
European Union	Euro 1	Euro 2					Euro 3				Euro 4			Euro 5					Euro 6					
Hong Kong, PRC	Euro 1	Euro 2					Euro 3				Euro 4			Euro 5										
South Korea											Euro 4			Euro 5										
China[a]						Euro 1				Euro 2			Euro 3			Euro 4								
China[e]					Euro 1			Euro 2			Euro 3			Euro 4			Euro 5							
Taipei, China					US Tier 1									US Tier 2 Bin 7[f]										
Singapore[a]	Euro 1						Euro 2																	
Singapore[b]	Euro 1						Euro 2				Euro 4													
India[c]							Euro 1				Euro 2				Euro 3									
India[d]					E1		Euro 2				Euro 3				Euro 4									
Thailand	Euro 1						Euro 2			Euro 3						Euro 4								
Malaysia		Euro 1											Euro 2					Euro 4						
Philippines								Euro 1					Euro 2						Euro 4					
Vietnam													Euro 2											Euro4
Indonesia											Euro 2													
Bangladesh[a]											Euro 2													
Bangladesh[b]											Euro 1													
Pakistan														Euro 2[a]			Euro 2[b]							
Sri Lanka								Euro 1																
Nepal						Euro 1																		

CAI-Asia, 2011 – 2012 Update is available

*The level of adoption vary by country but most are based on the Euro emission standards
Italics – under discussion; a – gasoline; b – Diesel; c – Entire country; d – Delhi, Mumbai, Kolkata, Chennai, Hyderabad, Bangalore, Lucknow, Kanpur, Agra, Surat, Ahmedabad, Pune and Sholapur; Other cities in India are in Euro 2; e – Beijing [Euro 1 (Jan 1999); Euro 2 (Aug 2002); Euro 3 (2005); Euro 4 (1 Mar 2008); Euro 5 (2012)], Shanghai [Euro 1 (2000); Euro 2 (Mar 2003); Euro 3 (2007); Euro 4 (2010)] and Guangzhou [Euro 1 (Jan 2000); Euro 2 (Jul 2004); Euro 3 (Sep-Oct 2006); Euro 4 (2010)]; f – Equivalent to Euro 4 emissions standards
Source: CAI-Asia. June 2010. Emission standards for new light-duty vehicles

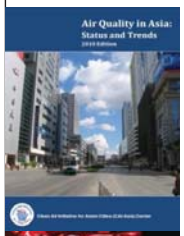
Sulfur levels in diesel

	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
European Union	500									50(10)[f]			10							
Japan[b]	500									50		10								
Hong Kong, China		500					50					10								
United States	500										15		10							
South Korea	500							430	100		30		15(10)[f]							
Singapore	3000		500								50									
Taipei, China	3000			500			350		100				50							
Thailand	2500			500					350								50			
China (metros)[g]	5000						2000		500	350			50							
China (national)[e,f]	5000						2000			2000 & 500					350					
India (metros)	5000				2500	500				350[a]					50					
India (national)	5000				2500					500					350					
Malaysia	5000		3000				500[c]							500[d]						
Philippines	5000					2000			500											50[a]
Sri Lanka	10000							5000[d]		3000&500		500					50[a]			
Vietnam	10000											500								
Indonesia	5000									3500					350					
Cambodia					2000				1500											
Bangladesh							5000													
Pakistan	10000						7000[c]													

CAI-Asia, 2011 – 2012 Update is available

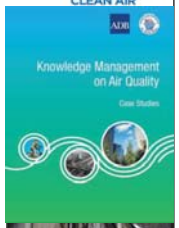
Notes:
a - under consideration/ discussion; uncertain; b = nationwide supply of 50 ppm commenced in 2003 and for 10 ppm in 2005 due to voluntary goals set by the oil industry; c = marketed; d = mandatory; e = voluntary standard of 500 ppm, however formal standard remains 2000 ppm, product in the market nationwide varies 500-1000 ppm; f = various fuel quality available; g = Beijing, Guangdong, Shanghai
Source: CAI-Asia. 2010. Current and Proposed Sulfur levels in Diesel in Asia, EU and USA

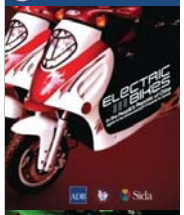
Tools & Assessments: surveys/studies



Air Quality and Climate Change

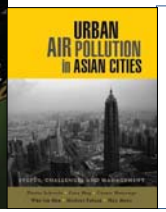
- Ambient air quality standards and air pollution levels
- Clean Air Management Profiles for ten countries with policies and institutional frameworks for air quality and climate change management
- Air pollutant and CO2 emissions indicators and forecasts from transport and energy
- Health costs resulting from air pollution related illnesses
- Asia public perception survey on air pollution
- Air quality management as part of mega-events

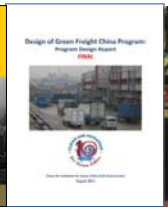




Transport

- Transport indicators for 22 Asian countries
- Fuel quality and vehicle emissions standards
- Fuel economy standards for Asia
- Walkability and pedestrian infrastructure in 21 Asian cities
- Green freight programs, technologies, logistics solutions
- Electric bikes in China, India and Vietnam





Guidance Framework Document

- Long-term Vision (LTV) on Urban Air Quality was adopted by the 2nd Governmental Meeting on UAQ
- Agree to come up with A Guidance Framework (Roadmap) to help achieve LTV

- Table of Contents for the Guidance Framework to be presented at the 4th Governmental Meeting on 6 Feb in Bangkok, for comments and recommendations
- Drafting of the Guidance Framework will require collaboration of experts, academics, scientists and practitioners

Guidance Framework Document

- Provide overview of internationally accepted standards, guidelines and practices
- Provide status of topic /area in Asia
- Identify the issues and challenges and recommendations to overcome them
- Case studies in Asia
- Guidance Areas/Topics:
  - Air Quality Standards and AQ monitoring
  - Emissions Inventory (including GHGs)
  - Health and other impacts (including link with climate)
  - Clean air plans, policies and measures
  - Communicating air quality and related information

For more information: www.cleanairasia.org

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Thyagraj Nagar Market, Lodhi Colony
New Delhi 110003
India

Clean Air Asia Country Networks

China • India • Indonesia • Nepal • Pakistan • Philippines • Sri Lanka •

Clean Air Asia Center Members

- Asia Clean Fuels Association
- Corning
- Shell

240 Clean Air Asia Partnership Members

- Cities
- Environment ministries and government agencies
- Development agencies and foundations
- Non-government organizations
- Academic and research institutions
- Private sector companies and associations

Donors in 2012 to 2013

Asian Development Bank • Cities Development Initiative for Asia • ClimateWorks Foundation • DHL/IKEA/UPS • Energy Foundation • Fredskorpset Norway • Fu Tak Iam Foundation • German International Cooperation (GIZ) • Institute for Global Environmental Strategies (IGES) • Institute for Transport Policy Studies • Institute for Transportation and Development Policy • International Union for Conservation of Nature • L'Agence Française de Développement (AFD) • MAHA • Pilipinas Shell • Rockefeller Brothers Fund • Shakti Foundation • Shell Foundation • United Nations Environment Program Partnership for Clean Fuels and Vehicles (UNEP PCFV) • USAID CEnergy • Veolia • World Bank

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- Private sector companies and associations

Donors in 2012 to 2013

Asian Development Bank • Cities Development Initiative for Asia • ClimateWorks Foundation • DHL/IKEA/UPS • Energy Foundation • Fredskorpset Norway • Fu Tak Iam Foundation • German International Cooperation (GIZ) • Institute for Global Environmental Strategies (IGES) • Institute for Transport Policy Studies • Institute for Transportation and Development Policy • International Union for Conservation of Nature • L'Agence Française de Développement (AFD) • MAHA • Pilipinas Shell • Rockefeller Brothers Fund • Shakti Foundation • Shell Foundation • United Nations Environment Program Partnership for Clean Fuels and Vehicles (UNEP PCFV) • USAID CEnergy • Veolia • World Bank

Global Atmospheric Pollution Forum

Role of Regional Networks in Global Atmospheric Governance – and Implications for Asia

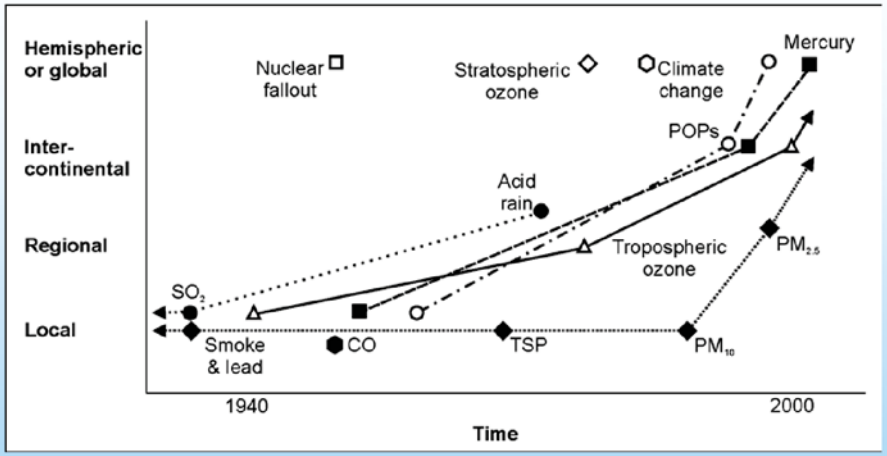
Richard Mills (IUAPPA) and Kevin Hicks (SEI)

IGES WORKSHOP
TOKYO
1ST FEBRUARY 2013

SEI STOCKHOLM ENVIRONMENT INSTITUTE

GLOBAL ATMOSPHERIC POLLUTION FORUM

Evolution of the Perceived Scale of Air Pollution Problems in the USA



Keating *et al.*, 2004

SEI

Scope of Presentation

- Need for enhanced global co-operation, particularly to control most harmful pollutants and ensure synergy with climate policies
- Possible ways forward. Strengthened regional networks operating within co-operative framework may be most effective. Catalytic role of Short-Lived Climate Pollutants
- But regional networks follow diverse models, from LRTAP to simple policy declarations, with different strengths and weaknesses. Which offer best opportunities for meeting hemispheric and global – as well as regional – needs?

Current International Co-operation Processes for Air Pollution – and their Limitations

- **Global** – treaties on Stratospheric Ozone, POPs and Mercury
- **Hemispheric** – only scientific assessments - HTAP
- **Regional** – various networks, varying for and effectiveness

Key issues:

- No international mechanisms for most harmful pollutants – Ozone and Particulates (particularly Black Carbon)
- Links between Climate and Air Pollution only emerging
- SLCPs link these two factors and can be catalyst

Pathways to Better Global Co-operation on Air Pollution

Indirect Globalization indirectly promoting global co-operation on air pollution through harmonisation e.g. product standards, ISO, and air and sea transport

Direct institutional change needed to secure environmental goals:

- new global treaty? - unrealistic
- bring within UNFCCC? - unwanted and unrealistic
- co-operation among regional networks? - more realistic – but slow

But SLCPs may now provide catalyst for faster progress

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Possible Models for Global Regulation (2) Bring main air pollutants within UNFCCC

Pros:

- Single framework for atmospheric policy

Cons:

- Added complexity
- Political gridlock
- Local pollution impacts more important for (developing) countries? Health, Himalayas, Arctic
- Global climate mitigation policies heavily reliant on trading – not appropriate for SLCPs (but could CDM be incentivised to favour local air quality improvements?)

Possible models for global co-operation (1) New global air quality treaty?

Pros:

Offers forum for shared experiences, common standards on technology, products

Cons:

Issues are local and regional so why establish global treaty?

What would Parties commit to do that was substantive?

Negotiating time and complexity.

Possible models for global co-operation (3) Building on Existing Regional Networks

Pros: Politically more feasible?

Co-benefits of air quality abatement are large

Uses existing structures

Solutions/targets can be 'customised' locally

Could link targets with climate policies

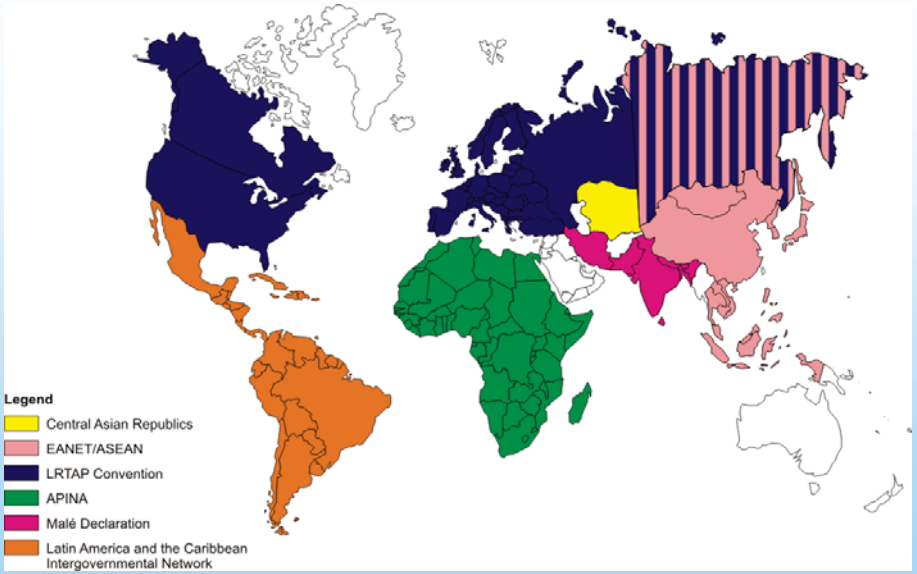
Regional networks can help deliver climate policies

Platforms exist and could be used as exemplars – CLRTAP

Science is already being 'globalised'- HTAP

Cons: Suspicion of negotiating climate 'by the back door'

Regional Air Pollution Networks



LRTAP Convention – the leading model; increasing regulatory sophistication

- Basic Model – Framework Convention and Protocols
- Increasing complexity
  - % reductions
  - BAT and BATNEEC
  - Optimized Strategies in 2nd Sulphur Protocol
  - Multi-pollutant and multi-effect approach in Gothenburg Protocol

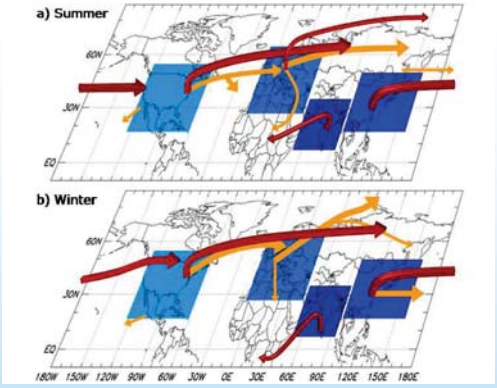
….but low ratification rate undermines effectiveness
….the best the enemy of the good?

Varieties of Regional Network

- Treaty-based – single or multi-pollutant (LRTAP Convention, ASEAN Haze Agreement)
- Science-based assessment networks (EANET, Malé, APINA)
- Regional Strategies/Action Plans (Latin America)
- Policy Declarations (African sub-regions)

LRTAP Convention: New Developments

Black Carbon included in international legislation for the first time



Task Force on Hemispheric Transport of Air Pollution (HTAP)

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Lessons from Emerging Networks in Africa and Latin America

Asia in part following LRTAP approach, but Africa and Latin America following different approach.

Key divergence - retreat from regulation and legal certainty to more voluntary and flexible approaches

Advantages - reflects cultural diversity

- allows more rapid and differentiated action
- need diverse options to reflect cultural differences

Disadvantages - less pressure on recalcitrant to progress

- weaker secretariats and processes undermine stability
- No burden-sharing

Possible Implications for Asia

- Joint Forum may be right scale for Framework Agreement – monitoring, reporting, public access to information, shared research etc
- Regional Networks could consider scope for supplementing current plans with possibility of voluntary 'alliance of willing' initiatives cf CCAC
- Regional networks could also explore scope for taking more account of climate issues and interactions.

Implications - General

- Diversity important, but can benefit from others' experience. Convergence will allow more co-operation on hemispheric/global issues
- Common model for networks needed which links voluntary and regulatory approaches; could be co-ordinated through a 'Framework Convention'; with regional implementation role on climate strategy
- Next steps:
  - LRTAP could initiate SLCP Strategy for northern hemisphere on non-mandatory 'alliance of willing' basis
  - Non-treaty-based networks could develop dual regulatory-voluntary approaches

Summary and Conclusions

- Current international co-operation processes inadequate – do not deal with most harmful pollutants
- Strengthening of regional networks and co-operation between them best way forward
- Progress slow, but catalysts could be:
  - climate/air pollution link
  - recognition of benefits from integrating regulatory and voluntary approaches.

Summary and Conclusions (cont)

- New common model for networks needed which links voluntary and regulatory approaches; co-ordinated through a 'Framework Convention'; with a regional implementation role on climate strategy

- Next steps:
  - LRTAP Convention could initiate SLCP Strategy for northern hemisphere on non-mandatory 'alliance of willing' basis
  - Non-treaty-based networks should develop dual regulatory-voluntary approaches

Thank You

GLOBAL ATMOSPHERIC POLLUTION FORUM

Opportunities to Improve Air Pollution Policies in Unified ASEAN

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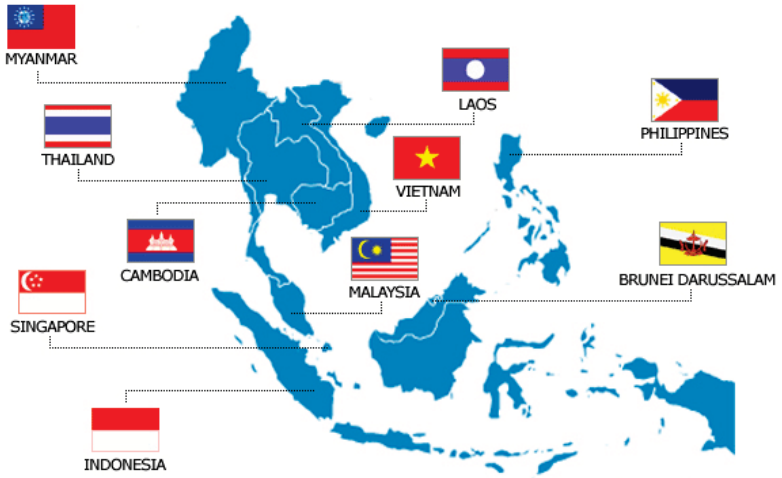
Thailand

ASEAN Countries



Economy

ASEAN and Selected Trading Partners: Population and Economy
2010 and 2011 estimated GDP

Country/Region	Population million	Gross Domestic Product US$ billion	Gross Domestic Product PPP$ billion	Estimated 2011 GDP US$ billion
Levels				
ASEAN	598.5	1,859	3,108	2,066
China	1,341.4	5,878	9,057	6,516
Japan	127.5	5,459	4,107	5,822
Republic of Korea	48.9	1,007	1,362	1,126
India	1,215.9	1,538	3,645	1,704
Australia	22.2	1,236	851	1,448
New Zealand	4.4	140	115	153
USA	310.0	14,658	14,119	15,227
EU-27	499.2	16,282	14,770	17,452

http://www.asean.org/resources/archives

Air Pollution Problems

- Domestic: Typical urban air pollution in large cities (Bangkok, Jakarta, Manila, etc.)
- Industrial: Large industrial complexes, power plants, mining (local problem in most cases)
- Natural causes: Wild fires in Indonesia, north Thailand, Myanmar, may be intensified by agricultural and other man-made activities.
- Transboundary: Haze problem from burning of forests in Indonesia, north Thailand and Myanmar.

Role of Scientific Evidence in Air Pollution's Policy Making in Southeast Asia

- In economy-based policy which is the typical policy in most ASEAN countries, environmental issues have not been priorities, unless they can also generate revenues or can be implemented at low costs.
- There are many issues for ASEAN's Environment Ministers to consider, and unless air pollution issue can be proved to be crucial to the well being of the people or economy, the priority will not be high. (Kasem Snidvongs, former Minister of Natural Resources and Environment, Thailand).

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Case Study of The Past Actions on Air Pollution Control in ASEAN

Table1.Keys dates in important air pollution politics among selected ASEAN countries

Issues	Ambient Air Quality Standards Set	Complete Removal of Lead from Gasoline	Modern Vehicle Emission Control (Euro I or higher)	Reducing Sulfur in Diesel to 500 ppm or lower
Thailand	1981	1996	1995	1999
Malaysia	1989	2000	1997	2002
Singapore	1971	1998	1995	1998
Philippines	1978	2000	2003	2004
Indonesia	1999	2008	2005	2010
Vietnam	1995	2001	2005	2007

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Complete Removal of Lead from Gasoline

- **Scientific Evidences**: Health impacts are obvious from US and other developed countries' study.
- **How did it become successful**:
  - Global trend,
  - Japan motor engine makers shifted to modern engines and emission control requiring catalytic converters
  - Thailand and Malaysia starts to assemble motor vehicles for export.
- **Role of scientists in ASEAN countries**: Supportive but not in the front line.
- **Opportunity**: With unleaded gasoline, the modern emission standards for vehicles became possible.

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Modern Vehicle Emission Control

Scientific Evidence: Emission testing results from EU and US indicates effective CO, HC and NOx control by using catalytic converter and other technology. No extensive testing in ASEAN.

How did it become successful: Vehicle manufacturing and exporting countries like Thailand and Malaysia responded very promptly to the Euro standards as well as the modern fuel specifications.

-Japanese manufacturers of motor engines agreed that older technology engines had less users globally and would cost more to keep producing them.

Role of scientists in ASEAN countries: Supportive but not in the front line. Much less activity than for unleaded gasoline.

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Modern Vehicle Emission Control (cont.)

Opportunity:

- Thailand, Indonesia and Malaysia are now exporting cars.
- In 2010 motor vehicle exports contributed 13 percent to Thailand's total exports of 6.18 trillion baht, making it the second-biggest sector after electronics and computer parts. The industry accounts for 12 percent of GDP.
- Thailand's vehicle sales in 2010was 800,357 units, Indonesia's at 764,088 and Malaysia's at 605,156.
- From the importance to the economy, there is no reason to not try to achieve the emission standards adopted in developed countries, which are the buyers for these vehicles.

Reducing Sulfur in Diesel to 500 ppm or lower

- **Scientific Evidences**: SO_2 is not ASEAN's urban air pollution problem, the lower sulfur in diesel is necessary for modern engines which will have higher emission control for other pollutants.
- **How did it become successful**: Modern emission control from motor vehicle engines require low sulfur diesel fuel, so it had to be implemented.
- **Role of scientists in ASEAN countries**: Almost none.
- **Opportunity**: Manufacturing of modern vehicles which can be exported worldwide and also for domestic consumption.

Summary of Case Study on Air Pollution Policies in ASEAN Countries

- With the region's history of air pollution abatement programs, it is concluded that the previous actions by the governments of the ASEAN nations have been supported in most part by the **changing economic opportunities**.
- The political will to improve air quality can be seen as seeking solutions which co-benefit the environment and economy.
- Economy in this context includes the countries' images such as cleaner environment which can draw tourism and boost exports.

Summary of Case Study on Air Pollution Policies in ASEAN Countries

- Looking at environmental policies of governments in ASEAN, the environmental ministers are not considered "economic ministers" and thus are regarded as less important.
- In ASEAN level, environment is in ASEAN Socio-Cultural Community, it is not directly ongoing with ASEAN Economic Community (AEC) or Unified ASEAN to be in effect by 2015.

The Current Challenge: Climate Change

- Scientific Evidence: From researches in other countries with some limited researches in ASEAN countries.
- How will it become successful: The awareness is already high due to the natural disasters such as droughts, floods, and even tsunamis, which people can relate to effect on their livelihoods.
- ASEAN's Actions: ASEAN Environment Ministers have endorsed the Terms of Reference of the ASEAN Climate Change Initiative (ACCI) in 2009. The collaboration through the ACCI will include: (i) policy and strategy formulation; (ii) information sharing; (iii) capacity building; and (iv) technology transfer.

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The Current Challenge: Climate Change (cont.)

- The ASEAN's initiative on climate change appears to focus on cooperation and sharing information and technical resources.
- The real actions on climate change depend on each member country.
- Unlike the European Union ,the ASEAN does not normally issue directives or standards that member countries have to follow, particularly on the environment.

Role of Scientists: Active in all countries of ASEAN particularly with respect to impacts and abatement measures on natural resources, sea level rise, agriculture, terrestrial and aquatic ecology.

Opportunities: Countries in ASEAN can benefit from carbon credits due to the availability of renewable resources and energy, and the exemption from reduction of GHG emissions which allow economic growth.

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The Problem of Getting Scientific Evidence to Policy Makers

"in addition to the local air quality and financial and human resource available, the cultural and social conditions are the third factor for the air quality management. ….. lack of sufficient political will, which probably can be overcome by gaining ministerial support in the country, gaining support from international agencies, especially with regard to technical and financial support; and undertaking cost-benefit analysis and health impact studies."

From: A Strategic Framework for Air Quality Management in Asia (APMA) project and the Clean Air Initiative for Asian Cities (CAI-Asia), 2004.

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Strategy for Air Pollution Scientists

"Science" in the air pollution research context in this region should be more inter-disciplinary and more complete to be understood by policy makers. This can be achieved by cooperation and guidance by several disciplines including air pollution scientists, sociologist, economists, political scientists, for example.

In order to win policies in air pollution in Southeast Asia, scientists must work closer with economists and political scientists to get realistic reports/proposals which represent co-benefit. International pressures (from the point of markets, trades, images) are required for support.

ASEAN is the forum to push for directives in air pollution, because individual nations are likely to go with the directives of the group

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Strategy to Build Political Will

- "If the international community agrees to do something, it is easier for the environmental minister in a member country to follow and implement" - Kasem Snidvongs, former Minister of Natural Resources and Environment, Thailand
- What Environmental scientists and economists have been trying to show the policy makers are the cost benefit of actions to reduce air pollution, like dollars per ton of pollutants removed or the health benefit in terms of dollars.
- The use of cost benefit numbers sometimes can be controversial, because some of the measures may still be in the development or experimental stage, and if used to demonstrate for the entire city or country, it loses credibility.

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Strategy to Build Political Will (cont.)

- The political will to improve air quality so far can be seen as seeking solutions which co-benefit the environment and economy.
- Scientists must cooperate with social and political scientists, economists, to deliver complete package of analysis to the policy makers.

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Strategy to Build Political Will (cont.)

Remaining Threats

- Even if there is political will, the environmental ministries in ASEAN are not considered "economic ministries" and are often deemed as second class ministries with almost no linkage with the key implementation agencies, for example the ministries in charge of industry, transportation and development.
- Thus there is another "gap" within the cabinet itself. This "gap" must be removed.

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Using the Past Lessons to Achieve Future Air Pollution Policies

- Unified ASEAN means free trading within ASEAN, and preparations are already underway for inter-country movement of goods.

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- The Unified ASEAN (ASEAN Economic Community (AEC)) shall be the goal of regional economic integration by 2015. This will present free trades among the member countries and provide opportunity to drive air pollution policies necessary for such integration.

Thailand purchases electricity from Laos PDR which will include those from lignite power plants. In such case it is necessary that the power plants in Laos should have similar level of air pollution control as the ones in Thailand, as it will be unfair to Thai power plants as well as burden to Laos people.

In similar manner, trucks moving goods from China through Laos PDR, Myanmar and Thailand to deep sea port at Dawei, Myanmar (under construction to be the largest seaport in the region) should comply with all emission regulations of the countries in transit.

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- Opportunities: Unified ASEAN's vehicles and emission standards, as well as industrial emission standards can be realized.
- Economic Benefits: Removal of different social and environmental costs which can eventually become barrier to effective free trade.
- Environmental Benefits: Better air quality with no "dumping" of pollutants in less developed countries.
- Role of Scientists: Must work together with environmental economists and political scientists. The report to policy makers must be professional and not over-exaggerate
- ASEAN's Role: If ASEAN adopts a directive on this, then the member countries will follow.
- Threats: Since this will prevent inequality among nations in the unified ASEAN, and will actually promote economy and images, there should be no problem.

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Conclusion

- *In order to win policies in air pollution in Southeast Asia, scientists must work closer with economists and political scientists to get realistic reports/proposals which represent co-benefit.*

- *ASEAN is the forum to push for directives in air pollution, because individual nations are likely to go with the directives of the group.*

23

Conclusion (Cont.)

- *International pressures (from the point of markets, trades, images) are required for support, and they could make things happened.*

- *Basic, hard core scientific evidences are to be systematically planned to maximize the use of the limited resources. This can be within country or multiple countries. The objective in policy must be set and efforts spent to achieve that.*

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Conclusion (Cont.)

- *We learned that there is not enough research in air pollution that can be combined to make effective results to convince policy makers in the past, so there should be certain organization acting as research coordinator. The research coordinator will be able to control research direction if it has policies-direct funding as a tool.*

- *Funding for future air pollution research for policy making should be different from the present. It should be mainly from the policy maker: the government. The research will be multi-disciplinary with analysis of scenarios and outcomes, including socio-economic impacts of options.*

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Thank you

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VOC emission reduction policy in Japan through the "best mix" of policies

Factors for success and failure

N. Matsumoto
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Governance and Capacity Group
IGES

Contents

1. INTRODUCTION

1. Introduction

- Early 2000s - Still low achievement of ambient standards for SPM and photochemical oxidants
- Opinion report by the Central Environment Council in 2004

⇒ Revision of the Air Pollution Control Law

- concept of "best policy mix" (legal control and voluntary approach)
- target: 30% reduction of VOC by 2010 compared with the 2000 level

- Results
  - Successful reduction of VOCs: reduction by 44.1 % (2000→2010)
  - Steady decrease in ambient SPM concentration
  - Ox warning numbers not reduced as expected

Question 1 "What were the factors which facilitated the success in the VOC reduction?"

Question 2 "What were the factors which hindered the improvement in the ambient level of photochemical oxidants despite the reduction in the precursor?"

2. JAPAN'S VOC REDUCTION POLICY

2-1. Historical background (1)

Japan successfully decreased air pollutant emissions in the 1970s and 1980s, and has managed to keep the ambient air concentrations leveling off since then.

- measures to reduce emissions
  - statutory ambient air environmental quality standards (EQS)
    5 pollutants (SO_2, *CO*, *SPM*, NO_2, and photochemical oxidants)
  - regulatory measures addressing stationary sources
    strict emission standards, total emission control programmes for specific areas
  - measures to address mobile sources
    Automobile NOx Law → Automobile PM/NOx Law
  - Efforts by local governments in collaboration with private sectors
    Pollution Control Agreements *(kogai boshi kyotei)*

→Compliance rates of the ambient air EQS have improved considerably for SO_2, NO_2 and *CO*.

However, those for ***SPM*** and ***photochemical oxidants*** remained low even early 2000s(OECD 2010) .

2-1. Historical background (2)

- ***SPM* and *photochemical oxidants* in FY 2002:**
  - ***SPM:*** EQS attainment rates were 52.6% at ambient monitoring stations and 34.3% at roadside stations
  - ***Photochemical oxidants****:* frequency of *photochemical oxidant warnings* increased over years and the total number of warnings during FY 2002 was 184 days in 23 different prefectures, which was still equivalent to the level of mid-1970s.

→***VOC*** emission reduction increasingly drew attention as **a common precursor of *SPM* and *photochemical oxidants*.**

- **Deliberation on the issue**
  - September 2003: MOEJ was requested to examine the potential reduction measures of VOC emissions from stationary sources through getting advice from experts .
    → The Review Committee on VOC Emission Reduction established.
  - February 2004: the Central Environment Council submitted to the MOEJ an opinion report on the emission control of VOCs.
    - warned of urgent need to address *SPM* and *photochemical oxidants*
    - emphasized the need to reduce the emissions of VOCs from the stationary sources in a comprehensive manner

→ **the Air Pollution Control Law revised** (promulgated on 26 May 2004)

2-2. Outline of the scheme (1)

- *Definition of VOCs (Article 2-4)*
  - *Organic compounds which are emitted into the air or in gaseous form when dispersed*
  - *The revised law focuses on* ***precursors of SPM or photochemical oxidants*** *– eight substances were excluded from the targeted VOCs (e.g. methane, Chlorodifluoromethane)*
- *Introduction of "**best mix**" of the policy measures*
  - *mentioned in the Basic Environmental Plan*
  - *among the recommendations by the Central Environment Council's opinion in February 2004*
  - *in this context, "**combination of legal emission control and voluntary actions by business entities to reduce emissions and spread of VOC**" (Article 17-2)*
- *VOC emission reduction target*
  - ***30%*** *by* ***2010*** *compared to* ***2000***
    10% by legal control *and* ***20% by voluntary actions***

2-2. Outline of the scheme (2)

Legal control

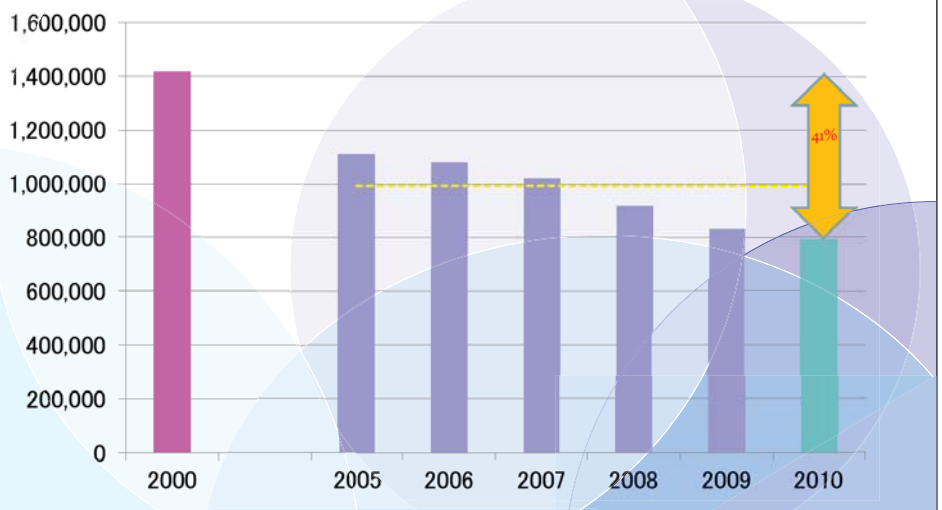
- Only large scale emitters (> 50 t/year)
  - notify installation/change of facilities
  - comply with emission standards
  - monitor VOC concentrations
- Regulated facilities
  - painting facilities
  - drying facilities (for painting, adhesives, photogravure or offset printing, chemical production)
  - cleaning facilities for industrial production
  - VOC storage tanks
- Tax benefit to purchases of emission reduction equipment

Voluntary actions

- Small and medium sized facilities / unregulated facilities
- Reduction measures and information disclosure/verification systems left to business entities' discretion
- Government expected to facilitate voluntary action
  →Joint Working Group of the Industrial Structure Council under METI
- No financial incentives provided

2-3. Policy outcome (1)

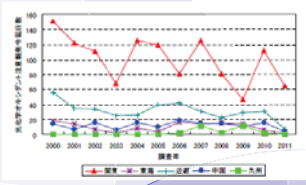
VOC emission (2000-2010) (tonnes)



2-3. Policy outcome (2)

SPM and ozone concentration – indication of reduction

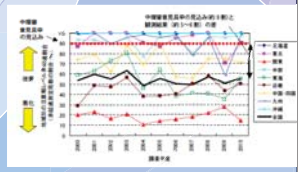
- Possibility of reduction in photochemical oxidants in highly concentrated areas
- Photochemical oxidant warning frequencies – declining trend in Tokai and Kinki areas
- Attainment rate of SPM exceeds the expected achievement (around 93%) (note: also need to consider effects of vehicle regulations)



(Ox Committee 2012)

Photochemical oxidant warning frequencies –reduction far from the expected level

- Significant gap from the ex-ante estimate: "the number of the monitors that do not exceed the warning level would increase up to approximately 90%"



(Ox Committee 2012)

3. DISCUSSION

3-1. Factors that facilitated the over-achievement of the VOC emission reduction target (1)

- Efforts by stakeholders

Industry	Compliance with the legal regulation Development and implementation of voluntary actions - 40 plans by 43 business associations (9,365 companies) in FY 2010
Local governments	Awareness raising on the VOC reduction in emitting facilities Promotion of the low-VOC products
National government	[Ministry of the Environment] • Development of emission inventory • Awareness raising through seminars, pamphlets, awards, etc. [Ministry of Economy, Trade and Industry] • Development of a countermeasure manual • Awareness raising through a compilation of good practices, seminars etc. • The Environmental Risk Countermeasures Joint Working Group of the Industrial Structure Council

3-1. Factors that facilitated the over-achievement of the VOC emission reduction target (2)

- Factors that facilitated industry's participation

[Motivation]
- In order to avoid legal regulation
- Participation by the industry representatives in the policy-making process
- Environmental awareness or strategy

[Benefits]
- Cost savings (painting, printing, industrial cleaning, etc)

[Design of the scheme]
- Designed to utilise business associations
- Follow-up scheme of the outsiders (small companies without affiliations with associations)

[Existing schemes]
- Voluntary management programme of hazardous air pollutants
- Pollutant Release and Transfer Register (PRTR) system
- Green Procurement Law

3-2. Barriers that hindered the reduction in photochemical oxidants

"The causes of the gap between the current status of photochemical oxidant warnings and the ex-ante estimate have not been fully sorted out"
(The Working Group on the VOC Countermeasures for the Next Period)

- Lack of scientific knowledge regarding Ox formation and limitation of computer simulation
- Naturally formulated VOCs (from vegetation)
- Potential for ozone formation (MIR:Maximum Incremental Reactivity) differs among VOCs.
- Area-specific conditions
- Transboundary factors

3-3. Next steps

Special committee on VOC of the Air Environment Committee of the Central Environment Council (December 2012)

- Concluded that it is appropriate to continue the current emission reduction scheme based on a mix of legal regulation and voluntary actions.
  - Importance of information disclosure and assessment
  - Considerations to alleviate burdens on the business (e.g. frequency of mandatory monitoring, etc.)
  - Continuation of emission inventory development and monitoring on air pollutants
- Proposed the dissolution of VOC committee into a new committee to address not only VOC, but also photochemical oxidants and PM2.5.

4. CONCLUSION

Conclusion (1)

- The VOC control policy can be considered as an initial step towards the multi-pollutant and multi-effect approach as it aims to reduce PM and Ox.
- While there was neither punishment nor economic incentives related to the voluntary participation, the voluntary approach led to significant reduction in emissions due to the factors identified above. This indicates potential for a multi-pollutant and multi-effect approach (i.e. VOC, an important precursor can be reduced through not only regulatory measures but also through a policy mix with voluntary approach).

Conclusion (2)

- On the other hand, the original aim, that is, reducing Ox concentration fell short of expectation. The identified factors that hindered the expected improvement indicate that further scientific research is a prerequisite for a success of a multi-pollutant and multi-effect approach. They also suggest a need to further investigation in the decision making rules under scientific uncertainties.

Major New Trends in China's Air Pollution Policies

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International Workshop on Strengthening the International Cooperation Framework and Science-Policy Interface to Promote Air Pollution Control in East Asia 2013

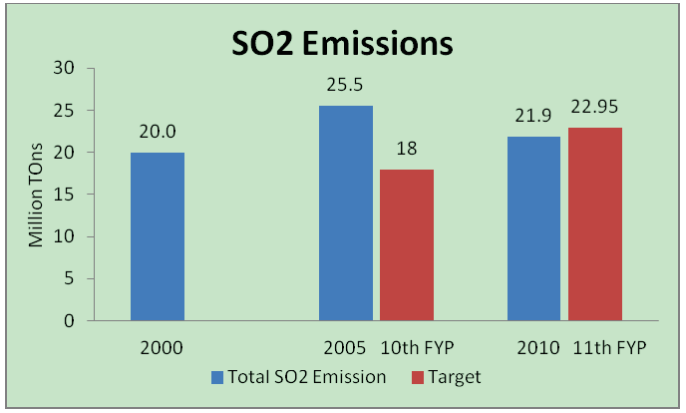
Overview

1.1 Introduction – Administrative Structure for China's Air Pollution Control

- Legal framework
  - Administrative law
  - Normative documents
  - Emission standards
- Five-Year Plans
- Institutional arrangement
- Policy measures and instruments

1.2 Introduction – Progress during 11th (2006-2010) Five Year Plan

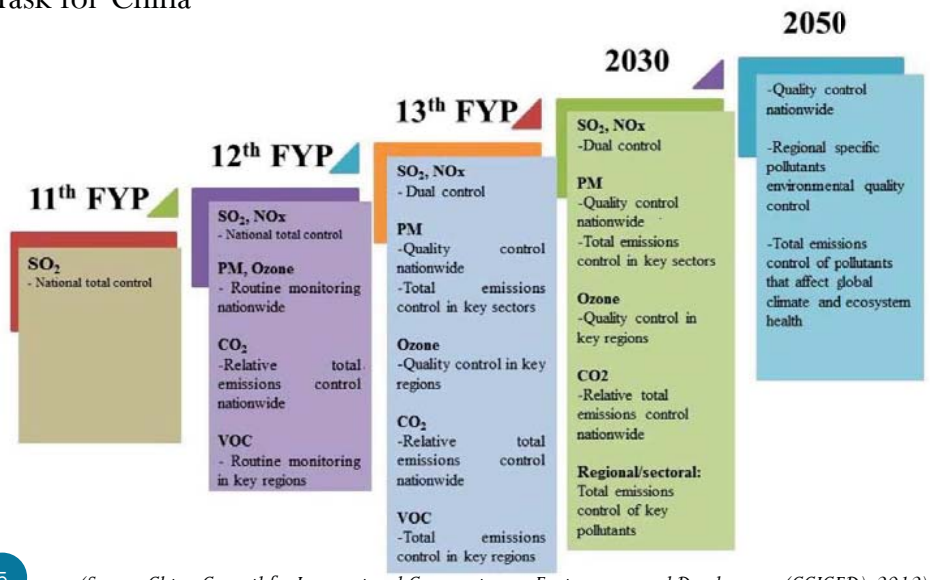
With joint implementation of a responsibility system for local governments, pollution control projects, structural adjustment, and environmental friendly economic incentives, China has achieved the emission targets in 11FYP.



(Source: China's Environmental Statistics Yearbook 2000-2010)

Integrated policy tools will be even more important for the 12FYP. The combination of strengthened penalties and flexibility will help to establish a culture of compliance which can support even more aggressive environmental targets in the future

1.3 Introduction – Improving Air Quality is a Long and Arduous Task for China



(Source: China Council for International Cooperation on Environment and Development (CCICED), 2012)

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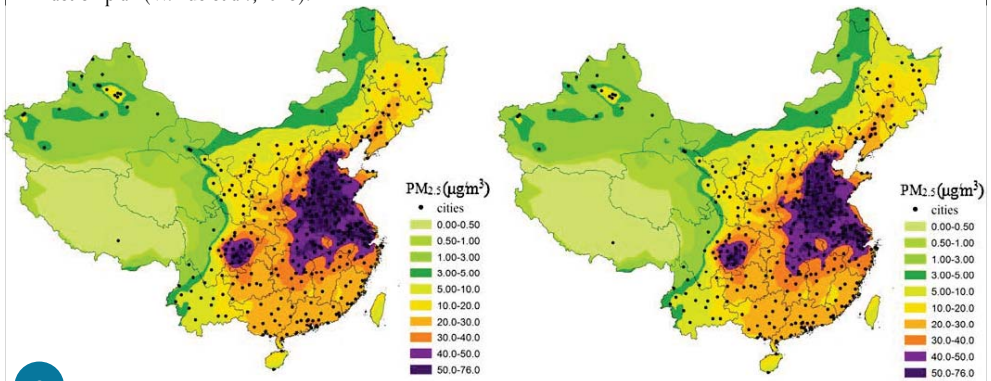
2.1 Major New Trends –Focus on $PM_{2.5}$

The Chinese Academy for Environmental Planning's simulation result of annual average PM2.5 concentrations under the 12FYP National Total Emission Control Program shows the state of heavy PM2.5 pollution in China will not change in 2015.

Key approach to reduce the PM2.5 pollution concentration should be the simultaneous control of PM, SO2, NOx, NH3 and VOCs emissions, as well as incorporating the removal of these pollutants into the national action plan (W.Xue et al.,2013).



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2.1 Major New Trends –Focus on $PM_{2.5}$

Measures for PM2.5 Implemented in 2012	
January	• PM2.5 real-time monitoring data of Beijing's CGZ station (used for research) was released.
February	• The revision of Ambient Air Quality Standard (with standard for PM2.5and O3 included first time) is released. • Technical Regulation on Ambient Air Quality Index (on trial) is released. • Decline of 15 % in PM2.5 from 2010 to 2015 in Beijing is expected.
March	• Funding from the special fund of major pollutants emission reduction in central finance for national environmental air monitoring network construction projects is declared.
May	• A detailed 3 steps plan of the implementation of the new standard is released. • The first stage of the comparison test on PM2.5 automatic monitoring instruments is finished
June	• Standards of Beijing gasoline and diesel upgraded from the Beijing-IVto Beijing-V, and provided for particulate matter (PM) emission limits for the first time.
August	• Technology policies for VOCs control called for comments

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2.1 Major New Trends –Focus on $PM_{2.5}$

October	• **Beijing reported the PM2.5 real-time monitoring data of 35 stations.** • **Beijing issued Beijing Emergency Response Plan for Heavy Air Pollution (provisional)** • **Six environmental standards including Technical Specifications, Test Procedures for Ambient Air Quality (PM10 and PM2.5), Continuous Monitoring System Technical Requirements and Testing Methods (on trial) etc. called for comments.**
December	• The first comprehensive air pollution control Five-Year Plan, requesting the average annual concentration of PM2.5 in Beijing-Tianjin-Hebei area decreased by 6% in the 12th five year period. • 496 stations in 74 cities across the country reported real-time monitoring data.
Future Agenda for PM2.5	
2013	• Monitoring network expand to 113 environmental priority cities
2015	• Monitoring network expand to every city in China
2016	• Nation wide penetration of new air quality standard, monitoring network, and public information disclosure system

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2.2 Major New Trends -Emission Standard Updates

Ambient air quality standard GB 3095-2012 (Release date: Feb 29th, 2012, Implementation date: Jan 1st, 2016)

Pollutant	Averaging time	Limit		Unit
		Class 1	Class 2	
SO_2	annual	20	60	μg/m³
	24 hours	50	150	
	hourly	150	500	
NO_2	annual	40	40	
	24 hours	80	80	
	hourly	200	200	
CO	24 hours	4	4	mg/m³
	hourly	10	10	
O_3	daily, 8-hour maximum	100	160	μg/m³
	hourly	160	200	
PM10	annual	40	70	
	24 hours	50	150	
PM2.5	annual	15	35	
	24 hours	35	75	

Industrial emission standards (Release date: June 27th, 2012, Implementation date: Oct 1st, 2012)

- Emission standard of pollutants for coking chemical industry GB 16171-2012
- Emission standard of pollutants for ferroalloy smelt industry GB 28666-2012
- Emission standard of air pollutants for steel rolling industry GB 28665-2012
- Emission standard of air pollutants for steel smelt industry GB 28664-2012
- Emission standard of air pollutants for iron smelt industry GB 28663-2012
- Emission standard of air pollutants for sintering and pelletizing of iron and steel industry GB 28662-2012
- Emission standard of pollutants for mining and mineral processing industry GB 28661-2012

Normative documents regarding vehicle emissions

•Standard for mandatory phase out of vehicles 《机动车强制报废标准规定》
(Release date: Dec 27th, 2012, Implementation date: May 1st, 2013)

•Types of newly produced vehicle and engine reached National Vehicle Emission Standards 《达到国家机动车排放标准的新生产机动车型和发动机型》
(Release and implementation date: Jan 20th, 2013)

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2.3.1 Major New Trends - Air Quality Management Related 12FYP Updates

Release Date	12FYPs for Air Pollution Reduction
16/03/2011	12th Five-Year Plan for National Economic and Social Development
09/06/2011	12th Five-Year Plan for Science and Technology Development for Environmental Protection
31/08/2011	12th Five-Year Plan Comprehensive Work Plan for Energy Conservation and Emission Reduction
20/09/2011	12th Five-Year Plan for the Environmental Health Work of National Environmental Protection
01/11/2011	12th Five-Year Plan for National Environmental law and Environment & Economic Policy Construction
15/12/2011	12th Five-Year Plan on Environmental Protection Planning
16/06/2012	12th Five-Year Plan on Energy Saving and Environmental Protection Industry
10/07/2012	12th Five-Year Special Plan of Blue Sky Science and Technology Project
21/08/2012	Task Distribution Plan for Key Departments working on 12th FYP for Environmental Planning
05/12/2012	12th Five-Year Plan on the Prevention and Control of Air Pollution in Key Regions

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2.3.2 Major New Trends – Air Pollution Control Strategies Incorporated in FYPs

- National Total Emission Control Program
  - National, top-down program with responsibility system
  - Successfully accomplished since 11th FYP
- Regional Air Quality Management Program
  - Regional, bottom-up program with much discussion but less implementation
  - Policies planned in 12th FYP, not yet practiced
- Co-control Method for Multiple Pollutants
  - Promoting con-control of major air pollutants and CO_2
  - Promoting energy efficiency and clean energy

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2.4.1 Major New Trends –Responsibility System started from 12FYP for Air Pollution Control in Key Regions

Binding Targets for Air Pollution Control in Key Regions

Target Pollutant	SO2	NOx	Industrial Smoke and Dust
Reduction in Total Emission by 2015 (%)	12%	13%	10%

Target Pollutant	PM10	SO2	NO2	PM2.5
Reduction in Concentration by 2015 (%)	10%	10%	7%	5%

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2.4.2 Major New Trends – Significance 12FYP for Key Region Air Pollution

- Most polluted regions covered
  - 3 major areas + 9 city clusters
  - 107 cities
  - 14% of China's land area
  - 48% of the population
  - 71% of total economic output
  - 52% of coal consumption
- Number of key projects: 13,369
- Estimated investment: 350billion RMB

- marks the shift of total quantity of pollutant control to overall improvement of ambient air quality: "synergy, integration and linkage" strategy for multi-pollutant control
- signs an emerging regional air quality governance is being built in China

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2.4.3 Major New Trends – Exploring China's Regional Air Quality Governance

Policies have not been decided but under discussion for regional air quality management

Establishing Governance	Innovating Measures	Building Capacity
• Establish a mechanism that unifies coordination • Establish a mechanism for joint enforcement of law and supervision • Establish a mechanism for consultation in environmental impact assessment in national major development projects • Establish an environmental information sharing mechanism • Establish an early warning mechanism	• Improve tax incentive policies • Further promote pricing, financial and trade policies • Improve discharge fee policies for pollutants such as VOCs • Fully implement discharge permit system • Implement environmental protection verification system for key industries • Implement franchising system for construction operation of pollution control facilities • Implement environmental information disclosure system • Promote compliance management of urban air quality standards	• Build a unified network of air quality monitoring • Strengthen the capacity building of monitoring and control of major pollutant source • Promote the capacity building of vehicle emission control • Strengthen capacity building in emission inventory and environmental quality management

(Source: Twelfth Five-Year Plan on the Prevention and Control of Air Pollution in Key Regions, 2012)

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3. Conclusion

PM2.5, with a detrimental impact on human health, has been placed in a core position in the prevention and control of air pollution in China. A concrete plan for environmental information disclosure reveals the strengthening public supervision over this issue.

Emission standards for air pollution are becoming more stringent. Coordination between ambient air quality standards, vehicle emissions standards and industrial emission standards is improving.

Emission control architecture is shifting from national control to national-regional control, with an approach of coordinated effort for multiple pollutants.

The current priority in the development of China's air pollution governance lays in the improvement of joint prevention and control mechanism for regional air pollution to address the transmission of atmospheric pollutants across administrative boundaries.

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