

Summary of the Advisory Board's Evaluation for FY2022

Advisory Board Members:

Prof. Brenda Howard (UK Centre for Ecology & Hydrology)

Prof. Sergey Fesenko (Russian Institute of Radiology and Agroecology)

Prof. Wolfgang Raskob (Karlsruhe Institute of Technology)

Dr. Satoshi Yoshida (Institute for Environmental Sciences)

Evaluation period: April 1, 2022 - March 31, 2023

Annual Symposium: February 13, 14, 2023

Advisory Board meeting: February 14, 2023 (Tue) 5:30pm ~ 7:30pm

CORASSE FUKUSHIMA, 4F Conference Room 401 / Zoom

➤ **Consensus of the four committee members**

Research

Over the last financial year, the IER has produced a considerable quantity of high quality scientific output that are highly acknowledged both nationally and internationally. The focus of the research is largely on current and future long-term behaviour of radionuclides in Fukushima prefecture, thereby addressing the current needs and concerns of the local Fukushima population. The overall objectives and goals would benefit from further refinement and clarification, in particular regarding the extent to which the research may also support the population currently living in, or returning to, the contaminated territories.

The potential tritium release from Fukushima Daiichi is a key current topic for both the scientific community and the public. Research activities related to the planned tritium releases are clearly important to support current social concern and data obtained by IER will inform and influence associated decision-making. Furthermore, scientific data may contribute to reducing both residents' anxiety and reputational damage associated with the release of ALPS-treated water into the ocean.

Interaction of experimental, field and modelling work has been intensified over the recent years. It is strongly recommended to explore the benefit of further integrating the research teams, potentially by combining research groups into a wider research structure. For example, Rivers and Lakes + Ocean could be combined to "aquatic environment" and Ecosystems + Speciation Radiochemistry could be combined to "terrestrial environment". Measurement and Analysis and Modelling are transversal activities that interact with the two main pillars of the IER. The proposed restructuring of the groups has the potential to support the message that is transmitted both nationally and to the outer world. As modelling and measurement and analysis are transversal research activities, the interaction between institute members will be intensified and outcomes may be enhanced. The proposed restructuring is only a suggestion and could be discussed further with the MB prior to, and during, any such structural change.

The SATREPS project with Ukrainian scientists has achieved interesting results and brought together experience from behaviour of radionuclides from Chernobyl and Fukushima disasters. Even if the end of the project seems to be unavoidable due to the war, collaboration with Ukraine should be continued where possible. The involvement of with Polish scientists might also assist in keeping contact with the Ukrainian researchers.

The collaboration with the Environmental Radioactivity Research Network Centre (ERAN) network in projects and in the annual symposium should continue as such collaboration is a key mechanism for enhancing research.

Reporting

To improve reporting, the project goals might be further reviewed to identify new challenges, expected outcomes and practical application of the research findings. Goals for each financial year could be compiled and the end of year outcome could then be assessed as to whether the goals were met. Consideration could be also given to how the content could be reduced by referring to some of the online material that the report covers.

The relevance of the scientific outcomes, from both a national and international perspective, could be enhanced by providing an overall short summary stating key achievements relevant to (i) the public and (ii) scientific knowledge.

Education

Even if the level of research in the Graduate School is high, attraction for students seem to have decreased. As these students build the core of human resource development in the field in the future for IER, effort should be devoted to reverse this trend. This might be achieved by dedicated advertisements and interaction with other research organisations and universities in Japan and worldwide.

Other

Collaboration with IAEA can be beneficial not only related to the ongoing research, but also because the IAEA brings in a wide range of expertise that might be utilised in research, training and education.

➤ **Prof. Brenda Howard**

The extent of research and other activities conducted at IER over 2022 is to be commended considering the challenges that have occurred worldwide over this period. The IER continues to be a vibrant, effective research unit of both national and, increasingly, international relevance. Key points of note are:

- Consideration and reporting of safety related issues has been included thereby responding to the comments of the advisory board in the previous year.
- A considerable amount of research and associated output has been achieved by all scientific groups. The information provided in the report on the activities of each section is consistently

impressive. The relevance of the scientific outcomes, from both a national and international perspective, could be enhanced by providing an overall short summary stating key achievements relevant to (i) the public and (ii) scientific knowledge.

- The close interaction of experimental studies, field studies and modelling is a key feature and strength of the IER. Long may it continue!
- The various scientific groups address some research issues and challenges which might benefit from merging the groups. Consideration should be given to whether restructuring could have organization and/or scientific benefits.
- Research activities related to the planned tritium releases is clearly an important current issue and data obtained by IER will be of direct relevance to both scientific and public understanding. Interaction with the IAEA and other national organizations is important with respect to both scientific data and analysis of impacts at local, national and international level.
- The continued interaction with Ukrainian scientists in SATREPS during 2022 and enhanced interaction with Polish authorities extending the remit is to be commended.
- Interaction with the IAEA seems to be increasing and includes not only on reference materials but also interaction within other IAEA activities regarding tritium releases and impact on local fisheries.
- The number of masters and PhD students is less than anticipated. Further consideration is needed to identify how to enhance the number of such students.
- The research activities in all areas continue to impress and apparently have not been greatly detrimentally affected by the covid pandemic. Referred paper output has been high and the submission of some papers to higher impact journals has increased.
- The annual report must involve a significant amount of time for the IER staff. Consideration could be given to how the content could be reduced by referring to some of the online material that the report covers.

➤ **Prof. Sergey Fesenko**

Fiscal year from April 2022 to March 2023 brings to the IER a lot of new achievements in research, educational activity, and collaboration with other institutions. Most of recommendations given at the last Advisory board meeting were implemented and resulted in increase of the IER research performance. A subsection “future vision” was added to each project description giving a possibility to see potential ways how these projects can be further developed, and which future results can be potentially achieved.

Upon more than 10 years lapsed after the Fukushima Daiichi accident some new accents should be implemented in the IER activities. In particular, the project’s goals should be reviewed with attention to a novelty and practicability of the research results. To do that, it would be desirable to supplement every project description with the “rational” subsection covering these issues. Although the research goals of the IER projects are well complimentary, some of them might be reevaluated and subdivision of the research among projects could be revised. In particular, "Speciation Radiochemistry" project can be included as a part of the “Ecosystem” project while the “Ecosystem” project could consider radionuclide transfers also in agricultural environments.

Overall, the IER research activities could be subdivided into five projects: Ocean (Marine ecosystems), Freshwater ecosystems, Terrestrial ecosystems, Measurement and Analysis, while bioavailability studies and modelling could be a part of each project. It would be also advisable to include in the IER Activity Report a map with the research sites to demonstrate how sampling sites of different projects complement each other. It is also recommended to consider in the IER research projects the management options to mitigate consequences of the Fukushima Daiichi accident for the affected population.

Publication activity of the IER is still very high. Most of the research findings are well described in the highly ranked peer reviewed journals. Further development received activities of the Environmental Radioactivity Research Network Centre (ERAN) and a collaboration of the Institute with other partners in and outside Japan expanded. The IER serves as the host institution for many other projects, which fit the IER research projects and contribute to the success of the whole IER scientific programme. Important extensions received also educational activity. Additionally, FY2022 contained social and information dissemination events organised by the IER, including 9th IER Annual Symposium and dialogue meeting. These events were very successful and attracted high interest both experts and public.

➤ **Prof. Wolfgang Raskob**

After the end of the Covid-19 restrictions, on-site meeting of the AB, the expert workshop and the symposium provided a much better view on the work performed and communication with the team as in the years before. On-site meetings are suggested also for the next years.

All scientists working the six research areas perform excellent research under the headings Rivers and Lakes / Ocean / Ecosystems / Speciation Radiochemistry / Measurement and Analysis / Modeling as one can see from the many publications in peer reviewed journals and elsewhere. Dissemination at the local level has many facets and is an integral part of the IER activities which is much appreciated.

There is a possibility to further shaping the profile of the institute. One suggestion is to combine research groups into a wider research structure. For example, Rivers and Lakes + Ocean could be combined to “aquatic environment” and Ecosystems + Speciation Radiochemistry could be combined to “terrestrial environment”. Measurement and Analysis and Modeling are transversal activities interaction with the two main pillars of the IER. This suggestion might be also useful in restructuring the groups, but mainly should support the message that is transmitted to the outer world. If modelling and measurement and analysis are transversal research activities, interaction between the institute members will be intensified and results might be improved.

War in Ukraine prevents to intensify the work on the SATREPS project or start SATREPS II. Nevertheless, it is suggested to continue cooperation with Ukraine as much as possible and even collaborate with neighboring countries such as Poland.

The dissemination activities which demonstrate the willingness of the IER to support the local communities can be further enhanced by directing research to applied topics such as remediation and tritium.

To overcome the limitation of the number of students of the Graduate School, advertisement and possibly broadening of the topics might be investigated. A vision document demonstrating the sustainable future of the education might support this effort.

➤ **Dr. Satoshi Yoshida**

Collaborating with universities and research institutes in Japan and overseas, and acquiring competitive funding, IER continues to produce many research achievements. In addition to research activities, IER continues to actively promote efforts to return the results to the residents of Fukushima and to develop human resources. In particular, it is commendable that IER has started initiatives to address important issues such as the future return of residents and the release of ALPS-treated water into the ocean, by holding a marine symposium in Iwaki and seminars related to Fukkou-Chi.

Individual research has appropriately shifted its focus to research on the long-term behavior and future predictions of radionuclides, meeting the needs at Fukushima. In addition, it is highly commendable that the tritium observation system was established in cooperation with related research institutes and a new survey was started. Based on the results, it is expected to contribute to reducing residents' anxiety and reputational damage caused by the release of ALPS-treated water into the ocean.

Research is being conducted by dividing it into six projects, but there are many issues that need to be tackled beyond those frameworks. It would be good to consider revising the framework considering how to show the research products to the public, although immediate change of organization might be difficult.

Although the international situation in Ukraine has made it difficult to implement SATREPS normally, it has produced important results that contribute to the resolution of long-term environmental problems at Chernobyl, and has also become a forum for training young human resources. Although the end of the project is approaching, the continuation of this project is strongly desired.

There are 7 students enrolled in the graduate school, including 3 students in the doctoral course that opened in April 2021. The levels of their research are high, and it will be the core of human resource development in the field in the future. On the other hand, the number of students is expected to decrease in the next academic year, and I hope that the recruitment and sustainment of career paths for graduates will progress further through the collaboration with the research community that IER has produced so far.