

EDITORIAL

Soil degradation is among the most serious environmental threats of our time; indeed it may be the most underestimated environmental and social challenge of the 21st century. Globally, soils and soil quality are eroding - largely unnoticed - from under our feet. There are clear indicators of potential disasters from chronic mismanagement and insufficient conservation.¹

The people involved in soil science and sustainability often bemoan that not enough attention is paid to the sustainability of soil. In reality, there is a great deal of attention to the many complex and intertwined issues that comprise soil governance, but it is fragmented. The biophysical topics associated with soil governance span: protection and restoration of soil, conversion of agricultural and undeveloped lands to urbanisation, natural resources and watershed planning, point and nonpoint pollution, genetic modification, desertification, floodplains, rural development, land degradation, geo-heritage and geo-diversity, sustainable food and fibre production, soil contamination, vegetation, climate change, soil carbon, tillage and land management, traditional agriculture, industrialised agriculture, soil systems, and land development. These topics all involve the dynamic resource termed variously soils, sediment, deserts, farmland, mud, the seabed, mountains etc. that refer to the complex system of minerals and microorganisms that constitute the land.

The human dimensions of soil governance are equally diverse and complex. Governance is about mechanisms to redirect human action into more benign patterns than would otherwise occur. The components of soil governance include: international conventions; national laws; national and international agricultural; environmental and rural justice strategies; agricultural politics; land development and environmental politics; agricultural and soil science; global connectivity and change; rural poverty; legal frameworks; capacity building; carbon and environmental finance; biodiversity ethics; international regional policies and programs; soil conservation programs; environmental non-government organisation strategies; regulatory implementation; soil, vegetation and related sciences; economic incentives and market instruments; and (pervading all of these issues) human behaviour. Considerations include individual or collective scientific, economic, political forms of behaviour at the level of the individual and the enterprise or property, the industry, nation-state, and the interconnected international arena. Because soil, along with water, the atmosphere and energy from the sun, forms the foundation of all natural systems it is not surprising that it is systematically connected with all aspects of the environment and all human systems.²

This makes soil fundamentally important but incredibly complex to govern effectively. The positive implication of 'equifinality' is the realisation that significant changes to a complex system can arise from alteration at any point within that system and, by implication, the dynamic effects of multiple small adjustments can mean significant changes to the total system. In this editorial, we highlight some of the key developments in rural soils law and policy, taking a constructive critical stance on both the papers in this special edition and similar types of scholarly and practitioner analysis from other soils governance publications.

Soil issues are receiving serious consideration

Because of the systemic connections between soils and many other issues, the attention that is actually paid to soil issues is far greater than is immediately apparent. As this edition of the *International Journal of Rural Law and Policy* is reaching finalisation, numerous events are being held around the world as part of the 2015 'Year of Soils'. At many of these events, experts will point to the 'soil crisis', highlighting the march of desertification, the loss of soil to urbanisation, deterioration in the fertility of agricultural landscapes, soil contamination, and many other serious problems. Statements like the one below will abound.

¹. L Montanarella and R Vargas, 'Global Governance of Soil Resources as a Necessary Condition for Sustainable Development' *Current Opinion in Environmental Sustainability* (2012) 4(5). DOI: [org/10.1016/j.cosust.2012.06.007](https://doi.org/10.1016/j.cosust.2012.06.007); P S Low et al. 'Economic and Social Impacts of Desertification, Land Degradation and Drought' (White Paper I, UNCCD 2nd Scientific Conference, prepared with the contributions of an international group of scientists, 2013 .<<http://2sc.unccd.int>>.

² Reflecting 'equifinality' that is characteristic of complex open systems: L Von Bertalanffy, *General System Theory: Foundations, Development, Applications* (George Braziller, NY, 1968).



Through misuse, we lose something like 24 billion tonnes of fertile soil every year. There are various reasons for this loss. Cities and roads are spreading. Asphalt and concrete seal the surface and damage fertile soil irreparably. A falling population does not stop the damage: in Germany, 77 hectares of soil lose some or all of their functions every day. That is the size of 100 football pitches that are no longer available to grow food. Farming, which is so dependent on the quality of the soil, bears its share of the blame.³

In many countries, scientists, public servants and politicians are debating sequestration of carbon in soils, deforestation and other land management matters which impact the soil, the atmosphere and the human interests bound up in these. Workshops, scientific congresses, and policy discussions highlight food security, flooding and sediment or fertilizer contamination, earthquakes and land slides, run-off from farms and roadways, land ownership and land access for the poor, and many other issues that impact on the sustainability of soils and the associated concerns about agricultural productivity and social equity. There will continue to be well thought out recommendations and citizen actions to try to deal with the many symptoms of the failings of our natural resource governance systems to protect and restore the land. In this special edition, Hannam and Boer, and Webb et al allude to this interconnectivity by indicating that soil relevant national and international legal arrangements occur under topics including land use planning, biodiversity protection, climate change and carbon sequestration, forest management, and protected area laws.

Regardless of legal instruments, in common with many other fundamental challenges for humankind, if past patterns of behaviour continue it seems unlikely that we will be able to make essential changes. History suggests that:

A just relation of peoples to the earth rests not on exploitation, but rather on conservation - not on the dissipation of resources, but rather on restoration of the productive powers of the land and on access to food and raw materials. If civilization is to avoid a long decline, like the one that has blighted North Africa and the Near East for 13 centuries, society must be born again out of an economy of exploitation into an economy of conservation. We are now getting down to fundamentals in this relationship of a people to the land. My experience with famines in China taught me that in the last reckoning all things are purchased with food. This is a hard saying; but the recent world-wide war shows up the terrific reach of this fateful and awful truth. Aggressor nations used the rationing of food to subjugate rebellious peoples of occupied countries. For even you and I will sell our liberty and more for food, when driven to this tragic choice.⁴

The challenge is, as always, one of individual and collective behaviour. This has been so for thousands of years. This special edition arose from a workshop held in Iceland in 2012, supported by the Australian Research Council and hosted by the Icelandic Soils Service.⁵ It brought together researchers and practitioners with expertise and interest in the human dimensions of natural resource governance. An aim was to generate fresh perspectives on how to govern human behaviour, to improve the sustainability and fairness of our use of the land. The team included experts and practitioners in soil issues, community engagement, psychology, sociology, economics, law and other disciplines from many countries. Reflecting our purpose of seeking fresh perspectives, some of those involved in this workshop did not have a background in soils issues, nor even natural resources governance. They brought to the event insights into collective and individual human behaviour from other fields.

This is not the first time that the Icelandic Soils Service has hosted an international gathering to focus on soils governance.⁶ Neither is the first time that diverse teams have come together to try to tackle soil governance issues.⁷ Not surprisingly the papers in this special edition reflect issues that have also been canvassed in other investigations. These papers provide some different perspectives as well as reinforcing some common themes.

³ See generally, <http://globalsoilweek.org/wp-content/uploads/2014/12/soilatlas2015_web_141221.pdf>.

⁴ W C Lowdermilk, *Conquest of the land through 7,000 years*. (Washington, DC, US Dept of Agriculture, Soil Conservation Service, 1953) 3 <<http://catalog.hathitrust.org/Record/011389947>>.

⁵ Australian Research Council (Project No LP110100659). Funding partners include the Australian Cotton Research and Development Corporation; Australian Government Department of Sustainability, Environment, Water, Population and Communities, Australian Organic, Penn State University, and the Icelandic Soils Service.

⁶ H Bigas, G I Gudbrandsson, L Montanarella, and A Arnalds (eds.), *Soils, Society and Global Change* (Selfoss, Iceland, Soil Conservation Service of Iceland, 2007); *Strategies, Science and Law for the Conservation of the World Soil Resources* (International Workshop, Selfoss, Iceland, SCAPE and Agricultural University of Iceland, 2005) 277.

⁷ T L Napier (ed), *Human Dimensions of Soil and Water Conservation: A Global Perspective* (New York, Nova Science, 2010).



Laws and other government instruments: Part solution, part problem?

Often discussions of soil governance laws and policies involve proposals for new instruments to improve the status quo.⁸ The Hannam and Boer article, the Webb article and the Williams article in this edition of the *International Journal of Rural Policy and Law* propose new instruments, though they also point to the possibility of adapting and improving existing instruments. The political act of creating a legal instrument is perceived as catalytic, reflecting an expectation (which is often not met) that once the instrumental problem is 'solved' things will get better. It is thus a characteristic of natural resource governance that when a prior instrument has failed the most likely proposed solution is another instrument. Read together, the chapters in this special edition point to the need for a more comprehensive approach, in which instruments are embedded within comprehensive governance strategies. A focus on strategies rather than instruments is likely to lead to many changes, not least of which will be an emphasis upon 'integrity mechanisms' to ensure effective implementation, and a more disciplined approach to evaluation and improvement in the outcome achieved by particular instruments.⁹

A characteristic of modern society is the explosion of environmental instruments. The Ecolex environmental law database, for example, records: over 2000 treaties; over 100 000 legislative and regulatory instruments and over 1500 court decisions.¹⁰ The same database reports over the last decade more than 5000 regulatory instruments that include the topic of 'soil'. Government action on topics such as carbon sequestration, biodiversity protection, chemical contamination, land use planning and urbanisation, agricultural development, and very many others is equally relevant.

Beyond the instruments included in (or omitted from) the Ecolex database, there are many binding administrative rulings, contractual environmental and social performance standards, and other relevant instruments that will not appear in that dataset.¹¹ In the last 30 years, in particular, we have also seen the emergence of market, market-like incentives and voluntary instruments.¹² These contribute to a very diverse and complicated instrumental framework for governing human action in relation to the environment (including many of the soils issues noted above). All of these approaches reflect a faith that creating a legal or other instrument should lead to a discernible improvement in environmental or social outcomes.

Neither should we limit our view on public governance instruments to traditional regulation. The government arrangements that impact upon soils include economic production strategies involving land and other natural resources (including industry development, tariffs and subsidies etc), or to manage landscapes for purposes including biodiversity protection, protection of vulnerable or indigenous people's interests, or urban or industrial development. Non-statutory arrangements are also fundamental, not least of which are property rights. The interpretation of various legal norms and government policies through courts or administrative tribunals, or bureaucratic processes is also relevant. Finally, and more recently, the role of government in establishing private markets for environmental interests, or promoting or subsidising desirable activities (whether in terms of increasing economic yields from the Earth, or pursuing sustainability) are also increasingly central in soil governance.

Unfortunately, the evidence that the outcomes from law and policy interventions are insufficient is growing. The outcome statement from Rio+20 included the comment:

the twenty years since the Earth Summit in 1992 have seen uneven progress, including in sustainable development and poverty eradication. We emphasize the need to make progress in implementing previous commitments.¹³

⁸ Bigas, Gudbrandsson, Montanarella, and Arnalds, above n 6; Napier, above n 7.

⁹ For a description of integrity mechanisms broadly see Transparency International, *What We Do: NIS Assessments* <<https://www.transparency.org/whatwedo/nis>>. For a discussion of evaluation in a legal setting see W Bussmann, 'Evaluation of Legislation: Skating on Thin Ice' (2010) 16(3) *Evaluation* 279. DOI: [org/10.1177/1356389010370252](https://doi.org/10.1177/1356389010370252); and, in a broader policy setting, P Mickwitz, A Framework for Evaluating Environmental Policy Instruments (2003) 9(4) *Evaluation* 415. DOI: [org/10.1177/1356389003094004](https://doi.org/10.1177/1356389003094004).

¹⁰ See Ecolex <<http://www.ecolox.org>>.

¹¹ To illustrate, there are more than 458 'ecolabels' reported for 197 countries, spanning 25 industry sectors (Ecolabel Index 2015).

¹² Soils issues where market and voluntary arrangements are increasingly evident include runoff and pollution, land clearing and conversion to urbanisation, tillage practices, and carbon sequestration.

¹³ The Secretary General of the Organisation of American States has referred to: 'the greatest challenge of our century: implementation' (Organization of American States, 2014); The IUCN and the UNEP Environmental Governance Sub-Programme (UNEP, 2009) and its Memorandum of Understanding with the International Organization of Supreme Audit Institutions (INTOSAI - Working Group on Environmental Auditing, WGEA)(UNEP, 2013) also reflect similar concerns.



The challenges of effective laws and policies are illustrated by the contrasting articles in this journal on law and policy issues in Australia provided by Williams and by Webb et al. We contextualise their different perspectives on Australian government action by an objective evaluation of Australian soil governance, from the national *State of the Environment* report:

Land-management practices have improved during the past few decades, but soil management has to improve significantly to build soil carbon, control acidification and prevent erosion. ... Few regions have increasing levels of soil carbon, although the potential in the savanna landscapes of northern Australia is significant. Soil acidification affects about half of Australia's agriculturally productive soils. Its severity and extent are increasing, and large areas will become unproductive and degraded unless they are treated. ... Current rates of soil erosion by water across much of Australia now exceed soil formation rates by a factor of at least several hundred and, in some areas, several thousand. ... The longer settled agricultural and coastal zones have the highest concentration of impacts on native vegetation. In most of these regions, less than 50% of native vegetation remains, and vegetation condition generally deteriorates with diminishing remnant extent. Approximately 13% of native vegetation nationally has been completely converted to other uses. Annual rates of native vegetation clearing averaged around 1 million hectares in the decade to 2010, balanced by the extent of regrowth by the end of the decade. ... Assessment of land, soil and vegetation condition over the past decade is complicated by the impacts of drought in much of the south and east of the continent. Drought affected these areas from 2000 to 2010 (sometimes known as the millennium drought), although in some areas it began as early as 1997. Furthermore, nationally consistent metrics for assessment of vegetation condition are still under development.¹⁴

Similar comments could be made for most countries.¹⁵ Webb et al outline the history and current state of soil governance instruments in the Australian state of New South Wales, with a focus upon agricultural landscapes. While a designated soils policy and legislation is not available (as is commonly the case, as outlined by Hannam and Boer), other law and policy instruments may help to address many of the strategically significant issues of soils governance. They point to the framework for sustainable agriculture, protection of land from subdivision diffuse source pollution, control of acid sulphate soil contamination, and the coexistence of agriculture and mining. In each of these cases government instruments, if effectively implemented, should advance the sustainability and social justice outcomes which soil advocates see as important. These state-level instruments are supported by regional natural resource management bodies, and state agencies (and are linked to national government laws and implementation arrangements for a number of important environmental issues).

Williams looks at the same suite of instruments, but is less sanguine about the ability of the state and Australian federal government to achieve the environmental, economic and social outcomes that are indicated by political policy statements. Mirroring the state of environment report, she points to indicators of governance failure. Her analysis suggests that an important focus of analysis should be the citizens who are intended to be the stewards of the land, whose active cooperation is essential. While her analysis does not discuss this issue, it does raise an important question about the nature of the soil issues that need to be managed and whether we are sufficiently sophisticated in understanding what type of problem we are dealing with, and, thus, what type of human and institutional requirements must be met for effective governance.

Effective strategies to tackle the human dimension of soils?

Some of the significant problems of soil management are relatively straightforward issues of individual action or failure - for example, the release of animal effluent, over use of artificial fertilisers, farm management practices which destroy the structure of the soil or remove protective vegetation. Both at an individual enterprise level, and then, collectively, across the landscape or catchments these problems accumulate, but they are fundamentally a problem of managing individual actions. Effective regulation, extension and engagement, and probably financial support and incentives for the individual land steward would seem to be appropriate for managing such issues. However, many major soil problems require far more than good stewardship at the level of the enterprise. Salinity across a landscape is the result of the accumulation of enterprise level harms, and complex interactions across many enterprises that may be spatially distant. The

¹⁴ State of the Environment Committee, *State of the Environment Report 2011* (Independent report to the Australian Government Minister for Sustainability, Environment, Water, Population and Communities, DSEWPac, 2011) 270. Similar observations can be made for many other countries.

¹⁵ For details, see the *Soil Atlas 2015* Heinrich Böll Foundation, Berlin, Germany, and Institute for Advanced Sustainability Studies, Potsdam, Germany <http://globalsoilweek.org/wp-content/uploads/2014/12/soilatlas2015_web_141221.pdf>.



problem is compounded by actions that are innocent in themselves, such as tillage or irrigation methods or private land use planning. These, when combined with other seemingly unexceptionable actions, can result in system-wide failures.

To address such system problems may involve co-ordinated collective action across a large area, sustained investment, and landholders may be expected to refrain from otherwise legitimate uses of their own property to protect the natural and economic capital of others. It strikes us from reading many papers that while they make specific proposals about interventions in agriculture to achieve improved soil stewardship, few grapple with the difficult challenges of complex systemic problems. These require ongoing coordinated action, and perhaps very substantial economic investment. There are (at least) three distinct classes of governance problem that require quite different types of approaches.¹⁶ Managing individual or enterprise level problems, which may accumulate into a larger scale version of the same problem is one category. 'Traditional' problems like sediment or water flow management, over fertilisation, or the use of poor tillage approaches are of this kind. A second category is managing problems that require collective action. Collective investment in water infrastructures to control erosion or flooding, or regional approaches to managing acid sulphate soils, are of this type. A third category is management of challenges that require sophisticated coordination on a sustained basis, possibly involving significant investment or foregone private opportunities. The management of salinity often seems to have this characteristic. Solutions to soils governance problems requiring co-ordinated, long-term, high cost collective action are underdeveloped in both theory and practice.

What the Williams paper also highlights is that the complexity of the legal and institutional arrangements may itself be an impediment to effectiveness. She suggests that the transaction costs of engaging with this system are a substantial imposition upon citizens who wish to protect the soil; and that the arrangements reflect a political dynamic which disempowers them. This raises some important considerations. Economists see transaction costs as a significant element in the dynamic of regulation and in the patterns of transactions that occur. The indications in the paper are that transaction costs fall heavily upon the citizens wishing to protect the agricultural landscape and the associated soil and water structures. Bromley¹⁷ suggests that without transaction costs there would be no perverse externalities because, with full knowledge, these would be priced appropriately. William's paper indicates another dimension to this issue, suggesting that the allocation of transaction costs upon private citizens can impact upon the outcomes of soil governance instruments, even when law and policy on the books might suggest a different intention.¹⁸ It is interesting to contrast this with the influential hypothesis of Ostrom and others that institutional complexity has a positive effect upon effective community action.¹⁹ It seems that efficiency for the citizen is an under-considered aspect of soil governance, and that where the balance lies between beneficial and damaging complexity is far from clear.

The paper by Sterner et al, dealing with the management of the New York and Chesapeake Bay watersheds, also points to the dynamics of individual and collective action. They highlight the ways in which institutional matters (including the history of prior transactions between the agents of government and citizens) form a framework for current transactions of natural resource governance. In common with the Williams paper, and the papers by Hine et al, and Prager and McKee, they highlight the interaction between the institutional, and the social and personal in soil governance. Processes of conflict or cooperation are framed by institutional structures that may be outcomes of issues that are not specific to those in contention. The way government agencies or community groups approach cooperation will be framed by structures that they have developed through prior relationships. This will frame the immediate transaction, not only in an interpersonal or sociological sense but also in how to establish 'hardwired' institutional processes.²⁰ Path dependence is

¹⁶ For a discussion of such problem archetypes see Paul Martin and Jacqueline Williams, 'Next Generation Rural natural Resource Governance: A Careful Diagnosis in Legal Aspects of Sustainable Development' in V Mauerhofer (ed) *Horizontal and Sectorial Policy Issues* (Springer, 2015).

¹⁷ D W Bromley, (1991). *Environment and Economy* (Blackwell, 1991).

¹⁸ P Martin and J S Shortle, 'Transaction Costs, Risks, and Policy Failure' in C D Soares et al (eds), *Critical Issues in Environmental Taxation: International and Comparative Perspectives* (Oxford University Press, 2010) 705; G R Marshall, 'Transaction Costs, Collective Action and Adaptation in Managing Social-Ecological Systems' (2013) [April] *Ecological Economics* 6. DOI: 10.1016/j.ecolecon.2012.12.030.

¹⁹ See, eg, the argument for 'complex, redundant, and layered institutions' in T Dietz, E Ostrom and P C Stern, 'The Struggle to Govern the Commons' (2003) 302(5652) *Science* 1907.

²⁰ P Martin and J Becker, 'A Tale of Two Systems: Conflict, Law and the Development of Water Allocation in Two Common Law Jurisdictions: Are Social and Institutional Factors Critical?' (2011) [Special Edition: Water Law Through the Lens of Conflict] *International Journal of Rural Law and Policy*.



relevant in understanding the potential for citizen cooperation in public governance initiatives to protect the land.²¹

In many prior studies concerning soil governance, the need to understand the community context, including the specific attitudes, behaviours and capacity to exercise effective stewardship or carry out behaviours expected of citizens does not feature strongly. Governance arrangements to achieve tangible outcomes (for example a desired state of an environment or a community) are strategically purposeful. Effective strategies are both context and resource dependent. The rich literature of military and corporate strategy, and methods of public policy, all suggest a proper appraisal of context. The implementation resources and capacity are fundamentals of good decision-making.²² Both Williams and Sterner et al identify that insufficient resources can be an absolute barrier to desirable action. This is a distinct economic and demographic concern compared to the usual issue of economic motivation. If something is impossible for people to do even if desirable and desired, it will not be done! Other papers in this special edition also point in the same direction. Effective soil governance requires approaches that are explicit about the need for careful social and economic (as well as biophysical) scoping. The contrasting case studies of watershed nutrient management in adjacent areas indicate that context really does matter in determining the effectiveness of soil governance strategies.

The Sterner et al paper interweaves the behavioural and institutional concerns, to which we have alluded. It indicates the centrality of 'engagement' of citizens, not only in the implementation but also in the design of governance strategies. Prager and McKee, and Hine et al, echo this, but add important refinements.

Hine, Crofts and Becker represent three distinct perspectives on soil governance. One author is an environmental psychologist who applies behavioural science techniques to changing community responses to sustainability challenges; a second author is a lawyer with a background in agricultural issues; and a third author is an independent advisor on environmental management issues with a background in applied soils governance. Their paper seeks to interweave their distinct perspectives, considering current approaches to land stewardship, traditional instruments and social strategies, and the possibility of new perspectives being applied to create better outcomes from governance. They suggest a new paradigm for land stewardship comprised of seven elements. They suggest that the fundamental failures of governance stem from political factors reflecting group self-interest, dominant institutional mechanisms which promote non-sustainable methods of production (with relatively weak counter pressures against these harms), and a failure to incorporate into agricultural stewardship an ethos of protection of natural capital. They suggest, as we do, that a focus on governance instruments to the exclusion of accountable systems of governance, incorporating objective evaluation and improvement, is impeding effectiveness.

The Hine, Crofts and Becker paper reinforces that many different stakeholders and actors shape the outcomes of soil governance. These, of course, include those who own and manage the land. They also include: those who control the value chain for agriculture (and competing value chains, such as land development and industry); who are 'gatekeepers' for important transactions, such as provision of subsidies or land-use approvals; politicians and political organisations, including farmer and environmental organisations; and the end consumers of the products of the land. The paper indicates that to understand various participants in the socio-economic system governing land, there are many methods of analysis and intervention. Relevant sources of expertise and inspiration include political science, sociology, economics, and the law. Different disciplinary paradigms provide alternative perspectives and potential solutions, but these are not necessarily competing. As noted above, for complex open system where contexts give rise to variable outcomes even from the same strategies, improvement may come in different ways under particular situations. A key to better outcomes may be varied interventions at different points within the complex system. The authors suggest that there is a sophisticated body of knowledge about changing behavioural patterns that is not being harnessed in soils governance. They illustrate this with applied examples of social interventions designed to align the attitudes and behaviours of citizens to more sustainable uses of the land. These examples mirror others in the soils governance literature, suggesting that marrying sophisticated behaviourism to strategically well designed and

²¹ I Greener, 'The Potential of Path Dependence in Political Studies' (2005) 25(1) *Politics* 62; D M Driessen, *The Economic Dynamics of Environmental Law* (M5T Press, 2003); E Moxnes, 'Not Only the Tragedy of the Commons: Misperceptions of Feedback and Policies for Sustainable Development' (2000) 16(4) *System Dynamics Review* 325; M Leach et al, *Understanding Governance: Pathways to Sustainability* (no 2, STEPS Working Paper, 2007) <http://www.steps-centre.org/pdfs/final_steps_governance.pdf>.

²² Kenichi Ohmae, *The Mind of the Strategist: The Art of Japanese Business* (Mcgraw-Hill Professional, 1982); Sun Tzu, *The Art of War* <<http://www.sonshi.com/original-the-art-of-war-translation-not-giles.html>>; Michael E Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors* (Simon and Schuster, 2008); P Martin and M Verbeek, *Sustainability Strategy* (Federation Press, 2006).



implemented institutional arrangements is likely to result in better governance outcomes, rather than separating different fields of knowledge. With this in mind, the paper by Howard and Lawson provides some interesting insights.

There is a substantial literature on multidisciplinary and transdisciplinary research and practice. This does suggest that far better policy outcomes are likely when different fields of knowledge come together to solve complex social system problems. Those literatures, supported by many examples, suggest that, as well as spanning disciplines, it is important to bridge the technical expert/community member divide. Many forms of relevant knowledge should be brought to bear, particularly where subtleties of context impact on the likely outcome of intervention. The Iceland workshop provided an opportunity for a small group of scientists from different disciplines²³ and practitioners within soil governance from many countries to reflect on applied trans-disciplinary investigations. The researchers selected one promising area of governance and engagement, co-regulation, to examine new approaches to achieve better outcomes.

The small-scale investigation described by Howard and Lawson reinforces what has been identified from other research with multidisciplinary research teams, and engagement between researchers and practitioners. The human challenges of effective transdisciplinarity are substantial, and many are not obvious. People from different backgrounds use the same words to mean different things, and approach issues with different disciplinary as well as personal values. This can result in surprising interactions, such as heated debates about the values perceived as being embedded in one discipline, when observed through the lens of another. Embedded in the desire to transcend hierarchical and scientific chasms is the need to achieve behavioural change even within the groups who are meant to be working together for a common cause. Achieving the right interpersonal relationships, and a shared understanding of different frameworks and objectives, is challenging. This is not an issue that has been generally identified as part of the soil governance challenge but it does appear to impede the effectiveness of soil governance. Given increasing complexity and interconnectedness between issues, true engagement between the different categories of stakeholders and experts can make a significant contribution to natural resource management.²⁴

Returning to the Rio +20 final statement, two sections are relevant:

42. We reaffirm the key role of all levels of government and legislative bodies in promoting sustainable development. We further acknowledge efforts and progress made at the local and subnational levels, and recognize the important role that such authorities and communities can play in implementing sustainable development, including by engaging citizens and stakeholders and providing them with relevant information, as, on the three dimensions of sustainable development. We further acknowledge the importance of involving all relevant decision makers in the planning and implementation of sustainable development policies.

43. We underscore that broad public participation and access to information and judicial and administrative proceedings are essential to the promotion of sustainable development. Sustainable development requires the meaningful involvement and active participation of regional, national and subnational legislatures and judiciaries, and all major groups: women, children and youth, indigenous peoples, non-governmental organizations, local authorities, workers and trade unions, business and industry, the scientific and technological community, and farmers, as well as other stakeholders, including local communities, volunteer groups and foundations, migrants and families as well as older persons and persons with disabilities.²⁵

There is evidence of the need for a more inclusive perspective on soils governance in the case study provided by Prager and McKee. They suggest that central to more effective governance is a more effective approach to the sharing and co-production of knowledge. They point to the human dynamics of co-production, and the interaction of this with institutional (typically hierarchical) structures that determine power and authority. These privilege or marginalise different types of knowledge or knowledge holders. Given the nature of the soil governance challenge outlined in the papers and in this editorial chapter, the dangers of pre-determining which knowledge will be relevant, or which actors are important to solve the problems, are obvious. The case study highlights the importance of interaction in reducing the risk that policy design and implementation will

²³ Social sciences, economics, natural sciences, law and 'unrecorded' categories.

²⁴ P Martin, J Williams, C Stone and T Alter, 'Researcher Lessons from Community Partnership and Trans-disciplinary Research in a Peri-urban Setting: The WISER Experience in Western Sydney' (series no 05/10, CRC for Irrigation Futures Technical Report, May 2010).

²⁵ United Nations, *The Future We Want: Our Common Vision* (Rio20 United Nations Conference on Sustainable Development, Rio de Janeiro, Brazil, 2012).



fail. The paper serves to highlight the diversity of stakeholders and actors involved in designing and implementing soil governance. The paper supports something that is often stressed in the community engagement literature: the problem of an entrenched view that professional scientists (those with a formal professional role and qualification) have a higher order of knowledge than 'mere' citizens.²⁶ The authors suggest that, while it is clear that different approaches are needed, where and how these may be achieved is a matter of conjecture, which will vary with context, history, relationships and subject matter. Solving the soil governance 'problem' seems unlikely to be the result of silver-bullet solutions, married to the hope that they will be simply adopted and effectively implemented. There is very little evidence to support such a Panglossian view of the modern world.

Cutting the Gordian knot.

The story of Alexander the Great, who, when faced with the challenge of untying a knot of unimaginable complexity, simply raised his sword and sliced through the confusing obstacle, has a great deal of emotional appeal. Many of us would like to think that, through our genius and imagination, we can confront issues of great complexity and propose the simple and neat solution that will resolve all complexity. This is rarely the case.

Excessive complexity can make it difficult - if not impossible - to un-pick the problem and to find which threads should be pursued; in what ways to solve the problem. The sustainable and equitable use of soil is a multifaceted issue, involving the intersection of many complex systems. A simple, effective solution seems unlikely. This points to the need for innovation in methods to tackle the challenge, even more than to the need to find innovative solutions to particular aspects of the problem.

There are many elements that, in combination, given the right circumstances, could lead to significant improvement in the effectiveness of governance. The papers in this special edition outline some of these, but so too do other contributions to soil governance. Napier, in the synthesis chapter in *Human Dimensions of Soil and Water Conservation: A Global Perspective*²⁷ outlines a number of conclusions. He suggests that the state of knowledge about adoption of conservation production systems at a farm level is less developed than many would expect, and that further investigation and innovation in the social aspects of governance will be required. The adoption of beneficial innovation will be important, but it is unlikely that there will be 'silver bullet' technological fixes for most important issues. He suggests that economic subsidies have proven to be the most consistently reliable form of behavioural intervention, and that continuing subsidisation to ensure good ecological and social outcomes is likely to be required. However, there is a significant difference in the capability of different societies to invest in this manner. He also concludes that there is an intertwined relationship between poverty and land conservation, and that the causal relationship may be circular. On this basis, solving poverty and solving landscape degradation are mutually dependent.

These factors are interwoven with the effects of population growth, with its consequent economic and social impacts. In the five years since that book was published, the effects of climate change have become more apparent. When combined with population, this suggests additional drivers for degradation and for inequitable outcomes from the use of soil resources.²⁸ He points out that the focus for intervention is shifting from the individual enterprise to a regional level, on the basis of watershed management. This suggests that the social problem is being redefined as a collective action matter, though many proposed 'solutions' tend to be individuated around the farmer rather than around complex coordinated collective action. He concludes that the private sector will be increasingly central to soil governance.

Napier believes that voluntary participation approaches and command and control or subsidisation strategies will be increasingly combined. His belief is consistent with what is indicated in these pages, with the recognition that effective strategies are likely to require multiple interventions at different places within the human systems that drive the way in which natural resources are used. Napier observes the importance of

²⁶ For an Examination of Citizen Power in the Context of Natural Resource Management see P Oliver and J Whelan, *Literature Review: Regional Natural Resource Governance, Collaboration and Partnerships* (Cooperative Research Centre for Coastal Zone, Estuary & Waterway Management, 2003) <<http://www.citeulike.org/group/1702/article/1049477>>.

²⁷ T L Napier (ed), *Human Dimensions of Soil and Water Conservation: A Global Perspective* (Nova Science Publishers, 2010) 373-381.

²⁸ P S Low et al, *Economic and Social Impacts of Desertification, Land Degradation and Drought* (White Paper I, UNCCD 2nd Scientific Conference, Prepared with the Contributions of an International Group of Scientists, 2013) <<http://2sc.ncccd.int>>.



institutional factors, which is reflected in the papers in this edition of the journal. Similar conclusions are echoed in the 2007 proceedings of the International Forum on Conservation and Restoration of Soil and Vegetation held in Iceland to celebrate the centenary of the Icelandic Soils Service.²⁹ That event focused attention on the interactions between technological and social systems that are generally observed as if they were independent. Issues of knowledge management, capacity building and legislative improvement (including the capacity of legislators) received attention.

The papers in this edition echo some of those observations, and expand upon others. There are five contributions to the discussion about how to improve soil governance we wish to make in this editorial.

First is that the conventional diagnosis of soil issues does not sufficiently ‘unpack’ the different types of challenges, each of which requires a different type of policy ‘solution’. This can result in insufficiently specific proposed solutions. Some issues are fundamentally ‘natural’ problems, calling for engineering or biophysical interventions. Other issues arise from harm-doing by individual actors, notably farmers and other land stewards, which accumulate into larger scale impacts. This type of issue is the conventional target for interventions like regulation, incentives and subsidies and extension. Overlaid on this are causes, effects and solutions requiring collective action, with interventions that go beyond managing cumulative individual behaviours. These collective action interventions must target issues of asymmetry and social complexity, beyond individual behaviour. Increasingly we have to address problems where the dynamic is driven by non-linear system behaviour. This occurs when human factors interact with natural systems issues, creating unexpected and difficult to manage outcomes. Society’s understanding of how to manage these types of issues is limited, but solutions often involve political organisation and negotiating at many levels, and sustained and costly interventions.

The second consideration is the problem of (in)coherence of institutional arrangements, and the transaction cost impacts of this. The boundaries and content of what is soil governance are difficult to delimit, but it would be unrealistic not to include the exploitation of soil alongside protective governance as constituent elements. It would be unrealistic to ignore the effects of ‘nested’ jurisdictional arrangements, each level of which has their own laws and organisational arrangements. In most jurisdictions, there is a complex and, often internally inconsistent, suite of laws and institutions in play. One effect is to embed transaction costs, including those arising from competition between arrangements and the organisations charged with implementation. Another is to create impediments to beneficial (as well as harmful) behaviours. A further effect is to ‘tax’ the resources and energy that are available for positive interventions. What is striking is the lack of overarching principles guiding natural resource governance instruments, notwithstanding the rhetoric of public policy. This problem is supra the specific issues of legal instruments, market incentives or other interventions.

The third disconcerting consideration is the absence of sufficient consideration of the role of resourcing in the effectiveness of governance. The fundamental reality is that if people or organisations do not have the funds or human resources to do what is expected of them, then it is not likely that the desired outcomes will be achieved. We have referred to a number of reports where similar issues to those considered in this special edition have been canvassed. The issue of feasibility seems to be only considered as incidental rather than central to solution-finding. There is a tendency to focus on instruments and institutions rather than strategies, without enough attention to understanding the specific context within which the strategy is likely to be implemented, and the resources needed to implement interventions.

The fourth, related, consideration is the capacity of those who are the ‘frontline’ in sustainable land management to do what is expected of them. Poverty in the developed and developing world is more pronounced in agricultural areas than in other sectors of society.³⁰ This suggests that an aspect of the link between soils governance and poverty that is under-recognised is the feasibility of people taking the actions that policies assume that they will be able to. This helps to illustrate the importance of making community engagement a central consideration in effective soil policy. While many other commentators have identified the need to have ‘the community’ involved in soils governance, the perspective that is most frequently evidenced is a science-led extension or a bureaucracy-led community development approach. There is a place for these forms of engagement, but a contribution of this edition is to highlight that, when dealing with complex socio-economic and socio-ecological issues, mechanisms to ensure that all potentially affected

²⁹ Bigas et al, above n 6.

³⁰ IFAD, *Rural Poverty Report: New Realities, New Challenges: New Opportunities for Tomorrow’s Generation* (IFAD, 2011).



citizens do have the power (not just the opportunity) to co-create knowledge and policy, and to be supported partners in implementation of these solutions.


The final consideration is the nature of relevant science. What this special edition provides is a unique perspective on the types of scientific investigation needed to generate more effective solutions to these complex soil governance problems. A simplistic understanding of complex behaviour seems unlikely to result in optimal outcomes, and the behaviours that are relevant include those of 'frontline' soil managers, bureaucrats, value chain participants and many others. There is a need to harness more sophisticated behavioural science techniques to improve the chances of securing better governance outcomes.



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