Landscape scale biodiversity assessment: the problem of scaling

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Contents

On the problematic 'political will' to conserve

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The discussion of conservation measures seems to revolve around protected areas and how many and big they have to be. Some have doubts that there ever will be many and large enough protected areas. They are right to worry. In democratic polities there are strict limits on the kinds of instruments politicians are allowed to use in exercising political will. Today it is not conceivable to declare an area for protected and then shut out or requiring non-development from the local people like it was done for example in the Serengeti National Park. Conservation of biodiversity will become increasingly difficult if protection is the only instrument known to deliver better conditions for ecosystems.

If biodiversity needs better conditions they have to be created around where humans live and work. To do this, politicians need to be able to judge the relative impact on biodiversity from several reasonable courses of action. Do we know enough to predict the true impact of a particular decision net of all confounding factors (that is all factors not part of the political decision)? If the decision to create a National Park in an area increases the number of tourists by 20% while the traditional use of the area by farmers dwindle to nothing, what is the effect on the ecosystem net of confounding factors? Will it be an improvement for our ecosphere if we were able to increase the proportion of cars running on electricity to 10%? What is better for biodiversity: building compact high-rise cities or land extensive suburban type cities? Both at small and large scales such questions require many and consistent decisions on many levels ranging from the person deciding to buy a car or landowner deciding to build to governments shaping taxes and regulations to encourage desired behaviour. To manage nature politicians need to know the net effects on ecosystems of their decisions. They have to be able to consistently choose the ecologically better of two options, not by guesswork but based on scientific knowledge. Today this knowledge does not exist.

Politics has traditionally been developed on a trial and error basis. Only during the last 50-100 years has policy development based on scientific knowledge been tried, and, admittedly, on balance, not with any remarkable success. But there is no turning back. Social and environmental change occurs at a high and maybe increasing frequency. The environmental problems have to find their solution more quickly than the ordinary trial and error approach can promise. But to my knowledge there is no large research program directed at the problem of determining the "subtle" effects of humans on ecosystem (Russell 1993).

In the world of social science a quantitative investigation of the impact of politically manipulated variables on ecosystems will be a mega project rivalling in cost anything known to this writer. But is it worth doing? Will it matter? Before going into this kind of mega project we should step back a bit and think hard on the question of whether a quantitative approach really will help us determine net causal connections. And if it cannot, can it still be worth doing? Causality is a difficult concept. In order to establish causal connections the basic requirement is that other things are equal, and that we are able to include all relevant variables. This amounts to a complete list of all initial and boundary conditions of the system we study. If this requirement is met, we are assured that our estimates, within the sampling error, are true estimates of the impact of causal forces. We are confident that the ecosystem will respond to equal quantities of impacts in the same way, most times. Hence, we are able to predict outcomes with a known uncertainty and able to advice on changes in policy.

However, there are reasonable arguments that the assumption of a complete listing of all initial and boundary conditions relevant for a study of system change is untenable not only for human societies, but also for biospheres. Kauffman (2000) argues this rather convincingly. He first conjectures that it probably is theoretically impossible to state the initial and boundary conditions for a biosphere. However, he argues, even if we grant that there perhaps is a theoretical possibility, it probably is practically impossible within the lifetime of the universe to enumerate all initial and boundary conditions relevant for the evolution of a biosphere. And moreover, the practical problems are of such a nature that it also is impossible to establish the distributions required for a statistical study of the possible outcomes.

The conjecture sounds familiar for a sociologist. The debates about research methods and goals for research in social science revolve around the question of predictability. What we are most interested in, social change and innovation are inherently unpredictable. On the other hand, most of human activity is rather routine and repetitive. People do react in predictable ways to changes in their physical and social environment. Hence local and short term predictions are feasible. But will shaping of local and short term behaviour be sufficient for conservation purposes?

One reason for the practical impossibility of stating initial and boundary conditions completely is that for every stimuli and every level of stimuli there are vastly more possible responses than what in reality can happen (in any finite lifetime of the universe), and therefore be observed. With no practical way of listing the state space of our problem analytically, life will always have a potential for surprising us. Life is inherently unpredictable. Yet, it is not chaotic. In hindsight, we do see the paths taken and the causes forcing the development.

If we have to abandon the ambition to generalize, we will at least be able to establish empirical connections with some validity in the short run and for the areas studied. How good we are at selecting relevant variables will determine how good our predictions are, and for how long they will be valid. As long as the goal of protecting biodiversity is clear, this will be a vastly better guide to policy than ordinary trial and error. However, it also means that results are not guaranteed. We need to supplement any policy intervention with a learning program. Every change in policy should be viewed as an experiment from which we can learn. Today only occasionally there are linked relevant policy variables to observations of biodiversity. Data to start the slow process of accumulating knowledge about ecosystem responses to policy decisions do not accumulate.

It was noted above that the choice of policy instruments or policy variables are strictly circumscribed in democratic polities. The debate around differences between democratic polities and other kinds of governance systems may not be conclusive, but there are some strong indications that some kinds of policy instruments are impossible to use regularly in democratic societies. Among these are all policies that rely on physical coercion of large groups of people, or large-scale takings of established property. In general, it is conjectured that systematic violations of human rights will generate political and social backlashes that negate any possibly laudable goal one wants to further by such policies. This means we have to put aside all grand revolutionary solutions. In democracies choice of policy instruments need a foundation in the values and opinions of the public in order to have a beneficial impact. What politicians actually can use are the subtle tools of ordinary democratic political action, the piecemeal and small scale measures. They need advice on how to fashion taxes and subsidies, and on how to formulate the marginal changes in legislation that directs behaviour towards sustainable use. Politicians need evidence of how changes in priorities of land use planning can further sustainable resource usage. They need a map of which marginal shifts in values should be reinforced, and not least, they need knowledge about the internal consistency of various policy measures. Political rhetoric and public information campaigns have their place in biodiversity policy. But they work only if they are integrated with institutional changes and are fashioned to reinforce these.

The conclusion from this line of argument is that in order to further the goal of sustainable use of biodiversity we need to know the direction and size of the impact from a change in a policy variable and how the impact changes from context to context. Before we can know this, the systematic collection of data has to commence. From there on case studies will accumulate. Cumulative analysis of quantitative case studies may be the only feasible way of approaching the problem of democratic biodiversity policy. There is a long way to go, but ultimately political will comes as much from the ability to do something as from wanting the thing done. Until a better ability to give knowledge-based advice exists we cannot lament the lack of political will.

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