Society of Environmental Toxicology and Chemistry

Technical Issue Paper

Recommended Minimum Reporting Information for Environmental Toxicity Studies

Environmental toxicity studies are key components in research that measures environmental health, and they are often used to guide environmental protection management decisions. Therefore, environmental toxicity studies need to be transparent to facilitate their use and maximize their impact. Transparency is imperative, now more than ever, given the need for data from a large number of such studies to address the continuous emergence of chemical, biological, and physical environmental challenges and the ever-growing interest in decreasing animal use for testing. Therefore, when environmental toxicity studies are published, it is extremely important that they are reported clearly and fully. Appreciating the importance of this issue, SETAC promotes open data as well as open science in general.

Open data is data that is available to the public; it should be complete, accessible and reusable

SETAC defines open data as data that is accessible and reusable to allow for reanalysis and novel analysis and interpretation. Data in this context include all information that is generated during a study including design plans, measurements, observations, calculations, tools, models, algorithms, and computer code among other types of information. However, it should be recognized that transparency in reporting alone does not equal rigorous science though it can help rigorous science get recognized and utilized.

Open science is science that is accessible to all society; it should be rigorous science

Environmental scientists have grappled with making environmental toxicity data more transparent and useable for some time and have published heavily on the topic. Many organizations that utilize environmental data have also published requirements and lists towards ensuring complete data is reported. SETAC Journals – Environmental Toxicity and Chemistry and Integrated Environmental Assessment and Management – encourage data accessibility with their Data Transparency Policy. The journals require that each article is accompanied with a data accessibility statement, which "clarifies whether the data and associated metadata are available through an online repository or supplemental files, are available from the authors or a third party, or are unavailable with reasoning (i.e., proprietary, legal implications)." SETAC Journals are aligned with Figshare to encourage open data.

Recommended Minimum Reporting Information for Environmental Toxicity Studies, as applicable

To facilitate open data reporting, we have compiled a list of recommended reporting information for a typical environmental toxicity study. The list is not all inclusive and it is dependent on the type of study being reported. However, it is provided as a guide for scientists who want to ensure their work advances science and science-based environmental management decisions, regardless if it was following a standard method or was original research.

Study Design

- Hypothesis or study type (e.g., stressor, subject, effects monitored)
- Scheme
  - Number and setup of replicates for stressor variable(s) (e.g., treatment)
  - Number and setup of replicates for control(s) (e.g., negative/positive, solvent) and reference(s) (e.g., location of population)
  - Number of test subjects (e.g., organisms, cells) per replicate)
  - Treatment design (e.g., block, randomized)
  - Methods, standard protocols, or testing guidelines (e.g. ASTM, OECD) and any deviations

Stressor

- Chemical
  - Identification (e.g. technical name, CAS-number, purity, composition of product formulation)
  - Source
  - Properties (e.g., physico-chemical parameters, radiolabeling)
- Biological
  - Strain
  - Source
- Physical
  - Type (e.g., temperature, moisture, polymer, light intensity)
  - Properties (e.g., substance shape and size, length of photoperiod)

Test Subject

- Organism
  - Scientific name / taxonomy ID
  - Source
  - Strain, clone, culture handling
  - Size
  - Age/ life-stage /reproductive condition
  - Sex
- Tissue
  - Type and Source
- Molecule
  - Type and Source

Exposure Conditions

- System
  - Type (e.g., field or lab, open or closed system, type and rate of flow of aquatic system)
  - Material and volume of system
  - Biomass loading (e.g., biomass per volume)
  - Nutrients or food available (e.g., type, frequency, delivery method)
  - Exposure schedule
  - Route of exposure (e.g., food, contact)
- Medium
  - Type and characteristics (e.g., soil type, geochemistry, nutrients)
  - Source
- Duration
- Ambient conditions
  - Measured conditions (e.g., temperature, pH, grain size, moisture level) at study time points
- Stressor Variable
- Preparation of stock solution if applicable
  - Nominal and measured variable and solvent level at study time-points (e.g., concentrations, levels, or counts)

Response / Observations

- Response endpoint (e.g., reproductive, biochemical, biological, morphological)
- Response for each replicate at each variable at various time-points (e.g., treatment, location)
- Comparison to validity criteria (e.g., control or reference)

Notes

- Data dictionary or guide describing the data and codes
- Deviations from standard methods including reasoning
- Data transformations justification
- Outlier identification and treatment
- Uncertainty and variability comments

Data and Analysis

- ALL data - including untransformed data
- QA/QC parameters (e.g., limits of detection and quantification, % recoveries)
- Details of analytical verification of exposure
- Statistical methods
- Software, version and date
- Model, version and date
- Code
- Results
- Variability or sensitivity analysis

Disclosures

- Potential competing or conflicting interests of data reporters
- Financial support for data generation
- Reasons certain data are not reported (e.g., confidentiality).

FAIR Data Principles specify that data should be:

Findable
Accessible
Interoperable
Reusable

Resources

Center for Open Science. cos.io

FAIR Data Principles. go-fair.org

Registry for Research Data Repositories. re3data.org

Acknowledgments

Marlene Ågerstrand, Anne Alix, Charmaine Ajao, Mark Hanson, Dale Hoff, Caroline Moermond, Tamar Schlekat, Jane Staveley

Copyright

When referring to this text, please use the following citation: [SETAC] Society of Environmental Toxicology and Chemistry. 2019. Technical Issue Paper: Recommended Minimum Reporting Information for Environmental Toxicity Studies. Pensacola (FL): SETAC. 3 pp.