



Collaboration for
Environmental
Evidence

2021 ANNUAL REPORT

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A Message from the Board of Trustees

I am delighted to introduce this 2021 Annual Report on behalf of the Board of Trustees of the Collaboration for Environmental Evidence (CEE). I became Chair in May 2021, so this is my first opportunity to write to all of you who have made such generous contributions of your time, talent, and energy in support of CEE. The Board wants to thank each of you for that support. Your contributions have helped CEE achieve remarkable successes over the past year. Your continued support will help us to reach even greater goals in the coming years.

The trustees also work voluntarily, and the Board acknowledges and appreciates here the long service to CEE by Gerry Post, Simon Gardner, and Kent Prior, all of whom completed their terms of office in 2021.

2021 was of course another challenging year for everyone. Covid 19 continued to dominate, bringing not only grief, but also a continued drive for change in work and home lifestyles, rethinking work-life balances, and increasing innovation. Evidence synthesis became, if not a household phrase, then certainly a common topic of debate as researchers rushed to find new vaccines and recommend behavioural changes to keep us safe. CEE continued to contribute to COVID-END (COVID-19 Evidence Network to support Decision-making) as one of the few environmental synthesis organisations in this diverse international network. As the pandemic runs its course, emphasis is turning to the environmental circumstances in which the virus appeared in the human population and how society might take action to prevent further pandemics. Through utilising rigorous evidence synthesis methods, the CEE community can make an important contribution to building this evidence base for understanding the causes of virus transmission from wild animals to human populations and how environmental management can reduce risk of further transmissions of novel viruses.

As the demand for evidence to address societal challenge — across countries and the political spectrum — increases, new methods are essential to facilitate faster evidence synthesis development, retrieval, and communication while maintaining accuracy, transparency, and replicability. Application of new technologies and the digitisation of our field are key to such transformation. CEE has led this both directly and by supporting its growing community.

As the Board recognised last year, the [CEE Environmental Evidence Summit Webinar Series](#) was hugely successful, replacing the cancelled 2020 Environmental Evidence Summit in Canada and covering everything from introductory sessions to technical innovation. In fact, it ran from late 2020 until May 2021. The series engaged many more people than might have attended in person and remains an excellent online resource. Our thanks go in particular to Jessica Taylor (CEE's Communications Officer and Meetings Committee Chair) for this success. The Board is delighted to see more and more webinars and recordings of CEE members' presentations being uploaded to the CEE YouTube Channel. We will continue to ensure these are promoted and used as a key part of our training services to both researchers and users.

Continued...

CEE grows on its central collaborative activities and those of its Centres' and individuals' own related activities, and the Board supports all these enthusiastically. I mention here two excellent examples from 2021. First, led by Neal Haddaway (Board Trustee and Stockholm Environment Institute representative) in January 2021, the [Evidence Synthesis & Meta-Analysis in R Conference](#) explored diverse tools and use cases in evidence synthesis tool development, and their YouTube Channel continues to reach a growing community of practice with over 4,100 views. Later in the year, the US Environmental Protection Agency Rapid Evidence Assessment Methods and Applications Working Group also ran a virtual event series exploring a range of related subjects. Sam Cheng (CEE representative for Center for Biodiversity and Conservation at the American Museum of Natural History) was on their Steering Group, and several CEE Board, Centre, and independent volunteers contributed to this small and highly interactive series of workshops over a five-month period.

One of the most notable events in 2021 was of course COP26 held from 31 October to 13 November in Glasgow, Scotland. For the first time, CEE was admitted to the United Nations Framework Convention on Climate Change process as an observer organization. Four of us, myself as CEE Chair, Ruth Garside (Board Trustee and Exeter lead for the UK Centre of CEE), Ruth Stewart (Board Trustee and Director of the Africa Centre for Evidence), and Barbara Livoreil (Past-CEE Centre Director) represented CEE by attending sessions virtually, with the goal of ensuring advocacy for evidence, and learning about the process to see how CEE could better contribute to future similar events. Whilst the evidence for the existence and progression of climate change is not in the main disputed any more, evidence to inform and shape the extensive complex interventions to mitigate and adapt to such rapidly increasing changes is needed urgently. CEE may seek funding to attend future events such as these where we can deliver strong face to face advocacy. The Board recognises the financial and carbon savings, however, of the increasing sophisticated virtual access systems and we will certainly increase our virtual presence in these international events in the coming years.

CEE is a not-for-profit charity and we run a tight ship financially, not least thanks to the continued support of Teri Knight as co-opted Treasurer. We are highly dependent on our extensive (and continually expanding) network of volunteers – from the Board and CEO to the deliverers of training programmes and the peer reviewers of our main income generating activity, the open access journal [Environmental Evidence](#). The journal's primary aim is to support the objective use of scientific evidence to inform policy or practice. To that end, it also publishes methodology papers and encourages submissions that promise advances in the field of evidence synthesis and dissemination. The Board was delighted to see that Environmental Evidence published more papers than ever before in 2021, including systematic reviews and maps, protocols for forthcoming systematic reviews and maps, and papers exploring metric development, novel tools, and methods for designing and wrangling multifunctional, machine-readable evidence synthesis databases. The proportion of the open access fees that comes to CEE helps fund our work in supplying all our support services to authors and users of evidence syntheses without charge. The Board recognises the demands on everyone involved, from Editor-in-Chief Andrew Pullin to the many unsung but much appreciated peer reviewers. Andrew has advised the Board that he will be stepping down as Editor-in-Chief at the end of 2022 and the search is on for a successor to take this key asset of CEE into the future.

Continued...

The Board appreciates the progress made by all the project teams in developing CEE services for both authors and evidence users. Further examples in 2021 included the continual updating of the [CEE Evidence Guidelines and Standards for Evidence Synthesis in Environmental Management](#), which stand alongside well-established health field guidelines, and the [CEE Critical Appraisal Tool](#). This Tool, developed by Ko Konno (Bangor University), is increasingly important for evaluating the 'risk of bias' (or threats to internal validity) of primary studies assessing effectiveness of interventions or impacts of exposures in environmental management. We are also excited about the development of CEE's [PROCEED](#) in partnership with the Julius Kühn Institute, a global registration system for titles and protocols of environmental evidence reviews and syntheses. This will provide a free open access resource of protocols for environmental evidence reviews/syntheses, with authors able to register and upload their protocols using appropriate templates. We hope to launch this formally in mid-2022.

For decision makers in policy and practice as well as for the general public, CEE also continues to develop and provide a range of services such as the ever-increasing catalogue of [Plain Language Summaries](#) of CEE Systematic Reviews and Maps and our open access [CEE Database of Evidence Reviews](#) (CEEDER). CEE runs CEEDER with the help of a volunteer network of editors, screeners, and reviewers. In 2021, the Board was delighted that Josie Jackson from Natural Resources Wales (NRW), the largest Welsh Government Sponsored Body, was seconded part-time into CEEDER's editorial team. As Josie says later in this Report, this was an exceptional opportunity for both parties, and the Board encourages other user organisations to collaborate with us in this way. We were also delighted to see the first ever CEEDER Collection launched during COP26, the 'Climate Change Collection'. To help decision makers navigate the ever-increasing volume of climate change literature, the new collection currently containing over 240 reviews allows users to easily browse policy-relevant environmental evidence syntheses related to climate change. This CEE service can ensure evidence-informed decisions are made using the most reliable syntheses, which will be critical in the race to Net Zero.

In the light of COP26 and the focus globally on evidence synthesis, the Board revisited the CEE Strategic Plan 2013-2023 just before Christmas 2021. Further Board-Centres workshops in early 2022 should produce a draft we can use to work with the wider CEE community by the end of summer 2022. With plenty of detail still to be explored, we see this as a time to consolidate and communicate CEE Evidence Services, promote diversity and inclusion in our network and activities, and develop an underpinning sustainable strategy for financing and staffing an ever more successful CEE. These are ambitious targets and, as always, we extend an invitation to all of you, both researchers and users, to engage with us. We welcome and need your ideas and offers of help.

Kathryn Monk (Board Chair)



**Collaboration for
Environmental
Evidence**

A Message from the CEO



The need for reliable evidence to inform actions has never been more obvious than in 2021. Uncertainty about the future and how we can meet the challenges of the next 10-20 years has been played out in the mass media and in the streets as well as in the numerous meetings of policy makers and campaigning organisations. The sheer number of questions we need to address concerning the sustainability of our environment, solutions to food and water security, and adaptation to climate change is daunting. At the same time, the volume of evidence generated by the science community through primary research is impressive and ever increasing. The recent report from the newly formed [Global Evidence Commission](#), in which CEE is a partner, notes that despite this ever-increasing demand and supply, things don't always go well, with some evidence going unnoticed or ignored and other evidence being given unwarranted attention through the bias of vested interests. The process of rigorous and reliable evidence synthesis gained attention in 2021 as crucial to societal interests and not least to deal with environmental crises that are upon us now.

CEE was created to support rigorous evidence synthesis and help fill the space between primary research and evidence-informed decision making. In 2021 we made some significant steps toward this goal with the preparation of the [PROCEED](#) protocol registration service, a new tool to assess risk of bias in primary studies and the further development of [CEEDER](#), an evidence service for users. The completion of a third year of collation of evidence reviews published globally on environmental management marked the completion of the development phase of CEEDER and a review of the state of evidence synthesis in the environmental sector. All of these achievements have been possible only through the contribution of volunteers throughout the collaboration and I thank them most sincerely.

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The Collaboration

CEE Mission

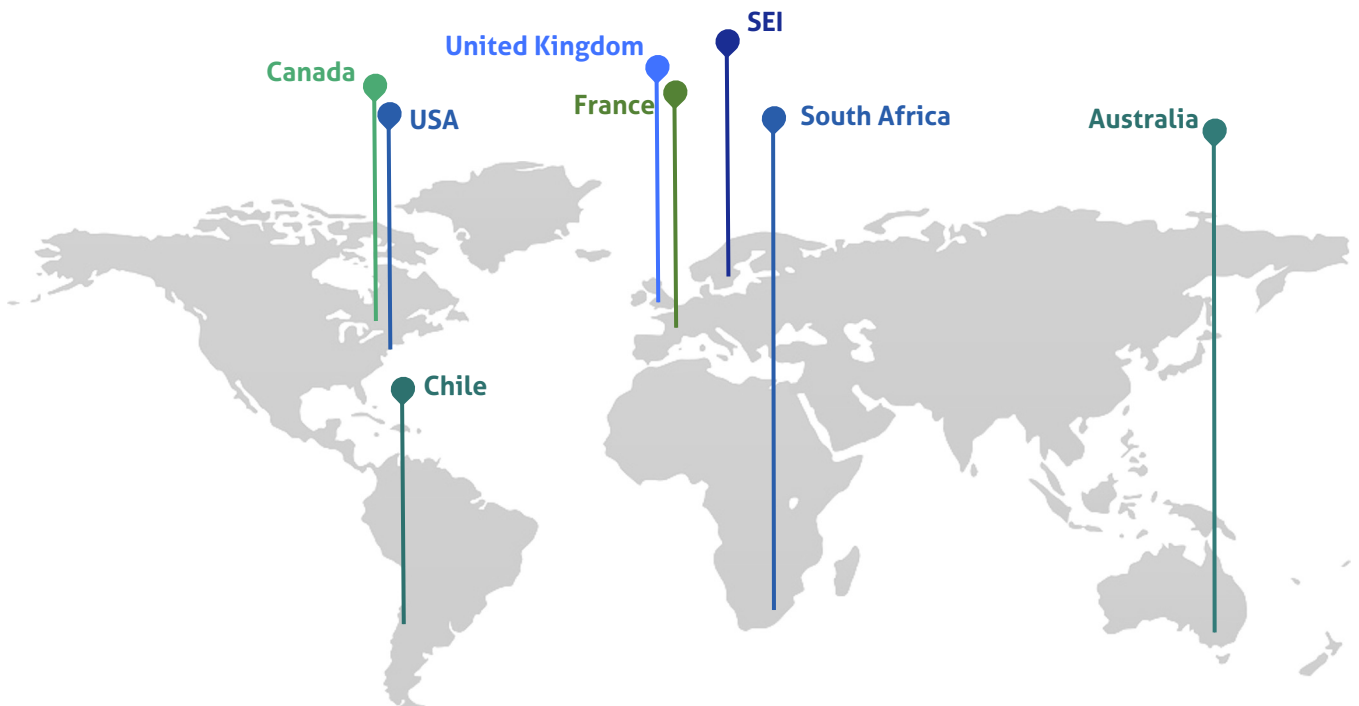
To effectively promote an evidence-based approach to environmental management by facilitating the conduct and dissemination of high-quality syntheses of evidence that will inform decision making and better conserve biodiversity and ecosystem services for global benefit.

CEE Vision

- Effective environmental management resulting from policy and management decisions that are informed by the best available evidence on questions of concern.
- A culture of scientific evaluation of environmental management through objective assessment and synthesis of available evidence.
- A society that appreciates and is supportive of the role of science in informing decisions that affect the environment and human wellbeing.



CEE Centres in 2021



Communications Strategy

The CEE Communications and Engagement Strategy aims to:

- ensure effective communication among the CEE Centres;
- provide a strategy to share knowledge and coordinate activity among the CEE Centres;
- provide clarity and consistency in the development and delivery of key messages;
- provide a framework to build awareness of the CEE and celebrate achievements;
- define roles and scope with respect to communications; and
- define review and evaluation processes.



In 2021, under the direction of the CEE Communications Team, Jessica Taylor continued as Communications Officer to conduct the communications work set out in the CEE Strategic Plan and oversee activities across various communications channels and functions. Jessica is a research biologist at the Canadian CEE Centre and is responsible for maintaining the CEE's website, LinkedIn group, Twitter account (@envevidence), the production of the Annual Report, and overall, acting as a 'brand guardian' ensuring consistency across all internal and external communications.

Priorities for the Communication Team in 2021 included the development of a template and system for producing plain language summaries to accompany new reviews and maps, promotion of CEE during COP26 while attending virtually as an observer, and launching the new CEE website and CEEDER database. The new CEE website was launched in February 2021 and more prominently outlines the services that CEE provides to both evidence users and producers. The CEEDER database was also re-designed and is now housed within the CEE website for easier navigation.

Plain Language Summaries

In 2021, CEE began publishing plain language summaries to accompany new systematic reviews and maps published in our Environmental Evidence Journal providing a new service for decision makers and other evidence users. These short, 2-page summaries present the synthesis in a digestible, easy to read format and save readers valuable time by highlighting the key findings.

Plain language summaries are written by review authors using a standardized template and then reviewed by members of the Communications Team and a knowledge user from the CEE Community. All plain language summaries can be found in a new [library of plain language summaries](#) on the CEE website as well as on their respective review page.

Summaries produced for 2021 reviews include:

- [Struvite precipitation is an effective technology for nutrient recovery from anaerobic digestate, while there is limited evidence to conclude the effectiveness of ammonia stripping](#)
- [Habitat preferences determine species' response to forest management in boreal production forests of Fennoscandia and European Russia](#)
- [Small, protected habitat patches within boreal production forests contribute to biodiversity conservation](#)
- [Research of crop yields under low-inputs should be reprioritised to ensure the assessment of integrated interventions](#)
- [Urban green areas are cooler and have lower concentrations of nitrogen oxides air pollution than non-green areas, but this varies according to type and extent of vegetation](#)
- [Herbivory research does not cover a sufficient range of environmental variation in the Arctic to estimate herbivore impacts on vegetation](#)



Collaboration for Environmental Evidence

CEE is an independent, not-for-profit, global network of researchers and stakeholders that publishes evidence syntheses to inform environmental policy and practice

Plain Language Summary

October 2021

Systematic Map

CEE 18-005

Herbivory research does not cover a sufficient range of environmental variation in the Arctic to estimate herbivore impacts on vegetation

Soininen, E.M., Barris, I.C., Björkå, R., Björnström, K., Ehrich, D., Hopping, K.A., Kaarlejärvi, E., Kolstad, A.L., Abdulmanova, S., Björk, R.G., Bueno, C.G., Eisehold, I., Finger-Higgins, R., Forbey, J.S., Gignac, C., Glig, O., den Herder, M., Hom, H.S., Huang, B.C., Jepsen, J.U., Kamenova, S., Kater, I., Koltz, A.M., Kristensen, J.A., Little, C.J., Mack, P., Mathisen, K.M., Metzcalfe, D.B., Mosbacher, J.B., Mörstedt, M., Park, T., Propper, J.B., Roberts, A.J., Serrano, E., Spiegel, M.P., Tamayo, M., Tuomi, M.W., Verma, M., Vuorinen, K.E.M., Väisänen, M., van der Wal, R., Wilson, M.E., Yoccoz, N.G., Speed, J.D.



The effects of herbivores on vegetation may depend on climatic and ecological context. Research on the impacts of herbivores on arctic vegetation is concentrated in those parts of the Arctic that are warmer, wetter, near the coast, and that have experienced a moderate increase in temperature. The current evidence base might therefore provide an incomplete picture of the effects of herbivores on arctic vegetation throughout the region.

Why is this Evidence Synthesis Needed?

A warming Arctic leads to changes of vegetation, the increase of trees and shrubs in the open tundra landscapes being the most evident of such changes. Herbivores that inhabit the Arctic encompass mammals (e.g., reindeer, musk ox, lemmings), birds (e.g., ptarmigan, geese), and invertebrates (e.g., birch moth). They modify arctic vegetation through feeding, fertilizing and disturbance. The effects of herbivores can counteract some of the climate-change induced changes of vegetation. However, the effects of herbivores on plants and ecosystem structure and function vary across the Arctic and seem to depend on the environmental conditions under which herbivory takes place. For example, the herbivore impacts on vegetation can differ in areas with different temperature or vegetation productivity. Therefore, studies in different locations can generate different outcomes, and generalizing the impacts of herbivores on plants becomes difficult. This systematic map assessed how well the existing literature of herbivore impacts on vegetation covers the environmental variation in the Arctic, to understand how robust are the conclusions that we can currently make about the effects of herbivores across the tundra biome.

This Collaboration for Environmental Evidence Systematic Map examines how well existing studies on herbivory cover the environmental conditions in the Arctic to assess how robust conclusions about the effects of herbivores on tundra vegetation might be. The map summarizes evidence from 662 studies on herbivore effects on arctic vegetation.

Main Findings

What studies are included?

The map identified 309 articles including 662 studies of herbivore impacts on plants or vegetation spanning the circumpolar Arctic. Studies included observational and experimental approaches, mainly from field studies but also remote sensing, modelling, and greenhouse studies. Most studies were published after 1980, with a marked increase in studies conducted around 2000 and peaking around 2010. Vertebrate herbivory, mainly by reindeer, small rodents, and geese, was studied seven times more often than invertebrate herbivory. Geographically, the largest cluster of studies was in Northern Fennoscandia.

How well do studies of herbivory cover environmental conditions in the Arctic?

Most studies on Arctic herbivory have been conducted in warm and moderately wet parts of the Arctic. Coastal areas and areas where the increase in temperature has been moderate have been studied more than more remote areas with extreme arctic conditions. However, the existing studies covered the range of observed warming and changes in vegetation greenness and growing season length in the last decades. The studies spanned the full range of Arctic vertebrate herbivore diversity and human population density and footprint.

A database of herbivory studies across the Arctic

The database of studies of herbivore effects on arctic vegetation is available through an interactive visualization tool: <https://shiny.vim.ttu.nl/users/speed/ArcticHerbivorySystematicMap/>. This tool allows exploration of individual environmental variables and the coded data for exploration and to generate further hypotheses.

What are the implications of the Review Findings?

The current evidence base might not be sufficient to understand the effects of herbivores on Arctic vegetation throughout the region. The bias in the geographical distribution of herbivore studies in the Arctic, the uneven coverage of some environmental gradients and the limited evidence base on invertebrate herbivory compromise generalized conclusions on herbivore impacts on Arctic vegetation. In particular, the overrepresentation of studies in areas with moderate increases in temperature prevents robust generalizations about the effects of herbivores under different climatic scenarios. The systematic map calls for future studies to prioritize the areas experiencing the most pronounced climate changes but also in those that are changing the least to increase our broader understanding and management of the effects of herbivores. Understanding how herbivory influences the responses of Arctic ecosystems to environmental change can help guide appropriate adaptive strategies to sustain ecosystem functioning and the provision of ecosystem services.



Synthesis Time Frame

The authors of this systematic map conducted their searches between March 2018 and March 2020, with no time restriction applied. The CEE Systematic Map was published in October 2021.

Full Citation

Soininen, E.M., Barris, I.C., Björkå, R., Björnström, K., Ehrich, D., Hopping, K.A., Kaarlejärvi, E., Kolstad, A.L., Abdulmanova, S., Björk, R.G., Bueno, C.G., Eisehold, I., Finger-Higgins, R., Forbey, J.S., Gignac, C., Glig, O., den Herder, M., Hom, H.S., Huang, B.C., Jepsen, J.U., Kamenova, S., Kater, I., Koltz, A.M., Kristensen, J.A., Little, C.J., Mack, P., Mathisen, K.M., Metzcalfe, D.B., Mosbacher, J.B., Mörstedt, M., Park, T., Propper, J.B., Roberts, A.J., Serrano, E., Spiegel, M.P., Tamayo, M., Tuomi, M.W., Verma, M., Vuorinen, K.E.M., Väisänen, M., van der Wal, R., Wilson, M.E., Yoccoz, N.G., Speed, J.D. (2021). Location of studies and evidence of effects of herbivory on arctic vegetation: a systematic map. *Environmental Evidence*, 10:25.

Link to Publication

<https://environmentalevidencejournal.biomedcentral.com/articles/10.1186/s13750-021-00292-9>

Funding

FRAM—high North Research Centre for Climate and the Environment supported this work with funding for two positions. Funding from the Terrestrial Working Group of the International Arctic Science Committee was received to organize the herbivory network meetings in Iceland in 2018 and in Vamali in 2019, where this project was worked upon.

Observer Status at COP26

CEE's mission as a global network is to effectively promote an evidence-based approach to environmental management by facilitating the conduct and dissemination of high-quality syntheses of evidence that will inform decision making and better conserve biodiversity and ecosystem services for global benefit.

For the first time, CEE was admitted to the United Nations Framework Convention on Climate Change (UNFCCC) process as an observer organization for the 26th session of the Conference of Parties (COP26) held October 31st to November 13th 2021 in Glasgow, Scotland.

Kathryn Monk (CEE Board Chair), Ruth Garside (Board Trustee), Ruth Stewart (Board Trustee), and Barbara Livoreil (Past-CEE Centre Director) represented CEE by attending sessions virtually over the two weeks. While the observer status largely limited the representatives to one-way engagement with the meetings, the goals for attending were:

- To attend sessions and note the presence or absence of advocacy for evidence-based decision making in current processes to help to identify opportunities for CEE to become more engaged.
- To learn how COP meetings operate and about opportunities to host a virtual exhibitor booth or event, hold informal meetings, and engage with registered participants at future events.
- To envision how CEE could better contribute to future similar events.

During COP26 the Communications Team used Twitter and LinkedIn to promote relevant evidence syntheses and CEE's involvement in climate change work to connect with the COP26 audience. An example of this included promoting a recently [updated systematic review](#) published in Environmental Evidence on urban greening and the associated [plain language summary](#) to coincide with COP26's 'Cities, Regions, and Built Environment' day on November 11th. During the conference, we also launched the first ever [CEE Database of Evidence Reviews](#) Collection, the 'Climate Change Collection'. To help decision makers navigate the ever-increasing volume of climate change literature, the new collection containing over 240 reviews allows users to easily browse policy-relevant environmental evidence syntheses related to climate change. This service provided by CEE can be used to ensure evidence-informed decisions are made using the most reliable syntheses, which will be critical in the race to Net Zero.



CEE Community Spotlight

In 2020 CEE developed a partnership with Wales' government sponsored body for the environment, Natural Resources Wales (NRW), to continually develop the Collaboration for Environmental Evidence Database of Evidence Reviews (CEEDER) as an important environmental decision-making tool for operational users and policy makers. Through this partnership, Josie Jackson, a member of staff with the Integrated Evidence Group in NRW, was placed on the CEEDER Editorial Team part time during 2020-21 whilst still undertaking her role as Evidence Synthesis and Communications Specialist. In her role with NRW, Josie supports staff to use and commission evidence syntheses and provide specific evidence advice to staff across NRW. This includes effective evidence communication advice to various audiences as well as advice around scoping exercises, rapid and systematic reviews. Josie's post with CEEDER ended in 2021 and she took some time to describe her experience:



I joined NRW in late January 2020 having just finished a short post-doc in conservation genomics at Cardiff University. Almost immediately after joining, I was asked if I would like to start a secondment for a quarter of my time in the CEEDER editorial team. Of course, I said "yes please"!

The benefits to NRW were clear, I was trained up by a collaboration of global evidence synthesis experts and this new knowledge was fed immediately into my role, which was spread wider through the organisation. It seemed like an ideal opportunity to speed up my learning curve in evidence synthesis methodology while increasing NRW's exposure of the latest research advances in environmental sciences from across the world. It felt good to be part of something global, even our weekly skypes were across three time zones! My day job is focussed on how we manage the Welsh environment, so being able to additionally help shape a tool which is used internationally was a huge motivator for me.

In the editorial team I was involved in searching for and screening the latest evidence reviews. I would often pass on recent findings that were directly relevant to my colleagues and importantly for us in NRW, these articles were evidence reviews as opposed to primary research. Assessing the papers using the CEESAT criteria improved my skills to rapidly search for information that indicated reliability. This familiarity with the CEESAT criteria has been an invaluable skill to bring to my NRW role, as like many of us, I often have little time to keep up to date with research, and to critically appraise it quickly.

But it is not all assessing articles! For example, during the year I (from a evidence user perspective) fed into the development of more tools to help those using, reviewing, or producing evidence syntheses, for example a checklist of journal editors which I have since been adapting for NRW to use internally.

For CEEDER, by including a representative from their targeted user audience into the editorial team, it created a continuous feedback loop between evidence user and provider to ensure the database was being improved according to the needs of environmental decision makers themselves. This is an obvious win-win and means that CEEDER is constantly evolving and improving.

An example of this in action was when I passed on some feedback from NRW staff that they would like CEEDER to include articles that are similar to systematic maps or 'overviews' (in addition to systematic reviews), like those that ask the question of 'what evidence exists on...'. This evidence is useful to us in NRW because we can get a general overview of a subject and assess where the evidence gaps are. As a small team, CEEDER can be incredibly agile and responsive to these suggestions and soon after we began including these 'evidence overviews' in addition to reviews. Adaptive management in action!

So now my time with the editorial team has unfortunately come to an end, and I am left to thank the team for being brilliant team-mates and mentors. I have learnt an immense amount and much of which I apply frequently in my role. I highly recommend this experience for those working in similar environmental organisations.

And the NRW and CEEDER partnership journey continues! We are looking forward to the next developments of the partnership to improve CEEDER for all.

Josie Jackson

Environmental Evidence Journal

The official journal of the CEE is Environmental Evidence, an open-access journal that accepts submission of systematic reviews, systematic maps, review and map protocols, commentaries and methodological papers related to the conduct of systematic reviews.

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Environmental Evidence

Featured Reviews



What are the effects of even-aged and uneven-aged forest management on boreal forest biodiversity in Fennoscandia and European Russia? A systematic review

Savilaakso, S., Johansson, A., Häkkilä, M. et al. What are the effects of even-aged and uneven-aged forest management on boreal forest biodiversity in Fennoscandia and European Russia? A systematic review. Environ Evid 10, 1 (2021).

<https://doi.org/10.1186/s13750-020-00215-7>

This systematic review contributes to the public discussion and provides evidence for policy making by synthesising current evidence on impacts of even-aged and uneven-aged forest management on biodiversity in boreal forests of Fennoscandia and European Russia. This systematic review suggests that habitat preferences determine species' response to different harvesting methods and the magnitude of effect is large. Less disturbance from harvesting is better for forest dependent species whereas opposite is true for open habitat species. Uneven-aged and mature even-aged forests (> 80 years old) are important to maintain biodiversity in boreal forests. However, the results also highlight that natural forests are needed to ensure the future of forest dependent species in Fennoscandia and European Russia. Given that a broader set of biodiversity aspects are to be protected, best overall biodiversity impacts for a variety of species at landscape level can be achieved by ensuring that there is a mosaic of different forests within landscapes.

Evidence on the impacts of chemicals arising from human activity on tropical reef-building corals; a systematic map

Ouédraogo, DY., Delaunay, M., Sordello, R. et al. Evidence on the impacts of chemicals arising from human activity on tropical reef-building corals; a systematic map. Environ Evid 10, 22 (2021).

<https://doi.org/10.1186/s13750-021-00237-9>

This synthesis systematically mapped the evidence of impacts of chemicals arising from anthropogenic activities on tropical reef-building corals, which are the main engineer species of reef ecosystems, to inform decision-makers on the available evidence on this topic. The map identified four well-represented subtopics that may be amenable to relevant full syntheses via systematic reviews: (1) evidence on bioaccumulation of chemicals by corals; (2) evidence on the effects of nutrient enrichment on corals; (3) evidence on the effects of human activities on corals; and (4) evidence on the ecotoxicological effects of chemicals on corals (except nutrient enrichment). The systematic map shows that corals in their natural environment can be exposed to many categories of chemicals, and that there is a complete gap in experimental research on the combined effects of more than two categories of chemicals. Further research on this topic is encouraged.

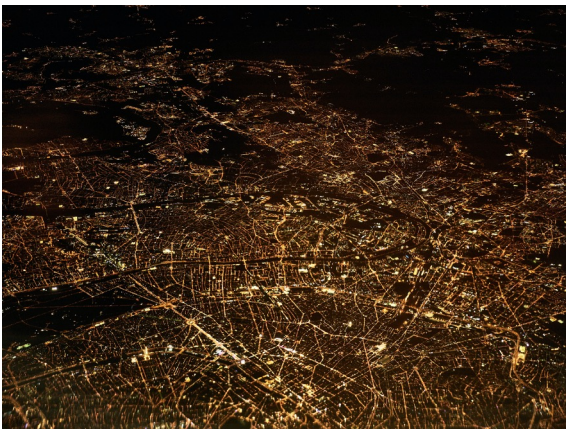


Featured Reviews

Effects of artificial light on bird movement and distribution: a systematic map

Adams, C.A., Fernández-Juricic, E., Bayne, E.M. et al. *Effects of artificial light on bird movement and distribution: a systematic map*. *Environ Evid* 10, 37 (2021). <https://doi.org/10.1186/s13750-021-00246-8>

This systematic map provides a comprehensive, searchable database of evidence of the effects of artificial light on bird movement and distribution, increasing both the quantity and diversity of studies that are accessible for further comparison and synthesis. Authors identify and describe the evidence available for four secondary questions relevant to conservation or management: aggregation/mortality at structures with artificial lights, evidence that light attracts and/or disorients birds, light-based deterrent efficacy, and the influence of continuous illumination on habitat selection. There may be sufficient evidence for a review of the weather and lunar conditions associated with collisions, which could help identify nights when reduction of artificial light is most important. Further experiments should investigate whether specific types of light can reduce collisions by increasing the detectability of structures with artificial lights. The efficacy of lasers as deterrents could be evaluated through systematic review, though more studies are needed for UV/violet lasers. To reduce the impacts of outdoor lighting on birds, research should investigate how spectral composition of white light influences bird attraction, orientation, and habitat selection.



Response of chlorophyll a to total nitrogen and total phosphorus concentrations in lotic ecosystems: a systematic review

Bennett, M.G., Lee, S.S., Schofield, K.A. et al. *Response of chlorophyll a to total nitrogen and total phosphorus concentrations in lotic ecosystems: a systematic review*. *Environ Evid* 10, 23 (2021). <https://doi.org/10.1186/s13750-021-00238-8>

In this systematic review, authors compiled and synthesized literature on sestonic and benthic chlorophyll a (chl-a) responses to total nitrogen (TN) and total phosphorus (TP) concentrations in the water column in streams and rivers to provide a state-of-the-science summary of nutrient impacts on these endpoints. This systematic review confirms that nutrients consistently impact primary producer biomass in streams and rivers worldwide. It builds on previous literature syntheses evaluating chl-a responses to nutrient concentrations and confirms that benthic and sestonic chl-a respond positively to nutrients across a range of stream and river conditions, but also points to limits on these relationships (e.g., potential saturation at high nutrient concentrations). Lack of consistent reporting of contextual data limited our ability to examine how moderating factors influenced these stressor-response relationships. Overall, this systematic review provides nutrient managers responsible for protecting the quality of lotic ecosystems with a comprehensive evidence base for chl-a responses to TN and TP concentrations in the water column.

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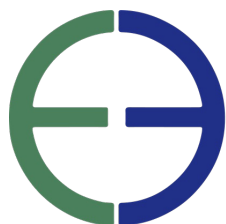
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