



Response to Macleod *et al.* 2008. “Mechanisms to Improve Integrative Research at the Science-Policy Interface for Sustainable Catchment Management”

Making Sure you Solve the Right Problem

*Kim Cartledge*¹, *Claudia Dürrwächter*¹, *Veronica Hernandez Jimenez*², and *Nick P. Winder*¹

ABSTRACT. Macleod et al. have given us an admirable case study and argued that “... there is an urgent need to create stronger and more transparent, integrated, and adaptive linkages between opening-up and closing down mechanisms at the science–policy interface.” Two questions must be addressed: what sorts of managerial reform would be required to achieve this? and Is this likely to happen? A natural subsidiarity makes large institutions more inclined to “closing down” (specification) actions and smaller ones more inclined to open problems up. The method of boundary judgments developed in integrative research could be applied to the science–policy interface but there are political and sociological reasons why this is unlikely to happen. Receptiveness to opening up actions is a prerequisite of innovation. Innovations are suppressed in times of geopolitical and economic stress. The result is often an ill-structured, co-evolutionary dynamic in which the actions of one species or population reduce the fitness of another.

Key Words: *epiphany; innovation; integrative research; science–policy interface*

SOME DEFINITIONS

A farmer making commercial decisions is a policy maker. So too are village elders, town councillors, government inspectors, and the rest. Even the project officer in Brussels who administers Macleod et al.’s (2008) project is a policy maker. In order to respond to their call for action aimed at embedding “opening up” and “closing down” at the science–policy interface, we must simplify language a little. The science–system interface is a co-dynamic interaction between a research consortium and a problem domain. The science–policy interface is an interaction between consortium and regulator. There is also a policy–politics interface, an interaction between civil servants and politicians. These domains are not hermetic. A citizen can join a research consortium and a researcher is a citizen; a researcher can act as consultant for the regulatory body, and a regulator can take an active part in research. The boundaries of these communities are fuzzy, although the groups are persistent, as are the lines of communication between them.

CONSTRUCTIVE AMBIGUITY

The European Framework Programme (FP) experiences a policy revolution once every 4 years on average. FP2 integrated the scientific and technical competence in the service of European industry. FP3 introduced a theme called “desertification” that created a niche for humanists. Archaeologists, for example, were well qualified to provide information about human responses to climate change and anthropogenic land degradation. That was how one of us (NW) began working in the European Research Project.

It turned out that there isn’t much desertification in Europe, just a little in southern Spain. Much of the Mediterranean is characterized by land abandonment. Mediterranean forests have grown like crazy since the big emigration to the United States in the early 20th century. However, the money had been ring-fenced. So the definition was broadened to cover any sort of anthropogenic soil erosion and then mangled a bit until it sounded like “desertion.” Then the money could be used to study erosion, land abandonment, policy in respect of rural

¹School of Geography, Politics and Sociology, Newcastle University, ²School of Agronomy, Polytechnic University of Madrid

development, or rural sociology. This was an early instance in Europe of the phenomenon that, following Dr. Henry Kissinger's example, is often called "constructive ambiguity."

Suppose two parties are arguing about a plan to build a factory. One party opposes the development on the grounds that it is unsustainable. There follows an argument about the meaning of sustainability that cannot be resolved, so we agree to stop worrying about generalities and focus instead on impacts, mitigation, compensation, and accommodation. This shifts attention from semantics and personalities to the problem at hand, which "opens up" into a clutch of substantive impacts that can be discussed and evaluated. As long as the outcome is not anticipated and all parties negotiate in good faith, it is reasonable to call that strategy "constructive" ambiguity.

At the end of the negotiation process there are always niggling doubts, and parties often try to negotiate conditions and get-out clauses. However, without consensus, you cannot close down and move toward implementation. Ideally, we should negotiate an on-going monitoring program—a "watching brief" that imposes ethical and empirical constraints on the work (Winder 2005). The trick is to negotiate pre-agreed, auditable indicators of compliance and system health supplemented by a procedure that allows any party to raise concerns about emergent problems.

We call these "boundary conditions," but the name is less important than the idea. If the boundary conditions are satisfied, then the work of implementation is allowed to proceed unchallenged. However, if the targets have not been met or there are unforeseen complications that erode system health, the implementation is halted and the project is opened up again. Those boundary conditions are the key to negotiating buy-in and sustaining trust in integrative research. Ambiguity at this stage would be destructive, and it often helps to have an independent arbitrator. On a research project, for example, you can form a steering board, answerable to the regulator, that maintains that watching brief and signs off on all remedial actions.

Sometimes, when boundary conditions are violated, the effort of repairing the project is trivial. You tweak the methods and revise the boundary conditions, negotiate sign-off with the steering board, and close down again. However, there are

occasions when you have to open up thoroughly and re-explore the system's structure in the light of what you have learned. This corresponds broadly to what has elsewhere (Winder 2007) been called an "epiphany," a change of perception that actually transforms the system's, in this case the research team's, causal structure.

Epiphanies, if handled well, are the stuff of innovation, but innovation is easily stifled by discouraging information flows up the hierarchy or using ambiguity destructively. Integrative projects are peculiarly vulnerable to mission-creep and scientific fraud. The method of boundary conditions provides an auditable record of the work, comparable to the notebooks kept by a field-worker or the records archived by a laboratory-based scientist. On those of our projects initiated after the method was developed, these procedures were actually written into the consortium agreement and form part of a binding contract.

OPENING UP

Once you start opening problems up, you can never be sure what will come to light. A project called EPPM, mounted under FP3 was engaged in an opening up of earlier research on aquifer management. Policy makers clearly saw aquifer salinization as the principal problem to be addressed and the science-policy interface was geared to infrastructural solutions. However, farmers, with all their holdings under citrus, saw fluctuating subsidies and the Common Agricultural Policy (CAP) as a greater worry. Many were pluriactive and making the transition from farming to tourism. Salinization, although inconvenient, did not reduce the land's development value.

EPPM ended up highlighting the effect of subsidy on farming practice, which not only aggravated salinization, but created waves of pest problems that periodically devastated crops. It said that current policies, if they were sustained, would lead to a new epidemic and that the simplest solution would be to cut the subsidies that led to intensive monoculture. The epidemic actually happened and subsidies were later cut. It would be wonderful to claim that EPPM was responsible for the CAP reforms, but integrative sociocultural science doesn't work like that. The political process drove the reforms; EPPM happened to get it right.

FP5 saw the science–policy interface freeze up almost completely. This was the run-up to the Lisbon Process, an attempt to create a command economy for research and technical development by raising investment to a staggering 3% of GDP. Official studies of Framework research showed that the pattern EPPM had observed was multiplied across many projects. We were doing loads of good research, but its measurable impact across the science–policy interface was negligible. A meeting of principal investigators (PIs) took place in Brussels around this time, nominally to establish synergy between projects.

The PIs were given time to become acquainted and, as we shared our experiences, began to resolve into two groups. One group was primarily technical in emphasis, concentrating on well-posed infrastructural problems and best practice. The other group was more integrative, trying to link hard and soft science perspectives. As we discussed our case-study experience, an animated discussion began about this, until a senior eurocrat cleared his throat: “The Commission does not wish to be told that it is solving the wrong problem.” After a polite pause, one of those present gently explained that the Commission’s wishes would be given serious consideration, but there were principles of subsidiarity and ethical issues involved that meant other views would sometimes take priority.

The Lisbon strategy failed to meet any of its financial targets and was eventually reformed. The budget was cut and targets were scrapped so no one would ever again be able to prove the strategy was failing. In effect, the Lisbon Process, as it is now called, will never be opened up again. To borrow Karl Popper’s phrase, it has been immunized against empirical refutation.

Options for integrative research opened up again between FP5 and FP6. FP6 put integrative research back on the menu but invented new “instruments”; huge “Integrating Projects” and vacuous “Networks of Excellence” that any competent research manager could see would not work. There were no boundary conditions set on these “instruments” and, therefore, no transparency in the reform process. The instruments have been quietly scrapped, but there is hardly any public record that it was a mistake. FP7 now has dedicated funding for humanities and social science research. Most of this money will probably be spent on discipline-specific studies, of course, but integrative sociocultural science is now possible, at least for the time being.

FRACTAL STRUCTURE AND KNOCK-ON EFFECTS

The purpose of telling this story is not to apportion blame or credit, but to explain that the politics–policy interface has profound impacts on the science–policy interface, which, in turn, has knock-on effects at the science–system interface. There are also potential information flows back upstream, but these are often blocked by unreceptive agencies. Cold War social engineering, for example, could be said to have caused the post-modern anti-science backlash by blocking that flow. Over the period between 1950 and 1995, a substantial body of academic literature and a vast corpus of policy-relevant reports, the “gray literature,” had shown that social engineering projects had unforeseen and undesirable consequences. Governments and supra-national agencies systematically ignored the findings of their own scientists. Small wonder, then, that educated humanists and ordinary citizens lost faith in the science–policy interface.

All integrative research requires a dynamic trade-off between closing down and opening up activities. Any attempt to open problems up creates problems at the science–policy interface, not because regulators are bad people, but because a natural subsidiarity makes opening up actions seem very disruptive. National and supra-national agencies are heavily sectorialized and almost paralyzed by problems of cross-policy compliance. It is hard enough to integrate the CAP and the Water Framework Directive (WFD) without taking into account accidents of history and geography at the regional level.

Large political agencies may not be very good at opening up but they control the resources to facilitate infrastructural projects and “closing down” actions. Small institutions like village councils can work across scales and often open the work up so much they can never agree what “the problem” is. They seldom have the resources for large, technical intervention. Indeed, large inward investment into small rural economies usually aggravates social exclusion. The people who win the grants tend to be better educated and better connected than those who do not. A lot of the money is lost in wrangling between insiders and outsiders. These blocking actions keep the problem open until long after the money has been spent.

The problems research managers encounter at the science–policy interface have the same structure as

those we must handle within the research team. Hard scientists tend to use methods that suit closing down (implementation) actions. They find it easier to work on international projects where there is substantial investment in infrastructure and these closing-down actions. Softer scientists and humanists specialize in problem framing (opening up) and tend to work at regional and local levels that are more responsive to these opening-up actions. This means that the same problem is mirrored across different scales, research communities, spatio-temporal perspectives, and power relations.

The power struggle we see among national, regional, and local politicians is also present as a sub-text in the relationships between natural scientists, social scientists, and humanists. Professional reward systems value “international” research more highly than regional studies. This is not part of a conspiracy; it is an artefact of the resonance among spatio-temporal scale, academic discipline, and established power relations, but it is an undoubted obstacle to integrative research.

The upshot is that similar structures and tensions are instantiated on at least three levels. The structure of the study domain itself is shaped by power struggles that resonate with tensions within the research team. These, in turn, resonate with tensions manifest among policy makers and, indeed, among politicians. Information flows between these levels also have a similar structure. There is the potential for information to flow from bottom up, opening problem definitions up at the level above. There is also the potential for information to flow from the top down, closing the problem down and initiating an implementation phase. Research managers can develop auditable criteria for switching those flows, but these become much harder to maintain at the science–policy and policy–politics interfaces.

Indeed, we sometimes use this fractal structure to our own advantage. Some projects may actually have a “participant observer,” whose task is to facilitate integration within the team. The team is used as a test bed for developing opening-up and closing-down methods that will only be deployed among external stakeholders once they have been evaluated. However, that fractal structure is also a threat. Ill-managed tensions within the team can actually spill across the science–system interface to destabilize the socionatural system we are there to serve. There are remote rural communities and decayed inner-city regions where researchers have

stirred things up so badly they may find themselves mugged, menaced, or running from angry dogs.

ILL-STRUCTURED PROBLEM DOMAINS

Good universities have the infrastructure to provide ethical support, mentoring services, and counselling for researchers working in difficult problem domains. Even disciplined professionals sometimes run into a wall because the “opening-up” phase is so disruptive. If the presence of a researcher taking notes in the corner is enough to start an all-out fight, bringing in a team of engineers and professional problem solvers is not going to make things better. If the science–system interface cannot be established without putting researchers and ordinary citizens under an unacceptable level of stress, we follow the first principle of professional ethics—avoid action you know will make matters worse.

All the methods used in the opening-up phase involve some sort of discursive action. Many involve practical steps to manage and minimize conflict between stakeholders. But the manifest level of conflict varies from one problem domain to another. Our current project, ISBP (Integrative Systems and the Boundary Problem) deals, among other things, with the purpose of higher education. Here, small-scale building-up actions clearly demonstrate a mismatch between government policy with respect to education and the aspirations of the students themselves.

Throughout Europe, governments and higher-education funding bodies voice the need for more science and technology graduates, whereas the majority of students choose a degree in social sciences and the humanities. This creates a mismatch between policy, which closes the system down, seeking to reduce diversity, and student aspirations, which open the system up again: social science and humanities graduates often face a more difficult transition to work than graduates in other disciplines. Within a higher-education agenda that is dominated by a purely economic perspective, this has fed into the employability debate and, as a result, the humanities and social sciences, both large sectors of higher education, have had to defend themselves with regard to their contribution to the labor market. The only way this problem can be resolved is if one party (or both) experiences an epiphany, but the system is locked into a stand-off

of recrimination and denial. Should policy change? It is impossible to tell because no pre-agreed indicators of compliance and system health exist, and all parties resist any attempt to negotiate consensus. This system is closed down, but there is scope for negotiation and failure is not likely to aggravate social exclusion.

Another integrative problem we are working on involves land-use conflict in Madrid. Here, a conservationist or an organic farmer bounds the problem in such a way that developers and planners are clearly delinquents, ignoring the problem of sustainable development and the statutory obligation to undertake impact assessment. Developers and politicians often see environmentalists as delinquents, frustrating infrastructural projects that create jobs and prosperity in a proud capital city. The Madrid autonomous region is large (8000 km²) and both urban and rural. Each community has influential friends in the political establishment with a different understanding of how the science–policy interface should work. Which of these parties has bounded “the problem” correctly? How are we to “integrate” their perspectives at the science–policy interface? Again, the system is closed down and here the competitive nature of the dynamic is manifest. Certain types of livelihood are untenable and human actions are putting populations of animals and plants under stress. This is a case of inter-specific co-evolution. The actions of one species are undermining the fitness of another (Winder et al. 2005).

We are also studying the experience of asylum seekers whose claims are rejected by courts and tribunals in Britain. Some of these people are destitute; many have injuries consistent with rape and torture and are terrified that they will be compulsorily repatriated. Their fears are well-grounded; compulsory repatriation (“refoulement”) has been common. The emotional challenges of this work are such that our researchers themselves need a mentoring system. All the evidence arising from this research suggests that governments are solving the wrong problem; they are treating the issue as one of border security when the evidence suggests it is a humanitarian crisis. Surely explicit boundary conditions on national and supra-national policy would trigger an opening-up phase? Actually, such boundary conditions already exist, the Geneva Convention is one, and European law provides others, but access to them has been closed down by administrative adjustments and destructive ambiguity.

Governments do not wish to be told they are solving the wrong problem, and there is little research teams, local support groups, immigration lawyers, and NGOs can do to change that. Here we have an intra-specific co-evolutionary system; the actions of some populations of humans are reducing the fitness of other populations.

The science–policy interface, particularly at national and supra-national levels, is much less open to these ethical and methodological constraints than one might expect. A team that has the courage to speak out has to face down funders and institutional stakeholders who don’t want to hear this. There are no prizes for empirical refutation in policy-relevant science. Indeed, it is better for your career to use constructive ambiguity to justify solving the wrong problem than to admit that some effort of mediation or emancipation is needed.

As Europe slips further into recession, we must expect the politics–policy interface to harden again. When it does, the knock-on effects will be felt at the science–policy interface and further down the line at the science–system end of the scale. This has happened many times over the last century or so. The result is usually an increased level of co-evolutionary stress, a war, revolution, or ecosystem collapse, say. Sometimes the consequences have amounted to genocide. Sometimes they “only” cost the lives of a few hapless minorities or endangered animals. In an ideal world, there would be boundary conditions set on the science–policy and policy–politics interfaces that allow epiphanies to bubble up the hierarchy before co-evolutionary stresses become manifest. Sadly, we do not live in an ideal world.

Responses to this article can be read online at:
<http://www.ecologyandsociety.org/vol14/iss2/resp3/responses/>

Acknowledgments:

We are grateful to the Commission of the European Union for funding under the NEST-Pathfinder initiative on Cultural Dynamics (Contract 043199)

LITERATURE CITED

Macleod, C. J. A., K. L. Blackstock, and P. M. Haygarth 2008. Mechanisms to improve integrative research at the science–policy interface for sustainable catchment management. *Ecology and Society* 13(2): 48. [online] URL: <http://www.ecologyandsociety.org/vol13/iss2/art48/>.

Winder, N. 2005. Integrative research as appreciative system. *Systems Research and Behavioral Science* 22:299–309.

Winder, N. 2007. Innovation and metastability: a systems model. *Ecology and Society* 12(2): 28. [online] URL: <http://www.ecologyandsociety.org/vol12/iss2/art28/>.

Winder N., B. McIntosh, and P. Jeffrey. 2005. The origin, diagnostic attributes and practical application of co-evolutionary theory. *Ecological Economics* 54:347–361