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Short communication

Framing environmental sustainability challenges for research and innovation in European policy agendas

Amy Diedrich [a,*], *Paul Upham* [b,c,d], *Les Levidow* [e], *Sybille van den Hove* [f,g]

[a] *Division of Strategic Issues and Applications for Society, Balearic Islands Coastal Observing and Forecasting System (SOCIB), Parc Bit, Ctra. Valldemossa, km 7.4, Edificio Naorte, Bloque A, Planta 2a, Puerta 3, 07121 Palma, Balearic Islands, Spain*

[b] *Manchester Institute of Innovation and Research and Tyndall Manchester, Pariser Building, Sackville St., University of Manchester; Manchester, M13 9PL United Kingdom*

[c] *Finnish Environment Institute (SKYE), Finland*

[d] *Centre for Integrated Energy Research, University of Leeds, United Kingdom*

[e] *Development Policy and Practice, Faculty of Maths, Computing and Technology, The Open University, Walton Hall, Milton Keynes, MK7 6AA, United Kingdom*

[f] *Median SCP, Calle Vista Alegre, 20, 08197 Valldoreix, Spain*

[g] *Institute of Science and Environmental Technology, Autonomous University of Barcelona, Spain*

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ABSTRACT

Recent EU policy has linked research agendas with societal challenges, which has resulted in an increased emphasis on the need for exchange of knowledge between research and non-research actors, especially civil society organisations. Concurrent with this, has been a call for democratic accountability of research agendas and science that addresses Grand Societal Challenges. The challenge of environmental sustainability features strongly in these discussions with an emphasis on global warming, the tightening of energy, water and food supplies, and the overarching goal of achieving an 'eco-efficient economy'. However, this challenge can be defined in various ways, with different definitions orienting towards different solutions many of which we argue may be contradictory to the goal of environmental sustainability. In this commentary we illustrate how dominant research agendas are often orientated towards the partisan agendas of influential stakeholders, favouring myopic technological fixes and marginalising other civil society actors and critical insights from social science. Our main recommendations include a more dominant role for social sciences, involving civil society more actively in research agenda setting, increased communication, information sharing and capacity building, and increased interdisciplinarity.

1. Introduction

In the last decade, policy and research agendas of the European Commission (EC) have increasingly stressed the need for *co-operative research*, a process which requires close collaboration and exchange of knowledge between research and non-research actors, especially civil society organisations (Martinez-Alier et al., 2011; Stirling, 2006). A policy document on the European Research Area (ERA) refers to co-operative research

* Corresponding author. Tel.: +34 971 43 9764; fax: +34 971 439764.
E-mail addresses: adiedrich@socib.es (A. Diedrich), P.Upham@manchester.ac.uk (P. Upham), l.levidow@open.ac.uk (L. Levidow), sybille@median-web.eu (S. van den Hove).

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as: 'the embryo of a specific European way to define and implement research priorities, engaging citizens and respecting common ethical norms' (CEC, 2007a, Annex: 107). The call for this approach has arisen alongside proposals for democratic accountability of research agendas. The Vision for the ERA emphasizes the need to 'democratise decision making, for a Science operating as a service to Society' (European Council, 2008). Co-operative research, therefore, goes beyond a mere dialogue among stakeholders and entails a profound, detailed process of exchange of knowledge and understanding from society to the scientific community and vice versa.

The concept of science as a ''service'' to society and the role of stakeholder engagement in achieving this goal also corresponds with emerging EU policy discussions that link research agendas with Grand Societal Challenges. The challenge of environmental sustainability features strongly in these discussions with an emphasis on global warming, the tightening of energy, water and food supplies, and the overarching goal of achieving an 'eco-efficient economy' (Lund Declaration, 2009). However, this challenge has been largely framed by dominant political–economic interests and, hence, not addressed effectively by European research policies, which emphasise the need for more efficient production methods for increasing economic competitiveness (e.g. CEC, 2010a). Europe has been rebranded as an Innovation Union, dependent on 'research-driven innovation' for economic growth, with emphasis on technological innovation as a means to meet social needs which may not be met by market or public sectors (CEC, 2010b).

In this communication we aim to illustrate how the challenge of environmental sustainability, which is largely driven by an already excessive demand on limited resources, is being eclipsed by calls for economic growth and increased production (albeit ''sustainable'') to meet growing demand. If these priorities continue to drive research agendas, we run the risk of reaching a critical ''tipping point'' where technological advances can no longer compensate for the imbalance between demand and supply of natural resources. In Section 2, we provide examples where proposed solutions for environmental sustainability challenges are underpinned by a political agenda favouring dominant economic interests in the stakeholder community and how their definitions of the challenge favour techno-fixes that disguise political decisions, often as an imperative for Europe to catch up with foreign competitors (O'Mahony and van Ark, 2003; van Ark, 2006). In addition to highlighting the need for a more balanced participation of stakeholders in co-operative research, in Section 3, we present an argument for a stronger role of social science in solving the current discord between the research agenda and needs of environmental sustainability.

2. Framing environmental sustainability challenges: whose research priorities?

Any societal challenge can be defined in various ways, with different definitions orienting towards different solutions. As indicated in the previous section, specific forms of technological innovation are seen as essential to solve 'societal challenges'. These tend to be high-tech, high cost and patentable technologies with the potential for *de facto* lock-ins and large-scale capital-intensive use of natural resources. Indeed, greater efficiency has often stimulated greater resource usage, as documented by critical perspectives from social science (Polimeni et al., 2009).

Past EC Framework Programmes emphasised societal progress through innovation in specific technological areas—infotech, nanotech, biotech and so on. Now, also highlighted previously, research agendas are being justified more via 'Grand Societal Challenges'. Some EC policy documents frame societal challenges in general terms: e.g. sustainable production in the agricultural sector (DG Research, 2006; Plants for the Future TP, 2007). This leaves the problem-definition and research agenda open to interpretation. However, more specific definitions may express and promote partisan agendas. For example, some European Technology Platforms (ETPs) interpret sustainable agriculture as the production of raw materials for industrial processing. According to a consortium of Technology Platforms, Europe needs 'the sustainable production and conversion of biomass into various food, health, fibre and industrial products and energy', (e.g. Becoteps, 2011: 5). Food needs are conflated with agro-industrial systems. Proponents cite the need to feed 9 billion people by the year 2050, as an imperative for more efficient inputs, which will supposedly reduce pressure on land use and natural resources (Becoteps, 2011: 11). In this future vision, eco-efficiency solutions take for granted industrial systems, which are expected to increase pressures on natural resources, as if production innocently accommodates markets exogenous to the system (Levidow, 2011). Yet we can legitimately question whether increased meat production and consumption, even if more efficient, may aggravate unsustainable agriculture rather than provide a solution.

As another example, research and innovation policy accommodates future market demand for transport fuel, which the EC expects will increase. According to its problem-diagnosis, 'there is a particular need for greenhouse gas savings in transport because its annual emissions are expected to grow by 77 million tonnes between 2005 and 2020—three times as much as any other sector'. As the remedy, biofuels are seen as 'the only practical means' to gain energy security, argues the European Commission (CEC, 2007b). This challenge has been turned into an argument for biofuels R&D, for more efficient production methods and for horizontally integrating agriculture with the energy sector (e.g. EBTP, 2008). Presented as an objective imperative, 'the production of green energy will also face the exceptional challenge of global industrial restructuring in which the very different value chains of agricultural production and the biorefining industries must be merged with the value chains of the energy providers' (Plants for the Future TP, 2007, 33). Even without debating the merits of different feedstocks and their uses, this agenda disguises and naturalises the role of the EU internal market, particularly neoliberal policies and transport infrastructure, which are arguably driving expansion of market demand for transport fuel in the first place. It also ignores widespread unease over the environmental and social risks and impacts of biofuels production (Upham et al., 2011a,b).

In these examples, dominant public-sector research agendas are shaped by strong industrial involvement in

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European Technology Platforms (ETPs). Indeed, the need for conventional lobbying is reduced because state agencies defer to industry-led partnerships as the main expertise for defining societal challenges. ETPs, when initially funded by the EC, were asked to involve 'all relevant stakeholders' and are presumed to do so by policymakers. However, ETPs are disproportionately shaped by the larger companies, partly because they have greater capacity; dissenting views rarely appear in ETPs. By contrast, SMEs and NGOs generally lack capacity to develop research agendas or even to engage in their development, although there are exceptions, e.g. Technology Platform Organics (Niggli et al., 2008).

3. Social science contributions to framing environmental sustainability challenges

There has been a marginal role for alternative innovation approaches that address root causes of the environmental sustainability challenge, including behavioural changes, lower consumption, and 'eco-efficiency', particularly reduced use of natural resources. This type of innovation requires a more comprehensive framing of environmental sustainability challenges, which implies a deeper understanding of societýs relationship with natural resources. As indicated by the examples in Section 2, this entails a more balanced participation of stakeholders in co-operative research, particularly civil society organizations. Including civil society more actively in research agenda setting provides the opportunity to question whether technological innovation is the key to responding to a particular problem, and provides a basis for substantively influencing the development of alternative solutions.

Such knowledge exchange depends on changes within the research community. Specifically, there is a need for more significant input from the social sciences in co-operative research. To date, research on environmental sustainability has focused more on understanding ecosystems, as if they were separable from social systems, even though the latter mainly generate the pressures and drivers that lead to unsustainable development. Social science consists of plural fields (e.g. anthropology, economics, psychology, political science, geography), all of which can contribute a multitude of quantitative and qualitative knowledge about social shaping of the environment.

As a dominant account of social science, its role is to organize and facilitate civil society involvement or simply to communicate solutions from technoscientific experts. Although social science can contribute to these roles, it also has the capacity to play a significantly greater role in environmental sustainability issues. Specifically, its knowledge is necessary to analyse and open up how we frame environmental sustainability challenges, which tend to be embedded in multiple systems (i.e. economic, governance, social, cultural, ecological) or sectors (Le Compte and Schensul, 1999). Social science methods can be used to explore the factors (drivers, pressures) associated with the problem, such as market competition and trade liberalisation and, hence, can guide research across disciplines and help to target priority objectives. Furthermore, taking into account the scenarios highlighted in Section 2, social science research is needed to analyse contexts in which more efficient use of resources increases or decreases their overall usage.

Of particular relevance to the co-operative research process, social science can contribute to the development of plural epistemologies to address complex systems and forms of participation (e.g. Stirling, 2003, 2006, 2008; van den Hove, 2007). van Asselt Marjolein and Rijkens-Klomp (2002) define participatory methods as, ''methods to structure group processes in which non-experts play an active role in order to articulate their knowledge, values and preferences.'' Such methods can help to identify, involve and accommodate multiple stakeholders in the co-operative research process, generating knowledge about local perspectives and conflicts (e.g. Chaniotis and Stead, 2007; Diedrich et al., 2010; Nunneri and Hofmann, 2005; van den Hove, 2000). With this knowledge, co-operative research can open up problem-definitions, social challenges and solutions to different societal futures. Civil society involvement has already highlighted divergent accounts of societal challenges that should be addressed, towards opening up innovation pathways as societal choices (Levidow, 2011).

4. Conclusions

In 2006, The Commission's Science in Society Programme delegated an expert group the task of evaluating the EU's research policy framework, emphasising the 'Knowledge Society'. The group's report, Taking European Knowledge Society Seriously, identified dominant policy assumptions that capital-intensive technological innovation will solve societal problems, thus marginalising other types of knowledge (Felt, 2007). Although published by the Commission, high-level officials ignored the report and declined a proposal to give it a public launch event. Following this, the MASIS report noted 'the normative challenge of integrating science in society, allowing for societal participation, in such a way that science's creative power 'is not subsumed by immediate interests' (DG Research, 2009a, 9).

In this commentary we argue that proposed solutions to environmental sustainability challenges are often orientated towards the partisan agendas of dominant stakeholders and myopic technological fixes, while marginalising other civil society actors and critical insights from social science. Academic research has a responsibility to explain different diagnoses of environmental sustainability challenges, as a basis for informing civil society and policy-makers. Scientists must also obtain knowledge from and about society to inform such research. In general, we see a need for increased communication, information sharing and capacity building with respect to both the definition of societal challenges and ways to undertake relevant research. Also important is the need to increase and facilitate exchanges and cooperation among different disciplines, i.e. to encourage trans-disciplinarity. In terms of practical actions, seed funding that encourages collaboration between civil society organizations, researchers and SMEs is useful for identifying different solutions to societal challenges.

There is a need for more diversity in research agendas; likewise plurality in defining societal challenges and solutions to them. This requires re-allocating resources, especially via

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civil society involvement and cooperation with academics, as endorsed by the European Commission (e.g. CEC, 2007a; DG Research, 2009b). These collaborations would balance the dominant Technology Platforms and/or provide alternatives to them.

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Dr. Amy Diedrich is the Lead Researcher of Sustainability Science and Integrated Coastal and Marine Management in the Division of Strategic Issues and Applications for Society of SOCIB (Balearic Islands Coastal Observing and Forecasting System). Amy's research interests include applied social science for conservation, sustainable coastal and marine tourism, indicators, marine protected areas, and Integrated Coastal and Ocean Management.

Dr. Paul Upham is visiting Professor of Climate and Energy Governance at the Finnish Environment Institute; Visiting Researcher at the Centre for Integrated Energy Policy, University of Leeds; and Research Fellow at Manchester Institute of Innovation Research and Tyndall Manchester, University of Manchester. Paul works on the psychological, governance and innovation aspects of energy and climate policy.

Dr. Les Levidow is a Senior Research Fellow at Open University, UK. His research interests have included: agbiotech, the bioeconomy, biofuels, Agricultural Knowledge Systems and food relocalisation.

Dr. Sybille van den Hove is Director of MEDIAN (Barcelona) and Visiting Professor at the Institute for Environmental Science and Technology (ICTA) of the Autonomous University of Barcelona. Her background is in physics and ecological economics. Her research focuses on environmental governance; science-policy interfaces; decision-making and policy formation under conditions of complexity; integration of natural and social sciences; environmental research strategies; and corporate environmental responsibility.

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