Accelerating conservation impact in this crucial decade of change: biodiversity early warning systems for evidence-based policy, planning and management

Phoebe Barnard, Tim Sheehan and John Gallo, Conservation Biology Institute

Narrative

The Starter: (3-5 mins)

- Welcome everyone - thanks for joining us today, this evening, wherever you are in the world.
- I'm Phoebe Barnard - chief science-policy officer of the Conservation Biology Institute, affiliate prof at University of Washington and research associate of the University of Cape Town. My co-presenters are **Tim Sheehan**, CBI's senior ecological modeler and team lead for decision support & GIS, and **John Gallo**, senior scientist, conservation planner and landscape ecologist.
- This webinar is co-hosted by the Conservation Biology Institute and Cascadia Partner Forum, thank you so much to both of them for enabling this discussion platform.

- So it's no shock to anyone that we are living in uncertain times, which increasingly represent a "perfect storm" for biodiversity. Climate change, habitat transformation and fragmentation, biotic invasion, wildfire regime shifts, technology innovation…. the list goes on.
- This will be an unusual webinar. We won't report back on an ongoing or completed project, and we won't demonstrate a model or software. Instead, we're going to talk today about an approach to improving the way that we, as a global conservation community, can support **better, wiser, more integrated, and faster decisions** about species and ecosystems.
- Much of this talk, and the work we're developing, draws from my 34 years in southern Africa, on biodiversity and climate change research, strategic planning, and public policy for the governments of Namibia and South Africa, and the University of Cape Town.
- We'll spend the first section outlining **what a biodiversity early warning system is**, and **what it's not**; its **essential elements**, and **how it can be co-designed** by coalition partners for local or national priorities; what the **original biodiversity early warning system in South Africa** actually looks like, and does; and **what impacts and products** are coming out of it.
- Tim will give some **insights into some of the hardware and software options for complex and rapid modeling of outcomes and scenarios** that can really help take our work up a notch, as a conservation community.
- John, Tim and I will give **examples in more detail of what such systems can do** in different regions, especially in southern Africa and North America, to give you an **incredibly brief idea** of the many possibilities.
- I'll also tell you briefly about an exciting **early warning system for biodiversity and natural hazards in Rwanda** that colleagues in Rwanda, in Vienna, and we at CBI are starting to design.

The Protein (12-15 mins)

- So, let's get started. What is a biodiversity early warning system, and what is it not?
- **It's a creative and rigorous <u>knowledge, analysis, and decision support system</u>** that must be **co-designed** by coalition partners for local priorities…
    - o **<u>At the social and organizational level</u>**:

- It's a **collaboration** - **integrated, very dynamic, and in the public domain** - to improve evidence, understanding, and decisionmaking about **how biodiversity and ecosystems are responding** to climate change and environmental change.
- And, where this is wanted, it can **explicitly predict how these changes intersect** with **natural hazard risks**, in space and time.
- A biodiversity early warning system **isn't controlled or top-down**. It's a kind of **bubbling honeypot** of data, ideas and information that enables active and creative data mining, data exploration, synthesis, visualization, and policy translation.
- Ideally, as in South Africa, it's **at least partly** a dynamic **citizen science endeavor,** in which robustly designed protocols can be both fun and rigorous, to support and supplement professional scientific work, so that results are defensible – even if challenged in court.
- It's a way of getting people out into nature to **learn skills, improve their well-being, engage socially** about environmental change, and **partner with public, nonprofit and academic organizations** to track species and ecosystem change in space and time.

- At the <u>**conceptual level**</u>….
  - It's **highly specific, geospatially explicit information** about species, ecosystems and the drivers of change which threaten them.
  - It may seem to some of you that the phrase "early warning" is inappropriate. One person said to me, "the world is screwed up and we've known this since the 1970s." But "early warning" gives specific, precise information on **when, where and what**, so that we can take conservation action, before it's too late.
  - It's not a set of simple biodiversity monitoring projects. It's relevant biodiversity and ecosystem data that enable a whole suite of needs to be met – from monitoring, to advanced research, to trends and attribution analyses that inform public policy, planning and management.
  - Its users can be government policymakers, academic, nonprofit or agency researchers and strategists, public watchdogs, and the media - among others.

- At the <u>**data and platform levels**</u>…
  - It's a cloud-based system that:
    - Allows users to explore data and model results via a web interface
    - Provides for uploading and downloading environmental data from sources such as satellites, field studies, public datasets, and citizen scientists
    - Automatically runs models and analyses for landscape condition and other elements, as new data is uploaded
    - Provides model results to users
    - Alerts users when a new analysis indicates a change in landscape condition or other elements.
  - It's not a data takeover. Nobody hands over data. Everyone retains complete ownership of their own data. They simply elect to share data in a common

platform for general use and interrogation. It's a **"honeypot" model** to accelerate data analysis, synthesis, use, and impact.

- Its essential elements are:
  - The **co-design** process by partners, based on local fixed and emerging priorities.
  - An **energized collaboration** across sectors and organizations.
  - **Responsiveness** to rapid change.
  - A **common data pool and collaborative workspace** and platform.
  - **Public domain** data availability, with full attribution and filtering to protect any sensitive information.
  - A **robust statistical design** of protocols, across citizen science and professional science…. Finding the right blend of "fun" and rigor.
  - Seed funding which enables partners to move towards co-funding within 3 years.
- The **original biodiversity early warning system in South Africa** looked like this… and it does this, this and this……;
- Some of its **most impactful products** are…
- We at CBI are now working with the University of Washington, the Cascadia Partner Forum, and a host of agency, academic and citizen science partners to design a biodiversity early warning system in the **Cascadia Region of Washington, Oregon, & BC**.
- We're also excited to be working with wonderful partners in the University of Rwanda, Rwandan Government, and the Albertine Rift Conservation Network, ARCOS, as well as the International Institute for Applied Systems Analysis in Vienna to start to design an **early warning system for biodiversity and natural hazards in Rwanda.** Many of you will know that Rwanda, the tiny and very special, densely populated country in east Africa, is a surprising and inspiring example of environmental leadership, as well as a microcosm of conflicts between biodiversity, water security, food security and human settlement.

Examples (6 mins or 2 mins each) – really succinct

Example 1. (Phoebe) – detecting demographic, spatial and phenological change with atlas data

Example 2 (Tim) - modeling and system architecture

Example 3. (John) – urban outgrowth models and impacts on charismatic species

The Dessert

The summary ….

Ending slide with survey question – would you like to engage with us further on co-designing and implementing such an approach? Yes/No

- Email: phoebe.barnard@consbio.org
- URLs for Cascadia and Global EWS projects are linked at: https://consbio.org/products/projects/early-warning-systems-for-biodiversity-and-ecosystem-health. https://consbio.org/products/projects/early-warning-systems-for-biodiversity-and-ecosystem-health. Community of practice Facebook page: https://www.facebook.com/groups/1014592878729526/