Supplementary Material

A Code of Conduct Is Imperative for Ocean Carbon Dioxide Removal Research

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**Table 1.** Core principles for a research code of conduct. Example language from the codes of conduct reviewed for each of the elements for code implementation, principles for responsible research, and provisions for equity and fairness listed in Figure 1.

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| **Elements for code implementation** | **Examples** |
| Definition of purpose of code | “The Principles are intended to guide the development of geoengineering techniques from early research to the point where they may be available for eventual deployment.” (Oxford Geoengineering Programme, 2009) |
| Definition of scope of code | “This code calls for implementation and compliance of awareness, accountability and oversight and targets all those engaged in life sciences activities: laboratory workers, managers, stakeholders and others.” (Rohde et al., 2013) |
| Guiding or interpretative principles | “[Nanosciences and nanotechnologies] research activities should be conducted in accordance with the precautionary principle...”(European Commission, 2009) |
| Definitions of key terms | “Transparency means having study information accessible to those having an interest in the study results, either as individuals or representatives of a group” (Kurz et al., 2017) |
| Flexibility or adaptability provisions for code | “This Code of Conduct should be applied taking a flexible and adaptive approach in the light of new information...” (Hubert, 2017) |
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| **Principles for responsible research** | **Examples** |
| Scientific integrity | “Scientific integrity means acting in accordance with the values of science, such as truthfulness, honesty and open reporting.” (Kurz et al., 2017) |
| Provision that research be justified by a potential benefit | “Promoting the collective benefit of humankind and the environment must be the primary purpose of research conducted to develop and evaluate the potential for climate engineering technologies to moderate or reverse human-induced climate change.” (Asilomar Scientific Organizing Committee, 2010) |
| Assessment of potential adverse impacts from research | “An assessment of the impacts of geoengineering research should be conducted by a body independent of those undertaking the research; ... assessments should address both the environmental and socio-economic impacts of research.” (Oxford Geoengineering Programme, 2009) |
| Minimization of potential harms from research | “Data should be collected ... in such manner as to create the minimum disturbance to the marine ecosystem... All marine research activities are subject to the basic principle that the design of the study should provide for protection of the marine life, habitats and ecosystems and the services they provide.” (OECS, 2016) |
| Assignment of responsibility for adverse impacts from research | “Researchers and research organisations should remain accountable for the social, environmental and human health impacts that their [nanosciences and nanotechnologies] research may impose on present and future generations.” (European Commission, 2009) |
| Tiered research structure by scale or methodology | “Geoengineering research should be conducted taking a prudent, step-by-step approach…the nature, scale, duration, and intensity of an outdoor experiment on geoengineering should be proportionate to the current state of knowledge about the potential adverse effects taking into account the precautionary approach.” (Hubert, 2017) |
| Publication or dissemination of results | “[S]cientists are expected to adhere to highest professional standards in proposing, doing and reporting of research results to ensure reproducibility.” (Indian Council of Medical Research, 2019) |
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| **Provisions for equity and fairness** | **Examples** |
| Public or stakeholder engagement | “When working professionally…interact and collaborate with counterparts, confer regularly with appropriate officials, share information…contribute to local capacity-building, and equitably share the benefits arising from the use of local knowledge and practices as appropriate.” (Society for Marine Mammology, 2013) |
| Consideration of fairness, equity, and/or social issues within or beyond direct impacts of experiment | “[R]esearchers should commit to...actively support and advance the goals of racial, gender, geographic, and economic equity in the conduct of [solar geoengineering] research” (NASEM, 2021b) |
| Rules about funding | “[S]cientists ... should be open and honest about their relationships, (e.g., relationships involving their employer and/or funding mechanisms for the research) [and] their commercial interests” (Jones, 2007) |

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