Submission on the National Environmental Prediction System (NEPS)

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Thank you for the opportunity to comment on the National Environmental Prediction System (NEPS) scoping exercise. The Centre for Air pollution, energy and health Research (CAR) is an NHMRC funded Centre of Research Excellence (https://www.car-cre.org.au/) and is the leading air pollution and health research collaboration in Australia. Health effects of air pollution and energy transitions are key considerations of environmental monitoring and management, and as such, CAR is well placed to offer expert insights into the requirements for NEPS development. CAR has established Australia's first online air pollution and health data management and analysis tools platform (called CARDAT). This platform facilitates collaboration with researchers, government agencies and the community, and our comments below draw on our experience developing this important research infrastructure.

Summary

CAR supports the establishment of a NEPS as it could help to develop:

- nationally consistent data collection protocols to facilitate environmental monitoring
- increased predictive power for environmental modelling
- framework/s to allow evidence-based policy decisions to be made
- data infrastructure to make data analysis and modelling transparent and reproducible
- opportunities for co-funding of research projects

There are various inclusions we suggest for the development of a NEPS. These are:

- wide consultation during development and implementation
- the development of, or support for, an online platform for collaboration such as CARDAT
- the inclusion of atmospheric prediction component
- the inclusion of a health component to model human exposure to environmental conditions (incorporating a framework for ethics approvals and confidential data management).

Benefits and impacts of a NEPS

CAR believes that a NEPS would be beneficial in providing a nationally co-ordinated approach to improve environmental monitoring and modelling, developing a framework to inform policy, building infrastructure for data analysis, and providing a mechanism for co-funding research. These are further discussed below.

Firstly, a NEPS could lead to improvements in monitoring and modelling. This can be achieved by developing nationally consistent data collection protocols (monitoring equipment, data standards, and methodologies, etc.). For example, currently air pollution data from different jurisdictions varies widely in its capture, thus making its use and analysis across these jurisdictions difficult and time-consuming. Having specific data protocols that all researchers and policymakers use would make cross-jurisdiction data access and analysis more efficient. The predictive power of environmental modelling will be increased by such enhanced monitoring data, and the NEPS could provide a platform for methodologists to develop more sophisticated models with improved precision and accuracy.

Secondly, the NEPS could include a framework for supporting evidence-based policy development by facilitating collaboration between data scientists and policy makers. Involving policy makers in the NEPS would ensure that any analyses done will have real-world applications.

Thirdly, a NEPS could develop infrastructure for data analysis and modelling that could be accessible to all users. This would increase the transparency and reproducibility of data analysis and thus would improve how we:

- predict and mitigate environmental hazards
- evaluate the effectiveness of government policy (for example the effects of environmental management practices and transitions to greener sources of energy)
- involve end-users in the data analysis or modelling process
- model changes to the environment as a result of human development, which can then inform planning policy.

Lastly, a NEPS could represent an opportunity for collaboration and leveraging of funds for important environmental research projects. CAR is involved with several Environmental Health projects, and a NEPS would provide an ideal platform for encouraging co-funded research in this area.

Recommended inclusions and considerations for a NEPS

CAR recommends the following considerations as key components to a NEPS.

1. A nationally co-ordinated approach

It is of vital importance that any development of the NEPS include consultation with a variety of groups across Australia. This will prevent duplication of effort and assist with developing consistent data and best practice modelling techniques, as well as ensuring the modelling can cover a broad variety of environments, be reproducible and updated on a regular basis.

A NEPS should include developers and users who are researchers as well as policy makers. Including those in government will ensure that work done under the NEPS directly answers policy-relevant questions.

2. Include an online platform for collaboration

A NEPS should include the ability for researchers to model environmental systems transparently and collaboratively. This can be achieved through an online platform that is capable of:

- data storage and sharing,
- data modelling (including configurable environments and access to software and tools),
- a secure online environment for collaborative work

- developing transparent and reproducible workflows.

CAR has recently established an online platform for data and analysis tools (CARDAT - https://cardat.github.io) which already has these characteristics. This project was undertaken with the assistance of resources from the Government's National Collaborative Research Infrastructure Strategy (NCRIS) funded projects: CoESRA (Collaborative Environment for Scholarly Analysis and Synthesis - https://coesra.tern.org.au/#/tern-landingpage) and Cloudstor (https://cloudstor.aarnet.edu.au).

This platform is accessible by Australian researchers and is used to share and analyse air pollution and health data. Using CARDAT, researchers have been able to create Australia's first consolidated air pollution dataset to facilitate health research amongst the broad community of Australian researchers. CARDAT is designed to support collaborative analysis and could be developed further to support NEPS data and modelling.

As an example of how such a platform can help end-users such as policy makers, CAR researchers have recently completed a major project to develop methods and tools for Environmental Health Indicator (EHI) reporting, funded by NSW DPIE and NSW Health. The EHI report used the platform to conduct comprehensive analyses of hazards and is considered a good starting point for generating what could become a regular 'State of EH in NSW' report. A NEPS could build on this framework, expanding it to similar projects that monitor changes to environmental systems and their impact on human health.

3. An atmospheric prediction component

Atmospheric prediction plays a key role in environmental modelling and should be considered a key component of a NEPS. Currently emissions data is inconsistently collected across states, and, as an important component of atmospheric predictions, it would be extremely useful if we could develop a national emissions inventory. This would allow national air pollution data to be made available in a consistent format across both geographical regions (states and territories), and pollutants.

4. A human health component

Environmental health impacts upon human health, and as such it is important to include a health component in the NEPS. This could be achieved by using environmental data to model human exposure to environmental conditions. This information could be used by health professionals and policy makers to predict the impact of environmental events (such as exposure to bushfire smoke). We have consistently heard through our CAR stakeholder meetings with government and the community that this capability would be extremely useful to policy makers and local communities. In particular, stakeholders have highlighted the importance of providing a link between research outputs and land use, transport planning and energy transitions. This would inform infrastructure planning and development decisions and interventions to reduce environmental health impacts and develop environments that promote health and wellbeing (see WHO definition of EH re: promoting health and wellbeing).

About the Centre for Air pollution, energy and health Research (CAR)

CAR is a Centre of Research Excellence funded by the National Health and Medical Research Council. The centre brings together more than 30 researchers at the forefront of their fields, based in seven of Australia's leading universities.

CAR is the only group of its kind nationally to bring together researchers focusing on health impacts of air pollution, and new versus traditional forms of energy. The centre supports teams of researchers in the fields of epidemiology, exposure assessment, toxicology, chemistry, biostatistics and clinical respiratory medicine to pursue collaborative projects and to develop their capacity. Our centre's vision for a healthier community is the driving force behind our research.

For more information

This submission has been produced by the Centre for Air pollution, energy and health Research (CAR). For more information about CAR and our work contact us
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