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OPENING THE DOOR TO POLICY RELEVANT, INTERDISCIPLINARY RESEARCH ON LAND DEGRADATION AND DEVELOPMENT

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Introduction: opportunities for policy relevance

Policy relevance and interdisciplinarity are becoming integral to research on land degradation and development, at a time when the opportunities for scientists to inform policy and decision making are greater than ever before. This special issue draws together 12 papers that place both policy relevance and interdisciplinarity at their core. In this opening editorial we unpack the current opportunities and highlight how each of the papers within the special issue makes an important contribution.

In 2013, parties to the United Nations Convention to Combat Desertification (UNCCD) decided to establish a science-policy interface (SPI) to help pave the way for scientifically-informed proposals to be channeled to the UNCCD's subsidiary body, the Committee on Science and Technology (CST). It was envisaged that such an approach could help the CST to better guide UNCCD implementation on the basis of evidence-based decision making. Development of the SPI occurred as the first of a series of institutional innovations (ICCD/COP(11)/CST/3.2013), in response to numerous studies that critiqued the previously disciplinary-focused and largely ineffective science-into-policy approaches (e.g. Bauer and Stringer, 2009; Grainger 2009; Thomas et al., 2012). Despite many challenges, often relating to resourcing and politics, previous experiences had successfully demonstrated that the synthesis of science for policy audiences can be simultaneously cutting-edge and relevant for decision-makers. For example, journal papers emerging from the 1st UNCCD Scientific Conference held in Buenos Aires in 2009, which were published in *Land Degradation and Development*, have been widely cited, with papers across the entire special issue, as of October 2014, receiving more than 400 citations since 2011. This underscores their contribution to scientific knowledge, but at the same time, shows to policy makers that interdisciplinary and sound science that brings together multiple knowledges and ways of knowing, can really help to inform their decision-making. It further demonstrates that investment in this kind of knowledge production is worthwhile for both the immediate and long-term benefit of society.

The importance of interdisciplinarity

Although the first meeting of the SPI members took place in June 2014, the effectiveness of this new platform is highly dependent upon the strong, durable commitment and support of the scientific community. For scientific advice to be most policy relevant requires attention to be paid to the timely integration of single-discipline research with holistic approaches that consider social, economic and political aspects of land degradation and sustainable land management (SLM). This need is increasingly pressing. Both the UNCCD, and the outcome document from the Rio+20 summit in 2012, *The Future We Want* (UNCSD, 2012), emphasize the requirement for urgent action to advance towards land degradation neutrality. Land degradation neutrality can be defined as the maintenance or improvement of the land's condition such that land degradation is prevented and reversed.

Several papers in this special issue address this challenge by presenting single- or inter-disciplinary research in such a way that it facilitates policy-relevant recommendations. Indeed, these papers come at a time in which interdisciplinary research is increasingly supported by scientific funding agencies (largely in the western world). At the same time, analyses in some of the papers in this special issue demonstrate that single discipline research still dominates: in Argentina, Spain and globally (Torres et al., this issue; Barbero et al., this issue; Escadafal et al., this issue). For some environmental and social issues this is unproblematic, and there remains value in gaining in-depth knowledge in specific areas that can then feed into interdisciplinary project design. It is not a case of 'either/or' but that a more nuanced awareness is required as to when and how interdisciplinary research can be advantageous. Informing effective policies to address land degradation (which is acknowledged to be a cross-cutting 'wicked' problem (Barkemeyer et al., under review; Akhtar-Schuster et al., 2011; Chasek et al., 2011), is one such area in which the development of interdisciplinary and cross-sector approaches are paramount. Projects need to build on specialist, disciplinary expertise in order to inform aspects that can feed into interdisciplinary research design.

Achieving policy-relevant interdisciplinarity is not however straightforward. The scientific community will need to stray into new thematic fields, developing and using more participatory and applied approaches. They will also need to work with stakeholders they have not previously engaged with, capture social, cultural, economic and political realities linked to locally held knowledges and practices, and target their investigations across multiple temporal and spatial scales (Reed et al., 2014). Ensuring the timely use of participation and delivery of findings at pertinent points of the policy review process will also be vital, if realistic pathways towards land degradation neutrality are to be developed (Stringer and Dougill, 2013). This is no small feat. It requires academic capacity building, flexibility/adjustability in the design of projects and wider acceptance of the role of the social sciences and economics in problem solving. It further needs to be coupled with a shift in mindsets, away from criticisms of the 'fluffiness' of social science methodologies, towards recognition that the biophysical sciences are unable to address the land degradation challenge on their own (Akhtar-Schuster et al. 2000; Hesse et al., 2013).

Aside from developing pathways towards land degradation neutrality, interdisciplinary approaches offer the scope for more integrated policymaking and the identification of synergies within the policy arena too. Perhaps for the UNCCD, the key links to be made are to its sister conventions, the Convention on Biological Diversity (CBD) and the UN Framework Convention on Climate Change (UNFCCC). For example, the Global Biodiversity Outlook, a mid-term assessment of progress towards

the implementation of the Strategic Plan for Biodiversity 2011-2020 - the most important publication of the CBD which was presented at the CBD COP-12 (06-17 October 2014 in South Korea)- clearly states that "additional pressures will be placed on the life-support systems of our planet by a greater population, by climate change, and land degradation" (Secretariat of the Convention on Biological Diversity, 2014)). Integrated science thus offers considerable scope to inform integrated actions.

Papers in this special issue

This special issue illustrates and begins to address the challenges outlined above, by bringing together papers from Europe, South America, Central Asia, East Asia and Africa, as well as one paper taking a global approach to analysis. Looking globally, Escadafal et al. (this issue) contest that the weak linkages between different disciplines and inadequate organization of research on desertification, land and soil, have arguably contributed to the weakness of policy measures to tackle the issues. Barbero et al. (this issue) consider how desertification research is being addressed in Spain by using a bibliometric approach to their analyses. They find that most research on desertification in Spain focuses on erosion, with soil degradation and soil analyses being the most important research categories. They observe that climatic issues are subsidiary and isolated from the other research topics, whilst socio-economic issues are poorly linked with biophysical science. Torres et al. (this issue) similarly highlight that the research community tends to focus on soil erosion and degradation. They also note few interdisciplinary studies that capture socio-economic aspects in the case of Argentina. Methodologies that capture traditional knowledge on desertification are also observed to be lacking. These findings support observations by Reed et al. (2011) who stress the importance of integrated approaches to knowledge management. Anaya et al (this issue) address calls for integration, and provide a methodology for scaling up information that is generated and collected at the local level using a bottom up approach. They find that modeling can be a useful approach that can permit different sources of information from different disciplines to be combined. In their paper, the integration of different data sources allowed the identification of soil threats under different climate change scenarios.

The paper by Miao et al. (this issue) demonstrates that in China, science has been successfully used to inform policy. China's strategies to combat desertification, such as plantation programmes, were informed by science and able to deliver important benefits to livelihoods. However, Marques et al. (this issue) find that in Spain, a lack of communication of scientific results can restrict the implementation of SLM practices. The effects of land degradation are undervalued by farmers. Scientific information is not just needed to develop policy, but also to change attitudes and behaviours. This requires structures and processes to be developed to provide advice and guidance, because even when policy incentives exist to help cover the costs of SLM practices, participants often do not apply, largely because they are unaware of the opportunities available to them.

Siyuan He and Richards (this issue) use the case of Tibet to highlight interdependencies between social and ecological components of pastoral systems and the need for integrated assessment methodologies. They demonstrate that different types of knowledge (both science and local perceptions) need to be integrated to inform policy, but also that policies can alter the extent of the resources that people can access, and therefore act as an important driver of degradation, as well as being a potential solution.

Wolfgramm et al. (this issue) focus on the knowledge-action interface in Kyrgyzstan and Tajikistan as it relates to SLM. They find (similar to other papers in this issue: Torres et al., 2015 Barbero et al., 2015 and Escadafal et al., 2015) that inter- and transdisciplinary studies are lacking, and also (similar to Marques et al. 2015) that academic research has been largely ineffective in delivering substantial societal benefits and in engaging multiple stakeholders. In the context of Wolfgramm et al.'s study countries, which have been in transition from a centrally planned economic system to a decentralized system, the importance of differences between the Soviet-era concept of rational use of land resources and SLM is noted, alongside the need to identify ways to help land users evaluate their land management strategies.

Land management strategies are particularly important in Africa as this continent is very likely to suffer severe droughts in the future (Masih et al., 2014). Policies promoting land conservation and rehabilitation may help to support adaptation to climate variability and food security (Fleskens & Stringer, 2014).The adoption of water and soil conservation techniques in Niger is studied in this issue by Wildemeersch et al. (2015). Farmers appear not to fully comprehend the effects of land degradation (similar to Marques et al., 2015 and Wolfgramm et al., 2015); they mainly observe poor yields and assume that climatic fluctuations are to blame for decreasing crop production. Other regional circumstances aggravate the situation. Severely degraded lands, increased population and lack of agricultural equipment move the government to provide food aid. Unfortunately, this hampers the adoption of conservation techniques. Policy measures should focus on environmental awareness and knowledge transfer, not only to farmers but also to governmental and non-governmental organisations.

Beyene (2015) studies the evolution of actively implemented rehabilitation activities in eastern Ethiopia. External incentives have no long-term effects in rehabilitation practices. Traditional community knowledge, self-organised collective action and elder community leaders are found to have had an important role in the adoption of SLM practices, training and effective decision-making.

In the highlands of Ethiopia, Teshome et al. (this issue) describe soil scarcity due to population pressure, land fragmentation, difficulties to obtain land access and land tenure insecurity. All these circumstances hinder farmers' decisions to adopt SLM practices. In this case, policy measures promote land registration and title certification. The majority of farmers perceive certification as a way to facilitate land renting, increase tenure security, and even women's land rights. Certification is also related to land quality increasing the probability of investing in SLM.

Finally, Lanckriet et al. (this issue) analyse the causes of land degradation inherited from the feudal period in North Ethiopia, the economic stagnation during the civil war that followed, and the last centralized conservation policies supported by the government and international donnors (Milas & Latif, 2000). They show how land policies drive and still cause land degradation. Droughts, high population density and farmers' lack of knowledge on conservation techniques have usually been considered the causes of land degradation in Ethiopia. Nevertheless, the unequal character of land rights, combined with insecure land tenure, have biased land use decisions against long-term SLM. In recent decades however, the implementation of soil and water policies in combination with egalitarian land rights have helped to reduce land degradation.

CONCLUSION

The set of papers brought together in this special issue clearly set out the challenge to the scientific community, as well as offering some ways forward. There is a clear and urgent need for:

1. Interdisciplinary research that provides a deeper insight into the socio-economic and policy aspects of desertification and land degradation, as well as into solutions such as SLM practices;
2. Modelling and other integrated approaches that can integrate data from different sources;
3. Methodological development and refinement, such that locally-held knowledges and SLM practices can be better understood;
4. Reflection upon and review of policies and incentives that drive degradation rather than address it;
5. Improved communication of scientific findings such that they not only inform policy but also stimulate action and behavioural change.

Perhaps the most compelling argument for scientists, policymakers and research funders alike to engage in fresh, innovative, interdisciplinary approaches, lies in the fact that land degradation remains an important problem. It is still a key threat to ecosystem integrity and human wellbeing more than four decades on from its first acknowledgement within international policy. All of the scenarios in the Millennium Ecosystem Assessment (MA, 2005) project an increase in desertification (land degradation in dryland areas) into the future. As such, integrated and interdisciplinary approaches like those in this special issue are not just desirable but unavoidable if challenges of current and future water, energy and food security are to be adequately tackled.

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