

Bioaccumulation



Our Mission

The committee's mission is to refine the evaluation of bioaccumulation of organic chemicals in fish, birds, and invertebrates, through an improved understanding of biotransformation processes, and to thereby improve the relevance of ecological risk assessments.

Steering Team

Public Steering Team Members

Dr. Janet Cermak (Environment and Climate Change Canada)
 Dr. Caren Rauert (German Environment Agency, UBA)
 Dr. Henriette Selck (Roskilde University)
 Dr. Lawrence Burkhard (US Environmental Protection Agency)
 Dr. Katrine Borga (University of Oslo)
 Dr. Dave Kuo (City University of Hong Kong)
 Dr. Yongshu Fan (Environment and Climate Change Canada)

Private Steering Team Members

Dr. Diane Nabb (FMC Corporation)
 Dr. Heike Laue (Givaudan)

HESI Staff

Dr. Michelle R. Embry (membry@hesiglobal.org)
 Dr. Sandrine E. Deglin (sdeglin@hesiglobal.org)

Webpage

<https://hesiglobal.org/development-of-methods-for-a-tiered-approach-to-assess-bioaccumulation-of-chemicals/>

2021 Committee Highlights



Participating Organizations

9 government/regulatory agencies, **16** academic/research institutes, **5** industry, **2** others, and **3** consulting



Publications

2 in progress



Outreach

- 1** oral presentation, webinar series, and survey
 - 1** oral presentation at the "1st Workshop for Risk Assessment: Successes and Challenges for Safety Assessment" organized by the Federal University of Paraná (Brazil), University of São Paulo (Brazil), and University of Washington (January 2021, virtual)
 - A monthly webinar series was initiated in 2021 with presentations related to the advancement of toxicokinetics and bioaccumulation science to aid ecological and human health risk assessment
 - A survey was distributed to identify critical scientific needs, as well as data and knowledge gaps which, if addressed, could considerably advance the field of ecological risk assessment



Geographic Representation

Canada, China, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Portugal, Switzerland, United Kingdom, and United States

Working Groups

- Bird Biotransformation and Toxicokinetics.** This working group is exploring the state of the science on biotransformation and toxicokinetics in birds. A literature review on bird bioaccumulation and biotransformation was funded by the committee and completed by Dr. Dave Kuo (City University of Hong Kong/Kuo Research and Consulting). This review involved evaluation of >550 peer-reviewed studies resulting in a database of >25,000 data entries on >700 organic compounds for nearly 500 wild and domestic bird species. Dr. Kuo is now leading the development of a manuscript to describe this effort, establish the state of the science in the field, and provide recommendations for future research. The manuscript was submitted to RECT and was accepted with major revisions.

- **Invertebrate Biotransformation and Toxicokinetics.** This working group is exploring the state of the science of biotransformation and toxicokinetics of organic chemicals in aquatic invertebrates. A literature compilation was conducted for 10 genera of invertebrates. The literature is currently being reviewed and biotransformation and toxicokinetics data are being extracted and compiled in a database. This work, funded by the committee, is being conducted by Kuo Research and Consulting. The review process and data compilation are completed and the database is undergoing curation.

Areas of Focus for 2021

- **Manuscripts.** Complete the revisions to the manuscript on bird bioaccumulation and finalize publication. Publish the state of the science on invertebrate bioaccumulation and biotransformation, and the output from the fish biotransformation workshop.
- **Merger.** 2022 will see the merging of the Bioaccumulation and Animal Alternatives Committees to create the New Approach Technologies for Understanding Risk in the Environment (NATURE) Committee. The mission of the committee will be to develop, refine, and communicate the scientific tools and approaches needed to support ecological risk assessment around the globe, with a focus on alternative, non-animal testing methods. This mission will include but is not limited to the following:
 - Develop tools to evaluate the toxicokinetics of organic chemicals and refine our understanding of the connection between exposure and hazard
 - Use and develop alternative methods for ecological risk assessment in various contexts (e.g., screening, prioritization, classification, risk assessment), sectors (e.g., pharmaceutical, agrochemical, chemical, personal care/cosmetics), and regulatory jurisdictions

Strategic Impact Areas

Enhanced Efficiency and Accuracy in Safety Assessment Practice

A better understanding of bioaccumulation, biotransformation, and toxicokinetics in various organisms, such as birds, invertebrates, and fish, will help determine how to use various metrics in a weight-of-evidence approach, and ultimately allow for a refinement of the way ecological risk assessments are conducted.



Enhancement of the Societal Knowledge Base on Environmental or Ecological Processes of Relevance for Protecting the Health of the Environment

The focus on biotransformation and the expansion to taxa beyond fish will enhance the ability to more effectively evaluate chemicals for bioaccumulation potential as well as broader ecological impacts.



Increasing the Audiences for Collaborative Safety Science

This committee constantly engages a variety of groups involved in “B” research, as well as modeling and improvements of assessment methods (USEPA, Environment and Climate Change Canada, European Commission Joint Research Centre, CEFIC, etc.). In addition, the group has maintained strong ties with the SETAC Bioaccumulation Scientific Interest Group (BSIG) through which scientific sessions, training opportunities, and presentations have been organized at all the SETAC annual meetings. At these meetings, HESI has presented overviews of ongoing research activities to better forge ties with other interested research and regulatory groups. HESI is regularly invited to present the work of this committee at other stakeholder events and meetings.



Publications

In Progress

Authors TBD. A review on bioaccumulation and biotransformation of organic chemicals in birds. In preparation.

Authors TBD. Application of the OECD 319 Test Guidelines for bioaccumulation assessment: opportunities, challenges, and next steps. In preparation.

 **Participating Organizations****Government/Regulatory Agencies**

Environment and Climate Change Canada
German Environment Agency (UBA)
Norwegian Institute for Water Research (NIVA)
Swiss Federal Institute of Aquatic Science and Technology (Eawag)
UK Environment Agency
US Army Corps of Engineers
US Department of Agriculture
US Environmental Protection Agency
US Geological Survey

Academic/Research Institutes

City University of Hong Kong
Ecole Polytechnique Federale de Lausanne
Fraunhofer Institute
Helmholtz Centre for Environmental Research (UFZ)
McGill University
Roskilde University
Simon Fraser University
University of Bern
University of Coimbra
University of Guelph
University of Oslo
University of Pittsburgh
University of Saskatchewan
University of Windsor
Utrecht University
Wageningen University

Industry

The Dow Chemical Company
DuPont
FMC Corporation
Givaudan
L'Oréal Corporation

Others

National Research Institute of Science and Technology for Environment and Agriculture (IRSTEA, France)
Research Institute for Fragrance Materials (RIFM)

Consulting

Arnot Research and Consulting
KJ Scientific
Kuo Research and Consulting