BIOPROTA
Radioecology Priorities and Expertise

International Union of Radioecology
Worldwide Harmonisation of Radioecology Networks
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Identifying Research Priorities

Graded assessment approach:

- As simple as possible to minimise resource needs
- As complex as necessary to meet confidence needs

Research priorities driven by insufficient confidence in current assessments. Research should improve:

- Treatment of features, events and processes (FEPs) of the systems under investigation
- Development of conceptual models giving adequate approximation to those systems
- Mathematical representation of those conceptual models
- Selection of parameter values to adopt within those mathematical representations

BIOPROTA's Particular Long-term Perspective

- Need for justified, well-supported models for the transport of key contaminants released from the sub-surface into and through the biosphere
- Implies a need for understanding of long-term temporal evolution of the (eco)-system

Not just about "contamination" {Gonzalez, 2013}

Not just about Kd and CR gaps

Key Processes

Relatively well understood:

- constant biospheres (IAEA-BIOMASS-6, various BIOPROTA outputs, IUR Report 6:2006)

Not so well understood:

- Climate and human action driven changes, affecting:
  - geosphere-biosphere interface
  - freshwater-marine interface
  - catchment evolution: hydrology, geochemistry, geomorphology
  - soil-plant systems

Key Contaminants

- Key radionuclides are long-lived, relatively mobile in the environment, historically:
  - C-14, Cl-36, Se-79, Nb-94, Tc-99, I-129, Np-237 and U chains
  - boron, cadmium, lead
- Newly of interest:
  - Ca-41 and Mo-93
  - Some shorter lived radionuclides
    - released by human disturbance of sites
    - present at legacy sites, e.g. Mayak

Not all processes are important for all contaminants
Partly depends on the significant mode of exposure

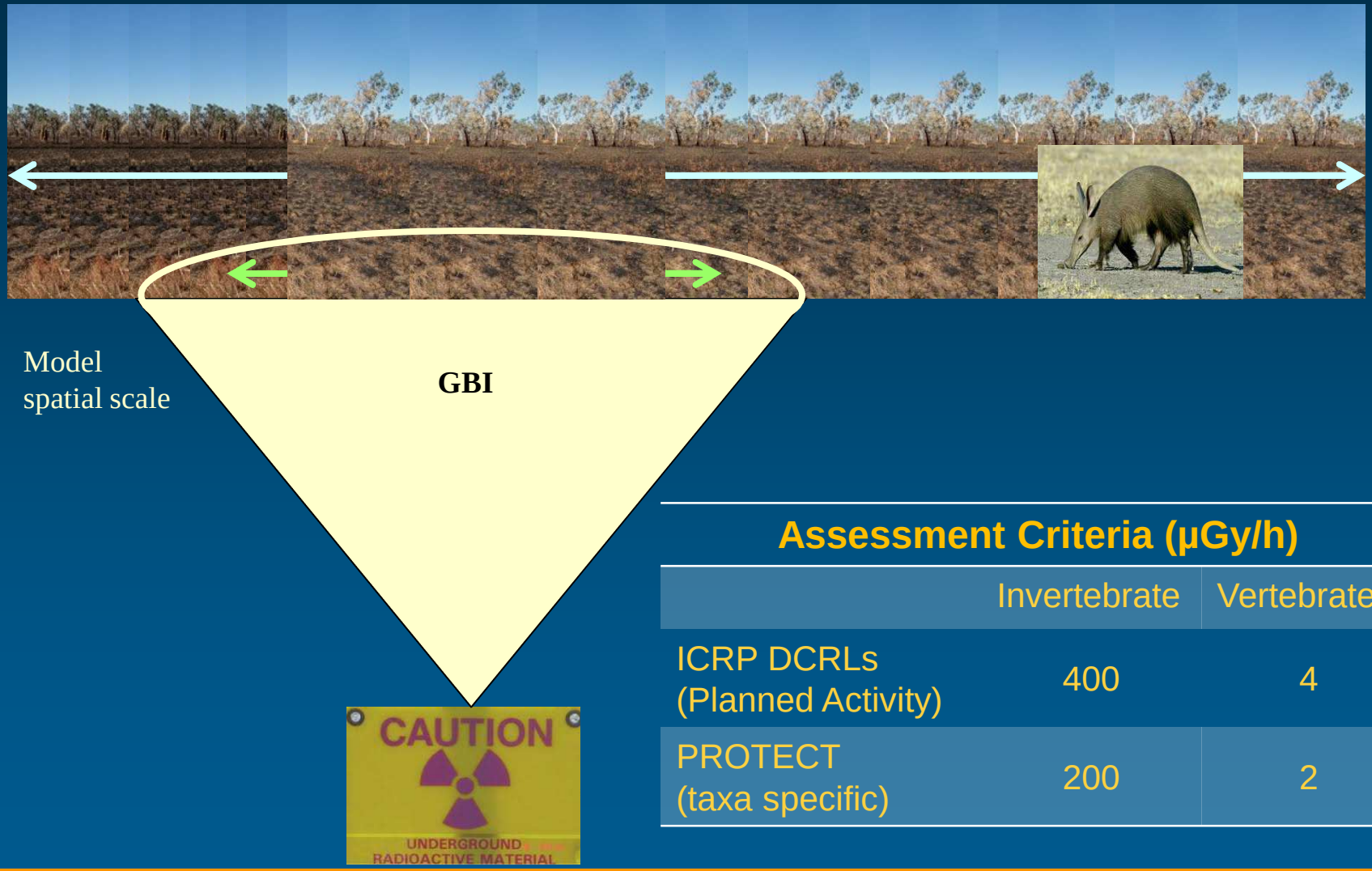
Continuing BIOPROTA foci

- Alignment of EIA processes with those for post-closure radiological assessment, including site characterisation and prognostic modelling
- C-14 dose assessment model validation
- Comparison of assessments for radioactive waste disposal and other hazardous waste disposal
- Long-lived radionuclide discharges
- Disposal of low-level RW in landfills
- Contaminated land, mine waste and other legacy sites
- NORM dumps and disposal areas

Continuing BIOPROTA foci

- Addressing uncertainties in long-term biota dose assessments
  - Simplistic interpretation of protection objectives can result in complex assessments that may not be supportable by available tools and data bearing in mind long-term uncertainties
  - Transfer parameters for key radionuclides to populations (lack of data can drive costly monitoring programmes, focus on the data needed)
  - Interaction of populations with the ecosystem - consistency with assumptions for human dose assessment

Assessment spatial scales



Assessment Criteria (µGy/h)

	Invertebrate	Vertebrate
ICRP DCRLs (Planned Activity)	400	4
PROTECT (taxa specific)	200	2

Continuing questions

Ideally need

- robust, coherent and internationally agreed standards,
- for protection of human health and the environment from radiological *and other impacts*, so that
- compliance with those standards can be clearly and unambiguously demonstrated

But:

- Variation in site characteristics (ecosystems) and optimisation, including economic and social factors, implies allowance for variation in derived standards

Addressing Correlations

It is clear that some parameters are correlated, and in order not to select or sample meaningless combinations of parameter values this issue must be addressed.

Derived approach:
implies finding an analytical or empirical relationship between the two parameters of interest, and then making one of them dependent on the other.

Statistical approach:
requires knowledge of correlation between parameters (in terms of a correlation coefficient) and a sampling method capable of dealing with correlated distributions.

Correlations: not just about data

Sharing information on methods

Significant correlations in assumptions for:

- Biosphere system description and representation
- Radionuclide behaviour in those systems
- Human behaviour in those systems (and influence on biota behaviour)
- *And then between the model parameters*

Once again highlights need for system understanding to underpin the assessment calculations

BIOPROTA Engagement Process

- Strong engagement with IAEA
  - MODARIA, especially on environment and climate change
  - HIDRA, future human actions affecting biosphere systems
- Growing engagement with European programmes, e.g. COMET
- Project participation open to all and has included experts from Europe, Russia, Asia and N America
- Sponsors globally connected
- *Always room for improvement!*