The 1st International Advisory Board (IAB)

Advisory Report

October 2015

National Institute for Environmental Studies

CONTENTS

Abstract

The National Institute for Environmental Studies (NIES), Japan, invited eight internationally active experts in the field of environmental studies to participate in and comprise the 1st NIES International Advisory Board (IAB), held from August 17 (Monday) to August 19 (Wednesday) in Tsukuba, Ibaraki Prefecture. The 1st NIES IAB was convened in order to benefit from the advice and suggestions of these invited international experts (hereafter 'IAB Members') in relation to forthcoming research activities: including the research plan for the next mid-term (4th NIES five-year plan) to develop forthcoming research prospects and inform the drafting, on the basis of research outcomes during the 3rd NIES five-year plan (2011-2015).

This report comprises a summary of the advice and suggestions of the IAB Members. In **Section 1** we outline details of the IAB; **Section 2** includes a full summary of the content of advice and suggestions received from the IAB Members following the IAB.

Research outcomes from the period covered by the 3rd NIES five-year plan, and an overview of the 4th NIES five-year plan are included in the separate "NIES International Advisory Board 2015 Preparatory Reference Materials (outline)" and consist of a modified summary of materials distributed to the IAB Members in advance of the 1st NIES IAB.

1. Overview

1.1 Main objective of the National Institute for Environmental Studies (NIES) International Advisory Board (IAB)

The main objective of the NIES IAB was to benefit from the advice of the internationally active IAB Members on the advancement of our institute's research activities based on explanations of our current activities and forthcoming research prospects.

1.2 IAB Members and advisory content

Under the direction of Prof. Dr. Miranda Schreurs (Freie Universität Berlin), entrusted with the position of IAB Chairperson, a total of eight internationally active experts were invited to participate in and comprise the IAB (see **Table 1**).

Alongside an overall evaluation of the institute, research at the eight centers into which the institute is organized was evaluated. These centers are as follows:
(1) Center for Global Environmental Research
(2) Center for Material Cycles and Waste Management Research
(3) Center for Environmental Risk Research
(4) Center for Regional Environmental Research
(5) Center for Environmental Biology and Ecosystem Studies
(6) Center for Environmental Health Sciences
(7) Center for Social and Environmental Systems Research
(8) Center for Environmental Measurement and Analysis

In addition to the respective centers above, we also elicited advice and suggestions with regards to scientific and academic contributions; research prospects with consideration to issue resolution; and international collaboration; and orientation of research planning, in relation to Environmental Emergency Research, begun at NIES in the aftermath of the Great East Japan Earthquake of 2011, as well as the forthcoming mid-term plan and research strategy which will begin in 2016 (the 4th NIES five-year plan).

In addition to the presentations and discussions by relevant NIES researchers, etc. at the main meeting, the IAB Members provided their advice on the basis of preparatory reference materials ("NIES International Advisory Board 2015 Preparatory Reference Materials (outline)") distributed in advance of the NIES IAB.

The "Summary Report on Advisory Content" (**Section 2**) consists of the summaries of advice and suggestions elicited from the IAB Members and received following the main meeting (see **Section 1.3**), on the eight perspectives which NIES identified as being of the highest priority given below:

(1) ongoing scientific/academic research and other contributions;
(2) future areas for scientific/academic research and other contributions;
(3) research and its applications, e.g. in policy, education, technology and society;
(4) international positioning of environmental research and deepening of international cooperation;
(5) collaboration between fields within NIES and with other organizations and groups;
(6) visibility of publications;

(7) directions for the next mid-term plan (in relation to institutional arrangements, aims, potential research questions, research capacity/needs, target audience, etc.); and
(8) other advice, suggestions, etc.

1.3 Meeting overview

The 1st NIES IAB was held in Tsukuba City, Ibaraki Prefecture over the three days from August 17 (Monday) to August 19 (Wednesday), 2015 at the National Institute for Environmental Studies (August 17), and Okura Frontier Hotel, Tsukuba (August 18 and 19).

The itinerary (session framework) for the 1st NIES IAB is indicated in **Table 2**. In order to facilitate sufficient explanations on research content and discussions, IAB Members conducted their deliberations, offered suggestions and advice on the basis of presentations by relevant affiliated researchers on respective research centers (Working Groups), Environmental Emergency Research (Full Board Meeting), and the 4th mid-term plan (Plenary Session <b>); 120 minutes were dedicated to presentations and discussions at each session and 90 minutes were provided for the session on the forthcoming mid-term plan.

The eight sessions (Working Groups) for the respective research centers were conducted in the form of pairs of two parallel sessions attended by four IAB Members each; the Environmental Emergency Research and 4th mid-term plan sessions were attended by all IAB Members. At the end of each session IAB Members submitted reports (Comment Sheets) summarizing their advice and suggestions on the eight items indicated in **Section 1.2**.

Following the presentations and discussions, the IAB Members conducted discrete discussions among themselves under the direction of the respective Working Group Heads, based on the content of these Comment Sheets. The Center-specific discussions were conducted among the four IAB Members attending respective Working Groups; with all IAB Members participating for the sessions on Environmental Emergency Research and forthcoming prospects at NIES. Following this, IAB Members summarized their advice in relation to each center, and Environmental Emergency Research (Advisory Content Summaries).

In a similar manner, we also elicited advice on NIES as a whole, including the forthcoming mid-term plan (Overall Summary) following the end of the meeting. One IAB Member was appointed as the head for each session, and advice and suggestions were summarized under their direction. Subsequently, at the final session of the 1st NIES IAB (Plenary Session <c>) an preliminary overall of advisory content for NIES as a whole was received, with each IAB Member (session head) making presentations of advisory content on each center's research, Environmental Emergency Research, and the forthcoming mid-term plan.

1.4 Advisory reports

Following the end of the meeting, and on the basis of the contents of the presentations and discussions, as well as the preparatory reference materials, IAB Members under the direction of each session head, created and submitted finalized advisory reports (**Section 2**). The content of these summaries will be used to inform the forthcoming research activities, etc. of NIES including the drafting of the 4th five-year plan.

This report has as its principle objective to report on the advisory content produced by the IAB Members. Research outcomes produced during the period of the 3rd mid-term plan and an overview of the 4th mid-term

plan are summarized in the “NIES International Advisory Board 2015 Preparatory Reference Materials (outline)” (see Appendix II). Those materials are a partially modified version of materials which were distributed to the IAB Members in advance of the 1st NIES IAB meeting.

Table 1. 1st International Advisory Board Member

	Name	Affiliation	Title	Expertise	WG & FBM
	Prof. Dr. Åke BERGMAN	Center for Toxicology Sciences, SWETOX (SWEDEN)	Head	Environmental Chemistry, Analytical Chemistry	● a2 b2 c2 d2 e
	Dr. Linda BIRNBAUM	National Institute of Environmental Health Sciences, NIH (UNITED STATES)	Director	Environmental Health	a2 b1 c2 ● d2 e
	Dr. James LAZORCHAK	Ecological Exposure Research Division, National Exposure Research Laboratory, U.S. Environmental Protection Agency (UNITED STATES)	Manager	Biology	a2 b2 ● c2 d2 e
	Dr. Berrien MOORE	College of Atmospheric and Geographic Sciences, Oklahoma University (UNITED STATES)	Dean	Air Environment, Carbon Circulation	● a1 b2 c1 d1 e
	Prof. Dr. Nebojsa NAKICENOVIC	International Institute for Applied Systems Analysis (AUSTRIA)	Deputy Director General	Climate Change	a1 b1 c1 ● d1 e
	Prof. Dr. Miranda SCHREURS 【IAB Chairperson】	Environmental Policy Research Centre, Freie Universitat Berlin (GERMANY)	Director	Environmental Policy	a2 b1 ● c1 d1 e
	Prof. Dr. Klement TOCKNER	Department of Aquatic Ecology, Freie Universitat Berlin (GERMANY)	Director	Ecology	● a1 b2 c2 d2 e
	Prof. Dr. Chettiyappan VISVANATHAN	School of Environment, Resources and Development, Asian Institute of Technology (THAILAND)	Dean	Waste Management, Effuluent Treatment	a1 ● b1 c1 d1 ● e

●Heads of Working Group (WG) and Full Board Meeting (FBM)

Table 2. Itinerary of 1st NIES International Advisory Board Meeting

	August 16	August 17 (Venue: NIES)	August 18 (Venue: Okura Frontier Hotel)	August 19 (Venue: Okura Frontier Hotel)
9:00		Transfer to NIES		
		9:00-10:00 **Plenary Session <a>** Overview of NIES & IAB [Room NA]	9:00-11:00 **Working Group <b1>** Overview of Waste Center [Room OA]	9:00-11:00 **Full Board Meeting <e>** Overview of Environmental Emergency Research [Room OC]
10:00		Coffee Break	9:00-11:00 **Working Group <b2>** Overview of Measurement Center [Room OB]	
		10:20-12:20 **Working Group <a1>** Overview of Regional Center [Room NB]	Coffee Break	Coffee Break
11:00		10:20-12:20 **Working Group <a2>** Overview of Risk Center [Room NA]	11:20-11:50 **Advisory Content Summary <b1>** [Room OA]	11:20-11:50 **Advisory Content Summary <e>** [Room OC]
			11:20-11:50 **Advisory Content Summary <b2>** [Room OB]	
12:00		12:20-13:30 **Lunch <a>** [Special Meeting Room, Main Bldg. 1F]	11:50-13:00 **Lunch <b>** ["TSUKUBANE", Main Bldg. 2F]	11:50-13:00 **Lunch <c>** ["TOH-KA-LIN", Annex 2F]
13:00		13:30-14:00 **Advisory Content Summary <a1>** [Room NB]	13:00-15:00 **Working Group <c1>** Overview of Social Center [Room OA]	13:00-14:30 **Plenary session <b>** NIES Forthcoming Mid-term Plan [Room OC]
		13:30-14:00 **Advisory Content Summary <a2>** [Room NA]	13:00-15:00 **Working Group <c2>** Overview of Biology Center [Room OB]	
14:00		Coffee Break		Coffee Break
		14:30-17:40 **NIES Facilities Tour**	Coffee Break	14:45-16:45 **Overall Summary** Summary of Advisory Content [Room OC]
15:00			15:15-15:45 **Advisory Content Summary <c1>** [Room OA]	
			15:15-15:45 **Advisory Content Summary <c2>** [Room OB]	
16:00			15:45-17:45 **Working Group <d1>** Overview of Global Center [Room OA]	Coffee Break
			15:45-17:45 **Working Group <d2>** Overview of Health Center [Room OB]	
17:00		Transfer to Reception Venue	Coffee Break	17:00-18:30 **Plenary Session <c>** Preliminary Report [Room OC]
18:00		18:00-19:30 **Reception <a>** [Room NA]	18:00-18:30 **Advisory Content Summary <d1>** [Room OA]	
			18:00-18:30 **Advisory Content Summary <d2>** [Room OB]	
19:00	18:30-20:00 **Preparatory Meeting** [Okura Frontier Hotel]	Transfer to Hotel	Meeting Adjornment	18:30-20:00 **Reception <b>** ["CielBleu", Main Bldg. 11F]
20:00				

2. Summary Report on Advisory Content

2.1 Overall Summary

IAB Members:

Prof. Dr. Åke BERGMAN,
Dr. Linda BIRNBAUM
Dr. James LAZORCHAK
Dr. Berrien MOORE
Prof. Dr. Nebojsa NAKICENOVIC
Prof. Dr. Miranda SCHREURS [Session Head]
Prof. Dr. Klement TOCKNER
Prof. Dr. Chettiyappan VISVANATHAN

2.1.1 Introduction

The International Advisory Board (IAB) spent the three days of August 17-19 touring the facilities of the National Institute for Environmental Studies (NIES), meeting with each of the eight main working groups, and talking with the NIES leadership and researchers.

The meetings with the center-specific working group panels were run in parallel (two Working Groups at a time) so that the IAB members were divided into different groups, deliberating in those Working Groups which were closest to their own areas of expertise. All IAB members were present for the plenary sessions at the beginning and the end of the meeting and for the final presentation on the Fukushima research area.

2.1.2 Focus regions

The IAB recognizes that NIES has a responsibility to provide evidence-based scientific studies (both natural science and social science) of relevance. It is our understanding that a primary focus of research is Japan and that since the Fukushima nuclear accident, also the Fukushima region. The IAB also notes that many important research contributions are being made to understanding environmental conditions in Asia as well as at the global level.

2.1.3 Main audience

The IAB considered who the main audience of the NIES's work is. It is the IAB's impression that NIES' research is targeted at the Ministry of the Environment, Japan, the Japanese government more generally, the Japanese academic community and the Japanese public. We recognize that efforts are being made to link NIES more strongly to research communities in Asia as well as globally. NIES work is, however, better known in Japan than in Asia or globally. The IAB notes that NIES is taking steps to strengthen its international visibility. It supports these efforts and suggests there are ways that this visibility could be strengthened, including more national and international press announcements, active participation in international conferences, and more use of new media (e.g. Twitter, Facebook). Continued efforts to publish in internationally recognized journals are also seen as important.

2.1.4 Major research areas

The IAB was impressed with the range of research areas pursued in NIES and sees much valuable research

output related to:

1) Fukushima Environmental Disaster Management and Recovery
2) Global Environmental System Monitoring, with a special focus on the atmosphere
3) AIMs modeling exercises/Socio-economic-environmental system interactions
4) Toxic & radioactive health and eco-system impacts
5) Biodiversity capsule, Genomics
6) Waste management (from an environmental and emissions perspective)
7) East Asian environmental low carbon communities.

In all of these research fields, much significant research is being conducted.

2.1.5 Overall impressions

NIES is certainly one of the most important environmental research institutes in the Asian region. More can and should be done to take advantage of this fact and to promote the research of NIES more proactively and aggressively, including for example with a communication team.

The IAB was impressed by the excellent group of hard-working, highly motivated researchers with whom we met. It is clear that there are some world-class research projects ongoing at NIES, including GOSAT I and II, the global carbon cycle research, the Japan Environment and Children's Study (JECS), the biodiversity research, and the general work on chemical analysis of organic pollutants.

NIES also has some world-class laboratories (e.g. high resolution mass spectrometry; the Time Capsule, storing examples of species nearing or already extinct; the waste management research lab; the GOSAT satellite projects; and the inhalation exposure facility).

There are many excellent research projects making major scientific contributions and implementing useful policy-relevant research. The IAB was also impressed by the excellent quality of data collected by NIES scholars and the databases they have contributed to or created. The IAB also noted the very important contribution being made by NIES to capacity building and training of young researchers in Japan (e.g. the seed money program for young scientists to develop bottom up research approaches) and to the building of research know-how, data collection, and scientific output internationally, but especially in Asia. Individual NIES researchers have also made it clear that they are actively engaged in many international research networks.

The IAB was strongly convinced of the importance and uniqueness of several of the long-term research projects being undertaken at NIES, including the Lake Kasumigaura study, pollutant data collection in Fukuoka, and the carbon monitoring projects. This kind of long-term data collection is vital for understanding trends over time and impacts that may be missed when data collection is not continuous. Although such research can require extensive budgets, the IAB sees this research as very important. Also important is the research on the Fukushima region, as Japan is in a difficult, but also unique, situation due to the nuclear accidents of 2011, to study the socio-environmental affects of disasters, to conduct research on paths to recovery, and to contribute to greater international disaster management awareness.

2.1.6 Suggestions for the future

The IAB recommends that in presenting the work of NIES to the outside more effort be made to distinguish NIES' areas of uniqueness. While the IAB recognizes that this was in part what was being done with the creation of eight working groups, more can be done to highlight the institutes' main research foci and areas of world-class science. This will be helpful in making NIES more internationally visible. As noted above, there are many areas where NIES is a global leader and these areas can be more strongly highlighted, e.g. GOASAT, the AIMS models, the Fukushima research, the Fukuoka research, the Time Capsule. Capitalize on such strengths of the institute, also linking individual research to these strengths.

Shortly put, NIES should put more focus on the forest and less on the trees. There is a very large spread of research being conducted at NIES given the size of the organization. Maintaining focus will be critical for the future.

The IAB suggests NIES continue the efforts we see being made to consolidate and increase inter-disciplinary work within NIES, across the different working groups, as well as within them.

Efforts to continue to strengthen international activities will be important to enhance NIES' global visibility and to strengthen international awareness of the high-quality research being conducted. The IAB recommends developing a science-society-media interface strategy for the whole institute (e.g. strengthening general outreach and developing a communication plan). The IAB also sees possibilities in making more use of scientific exchange programs, integrating more with universities (e.g. inviting MA and PhD students to link their research to the research of NIES), and providing seed money for young researchers to encourage them to work on areas relevant to NIES' priorities.

The IAB would also like to encourage NIES to strengthen research on human-health and environmental impacts of pollutants and environmental degradation.

The IAB supports the idea spelled out by NIES' president Akimasa Sumi that NIES dedicate itself to an Environmental Emergency Research Program. This would be a useful vehicle for presenting the findings from NIES' Fukushima research to the world as well as expanding this to other environmental emergency areas. Important could be determining what the full range of environmental emergencies that are to be worked on by the institute. Environmental Emergency Research is an area where NIES and Japan are in a special position and where global cutting edge research can be conducted.

The IAB sees the many databases and models developed at NIES as unique resources for international collaboration and frontier research. Additional points to those presented in the overview of the strategic plan for the next five years include expanding research related to living within planetary boundaries (e.g. nitrogen loads, biodiversity loss, climate change, toxic chemicals, etc.); shifting to a sustainable society (pollution prevention, resource efficiency and resource substitution (as partly captured in the idea of a circular economy), and reduced consumption), and how to scale-up and communicate best practice examples.

Furthermore, the IAB sees the ongoing efforts to promote cross-center planning as critical to the coherence of the institute and its external image. There are many complementarities in ongoing research, thus such cooperation should be encouraged. The IAB noted that there are already many ongoing efforts to work across

groups.

In the future, NIES' efforts to more strongly link research to socio-environmental questions is likely to require a greater focus on the social sciences, a still limited component of the institute. It may be necessary in the future to strengthen the social science research of NIES. This will also be true in relation to enhancing interdisciplinary research in the institute. It is important to not just have the social science contribution be an "add on" to the research of other departments but to also be a core component of NIES.

2.1.7 Reactions to the forthcoming five-year plan

The IAB agrees with the general direction proposed for the five-year strategic plan. It is an excellent idea to establish a department for promoting cooperative research projects, and we also concur with the plan to merge the health and risk groups into an Environmental and Health Risk center. The IAB strongly supports plans for an Environmental Emergency Research Program.

The IAB supports the plans to focus more in the future on emerging environmental threats, to put more emphasis on the societal significance of the research, but also believes in the importance of continued support for basic science (and especially the long-term projects at NIES).

The IAB recommends consideration of not only a strategic plan, but also the development of an implementation plan and a performance monitoring plan.

The IAB suggests adding a focus on process that would assure that work of individual centers are in dialogue with the strategic plan. It could be useful to set up cross-center working groups.

In addition to the IAB, NIES could consider setting up a standing advisory board which meets annually, or bi-annually to review a restricted number of programs (e.g. two of eight programs; with appropriate ad hoc expertise included). Consider having the chair of the evaluation board be a member of the NIES International Advisory Board (advice would be to appoint either a Japanese person or someone with an appreciation of the Japanese culture/situation).

2.1.8 International Advisory Board Meeting

Finally, the IAB would like to congratulate NIES for the very well prepared IAB meeting. The preparatory reference materials and IAB overview sent to the committee in advance of the IAB were extremely useful; the tour of the facilities was excellent; and the presentations very well prepared. Clearly a lot of work went into the presentations. NIES provided the IAB with a broad overview of the institute's activities as well as specific research projects.

For future IAB meetings or presentations to other outside groups, we recommend simpler, shorter, and more-focused presentations of material as this would help with understanding of the institute's main directions. The individual presentations were excellent, but board members sometimes found it difficult to discern the big picture. It would be helpful to first have a more general overview about the institute, its planning processes,

how decisions were reached to focus on specific research ideas, and the role of NIES within the broader governmental and research community in Japan. In terms of this specific meeting, it would have been helpful

to hear NIES' ideas about the strategic five-year plan and the relationship of the centers to this plan at the beginning rather than at the end of the meeting.

2.2 Center for Global Environmental Research

IAB Members:

Dr. Berrien MOORE
Prof. Dr. Nebojsa NAKICENOVIC [Session Head]
Prof. Dr. Miranda SCHREURS
Prof. Dr. Chettiyappan VISVANATHAN

2.2.1 Ongoing scientific/academic research and other contributions

The work of the Center for Global Environmental Research (CGER) is world class. In particular, the Greenhouse gases Observing SATellite (GOSAT) and the Asian Integrated Modeling (AIM) projects are central to this success. These will continue to require ongoing and constant funding. Both of these represent important contributions to international and national scientific communities and knowledge.

The main areas for potential improvement at CGER would be to facilitate better communication and improved outreach; better visualization of results; and re-vamping of the institute website. The foregoing might take the form of short video clips, educational videos and E-games, easy-to-understand presentations and finally much closer work with the media.

The Center is doing a good job of bringing in external research funding for its various undertakings.

The Center should take advantage of its attendance at COP 21 to highlight all of these outcomes and the ongoing and future work being done.

2.2.2 Future areas for scientific/academic research and other contributions

The work which is ongoing should be maintained into the future, with a greater emphasis on improving the linkages between bottom-up and top-down approaches. In terms of research focuses, specific attention should be given to improved determination of the nature of terrestrial sinks; determination of anthropogenic fluxes; clarifications of the interaction between oceans and atmosphere; and ocean-based monitoring. In addition, CH_4 research should be added to the research brief of the soil warming experiments. Increased coupling across models—water, agriculture, land-use, etc. – is also advised. Low emissions pathways and the feasibility of net-negative emissions from carbon-cycle and technological, economic and social dimensions should be assessed.

2.2.3 Research and its application (e.g., in policy, education, technology, and society)

Greater attention should be paid to efforts for scientific communication. A specific suggestion would be that every paper published should be accompanied by a press release which would include a key simple graphic, and possibly a video. Other central forms which such outreach activities might take are policy dialogues, blogs and fact sheets.

2.2.4 International positioning of environmental research and deepening of international cooperation

The Center is advised to continue building bridges and fostering collaboration with other laboratories and universities engaged in carbon cycle research. Efforts should be made to further disseminate and make

well-known the data and modeling results.

The AIM team is well-known for hosting and including researchers from Asia; this should be enhanced and nurtured. As the Center hosts the Global Carbon Project Office in addition to a number of added-value functions and activities, the data and modeling thus available represents a valuable resource. On this front and in other respects the possibility of commercial interest in the activities and outputs of the Center, which could be cultivated by marketing, and this is potentially work which should be pursued.

2.2.5 Collaboration between fields within NIES and with other organizations and groups

Expanded collaboration with the Center for Social and Environmental Systems Research and the Center for Regional Environmental Research is strongly encouraged. This could yield research avenues and outputs with the potential to inform efforts to enhance social behavior and lifestyles.

Closer collaboration should be pursued both within NIES and with external bodies that have well-developed component models internationally. Examples of the latter would include NASA or ESA. Integration of the nexus in terrestrial modeling looks very promising and should involve a wider NIES research portfolio.

We were also impressed with the importance of work looking at the relationship between ozone layer and climate change which should continue to be developed.

Visibility of publications

One suggestion to facilitate increased visibility of publications would be that every paper published by any persons affiliated with the Center should be accompanied by a press release. This and other efforts could be made in order to increase public awareness of the Center's activities and it is also advisable that relationships with the press be built up. Activities to further this particular aim might include information workshops aimed at the press and soliciting the support of scientific writers or communicators. The members of the Working Group strongly encourage the Center to enhance its online presence. To achieve this the Center should devise a visibility strategy.

2.2.7 Directions for the next mid-term plan

The next mid-term plan should incorporate an increased focus on the climate-carbon system.. Anthropogenic flux terms should also be of a high priority when the Center defines its strategies and objectives under the forthcoming mid-term plan.

2.2.8 Other advice, suggestions, etc.

The Center is doing extraordinary ongoing work and the research with which we were presented should be consolidated and maintained. One area which should definitely be improved is that regular press releases about the research at NIES and publications should be instituted as a guiding principle for the development and visibility of research at the Center.

As the research being pursued by the Center is critical for understanding earth-human system interactions, the bridging to the social sciences is also critical. In addition to fostering such internal ties the bridges to the government and stakeholders should also be strengthened. The Center's upcoming attendance and Side Event at COP21, represents a unique opportunity to communicate its messages and achievements via communication friendly presentations and exhibitions.

The IAB is of the opinion that any geoengineering work which may be under consideration would be of questionable value. Radiative forcing management in particular does not serve to compensate for other consequences of climate change: for example the acidification of the oceans. This work would also carry with it negative implications from the policy point of view.

2.3 Center for Material Cycles and Waste Management Research

IAB Members:

Dr. Linda BIRNBAUM
Prof. Dr. Nebojsa NAKICENOVIC
Prof. Dr. Miranda SCHREURS
Prof. Dr. Chettiyappan VISVANATHAN [Session Head]

2.3.1 Ongoing scientific/academic research and other contributions

The presentations and associated discussions which we heard during the session was an excellent overview of quantitative and quality research outputs of the Center. However, more emphasis should be given to the description of the overall "storyline", i.e., how these individual activities will contribute to the key research questions. What are the overall conclusions from the systems perspective?

Many of the research strands and themes are biased towards incineration. While this weighting is very relevant to Japanese context, it does not necessarily hold the same research importance in other Asian countries. Nevertheless, there is a scope for expanding these research ideas beyond the Japanese context, to address other relevant issues that are prevalent and thus applicable in other countries in the region or at a global level. The information brochure for the Center is very nicely done—it is easy to understand. When conducting research in SE Asia it is important to incorporate a team of local scientists into the research to expand scientific understanding in those countries.

2.3.2 Future areas for scientific/academic research and other contributions

(1) New and emerging wastes

For forthcoming research needs both in the immediate and long term, NIES should look into the many emerging waste types in urban context, for example *tyre waste; food waste; absorbent hygiene product (AHP) wastes; multi-layered packaging materials such as beverage/drink cartons; Nano waste (plastic bead in wastewater); and PV panel waste*. It will be interesting to research how these emerging wastes will change Municipal Solid Waste (MSW) composition. Other trends seen in developed countries are the declining proportion of traditionally prevalent waste types (such as E-waste in the USA). Due to increased E-waste recycling and recovery, the E-waste proportion has begun to decline at landfill sites, and other new waste types are emerging. Such studies therefore hold a remarkable research value in identifying (future projection of waste) and preparing the cities/countries toward technology and policy needs for addressing emerging wastes entering the MSW stream.

(2) 3R policy and their impacts

On one hand the research ideas here are mostly related to incineration and biogas generation, and on the other hand, the Center are also promoting 3Rs. Thus it will be of high necessity to gauge how the 3R performance will affect those technologies which are promoted. For instance, with the successful implementation of waste reduction and reuse, there may not be enough (type and quantity) of waste for energy recovery. One classic example is plastic waste; if plastic wastes are recycled (for material recovery), these high calorific plastic wastes will not be available to the incineration facility, and which hence may jeopardize the design capacity of the incineration established.

(3) 3R and/or Low Carbon Society

Incinerations in Japan were designed for waste disposal facilities (due to land scarcity), and not necessarily for waste to energy recovery. The research should also focus on the incineration technology trajectory, how it has evolved from mere waste burning to energy recovery facilities. Is 330-400kWh/tonne of MSW acceptable, while the industry bench mark is 500 kWh/tonne of MSW?

(4) Material Flow Analysis/global flows and supply chain management related research

There are very good Material Flow Analysis (MFA) research ideas on cadmium and nickel, however, looking at the regional need, it is advisable to conduct MFA of mercury too. Also, along with the macro/global level of these substances flow, it is useful to conduct MFA of various MSW waste types (plastic, beverage carton, tyre waste etc.) to identify the stock and flows of these waste types for setting management priorities (based on the flow & stock).

(5) Domestic liquid waste/Johkasou

This particular research is of a different nature to other items in this section. It is advisable to link this issue to wastewater reuse to support urban water security (i.e., 3Rs in water sector). Due to rapid urbanization and industrialization, both the water quality and quantity are under threat in Asia. Most Asia-Pacific countries face an imminent water crisis unless immediate steps are taken to improve the integrated management of freshwater resource, along with realizing the alternative water such as storm water and wastewater as potential solution to the water security. The 3R in water sector should/can explore; reduce (reducing water footprint through various demand management strategies), reuse and recycle principles and wastewater treatment technologies for wastewater reclaim and reuse (especially for urban uses). Nevertheless, the issues of fatty/grease waste conversion into energy is an interesting idea. Such projects have been conducted in London, where the 'fatbergs' have been converted to energy.

(6) Research on asbestos and POPs

These are great research ideas with very strong/complex analytical methodologies used. NIES can include the transfer of these research methodologies to other countries as part of capacity building projects. Development of tools for planning waste management systems is an excellent research idea.

2.3.3 Research and its application (e.g., in policy, education, technology, and society)

These proposed research ideas are more of a technical/scientific nature, and lack the policy, education and societal aspects. Various capacity building/mobilization components (for the transfer of research methodologies, technology transfer etc.) can be the part of NIES' research package. Also, research on stakeholder network analysis and mapping for the above mentioned research topics can be added. Similarly, simulation games and e-module courses on the findings of NIES' research can be a good outreach method.

It might be useful to integrate the research of university students (by supporting students' research/thesis through NIES) into the NIES research profile can be a good means of educating next generation scholars and raising awareness. Such tie-up can create opportunities for papers published in peer-reviewed journals.

2.3.4 International positioning of environmental research and deepening of international cooperation

NIES' work seems to be confined to Thailand (to a large extent-80% of research) with slight penetration to

Viet Nam and Philippines. If NIES wants to position itself as a research leader in the region (and cultivate the international context), it needs to include countries like India and China. Some suggested ideas are; stronger interaction with local groups of scientists, more “symmetrical” relationships of joint measurements and research in Japan and abroad, and more joint measurements and publications, and also explore how can the Japanese technology help other Asian countries etc.

2.3.5 Collaboration between fields within NIES and with other organizations and groups

Need to work very closely with the MOEJ initiative of 3R regional forum.

2.3.6 Visibility of publications

Publication visibility of NIES is not very promising now and there is a great scope for improvement. NIES can prepare and publish easy-to-understand materials, such as technology factsheets, policy briefs, etc. like the Institute for Global Environmental Strategies (IGES).

Continue to focus on international publication in peer review journals as the data being generated is very important. Continue to focus on both national and international presentation of findings at conferences and in other forums, rather than simplify releasing the research data/results on the website.

2.3.7 Directions for the next mid-term plan

Research focus seems very Japan–specific. To increase its international presence, NIES needs to widen the scope of its research subjects and geographical coverage.

Linking to broader questions on sustainable development and limited resources at a global level could be useful. Consider *the goal of creating a major report based on the work of the entire Center at the end of the next five- year plan on this question*—looking at waste: reducing resource loss and emissions while promoting health and ecological safety. Japan has many technological skills in incineration; nevertheless, it would be useful to deepen studies on the options that are not pursued (e.g. material recycling) when waste incineration technologies are used.

2.3.8 Other advice, suggestions, etc.

Other research focus can include circular economy (CE), eco-industrial clusters for resource efficiency. How the CE approach will positively or negatively affect the recycling businesses/industries? The CE approach adopts a new and expanded recovery hierarchy, which puts recycling in the least preferred options, as compared to reuse, revalue, and up-cycling. In such context, it would be interesting to study the potential impacts on recycling facilities, especially the small-scale recycling factories and informal recycling sector.

2.4 Center for Environmental Risk Research

IAB Members:

Prof. Dr. Åke BERGMAN [Session Head]
Dr. Linda BIRNBAUM
Dr. James LAZORCHAK
Prof. Dr. Miranda SCHREURS

2.4.1 Ongoing scientific/academic research and other contributions

1) The research being pursued within the center is excellent
2) Major environmental tasks are being addressed through the projects
3) Significant scientific achievements on a limited budget
4) It is important that nanomaterial toxicology research is being conducted in parallel to the ecological risk assessment and management of chemical substances
5) Prepare a “Summary for decision makers” on your research, emphasizing your results that are of particular use for improved decision making, to NIES stakeholders

The research being pursued is excellent, despite the limited budget. Major environmental tasks are addressed through projects on EDCs, nanomaterials and managing risks through strategic approaches. Including “Research Program on Risk Assessment and Control of Environmental Chemicals” in the project portfolio makes a “four clover” from which the projects emerge. There is a rather high degree of diversity in the projects being carried out. It is not evident whether the current project portfolio is organized in an integrative and cost effective manner within this Center. It may be worthwhile to invest in some advanced communication within each program and between the programs. It is not clear how much interdisciplinary communication has taken place during this research period. It is highly encouraged that the achievements within the Center for Environmental Risk Research 2011-2015 are written up in a summary for decision makers to present to stakeholders.

Consider incorporation of a prioritizations process for which chemicals to assess. For example, EDC and pharmaceutical research on existing chemicals should be prioritized in a national study of the frequency of magnitude of such chemicals. Subsequently, select a number of compounds within an MOA to assess using current and future risk assessment testing. It is important that nanomaterial toxicology research is being conducted in parallel to the ecological risk assessment and management of chemical substances.

2.4.2 Future areas for scientific/academic research and other contributions

1) Please clarify the relationship between the Center’s research goals and the goals of NIES.
2) Please prepare a strategic plan for the Center on the basis of an overarching plan for NIES, and link to an operational plan
3) Focus on some main areas involving more researchers, i.e. improve collaboration between centers and researchers to strengthen risk assessment.
4) Continue support for long-term field research.
5) Develop international collaboration

Future research programs/initiatives can be built on the main areas for 2011-2015 if the strategic plan points

out these areas as focus areas in research for 2016-2020. Based on the strategic plan an operational/management plan can be set up. Consider not to focus only on the research goals of individual projects but also on the processes that could strengthen communication, integration, and involvement of the public. All this is intended to direct the research into a more coherent and focused approach.

The projects can be decided on after these plans have been set up, but should include nanoparticles, EDCs and emerging chemicals, as they seem both logical and important to develop, as well as methodological studies. There is a need for integration within and across centers to increase interdisciplinary and cost effective approaches to assess risk. It may be possible to combine evaluation and testing of eco and human risks in water and soils for chemicals.

2.4.3 Research and its application (e.g., in policy, education, technology, and society)

1) It is important to build a strong component addressing risk assessments, including the full power of the research and activities being done in relation to health and environment responses to chemical pollution.
2) The possibility of merging Center for Environmental Health Sciences with the Center for Environmental Risk Research to reach the goal of having created a structure with the potential of giving NIES another world leading activity is encouraged.
3) It is important to develop a strategy that allows division of the efforts to satisfy both basic research needs and research of key importance to the Japanese society.
4) There is a potential in developing some general education activities (cf. below).

It is important to develop a strategy that allows division of the efforts to satisfy both basic research needs and research of key importance to Japanese society. The environmental problems related to both hazard identification and risk assessment are extensive and stakeholders require knowledge and guidance on how to act (similar needs for both companies and/or authorities). This type of interaction will likely drive a positive decision-making process, improve the policy in the direction of sustainable development to the mission to “use and produce chemicals in ways that minimize significant adverse effects on human health and the environment”.

It is important to build a strong component addressing risk assessments, including the full power of the research and activities being done in relation to health and environment responses to chemical pollution. This is based on toxicological and ecotoxicological method development, mechanism and effect studies on one hand, exposure assessment and modelling on the other. By using the full power of existing competences in these areas NIES has the potential to become a world leading institute on chemicals, health and environment. No firm risk assessment can be done unless many competences are involved. Further, there are so many similarities between wildlife and common experimental species for human risk assessments (rodents), but still differences, sometimes unpredicted. However, computational toxicology/ecotoxicology is an important tool in this context.

The exposure assessment is very strong in Center for Environmental Measurement and Analysis, covering advanced methodology developments and carrying out exposure analysis, and monitoring of any matrix being selected for analysis. The IAB propose to NIES to prioritize an incentive to identify activities within the institute to strengthen toxicology sciences contributing to risk assessments, and to consider the possibility

of merging relevant activities to reach the goal of having created a structure with the potential of giving NIES one more world leading activity, i.e. to merge the Center for Environmental Health Sciences with the Center for Environmental Risk Research.

In case this is approved as a path forward it has to involve all relevant partners within the institute and possibly with further advice and contacts with some professionals in leading roles from the outside. It is a major undertaking but a possibility for strengthening Japan's position on assessing chemicals, health and environment (wildlife).

In addition, there is a need for some general education activities. This is particularly important for nanosafety but also for hazardous chemicals (EDCs, in particular). This can be done through popular science publications or reports. It can also be part of information on the website. Indeed it is important to make this research accessible to a general, non-scientific audience in Japan and globally.

2.4.4 International positioning of environmental research and deepening of international cooperation

1) It may be wise to investigate potential for adding key research groups from international academic counterparts to the directions and competences within the Center for Environmental Risk Research and the Center for Environmental Health Sciences.
2) Try to strengthen the comparative dimensions of the research.

Even though NIES may have numerous collaborators in Japan, it may be wise to investigate potential for adding key research groups from international academic counterparts, thinking of a new center where the Center for Environmental Risk Research and the Center for Environmental Health Sciences have merged. It would be particularly beneficial if the partner can complement the research areas/projects pointed out in the plans suggested to be prepared. Joint research should strengthen the comparative dimensions of research.

Both senior and younger scientists should identify key conferences for their research fields to join and actively participate in. Such conferences may be the right meeting place for future research expansion.

2.4.5 Collaboration between fields within NIES and with other organizations and groups

1) There is a need for more interactions with other NIES groups
2) More leveraging of resources in other organizations should be pursued

Please see 4 above. It may be possible to survey the international arena for potentially interesting partners for cooperation; partners with a diverse palette with discipline areas and interested in interdisciplinary work. This is more general advice to NIES than to specifically one or two centers at NIES – there is a need for more interactions with other NIES groups. Also more leveraging of resources in other organizations should be pursued in order to compensate for declining budgets. More collaborations with and funding by the private sector may possibly be investigated. There are existing international activities and collaborations. These efforts should be continued and strengthened where possible.

2.4.6 Visibility of publications

1) Evaluate not only the number of publications produced annually per principal investigator (PI), also evaluate the average annual H-index.
2) Publish as “Open access”
3) Publications for policy makers and the public to expand awareness and improve visibility can be considered.
4) NIES may consider to improve the promotion of publications

Identify the journals that fit the best for the topic; should be international science journals publishing in English. The higher impact journals are more widely read but also open access publication is promoting the dissemination. NIES can promote at least some of the publications coming out by sending out press releases and promoting media to bring up relevant science articles. The publications should of course be promoted on the NIES webpage. Publications for policy makers and the public to expand awareness of the research issues in focus.

Evaluate not only the number of publications produced annually per PI, also evaluate the average annual H-index. Academics consider the H – index when evaluating the importance of a Professor’s research, there should be a way to evaluate the overall average of the lead PI’s contribution to the center as a whole. In this way you can judge overall impact of the Center by its overall citation rate.

2.4.7 Directions for the next mid-term plan

Consider integrating the group more strongly into other sections of NIES.

1) A strategy group may be of value for NIES and/or the Center
2) Try not to over-commit
3) More focus on computational modeling, development of big data approaches

NIES may initiate a process, if not already in place, to develop NIES over the coming 10 years. This can be made by forming a strategy group of NIES professionals and possibly add one or two persons from the most important stakeholder groups. The strategy group may have a continuous inventory of potential and important research questions. One advice is to prepare a strategy plan for NIES.

Consider downsizing the Center’s research portfolio to better reflect the budget and amount of people available to conduct research. Explain to your existing stakeholders and the MOEJ, that the past level of effort needs to be reduced in order to maintain the quality of your science and the morale of your scientists. Try not to over-commit. Seek collaborations with industry or private organizations to increase funding levels. However, sustain institute measures to maintain scientific integrity and trust of your governmental stakeholders.

Consider integrating the group more strongly into other sections of NIES. It would be useful to know more about why certain research priorities exist and how this relates to major environmental and health needs of the Japanese public. It could also be possible to integrate the research of this group more strongly with research being conducted in other sections of NIES, for example, with a research group that cuts across two or more of the eight research groups at NIES.

2.4.8 Other advice, suggestions, etc.

1) NIES has excellent research and forthcoming prospects.

2) Need to integrate various programs

3) Consider how research priorities are set and how the research of NIES is used by other Japanese actors.

NIES has excellent research and forthcoming prospects. Try to present these merits as often as possible. Need to link individual projects from 3rd 5 year plan to clear goals. Also, more application of modeling approaches and empirical confirmation.

In presenting the group to outsiders, it would be helpful to clarify more about the processes by which decisions affecting the group are made. How are research priorities set and how is the research of NIES used by other actors, including the Ministry of the Environment and other government agencies? You could also track newspaper citing of the work of members of the Center.

2.5 Center for Regional Environmental Research

IAB Members:

Dr. Berrien MOORE
Prof. Dr. Nebojsa NAKICENOVIC
Prof. Dr. Klement TOCKNER [Session Head]
Prof. Dr. Chettiyappan VISVANATHAN

2.5.1 Ongoing scientific/academic research and other contributions

The research presented is of very high quality and covers an impressive range of scales, systems, and topics. The center successfully integrates empirical data, experimental research, and advanced modelling tools. The research outcomes are of high societal and political relevance.

Given the importance of the influence of Chinese emissions on air quality in Japan, one should strongly consider to improve the current “input estimates” beyond Fukuoka City instrumentation (which is indeed a very important infrastructure). An expansion of the network in Japan would be desirable. In a similar direction, one should seek ways to also better estimate aquatic inputs into the East China Sea.

More emphasize should be given to outreach and interpretation of the achieved results for policy both public and private. A clear “storyline” of how the excellent work on water basins and regional air pollution is related could be developed and exhibited.

2.5.2 Future areas for scientific/academic research and other contributions.

Again, one should consider to improve the current “input estimates” beyond Fukuoka City instrumentation (e.g. use of the ABI instrument of JMA; Himawari-8 weather geostationary weather satellite) and to improve aquatic input estimates.

The long-term monitoring and research programs (e.g. on Lake Kasumigaura) are key assets of NIES in understanding the causes and consequences of rapid environmental change, and in developing appropriate management strategies. One should consider to better exploit these data, in particular by joining national and international networks (e.g. GLEON) and by taking leadership for joint data analyses and meta-analyses.

One should consider to establish collaboration with the upcoming launch of GEO-Kompsat 2B (air quality, ocean color, etc) as well as with further international programs (e.g. NASA pollution monitoring named TEMPO, launched 2017/18).

One may strengthen the integration between water, soil, and air in terms towards sustainable development (and across various scales). In the same line, one should consider to move from ecosystem functions to ecosystem services.

A clarification of what “regional” means is required to improve research integration across scales.

2.5.3 Research and its application (e.g., in policy, education, technology, and society)

The research carried out by the Center is of high societal and political value. Therefore, there are opportunities to further improve and focus the outreach activities (e.g. producing and publishing fact sheets, videos, policy briefs, visualization tools) and to develop a Science Society Interface Strategy (SSIS; which shall be implemented at the level of NIES). For example, for each project, there should be a 2-3 page well illustrated fact sheet with the major findings, which should highlight the outcome of the research and its policy relevance. For example, the finding that nitrogen saturation could be mitigated by an aggressive thinning was both a major scientific outcome as well as a very useful finding for the public and policy makers.

As a regional research hub, the Center should strategically invest in long-term capacity building – nationally and in selected SE Asian countries (e.g. through exchange programs) – and participate in concerted long-term environmental monitoring programs and assessment studies. Strong regional networks of scientists and institutions will help strengthen NIES as a whole, and may serve as a very helpful mechanism for increased funding.

2.5.4 International positioning of environmental research and deepening of international cooperation

Distinct opportunities exist to better integrate the research activities of the Center with other international programs (e.g., participation in international assessment studies).

Capacity building in the region (access to data, mechanism for increasing funding, long-term strategy) should be strengthened.

High quality and long-term data, advanced methods, and world-class infrastructure may form a nucleus for international cooperation, with NIES taking leadership in selected research domains.

2.5.5 Collaboration between fields within NIES and with other organizations and groups

The integration at NIES appears to be already very strong. A possible suggestion would be to consider integration of the bottom-up regional perspective with the top-down global approaches (i.e. collaboration with the Center for Global Environmental Research). Cross-center activities on innovative new ideas would be another vehicle to benefit from synergies. Because research outcomes are of major societal relevance the mutual collaboration with the Center for Social and Environmental Systems Research should be improved.

2.5.6 Visibility of publications

As mentioned above, a strategy to create a double impact on both science and the society should be developed. Press releases for major publications (including use of social media) may enhance public visibility of the important research outcomes. Technical reports, guidelines, methods and models are additional products of the Center that may serve the scientific community and the public alike.

2.5.7 Directions for the next mid-term plan

There are opportunities to strengthen the integrative approach (nexus air, soil, water), including transboundary air (three current sections) and water (three current sections) pollution studies and a focus on

ecosystem services. For example, transboundary air pollution studies may become even more important in the future.

A formalized network and capacity building in SE Asia should be considered.

Outreach activities should be strengthened and integrated into NIES' SSIS.

2.5.8 Other advice, suggestions, etc.

The Center already exhibits a high degree of integration; however, there are major opportunities to even further increase the research focus by better bundling the available resources. Less is more considering the relative size of the Center. The high motivation and the spirit of the people are the key currency of the Center.

2.6 Center for Environmental Biology and Ecosystem Studies

IAB Members:

Prof. Dr. Åke BERGMAN
Dr. Linda BIRNBAUM
Dr. James LAZORCHAK [Session Head]
Prof. Dr. Klement TOCKNER

2.6.1 Ongoing scientific/academic research and other contributions

The current research, as presented, is impressive, well structured, of highly quality, and well integrated and targeted. The research carried out by the Center for Environmental Biology and Ecosystem Studies (CEBES) is of very high value for conservation and management, and the unique infrastructure and databases are considered key assets of the Center. The Young Researchers Program, i.e. supporting bottom-up driven seed-money projects, is an excellent way to advance existing and stimulate new research domains, and to support young researchers in their career development. This program should be continued and might serve as a model for other centers too (but should be evaluated time-by-time and accordingly adjusted). The successful seed money projects might therefore form part of the next research program (and therefore some "open space" must be created).

2.6.2 Future areas for scientific/academic research and other contributions.

The present research is built on a solid fundament which should be maintained and further strengthened for the next period 2016-2020. It may be wise to look into the possibility to obtain database information from autopsies of species taken in for biobanking. At the same time, it may allow detecting early warning signals in physical, morphological, biological and possibly biochemical alterations over time. The unique biobanking and biodiversity databases should be used for initiating and leading national and international research collaboration rather than just form a service to the wider community (which is a major value of the Center too). Long-term monitoring and research are of excellent value too, and should be continued. However, joining GLEON (Global Lake Environmental Observatory Network) would strongly increase the visibility and scientific exploitation of the data of the long-term program. At the same time, spinning off public private partnership to help support operating costs of sample banks should be considered as a valuable option.

Citizen science projects, if carefully applied, may provide unique opportunities for biodiversity research and long-term monitoring. Some very successful projects are already in place and may serve as a nucleus for further activities in this domain.

Assess whether neonicotinoids also affect invasive bumble bees. Assess whether current or future conditions in freshwater lakes or streams may be suitable for invasive toxic species like estuarine dinoflagellates. Prioritize future research on invasive species based on ecosystem services losses. Consider application of the Satoyama index to other habitats such as urban areas depositing sediments into coastal estuaries that experience algal blooms.

Consider using a metagenomic barcoding approach for ecological monitoring. It is becoming cheaper to conduct sequence identification of plants and animals, and faster, and may provide information on food web

structure and ecosystem functions. Include the development of eDNA approaches for assessing detection of invasive and native species in aquatic environments. Use eDNA approaches as large scale monitoring approaches to screen geographical locations for more spatially and intensively monitoring using metagenomic approaches. However, establishing eDNA as a routine assessment method still requires major work on the fate of DNA in natural waters, appropriate workflows, bioinformatics, and experimental and empirical research to comparing traditional with advanced approaches.

2.6.3 Research and its application (e.g., in policy, education, technology, and society)

The work presented is highly suitable for policy and societal communication and should be promoted by NIES. Similarly the material coming out of CEBES is highly suitable for educational purposes, films and/or TV programs. Policy briefs, factsheets, press releases, and user-oriented workshops may be tools to further raise awareness about the actual research carried out, and of the value of biodiversity. Systematic conservation planning, the Satoyama approach, among others, are also research activities of high societal relevance. Consider to work with community groups and different workers to identify emerging concerns about rapid environmental change, in particular about the rapid erosion of biodiversity and ecosystem services in aquatic systems.

2.6.4 International positioning of environmental research and deepening of international cooperation

Current international interactions are considered very good. Seek collaborators to support specimen banking center such that overhead costs can be covered by contributions from partners that may want to include other rare or endangered species cells for current and future research. Expand work with climate change programs. Again, the unique biobanking and databases should be better exploited for joint research projects and programs, and may support the establishment of long-term international research networks. It would be worth to join international networks such as GLEON, and the long-term study sites may provide unique opportunities and set the context for *in situ* experimental work.

2.6.5 Collaboration between fields within NIES and with other organizations and groups

The Center is playing more and more a key role in the National Biodiversity Strategy of Japan; it should be strongly supported in achieving the key role it deserves. There is still an unexploited potential for interdisciplinary cooperation with other centers within NIES, although major interactions within NIES already are in place; e.g. with the Center for Regional Environmental Research (CRER) in respect to lake monitoring and ecosystem functions. Because a lot of CEBES' work is of high societal value and relevance, the collaboration with the Center for Social and Environmental Systems Research is of particular importance. In a similar direction the collaboration with the remote sensing unit of the Center for Environmental Measurement and Analysis is of key importance (e.g. new ways of studying components of biodiversity such as ecosystem diversity).

There are other major opportunities for collaboration with several institutions nationally and especially internationally (such as Liebniz Institute of Freshwater Ecology and Inland Fisheries (IGB) – e.g. on global freshwater biodiversity databases, long-term monitoring and research, conservation and restoration planning, among many other topics).

Satellite monitoring of vegetation – merge if possible with the remote sensing sections. Include remote sensing of harmful algal blooms in lakes. Seek collaborations and co-authorship of scientists working on ecotoxicology and risks in the Center for Environmental Risk Research.

2.6.6 Visibility of publications

Important publications may emerge from joining, and leading, international research networks, using the unique resources and databases. Conceptual papers, meta-analyses and review papers may also increase the visibility of the Center. Evaluate the current publications with high impacts, and use this information to evaluate which journals and research provide the greatest interest in the Center's research.

2.6.7 Directions for the next mid-term plan

Seek approaches for funding overhead costs of the biobanking program from external sources or collaborations. In some cases less might prove more by pooling the resources for major and particularly challenging questions that are relevant for both science and application. There is potential to better integrate the more "satellite" projects into the core programs of the Center. Look across all centers conducting remote sensing and see if there are efficient ways to combine fly overs monitoring. For example for toxic algae look at both marine and freshwater systems with the same satellite imaging. Combine ground measurement being conducted by other centers with remote sensing projects to calibrate and evaluate accuracy of image analyses. Possibly include trained citizen scientist to collect ground based information during fly over events. For example, during remote sensing of algal blooms, have other center scientists and citizen scientists collect water samples to test for chlorophyll, toxin and cyanobacteria and algae species identification. Contact instrument manufacturers to see if you can develop a collaboration to establish ground based real time monitoring that can be linked to remote sensing activities. For example there is a company in the Netherlands, BBE that has an instrument that measures and estimates the percentage of green, bluegreen and brown algae. This information may help remote sensing evaluation projects. Include real time water quality monitoring also.

2.6.8 Other advice, suggestions, etc.

The Center already exhibits a high degree of integration, however, there are major opportunities to even further increase the research focus on better bundle the resources. Less is more considering the relatively small size of the Center.

Above all I advise you to continue to maintain and nurture the high motivation and spirit of the Center!

2.7 Center for Environmental Health Sciences

IAB Members:

Prof. Dr. Åke BERGMAN,
Dr. Linda BIRNBAUM [Session Head]
Dr. James LAZORCHAK
Prof. Dr. Klement TOCKNER

2.7.1 Ongoing scientific/academic research and other contributions

The research is conducted in two major research areas: toxicology and epidemiology. The research in both areas is of extremely high quality. However, the groups are too small. The toxicology group seems to have three major projects which should be better integrated with each other and with the research conducted in the Center for Environmental Risk Research. In fact, parts of these programs should be combined into a general toxicology program with two parts: ecotoxicology and human health toxicology. The other part of the Center also has two parts, but only one major investigator. However, that person needs additional support to conduct this environmental epidemiology research. In addition, the Japanese Environmental Children's Study (JECS) is an amazing achievement to date – but it is impossible for it to continue without additional support. If NIES is going to be its "home" and coordinating center, it is imperative that they have a full time director.

2.7.2 Future areas for scientific/academic research and other contributions

The investigators should be better able to explain why they have chosen the research topics they have: why arsenic? Why diesel exhaust and SOA/diesel? Why phthalates? And why the animal models they have chosen? Why the doses? How will their work inform human health risk assessment? All of the topics they are researching are high priority areas for human health sciences. Exposure to mixtures of chemicals should be considered as a future research area to move into given the current shift in the scientific community thinking on the importance of multiple risks over single chemical risk.

2.7.3 Research and its application (e.g., in policy, education, technology, and society)

The research on toxicology may have very significant implications given the fact that many Japanese are exposed to arsenic via seafood, rice, and water. This group needs to use much lower doses which are more relevant to human exposure and expand to look at multigenerational effects.

The same is true for the diesel and phthalate exposures. However, unless this group expands in numbers, the investigators should consider focusing on fewer types of exposure but look at more health effects in the animals they study. The epidemiological investigations seem very appropriate, and have great potential for policy impact, but there needs to be an expansion of the number of investigators. And, as suggested above, JECS is a national treasure. However, it will not be able to achieve its full potential without additional staffing, especially a full time director.

2.7.4 International positioning of environmental research and deepening of international cooperation.

Individual researchers are well connected internationally and JECS is well connected to several other national birth cohort studies. The Center Director is an excellent and highly respected toxicologist and regularly attends international meetings, but might benefit from additional interactions with other Japanese

as well as international groups. The review team was impressed by their ability to actively participate in scientific discussions in English.

2.7.5 Collaboration between fields within NIES and with other organizations and groups.

The key point is that environmental risk involves both ecological and human health risks. Zebrafish, daphnia, or minnows are just other organisms to study adverse effects of exposures in contrast to studying mice or rats or cultured cells. The objective of all of this work is to understand the risk to human health and the environment. Much of the work in the Center for Environmental Risk Research (CERR), including the excellent work of the previous director, should be integrated/coordinated with the work of the Center. It should be noted that NIES has already recognized this need.

2.7.6 Visibility of publications

This group is publishing its work in international journals of excellent quality and high impact. The work of persons affiliated with the Center is highly cited.

2.7.7 Directions for the next mid-term plan

There are two major comments of the review team. 1) The toxicology group, which should be better integrated with the toxicology groups within the CERR. 2) The epidemiology group needs to add personnel and resources, both for its basic research program and especially to run JECS. 3) The toxicology and epidemiology groups should be sure to integrate some of their efforts – not only should the toxicology research inform the epidemiology studies including providing biological plausibility to the observational human findings, but the toxicologists should design studies to address questions raised by the epidemiology. Both of these programs should also remain aware of what is happening in the Center for Environmental Biology and Ecosystems Research as wildlife is often an indicator of effects on people.

2.6.8 Other advice, suggestions, etc.

The two main parts of this very small Center both conduct excellent work BUT they are too small. The toxicology group should be integrated with the toxicology in CRER; the epidemiology group must grow to reach its potential and to adequately be able to continue to run the JECS. And we cannot give praise enough the job that JECS has done to date, but for it to continue and reach its potential it is essential that it have more resources.

2.8 Center for Social and Environmental Systems Research

IAB Members:

Dr. Berrien MOORE

Prof. Dr. Nebojsa NAKICENOVIC

Prof. Dr. Miranda SCHREURS [Session Head]

Prof. Dr. Chettiyappan VISVANATHAN

2.8.1 Ongoing scientific/academic research and other contributions

The Center for Social and Environmental Systems Research provides an important social science perspective at NIES. The research team consists of a good balance to different disciplines (political scientists, environmental economists, modelers) and also includes several women. The Center clearly has a strong awareness of the growing demands for ideas about how to approach sustainability, such as in the area of eco-cities. The Center is doing an excellent job of bringing in competitive research funds and making use of post-docs.

The center has a good mission statement and wide interdisciplinary coverage. It made a very clear presentation of its main research areas and overall research direction. Several areas of special interest stand out: the emphasis on stakeholder participation; the focus of the center on nexus issues and spatial information; the development and use of Asia Pacific Integrated Models (AIM); the analysis of national adaptation strategies and impact assessment; urban monitoring systems including remote sensing and on-site monitoring; and the work on spatial analysis and “optimal” migration patterns.

It is also encouraging to see the Center’s active role related to research on the Fukushima area.

The substantial external funding being brought in by the Center attests to the high external interest in the Center’s work.

2.8.2 Future areas for scientific/academic research and other contributions

The current focus on the AIM model, design solutions for local technology policy, and policy design through cooperation with stakeholders is good. The main research themes are all important areas. The simulation research tied to AIM and climate change (and other pollutants) as well as on impact assessment (including hunger risk or impacts on agriculture) is useful.

The research in Southeast Asia, and in particular, the efforts to build up information about emissions in the urban environment is commendable. The comparative research on Asia and the efforts to build Asian-wide models is excellent and certainly should be continued. It is noteworthy that the Prime Minister of Malaysia made mention of the Center’s low carbon society report and that there is active collaboration with Indonesia, Vietnam, and other Southeast Asia researchers.

The institutional, policy, and societal attitudes research is also recognized as an important component of the Center’s work. The IAB recognizes the challenge the center faces given the demands on such a social science-focused center to be able to speak to a wide variety of issues. Maintaining areas of focus, such as with AIMS, smart cities, and climate change will be important. Having said this, it is likely that in the future, there will be more demand on the Center to address issues pertaining directly to society—including lifestyle and behavioral changes.

The work on Fukushima should certainly also be continued.

2.8.3 Research and its application (e.g., in policy, education, technology, and society)

The communication of the Center’s research findings to policy makers and the public is important. Given

that the Center's main expected contribution is to environmental policy making (and not simply academia), it is important that research outputs can be understood by concerned stakeholders. Although ideally the Center (and NIES as a whole) would have a communication expert within the team, in addition to the scientific publication and brochures the Center is already producing, and the conference presentations being made, the researchers at NIES could also consider working on thematic reports that cut across the research findings of the scholars at the institute. And, given that the communication challenge is great and important—consideration should be given to the use of video and games as a means of engaging the public in their work.

The Center is collaborating with other groups in NIES, such as in relation to research on transboundary air pollution using the AIM model. The IAB encourages other such cross center activities.

2.8.4 International positioning of environmental research and deepening of international cooperation

The IAB was impressed by the Center's extensive and solid research in Asia, and especially Southeast Asia. This is important and can be considered a strong point of NIES' international contributions. The AIM model includes wide collaboration across Asia. The Center is not only gathering information about environmental conditions in Asia but also helping to train researchers in the region, both through collaborative research and by hosting foreign scholars. The IAB encourages continued and even expanded engagement with other national teams in Asia.

That the Center cooperates with the IPCC, is part of the SSP (Socio-Economic Pathways) project, and has participated in other model inter-comparison projects, such as AgMIP and ISI-MIP indicates the high international relevance of the research conducted at the center.

2.8.5 Collaboration between fields within NIES and with other organizations and groups

Collaboration is one of the strongest points of the research group. The current network is very broad, nationally- and internationally (especially, but not only in Asia), and strong. Possibly more attention could be given to collaboration with NGOs at the national level.

Areas that were not so clear in the presentation, but were subsequently clarified in a memo provided us after the presentation by the center's team, is the collaboration with the Global Carbon Office (GCO). Strong continued collaboration among the Center, the GCO and the Center for Global Environmental Research should be pursued.

It is very good that the team is involved in the IPCC. Collaboration with Asian scholars and practitioners is clearly very important. Nevertheless, collaboration outside of Asia should also be encouraged—if for no other reason than to promote awareness of the Center's work more globally. The IAB also encourages working very closely with the UNEP Smart City initiatives.

2.8.6 Visibility of publications

The Center has a very strong and balanced publication record and an excellent number of peer review journal publications. The Center is active in publishing its research findings in scientific journals and has also expressed interest in thinking of other ways to communicate its work not only to the scientific community but also to other communities, including policy makers and the public. The Center has made important efforts in these areas and can play a particularly important role in such communication given that it deals with social and political matters tied to environmental protection and sustainability.

The group has a strong focus on international peer review, which is good for the scientific visibility of the institution. This should be continued although it is also important to have some publications in Japanese for the Japanese audience. Some members of the group are also visible in the media. Consider introducing a "game" to communicate with the public and also the use of videos. Each publication should be accompanied

by a press release with a central “iconic” graphic.

2.8.7 Directions for the next midterm plan

The IAB feels it is a good strategy to pursue a deeper integration of model research to various policy areas and real world policy needs. It could be an idea to become more actively involved in monitoring of policy effectiveness. Participatory integrated assessments could also be included.

The IAB suggests considering establishing a program to invite in environmental journalists, for example for a three-day or week-long training to help journalists better understand environmental issues. This can be a good means for enhancing journalistic awareness and interest in the research being conducted on issues of importance to NIES.

2.8.8 Other advice, suggestions, etc.

The group did a nice job of providing an overview of the Center’s mission.

The efforts of the institutional team to do more stakeholder dialogue are good for developing more awareness and participation in the Center’s research.

The collaborations proposed for Asia are excellent.

In relation to the AIM models, it could also be useful to look at the links between models and policy design and policy effectiveness. There are many other very important environmental and societal questions tied to economic structures, resource use patterns, and life styles that the AIM model does not capture.

For these questions, a stronger basis in NIES for other social science research approaches is needed. The Center clearly does some of this—there is excellent work on comparative policy making, climate change policy, attitudinal research, etc. These other kinds of social science research are often very important means for strengthening societal awareness and the science-policy communication and the science-public communication that is so crucial to promoting environmental change.

For the future, the IAB suggests slowing down the speed of the presentation and rather than trying to show us all of the research being conducted to pick a smaller number of areas that can be discussed somewhat more deeply.

2.9 Center for Environmental Measurement and Analysis

IAB Members:

Prof. Dr. Åke BERGMAN,
Dr. James LAZORCHAK
Dr. Berrien MOORE [Session Head]
Prof. Dr. Klement TOCKNER

2.9.1 Overview

The Mission of the Center for Environmental Measurement and Analysis (CEMA) is

1) To develop methodologies to better understand and monitor environmental conditions and changes, and to assess the biological impacts of environmental stress;
2) To forward measurement techniques and technologies which contribute to identifying the warning signs of new environmental deterioration by developing and optimizing our surveys and research; and
3) To implement research aimed at the development of techniques to preserve and use environmental samples and to further assure the reliability of measurement data and its appropriate management.

This Mission Statement actually *understates* the contribution and role of CEMA. The Center is doing extraordinary high quality work, which combines basic research, method development, and production of data that meets highly important societal needs and is of the highest scientific quality. For example, the environmental specimen banking (ESB) work in combination with advanced monitoring of chemicals, which is a societal responsibility for Japan, is a powerful combination. CEMA is very much an international leader in their field; it is of exceptional importance to NIES and other Centers within NIES, and it should be a priority within NIES.

CEMA offers a very impressive portfolio of advanced and world-class techniques and methods. This facilitates fruitful cooperation with many other research institutions nationally and internationally. CEMA's competences and techniques should be made more visible and thereby attract complementary partners.

2.9.2 Key Future Challenges

A challenge for CEMA is one of balance: a) *to develop new methods and techniques that can be established and applied* (e.g. real-time environmental sensing, unmanned aerial vehicles (UAVs), etc.) vs. b) *to maintain and even extend the existing techniques and applications*.

Two particularly important existing areas that are fruitful for extension are a) to develop methods for exposure analysis (methodology and chemical assessments) of polar compounds (semi-persistent pollutants), including conjugate and adduct analysis and b) to incorporate metabolomics into the MRI project.

New areas that merit consideration for future expansion are a) to explore hyper-spectral sensing to trace changes in biodiversity or threats such as harmful algal blooms and b) to consider expansion of the lidar work to support air pollution studies (e.g. with Center for Regional Environmental Research), and/or to develop space-based (International Space Station) Lidar for future CO_2 and CH_4 studies. To address such new areas would require additional personnel; moreover, ESB and monitoring efforts should not be

downsized, but rather expanded—this will also require additional resources.

To expand and improve exposure analysis of semi-persistent pollutants will require method development. This important area of research will likely drive policy decisions; therefore, the selection of target chemicals is most important. An example of a policy-relevant area is water pollution by perfluorinated sulphonates from firefighting foams, potentially leading to heavy exposure via drinking water. Examples such as this should be elevated to the policy arena and to media when relevant to confirm the importance of the research efforts.

One path for expansion of the research and impact of the Center is through an expansion of collaborations both nationally and internationally. The IAB suggests to focus on some key partners for in-depth cooperation. This may require that some resources be allocated bilaterally for such efforts. An example would be to form collaboration with IUCN in the area of the Red List of Ecosystems; http://www.iucnredlist.org). As an action step, CEMA should survey the national and international arena for potentially interesting partners for cooperation, particularly with partners with a diverse palette of discipline areas. This survey of potential partners should include industry, which offers the potential to create spin-offs and new patents. For instance, collaborations with the pharmaceutical industry on work involved with EDCs and the MRI behavior studies.

Finally, CEMA is central for most (if not all) other centers at NIES by providing the required advanced methodologies and techniques. This important strength should be increased by co-designing research questions and strategies with other centers. One approach would be to form joint cross-center working teams to discuss mid-term directions, especially areas for increased collaboration and opportunities to leverage the potential to use each other's expertise and resources. For instance, there are opportunities for CEMA and CRER to work on air and water pollution.

Further strengthening existing collaborations with other Centers at NIES, and beyond, will further increase the visibility and impact of the publications. Given the clear practical importance of the work of CEMA, there should be a focus on raising the visibility of CEMA publications through the use of press releases and engagement of the media. For instance, NIES should send out press releases, including a single key graphic with each center publication.

2.9.3 Summary

In general, the proposed future plans are very well justified. CEMA should continue on its current direction, standing on the solid foundation of research that CEMA has established. Key new areas include global chemical analysis of organic pollutants; chemical tracers; remote sensing (including sensor development for *in situ* monitoring and the potential integration onto UAVs) to support establishing early-warning signals detecting rapid environmental change; biological responses to chemical stress (MRI), and QA/QC in chemical analysis. This would, however, require additional resources for the Center.

CEMA should recognize that it is, in effect, a critical lynchpin for NIES, and therefore, there is a special responsibility and opportunity for increased cross-center projects. In this same vein, CEMA should build closer contact with selected national and international academic organization outside NIES. There should also be consideration of collaborations with the private sector.

NIES should make a special effort to ensure that the Japanese government (especially the Ministry of the Environment) understands the excellence of CEMA and its important contributions.

CEMA is one of the jewels of NIES—it should be given priority for expansion and for highlighting CEMA's work in the press and in communications between NIES and government.

2.10 Environmental Emergency Research

IAB Members:

Prof. Dr. Åke BERGMAN,
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Dr. James LAZORCHAK
Dr. Berrien MOORE
Prof. Dr. Nebojsa NAKICENOVIC
Prof. Dr. Miranda SCHREURS
Prof. Dr. Klement TOCKNER
Prof. Dr. Chettiyappan VISVANATHAN [Session Head]

2.10.1 Ongoing scientific/academic research and other contributions

This research team presents the excellent researches in the field of Environmental Emergency Research. As these researches are driven by the Fukushima nuclear power plant disaster following the earthquake and the tsunami in 2011, the overriding research theme is focused on the consequences of radioactive risks. The research clearly points out current deficiencies in the capacity of the Japanese governmental organization to optimally handle disasters of this type.

The research focuses mainly on radioactive/nuclear disaster related wastes and emissions, which is relevant in the Japanese context, but does not necessarily have the same research value and need in other Asian countries. There is a good understanding of the behaviour of radionuclides in environment (air, water, soil and solid waste), and its importance on eco-system and organisms. In addition, it will be good to research on the need for technological modifications to handle such radioactive contaminated wastes in Municipal Solid Waste (MSW) incineration and other treatment processes.

One of the major contributions of this research team is on the decontamination and adaptation related work, which has led to improving landfill standards, national guidelines, and focus on intermediate storage facilities.

2.10.2 Future areas for scientific/academic research and other contributions

There is a window of opportunity to define and build not only a new research area on environmental emergencies but also to take preparedness issues in this research initiative. Considering long-lasting ecological and environmental consequences, e.g. driving evolutionary processes, a strong focus on ecosystem processes and services should be considered. Integrate research across water, air, and marine systems.

Environmental Emergency Research must include other risks for natural catastrophes and accidents, offshore and inland, such as floods, earthquakes, forest fires, etc. (ex. 2011 flood in Thailand and the waste management, demolition waste in earthquake events). UNEP International Environmental Technology Center is exploring the possibility of post-earthquake waste management in Nepal. The research would benefit a lot from cooperation with competent partners abroad, particularly partners with experience of other but relevant incidences.

Apart from natural calamities, environmental emergencies also include disasters caused by human activity,

such as industrial or transportation related accidents that release hazardous substances, oils, and chemicals, thereby endangering the environment and human health. It would be good to look into these anthropogenic causes of environmental emergencies.

NIES through its research under the 'environmental emergencies' theme can create:

1) A database of past events occurring globally related to environmental emergencies;
2) A database of resources, including numerous tools, guidelines, reports, publications, and international and national governance and policy; and
3) eLearning modules on preparing for and responding to environmental emergencies

It could be very useful to publish a scientific book with the inter-disciplinary findings of the NIES researches. It would be good if this could be done in both Japanese and English to reach a broader audience.

2.10.3 Research and its application (e.g., in policy, education, technology, and society)

This research area is almost by definition of the highest social and policy relevance. Thus, the work of this research team is extremely important to the national context, and they are doing a great job. However, these information can be documented as a teaching training manual and shared with the other countries in the region. It is also important to document the "stakeholder" dialogues carried-out as part of the "nuclear disaster" management, inclusive of lessons learned from case studies.

To start with, the social system resilience case study document should be of the highest priority. A careful communication and information strategy seems to be in place. Social acceptance and trust is a major issue in relation to Fukushima. Citizen science is certainly very important in this region. The opening of the NIES branch in Fukushima might further support to embed the activities within the area. It could be useful to do comparisons with other regions that have been affected by major chemical disasters or chemical pollution and how recovery is achieved in those regions. Comparisons with the knowledge learned in the case of Chernobyl are also very important.

At the same time, environmental restoration of polluted areas is also important; the ethical questions regarding efforts to resettle individuals in a region bordering a damaged nuclear power plant should be a part of an open discussion, because any hidden information/issues may be likely to reduce future trust in science.

2.10.4 International positioning of environmental research and deepening of international cooperation

Very promising international collaborations across the globe are already established or are in the phase to be established. Here it is necessary to consider to which extent lessons from similar disasters (e.g. Chernobyl) can be learned, and how the collaboration can be established or strengthened.

2.10.5 Collaboration between fields within NIES and with other organizations and groups

This group has excellent linkage with the other research groups within NIES. They should extend this work relationship with International Atomic Energy Agency, US-EPA, LSCE, and IRSN.

2.10.6 Visibility of publications

Focus more on national news media. Considering the mandate of this research group, the level of

international peer review journal publications is also advised.

2.10.7 Directions for the next mid-term plan

The planned activities seem to be very plausible based on the presentation. The new Fukushima branch of NIES will play a fundamental role in fostering research activities on environmental emergencies and it should serve as a platform for collaboration within the country too.

In addition, is it possible to explore the research needs on basic environmental services in emergency situations: this can include water supply, wastewater treatment / solid waste / coastal zone contamination, etc.

2.10.8 Other advice, suggestions, etc.

Address the ethical issues related to conducting this type of research work.

It would be useful for the international advisory board to get an overview of how NIES fits into the structure of other institutions, and also receive a clear understanding of the relationship of the research at NIES with similar researches going on elsewhere in the country. It is advisable to promote the comparative advantages (or special characteristics) of the research at NIES as compared to other research institutions and initiatives in Japan and in the Asia-Pacific region.