シリーズ「発想のたまご」

Challenges of Science-Policy Interlinkages

Tokyo Institute of Technology

Rajendra KHANAL

I am the one who graduated in food technology. Despite majoring in food technology, I was more inclined towards water and wastewater analysis, and abatement of environmental pollutants. After spending couple of years in environmental laboratory after graduation, and after understanding the quality aspects and data analysis of environmental consequences, I shifted towards corporate manufacturing. Manufacturing industry is service oriented, where one needs to be aware of the needs and priority of the customer. At the same time, manufacturing industry do discharges waste, which if not properly managed leads to environmental pollution. This desire of unwinding complexity of environmental pollution drove me to undertake PhD in the field of urban environmental engineering. As a postdoctoral fellow, my research has been in identifying and quantifying temporal and spatial patterns of variation of pollutants in the urban drainage, and water and wastewater distribution system. The key research question that I analyze includes, how does distribution of pollutants occur in water environment, what are the treatment methodologies that needs to be employed for the real time management of wastewater system at the time of precipitation, how can non-point pollutant sources in the urban runoff be managed, what is the fate (build-up, wash-off and source) of these pollutants in the urban water environment, and how can the outputs obtained from science be converted to policy? Since water quality parameters at the sources are frequently changing during summer, winter, and even during dry and wet weather, knowledge of anthropogenic and natural activities on ecological dynamics is essential for the sustainable management of water environment. My postdoctoral research has been focused on three main directions: toxicological assessment, treatment, and science-policy interlinkages.

I am of the opinion that every developmental activity has some kinds of environmental and economic

consequences. The vision of the researchers, scientists and policy makers comes into play to come up with the win-win situation for economic growth, uninterrupted development and minimal environmental impact. The best-case study of the consequence of industrial development, economic growth, and environmental degradation can be learned from the Minamata disease – mercury poisoning - in Japan. The economic loss at the time of Minamata disease due to damage to health and fisheries was 12.6 billion JPY, whereas the cost of pollution control devices were merely 123 million JPY (in 1989 figure) (Source: Japan's Lessons on the Economy and the Environment: Our Pollution Experience, TVEAPfilms). I agree, economic development should be the priority in the developing countries, however, economic development should not be prioritized at the consequence of environmental degradation. The point here is to balance the overall development, which, in today's scenarios, is called sustainable development.

To achieve sustainable development and transferring the knowledge from research to policy should be done by bridging the gap between researchers and policy makers, which is really challenging. Researchers, in most of the time, focuses on particular case studies, and conclusions drawn cannot be applied to all the scenarios. Nevertheless, to have the convincing discussion – not only in academic publications but also in casual talks – one needs to show the evidences, facts, and figures. Most of the parameters in economics, environmental and developmental activities can be quantified whether it be in range, numbers, or even the qualitative grades. Quality and integrity of the data are crucial in any decision-making process. I strongly believe, any discussion with the quality data has an ability to convince the targeted audience. Scenario analysis, economic assessment, and discussion with quality data do have an ability to bridge the gap between researchers and policy makers.

For the generation of data for environmental analysis, I believe, complex environmental systems should be understood and can be better understood by understanding following key areas, i) instrumentation, ii) monitoring and statistical analysis, iii) treatment methods, iv) toxicity assessment, v) risk categorization, vi) science

communication, vii) policy formulation, and viii) capacity development. As a researcher, a deep interest in above eight categories would help one to generate quality data which can be used to convince the policy makers.

As a researcher in the field of environmental engineering, science-policy interlinkage, and sustainable development goals, I strongly recommend young researchers to build their interest in new and challenging fields. Every research is challenging, and when one changes the field, one faces both risks and opportunities (risk in a sense that no one can guarantee the success). However, I strongly believe, even the failure is a key to success. In research, nothing is absolute, and the conclusion drawn depends on the assumption taken at the time of research. Changing the field is an opportunity as it broadens ones' way of thinking in a new field. This 21st century is a research field of transdisciplinary research, so

I believe, when one researches in multidimensional field, it opens a wide range of opportunities to solve the complexities of environmental problems, waving a way for the sustainable development. For this, I recommend researchers to focus on quality control and analysis, reproducible and repeatable method development for pollutant analysis, advanced treatment of water and wastewater, capacity development, science communication, and analysis of different futuristic scenarios.

[Dr Rajendra Khanal has the PhD in Urban Engineering from the University of Tokyo and over 11 years of professional working experience leading in techno-managerial, policy research, capacity building, university-level teaching, programme development, project management, environmental risk assessment, and environmental leadership. Dr Khanal can be reached at <https://sites.google.com/view/rajendra-khanal>]