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PERSPECTIVES

A code of conduct for environmental and biodiversity scientists

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Abstract

There are thousands of codes of conduct in workplaces. However, most are general for all employees and do not address the behaviour of scientists conducting fieldwork and associated activities. Thus, through consultation with many colleagues within and outside the Global Earth Observation Biodiversity Observation Network, we synthesised a proposed code of practice for researchers. This is applicable to people working in environmental sciences, including ecology, biogeography, geology and associated subjects involving fieldwork.

Highlights

This code of conduct recommends that scientists:

- Respect all people, nature and laws
- Challenge inappropriate behaviour and misinformation
- Maintain their integrity and be accountable
- Minimise impacts on wildlife and habitats
- Publish their findings with full acknowledgements

Keywords

Best practice, environmental impact, ethics, fieldwork, field work conduct, health and safety, individual behaviours, law abiding, publishing

Preamble

Science advances through critical thinking and the testing of ideas and practices, and discoveries may confirm and challenge existing paradigms. Science benefits from the diverse perspectives of people, with knowledge gained from oral and written history, philosophy, observations, experiments, data analysis, and practical skills. The diversity of beliefs, practices, values and thinking can create tensions, which can be constructive but may upset people and the status quo. As scientists we need to be sensitive and respectful of these tensions and their consequences, encourage collaboration, discussion and not imposition of ideas, and strive to do the best possible science that will benefit people and nature in present and future generations. Here, we consider "scientists" to cover all researchers and practitioners who are engaged in discovery, including consultants and others in the private sector, government policy advisors, and social and natural scientists spanning engineering and biomedicine to humanities and the arts. We reflect on the behaviours and practices that enable a science that benefits society. Therefore, the code is applicable to the field of biogeography, which is based on field observations of wildlife in all environments and parts of the world, benefits from a diverse community of scientists (including amateur naturalists), and has a history of challenging prevailing paradigms and controversies (e.g., assisted colonisation, de-extinction, new conservation, conservation trade-offs, excluding people from protected areas). As with other codes, it aims to be a moral compass for individual and group behaviour.

Effective science practices and good citizenship require that we hold ourselves to high ethical and moral standards (Institute of Medicine 2009; Barbier et al. 2018). Most existing scientific codes of ethics and conduct tend to focus on employer-employee relationships (e.g., NOAA 2021), legal obligations (e.g., in conducting experiments on animals), publication ethics (e.g., Albert and Wager 2010; Anonymous 2019a), and data ethics and best practices (e.g., Costello and Wieczorek 2014; Wilkinson et al. 2016; Moher et al. 2020; OECD 2021). Respect for the diversity of people in the scientific community and society (TRUST 2018; Popp et al. 2020, e.g., CARE principles regarding Indigenous Peoples) and equity are also highlighted as guiding principles (e.g., Giakoumi

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et al. 2021; Research Data Alliance International Indigenous Data Sovereignty Interest Group 2019). Online resources for teaching good ethical practice have also emerged (e.g., Anonymous 2021a, 2021b). Many national academies, scientific societies and research programmes have codes of ethics for their members such as guidelines for institutional practice regarding research ethics, promotion and hiring (e.g., Anonymous 2007, 2008, 2019b, 2020a, 2020b; ALLEA 2017). More than 2,500 codes and guidelines from over 1,500 organisations around the world, including current and historical codes dating to 1887, have been archived in the Ethics Codes Collection (Anonymous 2021a, 2021c, 2021d). These codes have been developed through committees at research institutions, national academies, and other organisations. However, most existing codes of scientific conduct have gaps. For example, most do not explicitly provide guidance on how field studies should be conducted (Anonymous 2004, 2020a; Minteer and Collins 2005a, 2005b; Costello et al. 2016; Eichhorn et al. (2020) discuss the need to work across communities in collaborative ways, publishing data in open access channels and through proactive engagement with local researchers in developing countries before and after any research is conducted together.

The code presented below originated within the Group on Earth Observations Biodiversity Observation Network (GEO BON) community to provide guidance to individual scientists practising in the fields of biodiversity and environmental sciences and was made available on its website to the community (https://geobon.org/about-code-of-conduct)- yet it is more widely applicable and so being published here. These guidelines were developed through review of existing literature and by consulting with a wide range of individual scientists representing the diversity of our community around the world to provide perspectives across ages, gender, languages, cultures, and ethnicities. Following a review of existing codes, a draft was circulated within the Marine Biodiversity Observation Network (MBON) and the International Association of Biological Oceanography (IABO) for feedback. Following revisions, it was then circulated within GEO BON. A finally revised version was then deliberated on by the GEO BON Steering Committee before its acceptance. Some feedback suggested expanding particular parts of this code. However, there was consensus that the code should be concise and short to make it more likely to be widely read, digested and applicable to a broad community of scientists. Thus, we encourage users to expand on this code to fit their needs. We don't claim special moral authority to dictate such a code, nor that this code is definitive. Rather, its value will be judged by who adopts it, and whether and how it affects the practice of science and the well-being of people and nature.

We hope this code advances changes in behaviour and thought-provoking discussion that move us toward those goals. We encourage organisations and institutions to adopt any and all parts of this code for their purposes, and to help review and update it as appropriate. People building on this code may wish to add consideration of emerging issues, like the use of Artificial Intelligence, as they develop codes for their communities.

The guidelines below summarise values and principles regarding how we should work with others, engage with society, and how our work and methods impact life and nature. We encourage all to delve into more detailed guidelines developed by others. We start with three overarching principles, focusing on conduct in relation to people, nature, and scientific practice. Further details are divided into personal behaviours, practices, and publication strategies.

Overarching principles: We…

1. *respect everyone* and accept diversity of age, gender, sexuality, race, origin, religion, ancestry and culture, social and economic status, and physical and mental ability. This includes promoting and facilitating equity in all transactions.
2. *respect nature* by practising and promoting sustainable use of natural resources and minimising disturbance of living organisms and natural environments.
3. *conduct our science* with honesty and transparency of evidence, data, knowledge, know-how and/or ideas (Resnik and Shamoo 2011; Anonymous 2013).

Behaviours: We…

4. *take time to be mindful*, considerate, and supportive of others and their circumstances.
5. *respect confidentiality, cultural and indigenous sensitivities*, and do not impose ideologies (e.g., political, religious) on others.
6. *refrain from and actively oppose discrimination*, harassment, bullying, and misuse of power.
7. *respect the spirit and letter of laws*, regulations, agreements, and institutional requirements where these are appropriately designed for the benefit of a broader society, and otherwise work with these institutions for change.
8. *practice integrity*, honesty, impartiality, objectivity, and intellectual rigour in our work.
9. *are accountable for our research*, including mistakes and oversights in professional practice, publications, peer review, data collection and interpretation.
10. *oppose the spread of misinformation* and misleading presentation of evidence, such as selective reporting to conceal evidence of governmental, industrial, scientific, social and/or environmental issues that society should be aware of; and actively correct the public record, including retraction of flawed work.
11. *declare conflicts of interest*, both actual and potential, that may be perceived to influence our research and its interpretation.
12. *support the profession and colleagues*, such as by contributing as an editor and peer reviewer, organising meetings, mentoring, educating, and sponsoring as opportunities arise, and by supporting those disadvantaged by breaches of these guidelines.

13. *acknowledge our backgrounds* and limitations of expertise in discussions and applications.
14. *foster the ideals of this Code of Conduct* in others, including training and mentoring staff and students.

Practices: We…

15. *consider the consequences* our behaviour and work have on people and nature, including wildlife, climate change, and the environment, and minimise detrimental impacts.
16. *minimise health and safety risks* to ourselves, other people, and nature.
17. *prioritise research* methods and practices that have *low impact* on the well-being of people and nature, in the laboratory and natural environment, including non-lethal methods of collecting data on species and their environment.
18. *obtain permission* from landowners, local communities, Indigenous People, and any other relevant authorities in any fieldwork.
19. *make it clear that people are free to refuse* to participate in particular research. This includes explaining health and safety risks, and the effects the research may have on participants, other people, and the environment.
20. *avoid spreading species*, including microbial pathogens, beyond their natural ranges.
21. *deposit physical samples where appropriate*, including specimens, in herbaria, museums, or other appropriate national archives with rigorous metadata and all appropriate permits so they are maximally accessible to other users.

Publication: We…

22. *publish research findings and supporting primary data* in an accurate, timely manner to contribute to scientific knowledge, and enable transparency, reproducibility, and replicability of the work.
23. *acknowledge people* who have helped our research, including funding sources, and cite prior work and ideas which our work incorporates.
24. *respect the intellectual and material property of others*. Where we use data from third parties, we seek their permission to use and release data as appropriate.
25. *respect the sensitivity of data* that may enable the identification of individual people, or aid criminal or unethical behaviour; such as, collection of threatened species, spread of pests, or infringement of others' patents or copyrights.
26. *support publication* of ethical scientific research, as an editor or reviewer, regardless of whether it conflicts with our beliefs or interests, or those of our employers or group consensus.
27. *never fabricate or falsify research* findings, plagiarise the work of others, or condone such misconduct by others.
28. *follow scholarly publishing guidelines* for authorship and acknowledgements in scientific research papers (e.g., the "Vancouver Guidelines" Anonymous 2019a; Parker and Berman 1998; CASRAI 2021).

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Additional information

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Data availability
All of the data that support the findings of this study are available in the main text.