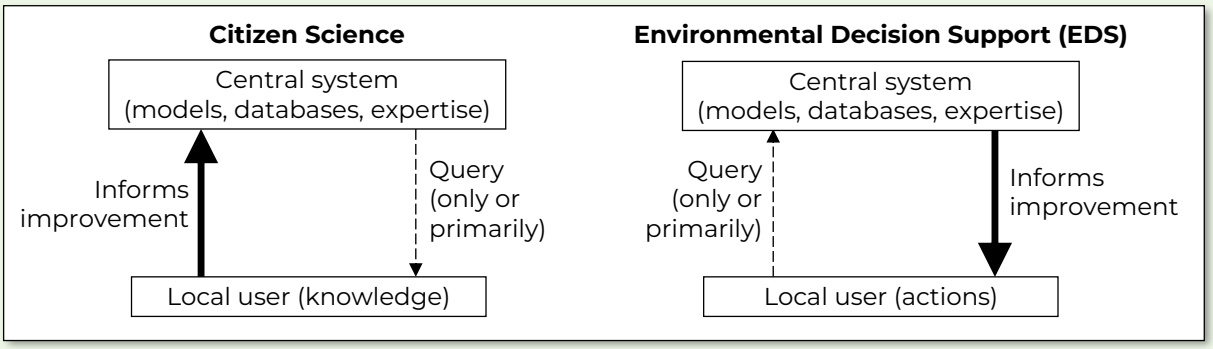
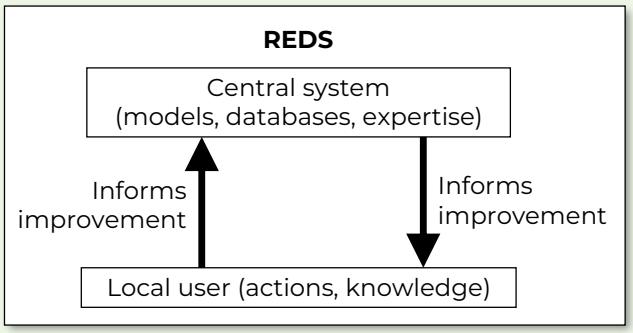
Reciprocal Environmental Decision Support (REDS): tailored support in return for data

Report by the European Sustainable Use Group (ESUG) 2024/09/25 v.2

Consider two traditional forms of one-way data flow:



REDS is Citizen Science and EDS combined:



Because of the virtuous feedback circle created by closing the loop, a REDS can bootstrap itself towards ever-better models, support, data, and user engagement.

We know of no existing REDS-like systems for untrained users.

ESUG's mission with REDS:

- Improve land-use decisions at central levels (authorities and scientists) and local levels (communities and individual land managers) by improving quality and access for models of effects of land-use change.
- The feasibility of this novel approach was established by ESUG's previous EU Horizon project TESS (Papathanasiou & Kenward, 2014).

ESUG's implementation of REDS:

- System design allows the incorporation of almost any existing environmental model.
- Different user interfaces target different scales and user types and give access to different types of model.
- The open-source and non-profit system can cover costs with government subscription and/or freemium services.
- Full transparency about data-use, with privacy available, and compliance with new EU data framework, makes ESUG's REDS a trusted data intermediary and fosters data altruism.
- ESUG (within IUCN and its Naturalliance initiative) is developing REDS as part of the three-year EU Horizon project PRO-COAST.

Use Case 1: gardenREDS for small-scale UK gardeners

- We find no well-functioning system aimed at small-scale gardeners that can provide spatial estimates of ecosystem service provision.
- Our garden-planner app allows gardeners to easily map their current garden, and test impacts of proposed changes on ecosystem services.
- As an indicator-species-based biodiversity index, we adapt a house sparrow habitat-use model (Matthiopoulos et al., 2019), which will improve thanks to user observations, according to REDS mechanisms.
- We also provide a carbon model, using the 1000-ton rule to convert between sequestered $CO2_{eq}$ and years of human life saved, as a more striking and intuitive metric (Pearce & Parncutt, 2023).
- *gardensREDS will be launched in late 2024.*

Use Case 2: Supporting the EU Horizon project PRO-COAST

- PRO-COAST engages EU citizens across nine case studies in conserving coastal ecosystems.
- PRO-COAST will deliver a Community Sustainability Platform (CuSP) including community networking and EDS as well as rules-based protocols and other tools from social science partners. REDS instantiations will be key parts of this CuSP.
- For example, the UK case study proposes to transform public opinion concerning the replacement of grey by red squirrels; a REDS will be used for citizen monitoring and advice to citizens about squirrel populations.

REDS Core Team (operating within ESUG and PRO-COAST)

Prof Robert Kenward, formerly of UKCEH, ecologist and environmental governance specialist.

Nick Casey, Anatrack Ltd, highly experienced full-stack developer, chief developer of Ranges Suite for animal range analysis.

Dr Julie Ewald, Principal Scientist at the Game & Wildlife Conservation Trust, farmland ecology and GIS specialist.

Dr Ben Kenward, Associate Professor at Uppsala University, environmental psychologist with background in ecology.

References

Matthiopoulos, J., Field, C., & MacLeod, R. (2019). Predicting population change from models based on habitat availability and utilization. *Proceedings of the Royal Society B*, 286(1901), 20182911.

Papathanasiou, J., & Kenward, R. (2014). Design of a data-driven environmental decision support system and testing of stakeholder data-collection. *Environmental modelling & software*, 55, 92-106

Pearce, J.M., & Parncutt, R. (2023). Quantifying global greenhouse gas emissions in human deaths to guide energy policy. *Energies*, 16(16), 6074.