

Integrating Expertise on Climate Modeling and Environmental Risk Assessment: A SETAC Pellston Workshop in the Oslo Fjord

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The in-person participants

The past decades have seen great progress in climate change and contaminant research as separate fields. However, despite calls to action, we still need better integration of climate modeling *and* environmental risk assessment expertise to handle future threats to the environment.

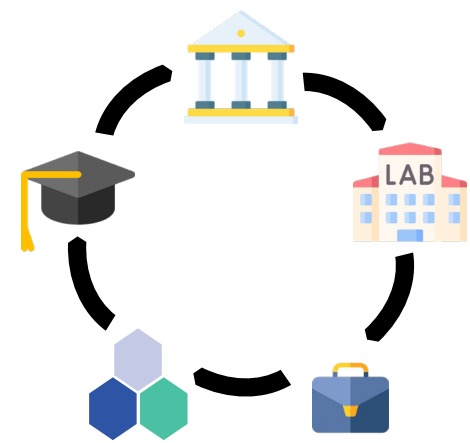
In June 2022, we brought together leading experts across climate and environmental sciences, to review and improve methods for incorporating climate model projections into environmental risk assessment frameworks. Three case studies of ecosystems facing chemical and climate stressors were selected to serve as examples for the development of methods.

We're now working, across 3 Working Groups, to communicate conclusions to key government, research, and international stakeholders, and to establish SETAC as a key partner in global climate change science.

More than 30 experts ...



From **12 countries** across **4 continents**



From **academia, government, business, research foundations, and SETAC**



From **early, mid- and late careers**

at



Oscarsborg Fortress, Oslo

... across 3 Working Groups ...

1 Problem Formulation & Exposure Characterization

Develop conceptual pathway models for how global climate change (GCC) and chemical stressors interact with ecological receptors.

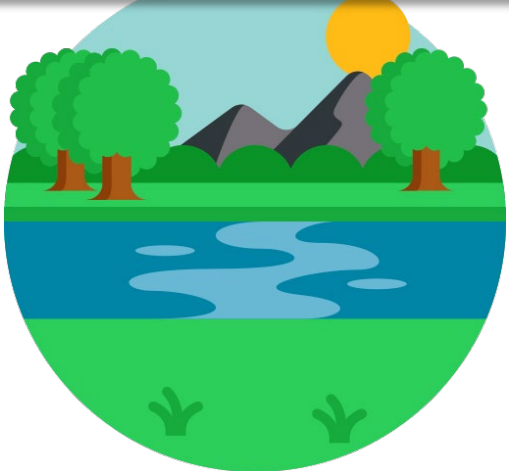
2 Effects & Risk Characterization

Develop and adapt existing methods for integrating the range of outputs from WG1 into environmental risk assessment (ERA) for chemicals and other stressors

3 Chemical Risk Management

Using the output from WG 1 and 2, illustrate how ERA that incorporate GCC models can be used to inform adaptation and mitigation strategies.

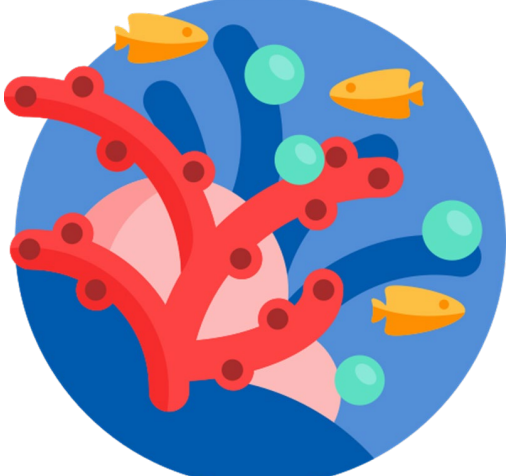
... and 3 case study ecosystems



Riverine salmon populations, Northwest USA



Agricultural streams, Southeast Norway



Great Barrier Reef, East coast Australia

Chemical & other stressors



Pesticides & hypoxia



Pesticides

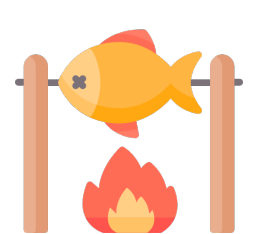


Pesticides, sediments & nutrients

Example of climate impacts on risk components



Precipitation
Pesticide run-off



Temperature
Fish development & survival



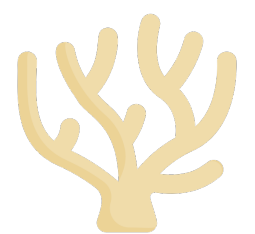
Precipitation
Pesticide run-off



Temperature
Chemical degradation



Precipitation
Nutrient run-off



Temperature
Coral bleaching



Cyclones
Physical damage

Key messages from WG1 (Moe et al. 2022)

- Use **ensembles** of Global Circulation Models, not single models
 - Projections from 30-100 models
- Generate robust "**climate information**" from these projections
 - Probability distributions characterised by statistical properties
- **Downscale** the climate information to the assessment region
 - Empirical-statistical and/or dynamical downscaling methods
- **Integrate** with exposure and/or effect assessment, using probabilistic methods
 - Bayesian networks (BN) as a tool for probabilistic modelling and communication

More information during SETAC Dublin:

Session 2.08: Ecosystems Responses Under a Multiple Stressors Scenario in a Rapidly Changing Climate
Platform 2.08.T-02: Integration of Climate Model Projections and Pesticide Application Scenarios for Probabilistic Risk Assessment with a Bayesian Network Model
Platform 7.06.P-Tu448: Predicting pesticide effects on aquatic community endpoints in rice fields of southern Europe – A Bayesian network approach

Further Reading

Mentzel, S., Welch, S. A., Desrosseaux, A., & Hader, J. (2022). *Writing the Future of Ecotoxicology: Contributing to a Pellston Workshop as a PhD Student*. <https://globe.setac.org/writing-the-future-of-ecotoxicology-contributing-to-a-pellston-workshop-as-a-phd-student/>
Moe, S. J., Benestad, R. E., & Landis, W. G. (2022). Robust risk assessments require probabilistic approaches. *Integrated Environmental Assessment and Management*, 18(5), 1133–1134. <https://doi.org/10.1002/ieam.4660>

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