

**International Symposium on Advanced Studies by Young Scientists
on Environmental Pollution and Ecotoxicology
August 4–6, 2011, Ehime University, Matsuyama, Japan
General Discussion**

During this symposium, many young scientists stated opinions on their individual fields of research. Here, we present a summary of the discussions at the conference to address emerging issues on environmental pollution and ecotoxicology.

In this conference, the researchers from different scientific disciplines and expertise introduced their studies on environmental science. One of the common themes shared during this symposium was that we are in the business of evaluating the environmental risk, and that the risks have many different forms. Some researches focused on the airborne risk, waterborne risk and food risk. The sources of risks are also diverse; there were presentations on arsenic, mercury, radioactive elements, POPs, PAHs, PPCPs, organotins, nano-particles, natural toxins, pathogens such as bacteria, parasites, etc. In addition, there is potential synergy of the risks associated with multiple chemicals, which could be predictable to certain levels, and also the risks associated with chemicals in combination with other potential risks like pathogens and parasites. Furthermore, there are different risks in different levels and processes; on the level of individual behavior and responses against pollutions and toxins, or the level of population responses in ecosystem context to the community ecosystems. However, so far, we were not talking much about the effect of pollutants on diversified functions of ecosystem that consists of various populations. Now, we need to scale up the research field to the level of population responses in ecosystem context.

With regard to the levels of community ecosystem responses, an issue was raised regarding the pollution effects on biodiversity and ecosystem services. Although the pollution is one of the major direct drivers that can impair biodiversity and affect ecosystem services, the impact of various chemicals on the community ecosystem level is still unclear. Therefore, research on not only individual level but also population level should be the further directions of environmental science. For example, the meta-analysis for the lower food web, such as microbes (e.g., Prokaryotes and single cell Eukaryotes), zooplankton and insects, might be the breakthrough approach to clarify the effect of pollutants on overall biomass. It is also noteworthy that the isotope analysis to observe the food chain systems in ocean would provide the insight into biomagnifications of pollutants.

The chemical pollutants in the environment not only serve as sources for risks but also could be utilized as tracers to investigate how ecosystems work, to

identify the pathways that those environmental contaminants invade the ecosystems, and finally to mitigate the impacts caused by pollutants. It is an ultimate objective of risk assessment to mitigate the impacts of a lot of toxicants. The modeling analysis will be an useful tool to provide insights for visualizing and predicting the dynamics of pollutants. By using the modeling analysis, it is possible to integrate the enormous amount of data including the chemical analysis for bioaccumulation of pollutants, the isotope analysis for the structure of food chain system, the geographical analysis for ocean and atmospheric current, etc., and we can predict the material cycle of the chemical pollutants in the ecosystem. While utilizing contaminants as tracers, global climate change will be one of the major issues, because it has an impact on the dynamics of pollution and organic matters in the environment. Additionally, it would be a future task to apply modeling analysis for reducing the amount of data to detect the bioaccumulation of chemical compounds; for determining a complex system, which is not possible now to access because of lack of appropriate analytical techniques.

Combined activities are essential as a frontier field trying to invest in future, and it is necessary for us to integrate researches into an interdisciplinary framework. Here, we realized that diversified expertise is available which is intending to evaluate environmental risk. Each discipline has its own way of thinking. In this meeting, young scientists from different disciplines took enough time to introduce their own research fields. Audience from the other fields had a good chance to understand the rationale behind other disciplines. These findings will lead us to start collaboration towards interdisciplinary studies in future.

In summary, there are three words to promote environmental science towards evaluating the environmental risk; to collaborate, innovate and mitigate. We hope that this General Discussion will guide us to accelerate ideal programs for developing innovative environmental researches.