

4th National Cyanobacterial Workshop

Wednesday 24th of September, Modelling Workshop

The workshop was organised to bring researchers, industries and managers together to have an open discussion on emerging topics identified during the previous two days of meeting.

The people participating in the modelling workshop had different levels of expertise and awareness of ecological models. While the group was relatively small, there were participants from both management authorities and research institutions. The time available was about two hours, at the beginning of which each participant introduced themselves and proposed possible topics to be discussed within the group. A list of emerging issues was then identified and discussed, for example:

1. What are the motivations to start modelling an ecosystem? Why do we use models?
2. How do modellers know that are going towards the “right” direction and correct approach?
3. It is better to use an established model or build your own?
4. How can we use models to predict cyanobacterial blooms?
5. How can we improve the way modellers and managers work together?

During the discussion the difference between model calibration and validation was clarified and the type of data necessary to start modelling a system with a deterministic model (e.g. DYRESM-CAEDYM or General Lake Model GLM-FABM, University of Western Australia) versus a statistical model (e.g. Bayesian network) was explained. The state-of-art on prediction capability of deterministic models was considered and it emerged that, at present, the confidence on physical and chemical predictions is much higher than the biological one, in particular simulating a large number of phytoplankton groups. Inter-calibration of models used at present, and their application to different systems, would be more feasible than developing new alternative models. New efforts should focus on new calibration strategies that will allow applying of models to different systems more rapidly.

Through the conversation it was also identified that managers are more inclined to select simplified models that can be rapidly applied (e.g. statistical ones) and not choose other models that may require longer time and larger data sets (e.g. deterministic ones). Statistical models can be useful for risk assessment but deterministic models can be a powerful additional instrument to understand the dynamics and processes of the system and to identify alternative management strategies to reduce risk. Furthermore, it was pointed out that in some cases limited management options are available, so the modelling scenarios should be adapted accordingly. In order to achieve good partnership between modellers and managers there should be close collaboration in selecting the type of model depending on the aims, designing scenario options, assessing the model capability and results uncertainty. In this way there will be more confidence in applying alternative management options suggested by modelling outcomes.

In conclusion, the group established a list of priorities on which researchers and modellers should focus in the future:

1. Improve confidence in the ecological models: modellers should work closely with managers and industry. Modellers should elucidate the benefits of modelling to water managers.

Additionally, modellers should clarify model outcomes depending on the type of model used (e.g. assessing cyanobacterial risk or understanding factors controlling cyanobacterial blooms)

2. Detailed guidelines for future users: modellers and managers should elaborate on guidelines for industries regarding the type of model to apply considering the aims of the study or the management problem to resolve. Communication between modellers and managers should be improved, for example it should be clear from the start which type of risk should be assessed (e.g. drinking, recreational) and the expectations should be matched to potential outcomes.
3. Update models with real data observations to improve future predictions (e.g. set up of probes collecting data in continuum that will “feed” data back to the models). Greater effort should be made in this direction.
4. Overcome the challenge of timeframe: find an intermediate point between the research time frame to develop and apply a model, and the operational time frame.
5. Keep informing and updating the industry on different modelling approaches while they rapidly evolve (e.g. via workshops, YouTube videos, presentations for different audience)

List of participants

Surname	Name	Institution
Huider	Bianca	Goulburn Murray Water
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Scard	Aaron	Victoria University
Millikan	Mary	Victoria University
Gaweda	Yvette	University of New South Wales
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