

Sustainable development, the ecosystem approach, environmental capacity and the precautionary principle

Sustainable development is now a key policy objective for most government departments and agencies, and increasingly for private corporations. The basic concept is simple and appealing, a fundamental moral rule: we should ensure that in all our activities we do not harm the interests of others, or compromise their opportunities, now or in the futureⁱ. Overlaid on this moral rule – and emphasised to a greater or lesser degree in different definitions – is the notion that natural resources, ecosystems, and the services they provide are both vulnerable and limited, so that in order to deliver on the moral rule, we must better understand, and be sensitive to, the state of those systems and resources, and our impacts on them.

The need for better understanding of natural systems is implicit in the term “**ecosystem approach**”, which emphasises the need to understand the network of connections within natural systems and the potential knock-on effects on the wider system when we disturb or destroy particular elementsⁱⁱ. This will require greater awareness of the potential for knock on effects, greater scientific understanding of the relationships, and greater integration of associated management systemsⁱⁱⁱ. Given the complexity of the relationships, large uncertainties will necessarily remain, and this in turn has spawned the various ideas and approaches associated with the “**precautionary principle**”.

Limits to change

Assuming that we can relate particular human activities to specific changes or likely changes in natural systems, the inevitable question arises as to how much change is acceptable. Are there limits to environmental change beyond which economic opportunities are lost in the short or long term? Are there limits to environmental change beyond which fundamental services^{iv} will be compromised irrevocably? Or, on a less critical but nonetheless important level, are there degrees of change which we as a society are not prepared to accept for social or cultural reasons?

It is generally agreed that there are indeed such limits, and a range of terms, such as “*ecosystem integrity*”, “*environmental capacity*”, “*carrying capacity*”, and “*environmental carrying capacity*” have been coined to formalise this idea.

The key to applying these ideas usefully and convincingly may be to consider them in relation to four broad (and overlapping) categories of environmental change:

1. Change which seriously threatens basic ecosystem services or “life support systems”;
2. Change which reduces economic opportunity now or in the future;
3. Change which threatens the livelihoods or interests of particular groups in society;
4. Change which is of aesthetic, social or cultural concern.

For the first of these the challenge will be how to address scientific uncertainty and the limits of knowledge. And knowledge of these systems remains very limited - the relationships between biodiversity and specific ecosystem services are very poorly understood.

For the other three, the difficulties of predicting change are compounded by the difficulty of defining *acceptable* limits to change – since they have both technical and social/cultural dimensions.

Taken together these various considerations imply a less techno-centric approach to policy and practice. We need better mechanisms to bring together science and society to generate an informed consensus on issues like carrying capacity, or the “conservation” of particular ecosystem services. We need to be better at analysing and communicating uncertainty and risk, and the distribution of possible costs and benefits associated with overall strategies or particular actions. We need to be more strategic in our assessment of cumulative change, and agree in advance acceptable limits, even when the scientific underpinning is limited.

The detailed nature of these approaches and mechanisms will depend on local circumstances, and implementation will not always be easy. In many cases these approaches have not been used in the past because they make life more complex, and government too expensive. A balance between time and cost on the one hand and thoroughness on the other will need to be found – appropriate to the severity of the issues and the resources available.

ⁱ The most widely quoted definition of sustainable development is that found in Brundtland, H. *Our Common Future*, (Oxford: Oxford University Press, for the World Commission on Environment and Development, 1987), but many national and international agencies and organisations have developed definitions which elaborate the basic theme.

ⁱⁱ The scope of meaning of the “ecosystem approach” has been expanded by some organisations to encompass the notion of effective management systems capable of dealing with the complexity of ecosystems and the services they deliver. A useful review of the meanings of the various terms associated with the ecosystem approach is to be found in the ICES WGECO Report 2009 http://www.ices.dk/reports/ACOM/2009/WGECO/wgeco_final_2009.pdf

ⁱⁱⁱ Hence the “official” UK government and 2002 World Summit definition: “a strategy for integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way”.

^{iv} such as clean air, clean or productive water, flood buffering, carbon storage, productive soil etc