

Raising awareness of science's environmental footprint

“Several specific measures were deliberately taken by the authors to reduce the environmental impacts of the activities associated with completing the science reported in this study (Appendix K).”

As we become increasingly knowledgeable about humanity's effects on the biosphere, scientists in particular have a growing responsibility to acknowledge their own work-related environmental impacts, and to respond accordingly. Indeed, science-related activities can be particularly damaging. For example, academic laboratories consume 3–6 times as much energy as commercial office space, largely due to refrigeration and fume hood ventilation requirements. Every research data collection process, including lab and growth chamber studies, field experiments, surveys, and computational analyses, is associated with negative impacts – both direct and indirect – on the environment. We are all undeniably part of the problem, even those who are conducting research specifically aimed at being part of the solution.

Awareness is the fundamental prerequisite to addressing a problem, and so here's an idea to raise awareness of science's environmental footprint. Wouldn't it be a great first step if we scientists were to identify and explicitly articulate any actions that were taken to minimize or counteract the environmental impacts of our research activities? For instance, individual researchers may have intentionally chosen to reduce their reliance on single-use plastic items, to re-use materials, to recycle wastes, to prevent unnecessary or inefficient electricity use, to avoid travel or minimize its impacts, and so forth. These deliberate, proactive efforts desperately need to be encouraged. Furthermore, communicating these measures in publications would help to raise awareness of science's environmental impacts among other researchers, who may then be inspired to adopt and develop their own mitigation practices. Therefore, I propose that such actions should be explicitly described in theses, dissertations, and journal article publications arising from the associated research. This simple idea to invigorate the environmental mindset in which most science research is performed could be readily achieved by adding a descriptive supplementary table to the article's online supporting information (see WebPanel 1 for tables with multiple examples of specific measures, and other resources), and just a single standardized sentence (such as the one at the beginning of this editorial) to the article's Acknowledgements section.

So how would formulating such a table work? Researchers would first need to identify the principal environmental impacts of the activities necessary for a project's completion, and then reflect on what they think would be the most effective, feasible, and economically viable measures they could implement to reduce, avoid, or mitigate some of those impacts. The goal is to articulate perhaps one to three discrete, implementable actions – not to be exhaustive. Such reflection is not easy, and comparison of options is often complicated – but even preliminary efforts to do either would inevitably heighten awareness among participating researchers of their science's environmental footprint.

When might the table formulation process be started? Ideally, researchers would begin reflection at the initial research-planning stage, add revisions during the activities stage, and collate the measures for each of the project's ensuing publications at the writing stage. Many of the major scientific funding institutions already require grant applicants proposing field research to indicate the likely environmental impacts of their on-site work and appropriate mitigation plans. Shouldn't that mindset be expanded from the field component to the entire research undertaking? Furthermore, voluntary inclusion of planned efficiency measures – such as equipment sharing, space utilization, energy and water conservation, and “green” lab assessment – within research grant proposals is now being promoted by the International Institute for Sustainable Laboratories (www.i2sl.org) as a “win–win” process in terms of not just environmental ethics, but also economic cost-savings.

Who might participate? Obviously the Principal Investigator and the publication's lead author would play a critical role, but every other member of the research group – from undergraduate and graduate students to technicians, post-docs, and collaborating professors – could contribute. Furthermore, the culture change inherent in the process proposed here may empower those many environmentally concerned researchers who desire more sustainable and equitable work practices but struggle against hierarchical inertia within their research groups and the upper echelons of their academic administrations.

The proposed process could also ultimately lead to much-needed advances in the development of user-friendly, holistic, full “life-cycle analysis” methodologies to comprehensively quantify and compare specific impacts and possible mitigation actions. But for now I suggest the first step should be on the “big picture” – raising researcher awareness of the environmental impacts of “doing science” and of potential measures to reduce those impacts. Scientists – it's not just what you do; it's also the way that you do it.



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