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REPORT

BASIC PRINCIPLES OF SCIENCE AND POLICY INTEGRATION

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Purpose: This discussion document was originally produced as part of both WP1 (Policy Interface) and WP3 (System Design) within the SPICOSA project to assist SSAs in thinking about the basic principles of science and policy integration.

1. Introduction: Learning to understand and manage change

Science and policy are both rooted in the human urge to understand and explore the processes of change: whether this change is in the physical environment, in social dynamics, in legislation and rules for action or in the process of acquiring and testing new knowledge. Change is simultaneously desired and feared in a world that we see need to change, but in which change simultaneously poses threats to the familiar ways of "doing things". A core interest is how the future can be altered by our own actions or how it will be shaped by exogenous events beyond our control. And, in turn, we have an interest in how we should exploit, how we may adapt to or how we can cope with those changes. Given that change is a central concern across science and policy, learning to understand change and manage transformations becomes the key vehicle whereby scientific progress, policy development and the links between science and policy are enhanced. In first principles, science and policy integration is about learning or changing our worldviews about social and physical systems and their interactions. But it is also about exploring and deliberating the meaning of success and social goals, about spontaneous innovations that leads to improvements that are not foreseen - and exploring and understanding the small variations in human activities that make a difference to the ecological, economic and social sustainability of decision-making.

2. Policy Relationships are not linear

The model of learning for science-policy integration has in itself changed as ideas concerning the nature and production of knowledge have themselves been transformed. Often the science-policy relationship is imagined to be a linear process in which scientists deliver their findings to policy-makers at the end of their research, and these findings then influence policy as in a cause – effect chain of events. However, this is an unrealistic representation of the reality of policy-making, which happens on its own timescales and is influenced by many other inputs besides scientific research (SMP, 2005). Changes in the attitudes, beliefs and values of society towards the environment, for example, can determine both the typology of possible policy responses available and the dominance of certain policy issues over others in a process of incremental policy change. But policy changes can also be "cyclical", for example when political inertia stalls adaptive changes for a long period so as to produce a "political crisis" that instigate a major change in power relations and in important social goals. But also major external events (e.g. major floods, forest fires, earthquakes etc.) may present is a 'window of opportunity' for key actors to exploit vacant resources and to accelerate the rate at which certain policies are implemented – often resulting in catalytic changes (Johnson et al, 2005). Imagining science and policy relationship as a linear process is also an unrealistic model of social learning, this requires the building of familiarity and trust over time and under changing conditions. The mutual incremental exchange of knowledge (e.g. the building of TEK) often takes place informally in faces to face encounters (SMP, 2005). Finally, such a linear process carries with it, what is increasingly seen as, an unrealistic model of the character of knowledge as it implies that scientists have special access to 'complete' knowledge by reason of being a scientist, which they can simply package for policy-makers. By contrast, knowledge should be viewed as 'incomplete' requiring mobilising efforts from a range of theoretical perspectives, as the familiar disciplines tend to fragment knowledge into manageable areas, as well as a steady flow of ideas from informal knowledge and from innovation within different communities. In this view, knowledge production is not limited to a laboratory or ivory tower of a university, but has become polycentric, relying on many centres of competence. This means that the boundaries between knowledge, society and policy are blurred and knowledge networks are required to connect relevant knowledge carriers (Evers, 2000). This is parallel to new views on governance, where there in most nations is no supreme centre of authority, but where policies are made and implemented through changing partnerships in various models of network governance. The integration of Science and policy thus needs to be considered as a truly iterative process with a requirement for constant interaction through network links. This also means that all policy making is preliminary, there is no "final solution". Policy changes are therefore experiments based on more or less informed expectations about potential outcomes and the distribution of these outcomes for participants across time and space (Ostrom 2005). In view of the complexity of the ever changing biophysical and socioeconomic world – combined with the complexity of the humanly designed rules for dealing with this world, most policy changes consequently face the chance of error.

3. Abolish popular myths

This new model of knowledge production and exchange makes obsolete a series of commonly held ideas regarding the nature of science and policy integration for environmental management. This implies that.

- The options open for policy makers and managers are not known in advance; specifically, the assumption that they are preferentially known by the science community has to be given up.
- All knowledge is not held on one side of the divide.
- Science does need to change its assumptions and paradigms; it is not merely a question of making existing science more effectively applied.
- Communication is not only about passing information and the problem is not simply one of ensuring that the information is transmitted more effectively.
- Science is not a homogenous unity - a single scientific community.

(Green, pers comm., 2008)

This also means that the assumption often held that policy making as designing laws and rules for optimal outcomes is a simple analytical task that can be done by distant analysts, is erroneous. Policy making, and the use of knowledge in this, is often about finding combinations that work together more effectively than other combinations (Ostrom 2005). Thus science and policy integration must be as close as possible to reality and must itself be relevant to a series of community-specific challenges. From a policy perspective in a world with plenty of cross-over problems, there is a clear need for better integration between policies for sustainable environment management, linking multiple policy drivers across multiple scales (Macleod *et al.,* 2007). Here, the decision makers and the scientists tend to approach an issue from different sides. The decision makers always have to decide what to do, and whether, given other priorities, to do anything at all now. Scientists, faced with an issue, do not necessarily want to make any proposals for action until they have studied the issue in more detail. Once they have studied the issue, it can become their sole priority. Scientists often complain that the decisions of others are made for 'political reasons'. Yet, the balancing of priorities, values and vested interests through a political process is precisely what a democracy is about. But a particular political process, a particular power play, a particular coalition of parties and a particular set of politicians may be unsatisfactory from the view of science, but still decisions ought to be made through a political process. The implied alternative is a meritocracy or some form of scientific dictatorship. And the simple fact is that not all scientific research is driven by a devotion to the welfare of others or to the environment: scientists can (and do) have their own agendas and science can be interest of both the “good” and the “evil”. From the policy perspective there are also difficulties in integrating research with existing and emerging legislation (Quevauviller *et al.,* 2005). Laws, rules and norms are in many ways the “hardware” of past policies and “frozen social structures and power relations. New scientific knowledge does not automatically lead to a change in such institutional structures, often a “brittle” governance system has to experience a “political crisis” before a “creative destruction” and a reorganisation of institutional resources can create a policy environment receptive such knowledge.

4. Science-Policy integration for improved sustainability

The need to integrate sciences for more sustainable environmental policy-making is well recognised, but examples or instances of converging theories and analytical frameworks remain relatively few in number. Ecologists, for example, do not only have quite different approaches from social scientists, but will also tend to construct social science in an ecological paradigm, and vice versa. Sometimes that can be an advantage to the progress of science, as long as the deliberation between sciences is conducted in an open and non-hegemonic way. Science integration involves and requires openness on both sides of the discussion – as well as in both sides - to explore new ways of thinking through the functional relations between the whole range of scientific knowledge carriers. Balancing the idea of converging science is the argument that interdisciplinary is a relational term that carries with it dialectic tension between unity and plurality (Schmidt, 2007). In the area of sustainability science therefore, interdisciplinarity requires theories and methods which are not always reducible to a disciplinary level; moreover, if unity and reductionism were completely successful, true interdisciplinarity would probably dissolve. This poses a challenging question for the sciences: given the challenges of integrating the biophysical sciences and the social sciences, how much of such integration is necessary - or desirable - in order to improve the interface between science and policy?

The sciences have domain-specific contributions to make towards science and policy integration, as well as specific challenges to address. Policy-making is also and object of research for political scientists and for example, a rigorous analysis of social dynamics in a coastal region can provide policy-makers and implementers with the knowledge necessary to determine why well-intended policy may fail, which effects can result from proposed actions and how best to achieve socially desirable objectives – if they want to have such knowledge. Conversely, the absence – or rejection of such knowledge can open the door to ‘prejudice, dogma and spurious common-sense’ (IFSSPN, 2006 p1). One key challenge facing the social science and policy interface is the difficulty policy makers have in accessing consensus-based, reliable, relevant and efficient information about social processes - and the difficulties researchers face in generating timely and relevant information that fits in with the often unpredictable timing for developing specific public policies (IFSSPN, 2006). The role of physical scientists in science-policy interface is better recognised in terms of routines for quantifying complex physical systems and providing information, on a realistic time-scale, to decision-makers so that choices can be made regarding precautionary policies to prevent serious losses. But when it comes to biological knowledge, the ecosystem scientist experience as much difficulties with non-consensus and system unpredictability in relation to policy-makers as do the social and political system analysts.

In addition to this, all the different sciences faces same problem of drawing policy makers attention to the long term sustainability issues. The results from long-term monitoring and the prediction of distant phase shifts (like demographic collapse, climatic change or ecosystem degradation) in both social and natural systems (SPICOSA, 2007) poses particular challenges for the science – policy integration. Policy making has a relatively short time frame and these long-term concerns tend to be lost in the daily political struggles between elections. Physical, biological and social scientists therefore have to relate also to the general public and to provide updated and relevant knowledge to the electorate on such long term issues. This poses special challenges to transparency and scientific honesty (leading to better decisions) regarding the assumptions and methods for assessing uncertainty (Faulkner *et al*, 2007).

The glue which holds science and science-policy together should be deliberative in substance. This means it should be a process in which individuals and organisations are open to scrutinising and changing their preferences in light of persuasion (but not manipulation, deception or coercion) from other participants (Dryzek and List, 2003). Such a process enables innovative discussions from which more useful options for management can emerge. This pitches science-policy integration as both an experimental and a social learning exercise: Understanding the differences in the roles and values underpinning the perspectives of the range of experts and non-experts, evaluating the effects of current policy measures as experiments, learning from erroneous policies, and moving towards figuring out more effective means of working together to identify more ecologically, economically and socially desirable options and actions for environmental management. How strong the glue is depends on continuous innovation in enabling learning and on exploring the working limits of new visions of knowledge and knowledge networks.

5. The Challenge of Science Policy Integration

Science and policy integration has been, and remains a challenge, underpinned by a spectrum of complex ideas and facets and this short summary has only aimed to identify some prominent discussion points in the arena. A fundamental underlying question that has not been raised is also whether Science and Policy should at all be integrated. As a guide to the SSAs in their struggle with integrating science into current policy making and ICZM at the various study sites, the, it is worth referring the recommendations from EU-DEFRA as a synopsis (UK Department for Environment, Food and Rural Affairs. These European workshops on ‘Science meets Policy’, seek to explore the challenges and opportunities for making better use of science in environmental policy-making (SMP, 2005). The workshop distilled numerous lessons into a set of key principles that underline effective science-into-policy practices. The principles are pragmatic messages regarding science and policy integration. They need to be viewed in the wider context of epistemological and analytical challenges discussed above: however, they provide useful guiding principles towards facilitating a science and policy learning process:

Principles of effective science-policy practices (SMP, 2005)

Opportunities for dialogue	Dialogue not only improves communication, but also mutual understanding. It helps with aspects of knowledge sharing that are widely under-estimated in their importance: familiarity, building of trust and informal interaction.
Dissemination is not dead	Although a style of research should be fostered in which researchers and policy-makers interact throughout, there is still an important role for dissemination especially as policy processes and networks become more diffuse, open and consultative.
Transparency and openness	Transparency is where the workings of decision-making groups and discussions are made visible and accessible: openness is where these processes bring in a wider range of interested and affected groups than the traditional categories of 'experts' and 'policy-makers'.
Strength of evidence	'Strong science' presented in a meaningful way, for example, the costs of not addressing the problem and the budget required for implementing these solutions. Researchers need to interact to 'road-test' the viability of any policy prescriptions they are suggesting: processes are required which bring evidence together as well as identifying areas of remaining uncertainty and ignorance.
Relevance of research	No-one wants to support 'bad' science, so scientific excellency will remain a central consideration, but the relevance criteria such as significant and urgency needs to be actively considered.
Problem focus	A focus on real-world problems: this is a necessary distinction because academic disciplines often define research problems in narrow ways; leading to research that is abstract, narrow and irrelevant.
Inter-disciplinarity	Consistently identified as a priority, yet there remain many institutional barriers to inter-disciplinarity within many research- as well as policy-organisations. This needs to be addressed by researchers, research funders and policy-makers.
Asking the right questions	This is not merely a chance to enhance communication. Researchers need to ask relevant constituencies 'if we are doing research in this area, what questions would you want answered?'
Staying independent	It is not a question of whether researchers are affected by policy discourses and priorities but how, by whom and to what extent. It is probably healthier to face up to influences on research than to try to ignore them. If researchers actively interact with the full range of interested groups it enhances their ability to 'see the whole picture', identify salient questions and extreme views.

6. References

Dryzek, J.S. and List, C. (2003) Social Choice Theory and Deliberative Democracy: A Reconciliation *British Journal of Political Science*, 33:1-28.

Evers, H.D. (2000) Epistemic Cultures: Towards a New Sociology of Knowledge. Working Paper No 330. Sociology of Development Research Centre, Bielefeld. ISSN 0936-3408.

Faulkner, H., Parker, D., Green, C. and Beven, K. (2007) Developing a Translational Discourse to Communicate Uncertainty in Flood Risk Between Science and the Practitioner. Ambio, 36, 7.

IFSSPN (2006) International Forum on the Social Science – Policy Nexus. International Social Science Journal Volume 58 Issue 189 Page 413-424, September 2006.

Johnson, C.L., Tunstall, S.M. and Penning-Rowsell, E.C. (2005) Floods as catalysts for policy change: historical lessons from England and Wales. *International Journal of Water Resources Development*, 21: 561-575.

Ostrom, E. (2005) Understanding Institutional Diversity, Princeton, Princeton University Press
Quevauviller, P., Balabanis, P., Fragakis, C., Weydert, M., Oliver, M., Kaschl, A., Arnold, G., Kroll, A., Galbiati, L., Zaldivar, J.M. and Bidoglio, G. Science-policy integration needs in support of the implementation of the EU Water Framework Directive. Environmental Science & Policy, 8: 203-211.

Schmidt, J.C. (2008) Knowledge Politics of Interdisciplinarity. Specifying the types of interdisciplinarity in the NSF's NBIC scenario. Innovation, 20, 4: 314-328.

SMP (2005) Science Meets Policy 2005 Next Steps for an Effective Science-Policy Interface. Report of London Conference held as part of the UK's presidency of the European Union. 23-25 November 2005.

SPICOSA (2007) Science and Policy Integration for Coastal Systems Assessment. Annex 1 Description of Work. Proposal/Contract no. 036992 in the SIXTH FRAMEWORK PROGRAMME, PRIORITY 1.1.6.3: Global Change and Ecosystems.