Early warning systems for biodiversity

a coalition-led platform for evidence-based decisionmaking on ecosystems and species
to support wiser policy, planning and management

PILOT SITES – EXPECTATIONS AND BACKGROUND (29 Sept 2019)

https://pbarnard9.wixsite.com/website-3

https://consbio.org/products/projects/early-warning-systems-for-biodiversity-and-ecosystem-health

Summary

This note sketches the Conservation Biology Institute's (CBI's) leadership of a coalition-driven, evidence-based "early warning system" (EWS for short) or "biodiversity evidence system" to support planning, policy and management for biodiversity and ecosystem health.[1]

It also outlines the broad nature of existing potential and actual **pilot projects and sites (p.3)**, and **broad principles for involvement in the system (p. 4).**

CBI and its coalition of partners will pilot the system, to be co-designed by these partners, in the Cascadia / Emerald Corridor region of the USA and Canada. Initially, this will focus on the state of Washington, especially from the Cascades west to the Salish Sea, and will spread outwards to Oregon and British Columbia if energy, interest, and funding allow.

The EWS can develop organically around certain themes and institutional goals. We do not wish it to be designed in detail from the top down, by agency officials or academic scientists (although its broad scope and outputs have been co-designed). Instead, we envisage a broad framework with:

- A **common, integrated platform** for rigorous data collection, sharing and collaborative scientific analysis.
- A **common science-policy framework for decision support**, to guide policy, planning and management.
- **Collaboration, education and engagement** between agencies, nonprofits, universities, tribes, citizen science groups, and/or other interested parties and individuals as appropriate.
- A **"bubbling honeypot" model** (see below), in which broad conditions are created for fun, democratic participation, and active engagement around the common theme of tracking the health of species and ecosystems in space and time, all of which leads to wise and well-grounded decisions.
- **Multiple pilot projects**, with varying degrees of collaboration and independence, from which results can be drawn and lessons learned to scale upwards.

Do we need this?

Biodiversity early warning systems:

- guide sound environmental policy, planning and management, and targeted research
- help organizations and people take good decisions
- provide an integrated, public-domain evidence platform to track species and ecosystem health
- include projects which track species in space (e.g. butterfly atlases) and time (e.g. phenology almanacs)
- are based on both professional and well-designed citizen science
- build awareness, passion and skill in volunteers
- connect science, policy, volunteer and media communities
- help keep biodiversity from 'falling through the cracks' of thinly-resourced agencies
- provide a valuable source of high-quality data for conservation biology/global change ecology research
- include an integrated online platform or portal, where component datasets remain under the control of data providers, but are made communally available
- support wiser public policy, planning and habitat management.

Systems like this are needed by organizations and society at the best of times, but especially in these turbulent times of significant USA climate and public policy shifts. We are seeing threats to the integrity of public lands and waters, tipping-point ecosystem changes with fire, fragmentation, invasive species, and flips in the carbon cycle from carbon sink to carbon source. Where exactly are the best opportunities for action and investment, to conserve and restore natural capital?

Not all species are negatively affected by climate change, land fragmentation, or other factors. Some do benefit. Ill-informed management actions or policies can inadvertently worsen a situation. We need to track change and understand its impacts adequately, in order to adapt proactively.

People in society often want to be positively engaged in change, for their recreational or retirement time to contribute to a bigger cause. This engagement allows their insight, understanding, identification and monitoring skills to grow, and their love and commitment to nature to deepen.

The Cascadia EWS is being co-designed, developed and implemented by a coalition of agencies, including tribes, academic partners, non-profits, communications, media and policy translation partners.

The bubbling honeypot

The Cascadia EWS currently includes five potential pilot study projects (Table 1). All are either emerging or under early discussion with partners, at different stages, being incorporated organically into the system. We use the model of a **"bubbling honeypot"** which attracts project "bees" to the system, in a framework guided by scientists and policy/planning users. This is an intentional departure from the traditional top-down, agency/natural scientist-dictated design. A couple of these projects are agricultural or working lands-focused.

Potential pilot projects (Table 1, in chronological order of identification)

Affiliated / pilot project	Geography	Ecosystem / scope	Partners of CBI	Status
Anacortes Community Forest Lands Monitoring Project (citizen + academic science)	Fidalgo Island, near Anacortes, WA	Oldish-growth cedar/fir Salish Sea coastal forest, 2800 acre greenbelt for small urban center	Transition Fidalgo & Friends City of Anacortes Skagit Land Trust Friends of the Forest University of Washington Western Washington Univ	Underway, active (May 2019)
St Edward State Park Environmental Education and Research Center program (citizen and academic science, human health and wellbeing focus)	St Edward SP, near Bothell, WA	Oldish-growth cedar/fir lakeside forest, 316 acre greenbelt near major urban centers Logged 19th century and 1920s	University of Washington Washington State Parks Dept Bastyr University (integrated medicine)	Planning and fundraising stage; high-level partnership plan released June 2019
Olympia Experimental State Forest (academic and community science, working lands angle, biodiversity monitoring via acoustic passive means)	Olympic Peninsula and OESP, WA	TBD	Washington State Parks Dept University of Washington, Bothell/ Seattle Local communities / CBOs (all tbc)	Early discussions
Skagit Watershed and Farmlands (agency and farmer/community science, working lands angle)	Skagit River Valley Watershed and Flats	TBD	Skagit Watershed Council Skagit Conservation District Skagitonians to Preserve Farmland	2nd round of discussions
The Salish Sea School citizen science program (high school science, collaborating with academic/ other partners)	Salish Sea SE region	Likely to be Cascades to Coast, including stormwater and land use practices, including coastal shellfish	The Salish Sea School (a new initiative for high-school field education) Salish Sea Institute (WWU) Likely Skagit Conservation District and Skagit Watershed and Farmlands Project partners above	2nd round of discussions

Program values and expectations of pilot projects

Pilot projects in the Cascadia EWS must aim to contribute directly to at least the first of its four overall goals.

Cascadia EWS goals:

1. **to track the health of species and/or ecosystems**, in space and time;
2. **to engage people in biodiversity projects**, upskill their knowledge, and grow their passion;
3. **to become a popular, collaborative platform and system** for using data in research, policy, planning and management
4. **to protect the region's species and ecosystems** by enabling **faster, sounder, and more efficient evidence-based decisions**.

Pilot projects must also have:

1. **a Cascadia focus** - on one or more sites in the Cascadia region (defined broadly as the political entities of Washington, Oregon, and British Columbia, but especially as the temperate moist forest west of the Cascade Range).
2. **a governance structure** with a basic means to ensure quality control and scientific rigor, even if the project is a fun citizen science project. (For example, monitoring projects must have scientifically verified data protocols and a plan for data management, curation, and analysis.)
3. **an agreement to share data** with the early warning system managers in the public domain, under basic terms and conditions to be agreed. Examples of T&Cs might include a delay of 12 months for first rights to publish, or sensitive species localities to be "masked," i.e. not publicly visible.

What's happened so far?

Design and development: Fundraising/ investment and detailed design are the focus for 2019-2020, with the seed-funded Phase 1 in 2019-2020 and active implementation in Phase 2 (2020-2030).

In 2017-18, we started a design and development process with potential partners, stakeholders and donors. Our potential core academic partners include UW, WWU, UBC, Cornell (through the Cornell Lab of Ornithology) and Stanford University (through the Natural Capital Project). Federal and state agency discussants (potential partners & collaborators) include NOAA, USFWS, USGS, WDFW, WDNR, WA State Parks, WA Dept of Ecology, and the Puget Sound Partnership.

Funding: We secured a seed grant of $20,000 from the Charlotte Martin Foundation in May 2019 and are undertaking detailed budgeting with different partners. We seek $290 000 to design, develop and launch Phase 1 in 2020, and a graded annual Phase 2 budget of up to $1.55m/yr (https://pbarnard9.wixsite.com/website-3). Roll-out and adaptation in other states and countries will be costed on need, interest, funding, data availability, and lessons learned. There is interest by California and other countries in adapting and scaling up the system.

Partners: Agency, academic and non-profit partners are coming on board, bringing extra skills, students, postdocs, management capacity, design insights and funds (cash or in kind) to the table. We are applying jointly for significant funding. With core partners, we are leading a detailed, consultative design process.
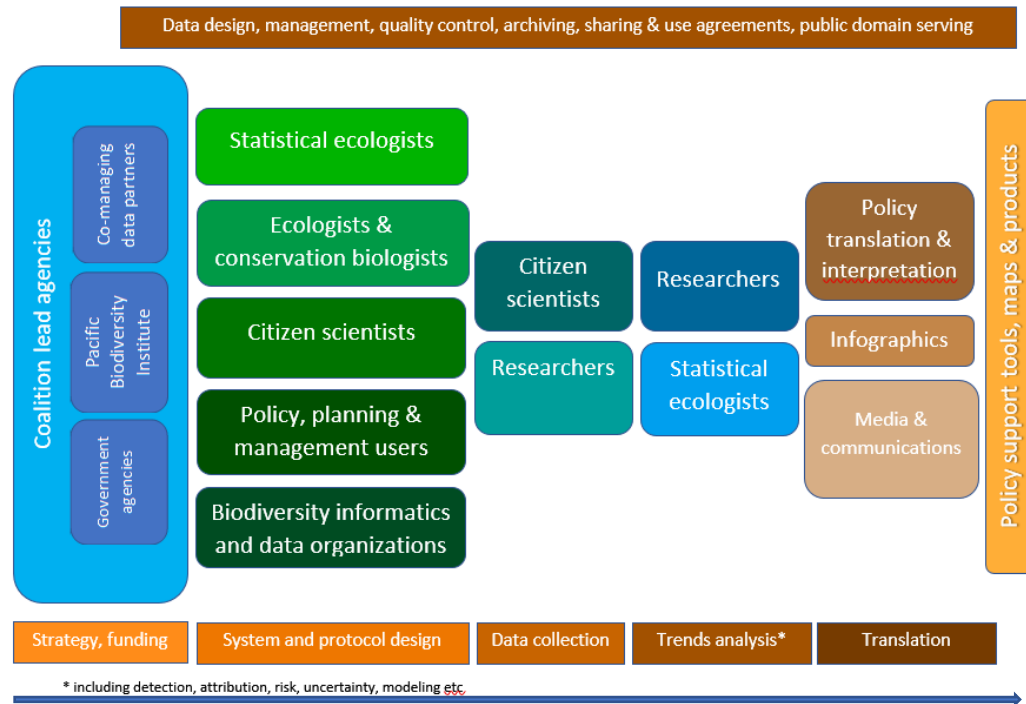
Fig 1   A simplified 'straw dog' process flow chart (left to right) of the coalition-led early warning system for biodiversity, for piloting in the Cascadia Region of North America. *Although the process is shown as linear, the system involves adaptive science/policy feedback loops.*

Core skills in an EWS include, but might not be limited to:

- conservation biology, marine and global change ecology and ecological classification/ inventory
- spatial biodiversity planning and valuation (terrestrial, marine, freshwater)
- statistical ecology and trends analysis (especially with large-scale and long-term datasets)
- citizen science project management, including protocol design and structures for quality control
- biodiversity data management, including complex archiving and use/ sharing agreements
- data analysis and synthesis
- policy translation and analysis
- infographics and science communication
- media, especially social media
- business planning and investment/ fundraising models

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[1] https://www.weforum.org/agenda/2015/09/why-the-world-needs-biodiversity-early-warning-systems/
http://www.sanbi.org/sites/default/files/documents/documents/biodiversitybooklet2012barnard.pdf
https://www.sanbi.org/sites/default/files/documents/documents/brdscc.pdf
https://www.researchgate.net/publication/308737336_Early_warning_systems_for_biodiversity_in_southern_Africa_-_How_much_can_citizen_science_mitigate_imperfect_data

Comments or to participate: Please contact Prof Phoebe Barnard, phoebe.barnard@consbio.org or pbarnard@uw.edu with subject line "Cascadia biodiversity early warning system"

Appendix 1. Southern Africa's experiences

In Namibia and South Africa, independence and democratic rule in 1990-1994 offered remarkable opportunities for environmental management. Phoebe Barnard was in the right place at the right time, as founding national coordinator of biodiversity and climate change programs in Namibia and later, as lead climate and biodiversity scientist melding citizen science with professional science in South Africa. She led development of 'biodiversity early warning systems' in both countries, and secured funding through government and international sources. This led to a wonderful collaboration of academics, citizen scientists, policymakers and other bodies. A number of high-quality biodiversity datasets are now used for high impact in environmental policy, planning, and management. See clickable links on p. 5 or in https://pbarnard9.wixsite.com/website-3/the-model.
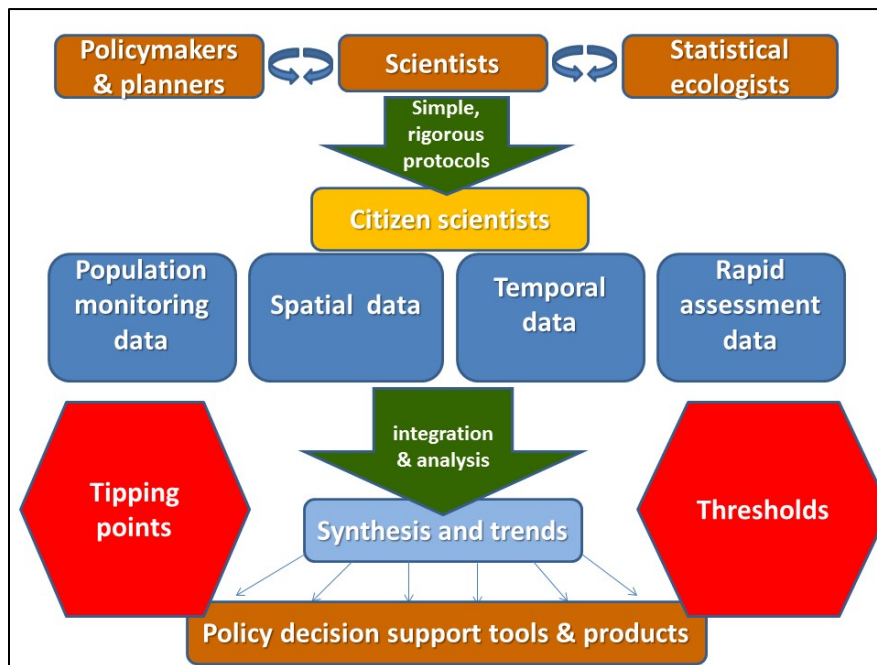

Fig 2   Conceptual schematic for the structure of South Africa's biodiversity early warning system (*Barnard et al., 2017, Biological Conservation 208:183-188*).