OXFORD'S ENVIRONMENTAL SUSTAINABILITY STRATEGY: LETTING IT ROLL?

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The Draft Environmental Sustainability Strategy (ESS) published as a supplement to the OU Gazette on November 18th and offered by the university for public consultation until December 6th deserves the attention it has triggered, with over a thousand responses. On the one hand, it commits the university to pursuing bold goals (net zero carbon emissions by 2035, instead of the 50% reduction of the current strategy). It aims at seizing the day: as Lenin is reputed to have said "there are decades where nothing happens, and there are weeks where decades happen". It pledges frequent and transparent reviews. The presence of renowned experts in the Working Group and additional contributors, and its endorsement by both the Vice-Chancellor and the President of the Student Union, invite confidence and 'buy-in'. On the other, it adopts an approach which focuses on meeting a set of targets without dealing with implications for the subsystems which form part of its concept of the environment. Our critique focuses upon the integration of missing environmental subsystems, and on how the current focus of the Draft ESS could be pursued with minimal risks of unforeseen consequences. We argue that an application of a set of science-based sustainability principles derived from natural laws allows for progress on climate change and biodiversity while avoiding unintended effects and addressing environmental dimensions not yet incorporated in the Draft ESS. We offer some further ideas to consider:

Scope

While the draft strategy privileges climate and biodiversity, our ecological crisis is more complex. Rockström, Steffen and colleagues in papers in *Nature* (2009 and 2015) see seven more environmental subsystems that intertwine with both climate and biodiversity, and whose boundaries are also dangerous to cross. The reasons why the draft ESS does not address all nine subsystems – some of which have been trespassed by the UK[1] – should be clarified.

Categories and activities which differ in their function and status (e.g. biodiversity, sustainable food, research, curriculum, teaching, emissions from buildings etc.) are currently treated similarly by the ESS.

Differentiating (i) 'ends' (e.g. mitigation of climate change; biodiversity and freshwater conservation; pollution reduction etc.) from (ii) 'means' (e.g. facilities management, heating, procurement, research, curriculum, etc.) would make tasks and purposes clearer for faculty and managers. But new institutions would need to be created with powers to resolve conflicts over resources, trade-offs and sequencing between departments and colleges

Sustainability: principles and mechanisms

A sustainability strategy, even one which like the Draft ESS focuses only on climate change and biodiversity, is a road map for navigating a specific complex system: society within the biosphere. Defining strategic goals that are robust, clear and can preserve the biosphere while providing for societal needs is key. One approach is to model this complex system, forecast future behaviour and

[1] https://goodlife.leeds.ac.uk/countries/#UnitedKingdom

set strategic goals accordingly. An alternative and complementary[2] approach is to "backcast"[3] from visions framed by a principled definition of sustainability[4]. As the Draft ESS is meant to provide long-term guidance, here we argue for the latter, because it provides clearer and more robust[5] goals than the former.

Broman and Robèrt (2017)[6], explain the principles that are needed. After decades of trans-disciplinary dialogue with fellow scholars they established three environmental sustainability principles[7] grounded in universally accepted science[8]:

"*In a sustainable society, nature is not subject to systematically [9] increasing*

(1) concentrations of substances extracted from the Earth's crust,

(2) concentrations of substances produced by society, and

(3) degradation by physical means."

These principles are **systemic** (establishing conditions for society and ecosystems to coexist healthily and indefinitely). Principle one is meant to prevent mined elements from accumulating systematically in the earth's ecosystems, altering their chemical composition and creating an environment that is poisonous to living organisms.[10] The second principle follows a similar rationale for artificial substances. The third avoids nature's being degraded by physical means, as opposed to by chemical means, as in the first two principles.

As well as being systemic, the principles are **necessary** for environmental sustainability (violating them degrades nature), **sufficient** (there are no unaddressed means of destroying the biosphere), **general** (they are applicable to any organisation and sector), **concrete** (to guide practical problem-solving), and **non-overlapping** (avoiding confusion) (Broman and Robèrt, 2017).

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[2] Mathematical modelling of complex systems allows for the definition of goals that are useful in the short-term but lose precision over time. Complementary goals based on immutable sustainability principles allow for long-term guidance. While the former can be useful for tactical short-term steps, the latter ensures the strategy always points towards sustainability. Both can complement each other.

[3] As opposed to forecast.

[4] A definition of sustainability formed by fundamental principles that state conditions for society not to destroy the biosphere.

[5] In the second approach, goals are not weakened by modelling uncertainties and, hence, are better suited for long-term guidance.

[6] Broman, G.O. and Robèrt, K., 2017. A framework for strategic sustainable development. *Journal of cleaner production, 140, pp. 17-31*

[7] The authors also posit a principled approach to social sustainability, which is outside of the scope of our current comments to the Draft ESS.

[8] Physics, chemistry, biology, and geology.

[9] If pollution and degradation occurred only occasionally, the resilience of biophysical subsystems would usually be sufficient to absorb such disruptions. But when pollution and physical destruction recur systematically, resilience is eroded, pushing the earth system towards tipping points.

[10] This is due to the fact that during billions of years of the planet's geological evolution, many substances became rarer in the biosphere due to sedimentation, allowing life to evolve without them. Hence, the systematic accumulation in nature of mined materials recreates a chemical scenario to which current living organisms are not always adapted.

Importantly, they focus on negating destructive mechanisms, rather than on pursuing quantitative targets. There are four reasons for this: (1) mechanisms can guide action better[11] than quantitative boundaries, while (2) environmental boundaries are hard to quantify, (3) the subsystems they represent intertwine and change under mutual influences, and (4) pressure on boundaries cannot be attributed unequivocally to individual sectors or organisations such as, for instance, Oxford University. Enabling institutions to assume a share of the responsibility for violating a planetary boundary has not yet proved possible. By contrast, the mechanisms that push nature towards boundaries when interacting with unsustainable human systems are immutable. They operate irrespective of where such boundaries are estimated to lie. Organisations can plan to phase-out contributions to mechanisms of destruction regardless of size or sector, and unrelated to their historic relations to environmental boundaries.

Further, by considering all sustainability principles, an organisation can solve problems in one environmental domain without creating problems in another. Take the example of producing low carbon energy by boosting the productivity of bioenergy monoculture through the intensive use of agro-chemicals. An evaluation using sustainability principles would indicate consequences such as water pollution affecting food chains, and GHGs in agro-chemicals production. These impacts can be mitigated or avoided through measures to comply with sustainability principles, preventing a chain of negative ripple effects from happening. In this example, what could be done? Agro-chemicals could be reduced and eventually phased out by adjusting management practices that use biodiversity for controlling pests and enhancing soil fertility.

Armed with environmental sustainability principles, people implementing a sustainability strategy can identify the trade-offs they incur when choosing one route over other, and plan for corrections – in Oxford University's case, to prevent its prioritized goals being achieved at the expense of other biophysical subsystems.

What industry does not violate these principles? Indeed, to some extent, all do.[12] That does not mean they are all inherently unsustainable. The problem to be tackled is the reduction / elimination of their systematic impacts on the biosphere. Substituting material inputs, closing material cycles when using mined or artificial substances in order to protect nature from their effects, or implementing efficient reverse logistics to improve recycling can all help the economy to reduce its violation of these principles while providing the goods and services needed as societies develop towards full compliance.

This approach has been successfully adopted by a range of pioneering organisations since as far back as the 1990s, including Ikea, Scandic Hotels, Interface and various municipalities.

Electrolux – one of the early adopters, following the insistence of retailer ICA, also an early adopter – required all product lines to present plans informed by careful life-cycle analyses based on sustainability principles. As a result, certain material inputs such as CFCs or HCFCs, toxic solvents, or PVC were reduced or phased out, hazardous waste was reduced, industrial processes started treating

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[11] Why better? Sustainability principles as mechanisms for not destroying the biosphere are immutable, as opposed to ever shifting quantitative boundaries. Hence, they act as a steady compass for defining and periodically revising strategic goals, allowing for a constant and stepwise development towards a sustainability.

[12] The inevitable consequence of violating environmental sustainability principles is environmental degradation. Occasionally, degradation is foreseeable based on knowledge about past ecosystem dynamics and behaviour. However, (1) identifying all responses to disturbance in a complex system is impossible, and (2) often feedbacks in nature are long delayed. Hence, some environmental impacts of the violation of the principles, although sure to happen, are unforeseeable when the activities that cause them are initiated. Yet, environmental degradation, even when not foreseeable, can be avoided by complying with the principles.

and recycling water, products became more energy efficient and incorporated more recycled materials, and the first CFC-free refrigerators came to market.

In the late 1990s, following criticisms about working conditions and environmentally damaging resource-use, Nike also adopted these sustainability principles. Their environmental strategy led to reductions in material inputs and toxicity. By the late 2000s, its directors decided to use the principles for innovation in design.[13]

Hydro Polymers (later INEOS) pioneered the use of these principles to identify and address sustainability issues in the PVC industry. This UK led initiative eventually resulted in the principles being embedded in the entire European PVC value chain, which resulted in the current Vinylplus initiative.

Over 100 of Sweden's 290 municipalities have adopted these principles for strategic planning, reducing negative impacts and devising less-unsustainable processes. Through workshops with city council officers, civil society activists and politicians, problems are assessed, and rolling solutions are developed.

Evidently, all these organisations still have environmental problems to address. But reference to these environmental sustainability principles has ensured their movement away from unsustainable impacts and has helped address unintended consequences of actions taken earlier.

The structure of the strategy:

To develop guidelines for implementation, the Working Group would have to scrutinize these environmental sustainability principles. Then, a vision of the university compliant with the principles would be developed with clarity for those working in three separate areas: teaching and research (core purposes) and administration (essential support). In all three areas, physical, intellectual and academic processes would be evaluated against the environmental sustainability principles. The ESS would then develop a gap analysis between current and desired processes, offering guidelines for departments and colleges in all three areas. In a collegiate structure such as Oxford University's, once a masterplan was defined each of the 67 departments and 39 colleges would then establish how their teaching, research and administration would shift towards compliance with the principles. As these principles are grounded in natural laws and scientifically established knowledge the ESS would remain valid over time and would act as a compass for the whole collegiate structure of the university on its journey towards sustainability.

Conclusion:

The Draft ESS is an important step in the university's commitment to addressing the ecological crisis. Its response to climate change and biodiversity challenges shows its commitment. The approach we outline here is compatible with and complementary to the Draft ESS. It could help develop the project further, placing the university among the vanguard of environmental responsibility, and making curriculum and research in colleges and departments generate ripple effects in the wider world.

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[13] https://thenaturalstep.org/project/nike/#:~:text=Nike's%20North%20Star%20Innovation%20Goals&text=It%20is%20best%20described%20as,materials%20and%20sustainable%20product%20innovation

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