Cover Story

Out of Breath

Tackling Asia's Air Crisis

Asia's extraordinary economic growth since the Second World War has come at an enormous price to the environment, and above all, on its air.

For this cover package, Associate Managing Editor John Delury and Editorial Board member Peter Hayes assembled an international team of experts to look at the challenges posed. In particular, we sought to look at both the science and the policy-making behind the problems.

A short package of essays on an issue of this complexity cannot hope to be comprehensive, but we do aim to highlight key issues and how they might be addressed. One major conclusion is that air pollution in Asia is a problem that cries out for regional cooperation, precisely because it is transboundary in nature, as numerous authors in this cover package point out.

ESSAYS BY

Transboundary Air Pollution in Northeast Asia and Lessons from North America

By Matthew A. Shapiro

The US and Canada have a long history of forging bilateral approaches to transboundary air pollution problems, dating back to the middle of the last century. Such approaches have increased in scope over the years.

China, Japan and South Korea would do well to look to the lessons of North America as they attempt to address transboundary air pollution in Northeast Asia, writes Matthew A. Shapiro. For that to happen, China will need to take more responsibility for its contributions to the problems, while Japan and South Korea will need to own up to theirs.

TRANSBOUNDARY air pollution in North America was first formally addressed with the 1949 Trail Smelter Arbitration. The US government claimed that Washington State residents and property were negatively impacted by sulfur dioxide blowing south from the Consolidated Mining and Smelting Company of Canada, operating in Trail, British Columbia. The US and Canada formed an arbitration tribunal to establish costs for the damage caused in the US by Trail's smelters, invoking the international principle of *external responsibility*: "Under the principles of international law, as well as of the law of the United States, no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties of persons therein …."[1]

The International Joint Commission, already established in response to water pollution in shared bodies of water between the US and Canada, eventually set emission limits on the smelters and also set a recommended payment of damages to the injured parties, providing an important precedent regarding transboundary air pollution in North America.

ASYMMETRIES IN POLLUTION FLOWS

While the Trail case focused on transboundary air pollution moving from Canada to the US, flows have generally been in the opposite direction in North America. In the past, as much as 50 percent of Canadian pollution could be attributed to the US, and as much as 70 percent of the acid rain that fell in Canada originated in the US. Four times more sulfur dioxide moved from the US to Canada than vice versa, and, in Canada, acid precipitation and dry deposition of compounds that form acids when in contact with water were primarily emitted by American electric utilities. As one would expect, claims were typically made by Canada against the US.

The asymmetries present in North America are reflected in Northeast Asia. Most atmospheric scientists conclude that as little as 40 percent and as much as 70 percent of Korea's and Japan's air pollution originates in China. Asymmetries in Northeast Asia are more severe during the winter and especially the spring months when the trade winds bring even more pollution from China to the Korean Peninsula and Japan. Residents in South Korea, as a result, have significantly modified their lifestyles, closely watching weather and pollution monitoring reports, purchasing indoor air purifiers, and opting to stay indoors for as much as four weeks each year.

RESISTING SCIENCE

One would expect that transboundary air pollution problems are resolved after establishing the cause of the pollution, but this has not historically been the case in North America. Attempts by atmospheric scientists to use simulation modeling to trace the proportions of acid rain deposition to its source, known as "source-receptor relations," have been coupled with concerns about the uncertainty of complex atmospheric processes. This uncertainty initially resulted in no regulation of acid deposition precursors in the US.

While the integrity of air pollution science in the North American case was challenged on the basis of difficulties establishing source-receptor relationships, air pollution science in Northeast Asia has been attacked even more vigorously. One could even say that science has been politicized in Northeast Asia, meaning that air pollution research is being used to achieve a political or policy goal by creating doubt about research findings or to prop up questionable research. As evidence, China has consistently resisted acknowledging itself as a contributor to regional air pollution, assigning blame to natural weather patterns such as the springtime yellow dust blowing from the northern deserts. Another strategy China uses is to change the science-related narrative by questioning whether examinations of source-receptor relationships in South Korea and Japan account for domestic contributions. There may be some merit to this.

It is worth noting here that some nations have welcomed source-receptor relations, particularly those in Europe, where source-receptor relations were first utilized in 1977. Shortly afterward, the Convention on Long-Range Transboundary Air Pollution (CLRTAP) sought to establish source-receptor relations when conducting impact studies based on measurements of emissions sources and pollutant depositions in Europe. Building on CLRTAP, the Gothenburg Protocol in 1999 helped establish causality in the long-range transport of transboundary air pollution, due largely to the increasing reliance on atmospheric modeling simulations showing the connection between source and deposition of air pollution.

MODEST DIPLOMACY

Despite the lack of agreement about the science of air pollution, international environmental co-ordination has been positive and relatively important for both Northeast Asia and especially North America, where it has been occurring since the early 1900s. The US and Canada signed a Memorandum of Intent in 1980, leading to bilateral working groups to identify air pollution impacts, study the nature of pollution flows, evaluate methods for controlling emissions and predict future emission patterns. While these efforts stalled with the election of President Ron-

1 See US & Canada (1938). *Trail Smelter Case.*

ald Reagan, they established new dimensions of dialogue between the US and Canada that had not previously existed.

In Northeast Asia, building on the institutions of the Asian Development Bank (ADB), the United Nations Environment Program and the Northeast Asian Conference on Environmental Co-operation,[2] environmental regionalism has grown. For example, since 1998, the East Asian Acid Deposition Monitoring Network has been focusing on acid rain in the region. And, since 1999, the Tripartite Environment Ministries Meeting has been bringing together environmental ministers from China, Japan and South Korea to discuss shared problems. These are not minor events, but they have yet to provide a coherent solution to the problem of transboundary air pollution in Northeast Asia.

DIVERGING DOMESTIC POLICIES

In North America, reductions in transboundary air pollution have largely resulted from incremental changes on the domestic front. The US Clean Air Act (CAA) initially emphasized local over regional pollution, meaning that local governments could be in compliance with the US CAA by reducing immediately proximate air pollution. This was achieved by simply installing taller smokestacks at coal-fired power plants to move the pollution farther away, leaving long-range pollution flows virtually unchanged. We are currently witnessing a similar phenomenon with China's 2018 three-year action plan on air pollution control. As industrial processes are moved out of the Beijing-Tianjin-Hebei region, there have been emissions reductions; however, these reductions have been accompanied by increases in emissions in the neighboring areas to the north, west, and south.[3] The effects on transboundary air pollution are expected to be negligible.

Revisions of section 110 of the US CAA allowed individual states to request that the US Environmental Protection Agency (EPA) force upwind polluting states to reduce their air pollution. In the eastern US, this led to reductions in transboundary air pollution flows into Canada. This was coupled with section 115 of the US CAA, which invoked the principle of *external responsibility* by requiring that emissions affecting foreign entities be identified and reported to the leadership of the areas in which the emissions originate. Further, section 115 states that "any foreign country… affected… shall be invited to appear at any public hearing associated with any revision of the appropriate portion of the applicable implementation plan."[4]

The experiences surrounding sections 110 and 115 in North America will not apply to the Northeast Asian case anytime soon. The positive externalities generated from legislation similar to section 110 of the US CAA will not occur in Northeast Asia so long as China simply redistributes its pollution as it has in the Beijing-Tianjin-Hebei region. In addition, legislation similar to section 115 of the US CAA has no legitimacy in Northeast Asia, given that China does not acknowledge its role in regional air pollution. This was, incidentally, not very different from the North American case under Reagan's presidency: in 1981, he rejected outright claims by then-EPA Administrator Douglas Costle that the US was responsible for Canada's acid rain.

The 1991 Canada-United States Air Quality Agreement (AQA), the most formal agreement to address air pollution in North America, was rooted in the foundation laid by the 1990 US CAA Amendments. The US initially balked at agreeing to a clearly outlined mutual commitment to reduce transboundary air pollution, but both the US and Canada eventually agreed to emissions reductions that had already been outlined in their respective domestic air pollution regulations. The AQA formally reinforced both countries' adherence to the principle of *external responsibility*. Yet, the impact of the AQA has been overshadowed by improvements in North American transboundary air pollution resulting from the US and Canada's respective domestic air pollution regulations and the positive externalities they have generated for neighboring regions.

Old ways: The smelting works in Trail, British Columbia in the 1920s.

NORTH AMERICAN LESSONS FOR NORTHEAST ASIA

To repeat, the most significant reductions in transboundary air pollution in North America have been the result of domestic air pollution-related policies. However, these did not develop in a vacuum but were rooted in long-standing institutional arrangements between the US and Canada that drew attention to the source-receptor relationship and legitimized the principle of *external responsibility*. In other words, the solution to transboundary air pollution has been a function of robust domestic policies, international co-ordination and co-operation and the fostering of valid atmospheric science. All of these characteristics have been met in North America, and Northeast Asian nations have been working in that direction. It will require, however, a revamping of how each nation conceptualizes the air pollution problem in an effort to establish the principle of *external responsibility*.

Self-reflection. First of all, to eliminate gaps in understanding the air pollution problem, regional dialogue and co-ordination must go beyond efforts such as the East Asian Acid Deposition Monitoring Network or the Tripartite Environment Ministries Meeting. South Korea's demands have historically called for China to rein in its air pollution problem. China has in turn responded with calls for its downwind nations to address their own air pollution emissions before targeting

2 See details in Shapiro, MA, (2014), "Regionalism's challenge to the Pollution Haven Hypothesis: A study of Northeast Asia and China." *The Pacific Review*, *27*(1), 27–47.

3 Fang, D., Chen, B., Hubacek, K., Ni, R., Chen, L., Feng, K., & Lin, J. (2019). "Clean air for some: unintended spillover effects of regional air pollution policies." *Science Advances*, *5*(4), 1–10.

4 www.law.cornell.edu/uscode/text/42/7415

5 Updates can be found here: news.bloombergenvironment.com/environment-and-energy/south-korea-pitches-sweeping-policy-changes-to-fight-pollution

6 www.koreaherald.com/view.php?ud=20190603000610

7 www.law.cornell.edu/uscode/text/42/7415; scholarship.law.cornell.edu/cgi/viewcontent.cgi?article=1311&context=cilj

8 theieca.org/conference/coce-2019-vancouver/papers/politicization-atmospheric-science-meta-analysis-northeast

their upwind neighbor. This has had at least a partial impact as, over the past couple of years, South Korea has been attempting to reduce its domestic air pollution. Coal-fired power generation in South Korea has been significantly reduced, and there has been a marked shift away from diesel vehicles and a simultaneous embrace of electric vehicles.[5]

Rebooting diplomacy. This focus on domestic air pollution sends a signal to China that South Korea recognizes foreign as well as domestic air pollution in the source-receptor relationship. It may also signal that South Korea acknowledges China's concerns about the haphazard attribution of responsibility, which in itself could thwart diplomacy among the Northeast Asian nations. Earlier this year, South Korea also demonstrated the importance of environmental regionalism with the appointment of former UN Secretary General Ban Ki-moon as head of the National Council on Climate and Air Quality and chief negotiator with Chinese officials. Former Secretary General Ban's efforts effectively supersede the Tripartite Environment Ministries Meeting.[6]

In terms of what goals Ban should pursue with regard to transboundary air pollution, the benchmark for a truly shared understanding of air pollution is the establishment of international legal institutions. In North America, such institutions can be observed with regard to the International Joint Commission's resolution of the Trail Smelter case as well as other disputes between the US and Canada, such as air quality issues between Detroit, Michigan and Windsor, Ontario. Litigation has been made even more feasible in North America with the definition of *reciprocity* offered in section 115 of the US CAA and section 21.1 of the Canadian CAA. Referring to the US CAA, *reciprocity* means that emissions affecting foreign entities are reported, but invitations to appear at public hearings will be made so long as those nations provide "the same rights with respect to the prevention or control of air pollution."[7]

The solution to transboundary air pollution has been a function of robust domestic policies, international co-ordination and co-operation and the fostering of valid atmospheric science. All of these characteristics have been met in North America, and Northeast Asian nations have been working in that direction. It will require, however, a revamping of how each nation conceptualizes the air pollution problem in an effort to establish the principle of external responsibility.

Improving science. Regarding the science of transboundary air pollution, there must be a renewed focus on bringing together researchers and funding from China, South Korea and Japan in a way that is consistent with the spirit of the 1980 Memorandum of Intent between the US and Canada. Given that a nation's conceptualization of the air pollution problem is a function of how atmospheric science is interpreted by policy-makers, South Korea attempted to address uncertainties in the atmospheric science of transboundary air pollution through its Korea-United States Air Quality (KORUS-AQ) campaign in 2016, accounting for both foreign and local emissions when measuring air quality over the Korean Peninsula.

There have been some concerns about Northeast Asian transboundary air pollution-related research that may preclude the establishment of any scientific consensus. Specifically, a preliminary meta-analysis of published research on Northeast Asian air pollution shows that Japan-funded and South Korea-funded research focuses on China as the source of the pollution, and South Korean-based research efforts have been shown to ignore local emissions.[8] Again, China, South Korea and Japan can resolve this by increasing research collaboration and sharing the costs of research, effectively addressing and mitigating the problems most likely to politicize the science of transboundary air pollution.

Engaging sub-national governments. Whether or not a shared conceptualization of the air pollution problem can be immediately achieved, the North American case provides evidence that diplomacy must continue. It has also shown that diplomacy does not necessarily take a single form. For example, Canada attempted to engage in bilateral negotiations with the US by influencing members of the US Congress to adopt stricter air pollution standards under the US CAA. This public diplomacy led to denouncements of President Reagan's attempts to limit discussion about acid rain and focus on clean coal as a solution. In China, with its centralized political structure, it is pointless for South Korea or Japan to attempt to influence, say, the National People's Congress regarding air pollution-related matters. Yet, if there is a devolution of leadership in China with regard to air pollution, it would be feasible for South Korea and Japan to engage in air pollution-related discussions with individual Chinese provinces and municipalities.

This devolution of leadership has occurred in the US. The Supreme Court ruled in 2014 to protect downwind states from air pollution generated in other states. Indeed, individual US states have made their air pollution standards more robust to the point where their efforts to lower pollution also reduce greenhouse gas emissions. In Northeast Asia, however, the challenge for South Korea and Japan when engaging with sub-national governments in China is to avoid any challenge to the authority of the Chinese Communist Party. To this end, socio-economic benefits must be emphasized during this process, particularly the potential for improving health indicators among local residents in addition to sharing air pollution-reducing technologies and other related assistance.

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