Translating policy into practice: purpose and potential of engaging landholders in monitoring soil condition

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Abstract
This paper explores the Australian perspective on the purpose and potential of engaging landholders in monitoring soil condition to manage agricultural landscapes sustainably. This particular perspective examines the difficulties in reconciling national interests in conserving and maintaining soil health with landholder's interests in and concerns over soil monitoring, especially about how the data will be used. Ultimately the information gained through monitoring soil condition is to make decisions that will be relevant for varied audiences and at different points in the decision-making process. However, in designing a 'one-size-fits-all' soil monitoring scheme that appeals to a varied audience it can unintentionally miss one of its targets – the land manager. Involvement by landholders in soil monitoring, in New South Wales (NSW), Australia, could occur at different points in the monitoring cycle but so far their involvement has been limited to site access for soil sampling, and completing a land management site survey. It appears many areas of the soil monitoring cycle are fixed with little flexibility for local or contextual variation, as the demand for date to report on Natural Resource Management (NRM) outcomes at the national, State or regional levels takes precedence over landholder or local needs.

Key Words
Soil monitoring, soil condition, soil quality, landholder engagement, Natural Resource Management (NRM) policy, farmer-led monitoring.

Introduction

Soil, due to its slow rate of formation, should be considered a non-renewable resource (CEC 2006), and as such if used and managed inappropriately could be lost, and possibly irretrievably (De La Rosa 2005), with limited possibility of recovery to its former functional capacity. Soil is the foundation of life, home for a wealth of above- and below-ground biodiversity, driver of landscape functions, and medium for ameliorating off-site impacts when in good condition. Soil is also the base for many production systems, and the long-term economic and social sustainability of communities depending on them. To improve the long-term sustainability of the agricultural landscape (including natural ecosystems that are affected by surrounding land uses and their management) requires maintenance or improvement in soil condition and continued management in a sustainable manner. The continued degradation of soil condition is a cost to the landholder, but more importantly a public cost (often at least four times greater than the private costs; Crosson 2004) as reflected by loss of biodiversity, salinisation and degradation of wetlands and waterways, and threats to World Heritage Areas (Crosson 2004; CEC 2002).

Can the information required to guide soil policy and land management practices be obtained through monitoring or other means and will monitoring soil condition be viewed as: enhancing information and knowledge requirements for key audiences or an 'exercise' with no obvious merit or value for decision-makers? In general, we would not have to monitor our actions if we were certain or confident of their outcomes. Without monitoring we cannot learn and we cannot adapt our management of natural resources (such as soil), and hence we cannot appreciate if the actions of land managers are having deleterious or positive impacts on the soil. Without monitoring we cannot understand if the goals or targets set by individual landholders or others (including natural resource management agencies and governments at many levels) are being met. Without monitoring we cannot gauge the impact of policy measures on the activities of land managers nor inform policy development to improve land or environmental management. Without monitoring we cannot assess the achievement of goals or targets, which in turn, have been set as an incentive for funding or as a requirement by funding agencies to demonstrate greater accountability of allocated funds. For example, in Australia, access to Federal Government funds for 'on-ground' land improvement activities that will enhance the sustainability of agricultural enterprises and natural resource condition are only available to natural resource management (NRM) regions (often Catchment Management Authorities, CMAs) once they have an accredited Regional Plan (Catchment Action Plan, CAP) which sets targets for

achievement in resource condition and management of land (includes soil), water, biodiversity and community (NRMMC 2005). At the State-level in NSW the requirement for standards is to:

> ... demonstrate transparent and effective decision making. The application of state-wide standards by CMAs will be audited, to ensure that CMAs are accountable to the community and to the Australian and NSW Governments for the expenditure of government funds (NRC 2004, p13).

In Australia, the National Land and Water Resources Audit (NLWRA) (1997-2002) had six objectives and the sixth was: "Providing a framework for monitoring Australia's land and water resources in an ongoing and structured way." The National Natural Resource Management Monitoring and Evaluation Framework (NM&EF) was established in 2002 by the State, territory and Federal Governments and approved by the Natural Resource Management Ministerial Council (NRMMC). NM&EF (Woodhead *et al.* 2004) has both 'end in itself' and 'means-to-ends' goals respectively with monitoring and evaluating the: health of Australia's land, water and biological resources, and performance of government programmes, strategies and policies (NRMMC 2005). This paper explores the purpose and potential of engaging landholders in monitoring soil condition to manage agricultural landscapes sustainably, through the current literature and soil monitoring initiatives operating at national, regional and local scales in particular, New South Wales, Australia.

Results and discussion

Purpose of landholder engagement in soil condition monitoring

Hence, is there a reason to involve landholders in soil monitoring and at what stage in the monitoring cycle could they be involved? Landholder interest, co-operation and participation in soil monitoring is necessary, given that many of the monitoring sites are on privately-owned land (90% in Australia; NRC 2004), and subject to their management practices, consent for site access, and information on site land use history. However of more critical importance for widespread landscape improvement in soil condition is the influence of different institutional designs on landholders' participation in soil monitoring. More often than not the agenda for soil monitoring has been set at the National (NLWRA 1997-2002) or global levels (UNCCD) by policy-makers and panels of experts working on committees, with in some cases, periods of community consultation (e.g. United Kingdom Soil Indicator Consortium, European Commission Thematic Strategy for Soil Protection, Natural Resource Commission (NRC) State-wide Standards and Targets). However, the consultation process seems to have minimal impact on the eventual outcome – soil monitoring structure and protocol. In the case, of Australia's national NRM monitoring and evaluation framework it was principally focused on a monitoring process to allow regional NRM organisations to report on the impact of a Federal Government funding programme (in relation to: management action targets (MATs) and resource condition targets (RCTs) (NRC 2004). In the case of RCTs an assessment is made whether there has been a change as a result of 'point of investment' monitoring, that the regional organisations will report on overall resource condition and trends as part of 'surveillance' or 'ambient' monitoring in their State of Catchment Reports (NRMMC 2005). The NRM regions have some flexibility in that they can set and monitor those matters for resource condition targets (RCTs), and associated indicators, which are relevant to their particular circumstance. However, tracking progress towards RCTs where there are no obvious established thresholds or reference points would be seen as problematic, as in the case of the current NSW, State RCTs (NRC 2004): By 2015 there will be an improvement in soil condition. (Accessed 30 March 2010, http://www.nrc.nsw.gov.au/content/documents/Standard%20and%20targets%20-%20The%20Standard%20and%20targets.pdf)

The responsibility for data collection towards progress in the set resource condition targets at the regional level is through regional NRM organisations (56 across Australia), with the structure and protocols for soil monitoring having been derived by National Co-ordination Committees, and developed by State Government agencies (DECC 2009). In a recent evaluation of regional programs (NRMMC 2005) over 2004-05, 50% of the regional organisations were unable to report on soil condition as they had yet to set RCTs for soil condition (NRMMC 2005). In addition, ability to report on RCTs was low, with only 12 of the regional organisations (out of 56 across Australia) able to report progress towards their RCTs (NRMMC 2005).

However, the design and implementation of a monitoring program is often viewed by those undertaking it as an 'end in itself' rather than a 'means-to-ends'. Noss and Cooperrider (1998, p. 305) suggest:

> The root cause of most of these problems is that those doing the monitoring have not had a clear vision of what they wanted to achieve and why they were monitoring. Furthermore, they often had neither a real commitment to monitoring nor to using the information in decision making.

In the case of soil condition, the national indicators were limited to four: soil acidification, soil erosion by wind, soil erosion by water, and soil carbon content. At June 2005, across 38 NRM regions (out of 56 across Australia) there were 10 studies examining baseline, trend or condition studies for soil condition targets, and 229 sites had been monitored (NRMMC 2005). Hence, the indicators of choice for monitoring soil condition are attributes that can be: easily measured, improve soil productivity; or protect the soil. Often attributes that have intrinsic value; maintain function in ecosystems; and are difficult to measure are ignored as soil condition indicators. Often too the indicators chosen are not relevant to certain audience members, particularly landholders, and they should be tailored to meet the target audience, be accessible and the data produced by their use interpretable at the appropriate audience level (Lobry de Bruyn and Abbey 2003). This observation seems also to equally apply to site selection where there is often a bias towards the productive soil landscapes. In NSW, by May 2009, there were 850 sites monitored for baseline conditions (sheet and gully erosion, wind erosion, soil pH, soil organic carbon, soil structure, acid sulphate soil, where applicable), and 497 landholder surveys returned that were on site management and land management history according to the sampling and testing protocols developed by Department of Environment and Climate Change (DECC 2009; Gray *et al.* 2009).

Potential for landholder involvement in soil condition monitoring

At present the level and nature of soil condition monitoring by rural landholders is largely unknown, even though there are some good examples of farmer-led soil monitoring projects both in Australia (Healthy Soils for Sustainable Farms Programme, URL accessed 29 October 2009: http://lwa.gov.au/programs/healthy-soils-sustainable-farms), and overseas in developing (Stocking and Murnaghan 2001), and developed countries such as USA (Romig *et al.* 1996). Despite these efforts soil monitoring would not be considered a widespread landholder phenomenon. McKenzie *et al.* (2002) elaborated on the institutional, technical and social challenges of monitoring soil condition, under Australian conditions, especially at the national-scale and stated that community motivation to be involved in soil monitoring is considered to be lower than other aspects of the environment which have proven appeal (e.g. birds, weather and rivers). State government agencies provides technical support and guidance to CMAs through a soil monitoring sample kit - SoilWatch kit - which is specifically used for performance monitoring on local soil condition projects by examining control and intervention sites using undisturbed soil cores, photographs and GPS (Greg Chapman pers. comm.).

The NLWRA will facilitate co-ordination of regional data to report on the indicators developed under the national NRM monitoring and evaluation framework to ensure national consistency in data collection (Woodhead *et al.* 2004; NRMMC 2005). Hence, the opportunity to co-evolve a soil monitoring system with all audience members (Government, regional NRM organisations and their constituents, i.e. landholders) and reach consensus on the steps (goals, indicators, procedures, data custodianship and interpretation) in the monitoring process has not been considered. Despite the NRC (2004) and others touting the advantages of setting natural resource condition targets to the landholder it is difficult to see those benefits becoming realised, when soil condition monitoring is not a co-operative process, and indeed may be viewed with some suspicion by landholders when terms like "surveillance" monitoring are used by governments. It is questionable whether a 'top-down'- derived model of soil monitoring in which government agencies in partnership with regional NRM organisations conduct the monitoring and are responsible for its outputs and outcomes will meet their targets if community support is not forthcoming. Even though, recent documents claim that "Developed Plans have required the involvement of all stakeholders to ensure accredited plans have community support" (NRMMC 2005).

Monitoring that is conceived and executed in a collaborative arrangement (Singleton 2001) or adaptive management framework (Holling 1978) has the potential to resolve several points of tension between different audiences for soil monitoring data. These tensions may lie in: monitoring design (objectives, structure and protocols); data collection procedures; data storage and retrieval mechanisms; and level of landholder input to, access to and ownership of data. Ultimately, these tensions arise from the inability of soil monitoring systems to assess and communicate soil condition data satisfactorily for all key audiences. Indeed, there is increasing recognition internationally of the need to design soil monitoring systems that can cope robustly with: organisational, technical and staff changes; multiple scales; asymmetry in the transaction costs of different decision-makers accessing monitoring data; and demands from multiple decision-makers, including government, to monitor a raft of soil functions (Singleton 2001; Loveland *et al.* 2002, Van-Camp *et al.* 2004). By engaging landholders at some point in the soil monitoring cycle there is an increased potential: to affect their trust in, and on-ground co-operation with efforts to manage soil resources across a

catchment; to create interest in, and provide means to access their data for their own needs, and allow for meaningful output; and to re-assure them that confidentiality will be maintained when their data is used for public interests. Strategies for engaging landholders in soil monitoring include:

1. Inclusion and Integration – of all interest groups by recognising the importance of local knowledge, lived experience, land stewardship, and locally-derived solutions – and engaging these 'resources' in soil condition monitoring efforts. Such recognition, for instance, can help landholders to be 'part of' rather than 'apart from' processes and products intended to inform their management of the soil. Notably, the hurdle here includes tensions between scientists and practitioners over the 'rigour' and 'scientific merit' of soil data collected through joint monitoring procedures.
2. Enabling Processes – developing distinctive strategies and mechanisms to allow for active participation of key interest groups in soil asset condition monitoring such as the SoilWatch kit.
3. Creating Opportunities – for active learning and two-way interactions from past and proposed attempts at soil condition monitoring, and for meeting continuing needs to evaluate the impacts of monitoring systems on landholders' practices and adapt the design of these systems accordingly such as Property Management Planning or one-on-one property visits.
4. Simplify – the task and accept the need for adaptive management, rather than overwhelm interest groups immediately with the complexity, scale and urgency of the issues.
5. Responsive – to different needs of interest groups in a timely manner with information that can align advice and practice to appropriate scales, and be geographically referenced.

In the final analysis, a national soil monitoring scheme (one-size-fits-all approach) and the requirements of it may satisfy the information needs of policy makers and auditing requirements for funding at the national level, but in terms of motivating and generating lasting practice change at the local, and possibly, regional level it has yet to demonstrate its potential. To engage with landholders, in particular, there needs to be the opportunity within a national soil monitoring scheme to create discrete, purpose-built soil monitoring modules that may draw information from some of the same resources, but provide more immediate and relevant feedback at the local and regional level. Especially for landholders concerned about their farm management and what they can do to prevent the loss of soil condition. This is evident in the Western Australian Soil Quality web site that allows farmers to interact and interrogate their soil data, and others (http://www.soilquality.org.au/). In monitoring the condition of the soil resource land managers or landholders need to value soil as an 'end in itself' rather than solely as 'means-to-end', so that soil can continue to be nurtured, and provide for the livelihood of future generations.

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