

Worldwide Harmonization of Radioecology Networks
Summary of a workshop organised by the International Union of Radioecology
19 - 20 June 2014, La Baume, Aix en Provence, France

Background and Introduction

International arrangements to control risks from ionizing radiation are supported in three ways: epistemology, safety paradigms, and standards supported by regulation. Epistemological aspects of science and knowledge of the effects of ionizing radiation are led and summarised by the United Nations Scientific Committee on the Effects of Atomic radiation (UNSCEAR). Safety paradigms are developed by the International Commission on Radiological Protection (ICRP) and incorporated into a system of radiological protection used internationally as the common basis for setting radiological protection standards. Basic safety standards for radiation protection and safety of radiation sources, as well as corresponding recommendations and guidance on their practical implementation are provided by the International Atomic Energy Agency (IAEA). These three organisations interact with regional networks covering different geographical areas, and with networks addressing radiation protection topics, such as solid radioactive waste disposal.

Despite the Fukushima accident, in response to the growing energy demands with low greenhouse gas emissions, the nuclear industry is expanding globally beyond the historical group of countries operating nuclear licensed sites. In this context, the initiation of a process for worldwide harmonization of R&D programs and related work in radioecology is becoming increasingly desirable. Such a harmonization process should have the objectives to: identify key research priorities and gaps; avoid duplication and promote efficient exploitation of existing infrastructures and resources to address them; support harmonized and coherent regulatory developments, and develop well-informed and balanced consensus on the scientific conclusions, whilst meeting the specificities of problem-oriented or regional objectives. This would promote the development of relevant research activities, the consistent interpretation of scientific results in the development of safety paradigms, and the appropriate application of the results in development and application of safety standards.

As the relevant established international professional body for radioecologists, the International Union of Radioecology (IUR) is well placed to meet these objectives and, accordingly, arranged to hold an international workshop bringing together relevant members of as many networks as possible. Of the 20 international networks and organizations invited, representatives from 15 were able to attend and participate in the initial discussions. These included regional and problem-oriented networks as well as networks led by international organizations. The workshop took the form of presentations on the objectives of the individual organisations and on their perspectives on priority issues for radioecology research. This was followed by discussion of overall conclusions and development of a way forward to meet the challenges identified. Participation is listed at the end of this note.

Presentations on Networks¹

All the organisations and networks represented gave presentations on their goals, how they strive to achieve them and the challenges encountered. Geographical representation was broad, including Europe, Asia, the South Pacific and North America. Regulators, academic institutions and technical support organisations were represented, as well as the IAEA and ICRP. Specific technical areas represented included: radioactivity in the arctic (Arctic Monitoring & Assessment Programme, AMAP); the marine environment (Convention for the Protection of the marine Environment of the North-East Atlantic, OSPAR); monitoring of airborne radioactivity (European Trace Survey Stations Network for Monitoring Airborne Radioactivity, Ring of Five); and solid waste disposal (BIOPROTA, a global forum addressing key issues in assessment of the long-term impact of contaminant releases associated with radioactive waste management). Apart from IUR itself, networking in radioecology at the regional level was represented by the European Radioecology Alliance, the National Center for Radioecology (NCoRE, USA) and the South Pacific Environmental Radioactivity Association (SPERA). Particular importance was attached to representatives from Japan, directly connected with radioecology efforts in support of management of areas affected by contamination from the Fukushima Daiichi NPS accident (NIRS and Institute of Environmental Radioactivity, Fukushima University, and the National Institute of Radiological Sciences, NIRS). Also important was inclusion of wider environmental science through the Society of Environmental Toxicology and Chemistry (SETAC).

The presentations indicated that radioecology is an important subject serving the interests of many different communities with interest in radiation protection, but also providing tools for scientific investigations, e.g. through the use of tracers and analysis of the distribution of radioactivity in the environment.

The interactions between the leading international organisations in radiation protection (UNSCEAR, ICRP and IAEA) were noted, alongside those of other international organisations concerned with environmental and human health, such as the United Nations Environment Programme (UNEP) and the World Health Organisation (WHO).

It was emphasized that, as in other research areas, it is necessary to maintain effective relations with academia, government, business and other stakeholders. This is not always easy to do, as the respective communities need to maintain their independence. Mechanisms for building of trust and confidence were seen as vital. The links between success, clear communication of values and benefits, and confidence in the results of scientific research, were all commonly highlighted. The need for an increased numbers of people with technical competence in radioecology was also commonly identified. Support for training programmes is therefore another critically important issue, allowing for geographical and gender inclusivity, combined with focus on meeting the needs for radioecology related products.

¹ All presentations on the organisations and the perspectives in research priorities are available at the link <http://iur-uir.org/en/actualites/id-242-launch-of-the-forum-a-collective-initiative-prompted-by-iur-to-promote-worldwide-harmonization-of-radioecology-networks>

Presentations on Research Priorities

A large number of research issues was identified. Interests range from those closely connected to fundamental research in radioecology as it supports assessment of impacts on non-human biota, e.g. on voxel phantoms, to quite specific studies designed to address particular needs, such as the transport of key radionuclides from the sub-surface into and through the biosphere, to support long-term assessments of geological disposal of solid radioactive waste.

Improvement of dynamic models for radionuclide migration and accumulation in the biosphere was a common issue, including widely different temporal and spatial scales for assessment of major accidents and for solid waste disposal. The update of general models for assessment of doses to representative persons from planned releases, IAEA's update of Safety Series 19, was another important example. A further assessment area of interest was that connected with management of naturally occurring radioactive material, the management of uranium mining and ore processing wastes and other nuclear legacies.

A common theme concerning modelling was that it concerns much more than finding values of parameters to include in models; in particular the application of a particular model should be based on an appropriate level of understanding of the relevant processes. Understanding of ecosystem behaviour can, for example, be very important. A graded assessment approach is needed which is as simple as possible to minimise resource needs and as complex as necessary to meet confidence needs.

A different issue identified was the need for more effective and efficient monitoring techniques, to support emergency preparedness and response, but also confidence in arrangements for containment and release of radionuclides. Such time series data, if appropriately taken and recorded, can also support the understanding of processes and the selection of appropriate parameters in assessment models.

Improved understanding of the effects at low doses and dose rates on both humans and other biota from the individual to the ecosystem level, were seen as critical. The effects of environmental change, particularly climate change, were identified as an issue of increasing significance particularly as they affect radionuclide behaviour and the potential for exposure within changing ecosystems. In addition, several contributors noted that protection of the environment and human health from ionising radiation cannot be considered in isolation from other potentially harmful phenomena and the consequences of multiple stressors.

Conclusions

Based on the presentations and discussion it was concluded that there was a clear need for a better description and common understanding of the roles and functions of the various networks concerned with radioecology R&D, the interface with international regulatory bodies, and how consensus on assessment of risk can be achieved and communicated.

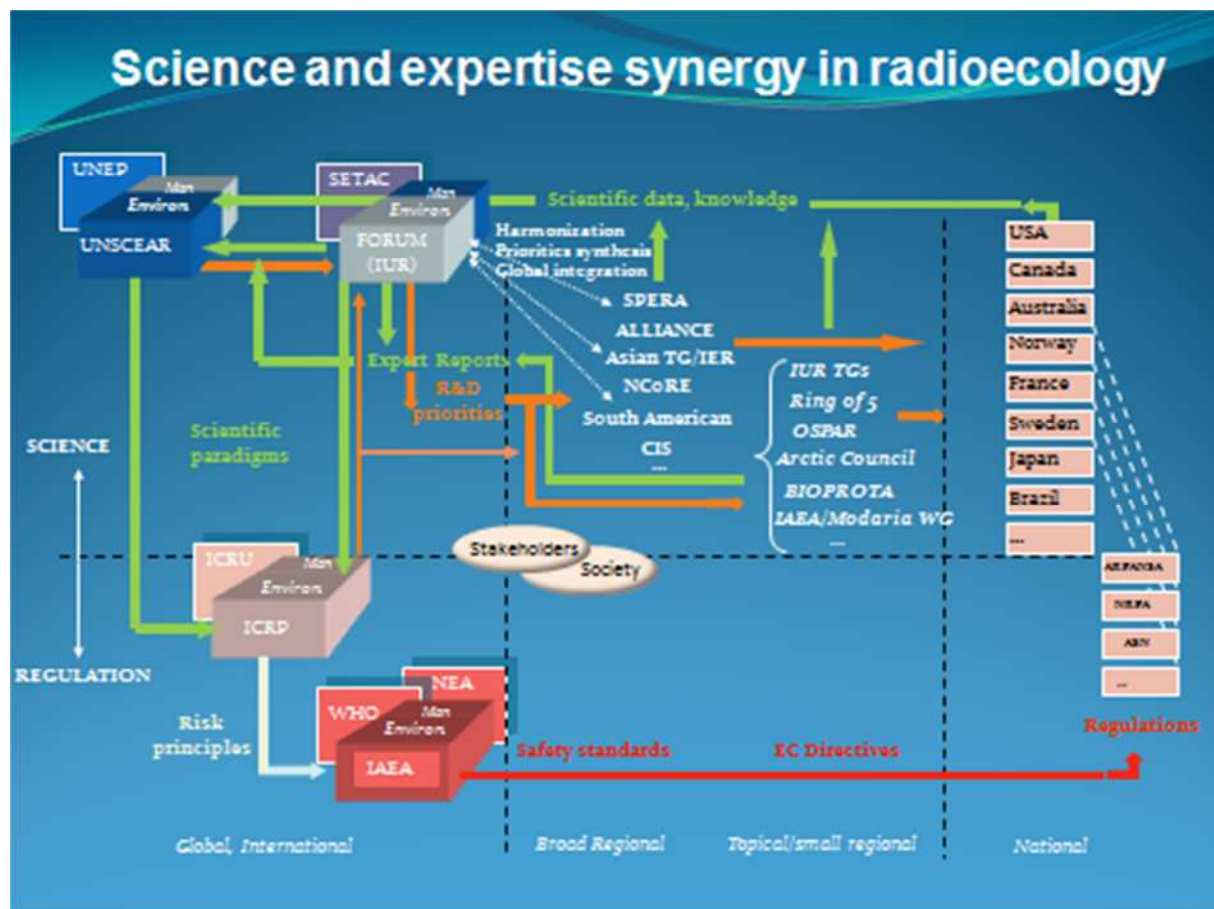
A collective proposal was made that the IUR should take the lead in launching a "FORUM" as a tool to promote radioecology internationally, with three key objectives: (1) communication, both among regional and technical radioecology networks and with other networks with an interest in the application of the results of radioecology, (2) global integration and construction of consensus on key scientific radioecology issues, (3) maintenance of expertise. The figure below is not comprehensive,

but was developed to illustrate the connections among the networks, the flow of scientific information, how that is used, and how that gives rise to further research requirements.

The FORUM should seek to include all other existing networks, especially in the CIS countries, South America and Africa, which have not yet been represented at this initial stage, in order to meet better international representation, The FORUM should also integrate non-nuclear networks dealing with similar environmental risk issues, for example, as already embarked with SETAC. The basic ecological principles and science are essentially the same and mutual benefits are expected from such improved liaisons and with further discussion through UNSCEAR and the UNEP family of environmental programs of relevance.

The IUR representatives agreed to take forward the proposal and to bring the outcome from this workshop to a wider audience at the next ICRER Conference to be held in Barcelona on 8-12 September 2014.

Radioecology is the study of how radioactive substances interact with nature: how different mechanisms affect the substances' migration and accumulation in different media, their behaviour within overall ecosystems, and their uptake in food-chains. It is a multidisciplinary science situated at the crossroads between environmental radioactivity, whether natural or man-made, and its consequences for man and the environment. The justification for individual networks is expanded by the benefits of the forum at the global level; there is merit in working and standing together.



Participation List

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A. Bollhoefer	South Pacific Environmental Radioactivity Association (SPERA) and Environmental Research Institute of the Supervising Scientist, Department of the Environment, Darwin, Australia.
K. E. Frogg	AMAP and Norwegian Radiation Protection Authority (NRPA), Østerås, Norway.
K. Higley	ICRP and Department of Nuclear Engineering and Radiation Health Physics, Oregon State University, USA
T. Hinton	International Union of Radioecology (IUR) and Institute of Radioprotection and Nuclear Safety (IRSN), Centre of Cadarache, France.
L. Kapustka	SETAC and LK Consultancy, P.O. Box 373, Turner Valley, Alberta, Canada.
W. Kuhne	NCoRE and Savannah River National Laboratory, USA.
K. S. Leonard	OSPAR and Centre for Environment, Fisheries and Aquaculture Science (CEFAS) Lowestoft, UK.
O. Masson	Ro5 and International Union of Radioecology (IUR) and Institute of Radioprotection and Nuclear Safety (IRSN), Centre of Cadarache, France.
K. Nanba	Institute of Environmental Radioactivity, Fukushima University, Japan.
G. Smith	GMS Abingdon Ltd, Oxfordshire, UK.
K. Smith	BIOPROTA and RadEcol Consulting Ltd, Cumbria, UK.
P. Strand	IUR and Norwegian Radiation Protection Authority (NRPA), Østerås, Norway.
H. Vandenhove	European Radioecology Alliance and Belgian Nuclear Research Centre (SCK-CEN), Mol, Belgium.
T. Yankovich	International Atomic Energy Agency (IAEA), Division of Radiation, Transport and Waste Safety, Vienna, Austria.
S. Yoshida	National Institute of Radiological Sciences (NIRS), Fukushima Project Headquarters, Chiba-shi, Japan.