

Achieving improved soil management on-farm – insights from a New Zealand case study.

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Abstract: Despite a history of soil conservation since the 1930s, soil erosion remains a significant environmental and sustainability challenge in New Zealand and will almost certainly be exacerbated by climate change. Although government recognises the issue of soil erosion, there are no specific national policy initiatives directed at reducing soil erosion. Central government's direct funding of soil conservation in New Zealand ceased in the early 1990s, a component of broader neo-liberal policy reforms.

An extreme rainfall event in 2004 resulted in widespread erosion in the Manawatu-Whanganui region. This event, in conjunction with a diverse mix of factors, led to the establishment of the regional level Sustainable Land Use Initiative (SLUI). This initiative is unusual in New Zealand because it is partly funded by central government, the regional council and farmers on highly erodible hill country land in the region. Soil conservation of highly erodible land on hill country farms is targeted in SLUI, with whole farm plans being the principal mechanism for shaping farm management. The implementation of the whole farm plans is supported by incentives for farmers and regular interaction with, regional council staff.

Drawing from the SLUI experience, this paper will present insights in to how improved soil management can be supported and enhanced at a regional and farm level. Results will highlight the importance of constructing and representing soil management issues in ways that align with central and regional government priorities, which may not include soil management. When improved soil management is not a priority, the important role of a network of soil conservation advocates, who are strategically positioned in central and regional government and who can shape policy that indirectly and directly achieves improved on-farm soil management, will be described. The need for congruence between government policy, existing knowledge and the practices of farmers will also be illustrated, as will the critical role of intermediaries in translating policy into on-farm implementation.

Keywords: hill-country erosion, Sustainable Land Use Initiative, whole farm plans, soil conservation, government, farmers

Introduction and paper structure

The Manawatu-Whanganui Regional Council³⁰⁸ launched an initiative to reduce hill country erosion in the Manawatu-Whanganui region in 2006. The Sustainable Land Use Initiative (SLUI) is primarily focused on assisting farmers of highly erodible hill country to implement on-farm land use practices that will result in reduced erosion of this land. Accelerated erosion of hill country is directly attributable to pastoral farming on this land. SLUI is jointly funded by central government, the regional council and those farmers who voluntarily choose to participate. The initiative is acknowledged to be performing well, over-achieving across an aggregation of its specific targets by approximately 19% over the first six years (Manderson & Mackay, 2013). In 2010, government committed a further four years of funding to SLUI.

³⁰⁸ The Manawatu-Whanganui Regional Council is also known as the Horizons Regional Council (HRC).

The governing of farming of highly erodible hill country illustrated in the SLUI case study is a complex interconnected web of governing across national and regional scales. The form of governing has inconsistencies and contradictions, alignments and complementarities evident in hybrid neo-liberal forms of rule reported in agriculture in Australia and more broadly (Peck & Tickell, 2002 ; Dibden & Cocklin, 2005 ; Higgins et al., 2010). Although not the main purpose, what this paper highlights is how government (national and regional) can govern soil conservation on-farm while continuing to facilitate market led rule of agriculture.

Drawing on the SLUI case study, this paper will explore and present insights as to the factors that shaped the establishment and implementation of SLUI and thereby illustrate also how the farming of this land is governed. The history of soil conservation in New Zealand is outlined briefly at the start of the paper because this history is significant to the establishment of and on going support provided to SLUI. The highly erodible hill country of the Manawatu-Whanganui region is the focus for SLUI. Characteristics of the region are given along with details on the storm that was a catalyst for the development of SLUI by the regional council. Then an overview of SLUI is presented along with reported outcomes from the initiative.

The factors that have led to central government support for the initiative are then outlined including the role soil conservation advocates played and the importance of timing and quantitative metrics to establish the performance and value of SLUI. Lastly, consideration is given to the complex of factors that influence the extent of soil conservation work farmers and the aspects of SLUI that were in particular highlighted as important for farmers. The paper finishes by concluding on the main point made by the paper.

Methods

This paper primarily draws on research undertaken as part of a PhD programme of study completed in 2013 (Reid, 2013). The PhD research was based on semi- structured interviews at a national, regional and farm level. Interviews were completed with individuals in central government, the regional council as well as industry organisations and farmers associated with or directly involved in the SLUI initiative. Also analysed for the research were documents relevant to the history of soil conservation in New Zealand and to the design, funding, roll out and implementation and monitoring of SLUI in the Manawatu-Whanganui region. To supplement the PhD research recent documents relating to SLUI have also been drawn on in the writing of this paper.

Background

New Zealand's soil conservation history

Recognition of the adverse effects of pastoral farming on erosion prone hill country in New Zealand is long standing. Central government is reported to have publically acknowledged the adverse effects of the deforestation of land in New Zealand as early as the 1860s (Mathewman, 2003 ; Reid, 2013). However, it was a succession of severe erosion causing storm events in the 1930s that was the catalyst for central government passing into law the Soil Conservation and Rivers Control Act in 1941.

The act provided for the establishment of catchment boards, and put in place the mechanisms for central government and local government to fund erosion control measures and flood protection works through these boards (Campbell, 1966 ; Ministry for the Environment, 2001). By 1967 catchment boards had been established covering the majority of New Zealand (McCaskill, 1973).

Voluntary environmental farm plans in conjunction with direct subsidies were the primary mechanism used through catchment boards to encourage and support the implementation of soil conservation work by farmers on erodible farm land (Makin et al., 1991). Subsidies were differential-

ly applied, depending on the extent of community benefit deemed to be involved (Steel, 1991). Soil conservators employed by catchment boards worked closely with farmers to develop farm plans and assist practically and with advice in the implementation of soil conservation works.

In the mid 1980s the New Zealand government initiated radical economic reforms that had dramatic effects for the farming sector and for soil conservation in New Zealand. In addition to the de-regulation of the economy and the removal of production linked subsidies for farmers, direct funding for soil conservation by central government ended (Sandrey & Reynolds, 1990 ; Walker & Bell, 1994). Local government reforms in the late 1980s resulted in the formation of regional councils and unitary authorities that were an amalgamation of a number of local body authorities including catchment boards. Funding for soil conservation became the responsibility of these regional level authorities. Under the Resource Management Act (1991), regional councils and unitary authorities in New Zealand, including the Manawatu-Whanganui Regional Council, are responsible for the sustainable management of the region's natural and physical resources. In the period after the reforms there was overall decline in the level of funding and effort allocated to soil conservation in New Zealand.

In the early to mid 2000s, no national level central government initiative in soil conservation was in existence. Although soil erosion was identified as an important issue by central government no formal national level monitoring of erosion was occurring. Erosion risk was identified as an environmental indicator in the last State of the Environment report prepared by the New Zealand government in 2007 (Ministry for the Environment, 2007). However, in the report the indicator was classified as having: 'No national or international benchmark against which we can compare the current state, not enough data to determine national trend, not able to measure, or no data available' (Ministry for the Environment, 2007:7,8).

The Manawatu-Whanganui Region – an erodible hill country landscape

The Manawatu-Whanganui region is located in the lower central North Island of New Zealand. Hill country farming and the erosion of this land is an inherent characteristic of the region's landscape. The region is identified as having the greatest total area (2.2 million hectares) and percentage of hill country (61%) of any region in New Zealand (Controller and Auditor General, 2005). The region is acknowledged as having the greatest area of erosion prone hill country land (Ministry for the Environment, 2007), with 274,000 hectares of hill country (12%) at risk of moderate-severe erosion (HRC, 2013).

Agriculture dominates land use in the region and is significant to the region's local economy and identity. Following the local government reforms in 1989 and the formation of the Manawatu-Whanganui Regional Council, despite retaining soil conservation expertise within the staff of the new council, the level of funding and effort directed at soil conservation declined significantly. A long serving regional council staff member described the regional council's approach during this time as 'more reactive than proactive', and more 'output' rather than 'outcome' focused: '[soil conservation] didn't have a high profile in policies and it struggled to get extra funding for works and also core staff were getting dragged off into other issues' (Regional Council Interview, 2007).

The regional council and ultimately central government's involvement in soil conservation in the region changed significantly as a result of extreme climatic events that impacted on the region in 2004.

The 2004 storms: a catalyst for change

In February 2004, a 1 in 100 year rain fall event had devastating effects for the region. An estimated 62000 landslides were reported to have resulted from the extreme rain (Todd, 2004) with an estimated 116,000 ha of hill country affected and approximately 200 million tonnes of soil

eroded resulting in wide scale damage to infrastructure, land and communities (HRC, 2010a). The estimated economic impact on the region was \$300 million (HRC, 2004b). Central government assessed the impact on the region at the time as being beyond the ability of the region to recover from on its own. Subsequently, central government provided close to \$130 million to cover emergency response activities and to assist with the clean up and repair (HRC, 2004a).

The storm and the implications of its effect on the region's hill country galvanised the regional council to focus effort into achieving more sustainable management of farm land affected by and at risk of erosion. Efforts to establish SLUI were initiated by the regional council in 2004, including the lobbying of central government for funding to support the initiative. The regional council initiated SLUI in the region in 2006 and funding from central government, through the Ministry of Agriculture and Forestry, was finally confirmed in 2007 for an initial four years.

The Sustainable Land Use Initiative (SLUI)

Similar to the approach used during the catchment board days, SLUI is based on the development of a whole farm plan that is farm specific. The on-farm works that result from the plan attract direct subsidies which are differentially applied depending on the broader community benefit deemed linked to the works. Likewise, the plan development and implementation is associated with the one to one interaction of a regional council staff member and the farmer.

Whole farm plans: the central mechanism in SLUI

Whole farm plans are central to SLUI (see for example AgResearch, 2005). Within the plan a farm is mapped according to the characteristics of the land resource as well as the current and potential levels of assessed pasture productivity. The land resource is differentiated based on a classification of the land using a Land Use Capability (LUC) classification system (Ministry of Works: Water and Soil Division, 1971 ; Lynn et al., 2009). Central to this classification is an assessment of the land's susceptibility to erosion as a constraint to sustainable productive pastoral land use. In addition to the land resource assessment the whole farm plan also includes an assessment of the farm business in terms of productive and financial performance. The farm business assessment is a new component of the whole farm plan not previously an element of the environmental farm plans used historically.

The farm land resource and farm business assessment component of the whole farm plan are completed by consultants independent from the regional council. This is designed to ensure that the assessment of the farm and the recommendations for land use changes and conservation works are arrived at separate from a consideration of available subsidies.

Based on the completed whole farm plan the regional council negotiates with the farmer a plan of works. This phase of the process is described by the council as being 'essentially a two way discussion between the landowner and [the regional council] on what will be implemented and what input (i.e. what grants, subsidies or support) [the council] will give' (Cooper, 2013b:8). Finally, when agreement on what is required is reached the farmer 'signs up to' a work programme, although there is currently no compulsion to complete the defined work programme.

Performance assessment of SLUI

Farmer involvement in SLUI is voluntary. However, the regional council has targeted through field days and one on one visits, farmers identified as having land being at high risk of erosion and in catchments at greatest risk of erosion into waterways. The regional council's approach is now very much outcome focused and proactive. Performance targets and indicators for the council in relation to SLUI include not only the number of plans completed but the area of highly erodible land retired (see for example Mitchell, 2009 ; Cooper, 2013a), and an assessment of the erosion and sediment-yield reduction (see for example HRC, 2010b ; Manderson & Mackay, 2013).

As at 30th June 2013, 480 farms were recorded as being involved in the scheme covering 372,443 hectares of the region and 14,451 hectares of this land across the farms had received treatment to mitigate and or manage the risk of erosion including afforestation, and retirement from grazing (Cooper, 2013b). A total of 67,332 poplar poles had been planted and 2688 hectares had been protected through space planting (Cooper, 2013b). As at June 2013 it was assessed that over 9,860 hectares of slope stabilization work had been completed which in 20 years was forecast to reduce erosion on treated land by 9.5%, and equate to an estimated reduction in sediment yields by 0.44 million tonnes per year (Manderson & Mackay, 2013).

Factors that shape the implementation and performance of SLUI

Central government support: complementarities and synergies

An inherent concern with reducing the loss of soil from hill country erosion was not the reason the government of the day agreed ultimately to support the regional council's SLUI. Rather, the government invested in SLUI to assist the region to build its resilience to future adverse climatic events. The financial implications of the 2004 storms to the region and central government were significant. Government's investment in SLUI is to ensure that following future adverse events it will not need to assist as it did in 2004, a point made clear to the regional council.

Synergies between SLUI and the government's broader policy and political priorities contributed to government's positive view of SLUI. The land use changes implemented on-farm as a result of SLUI were complementary with outcomes government had committed to in its climate change policy priorities and international climate change commitments at the time. Likewise, funding of SLUI added weight of evidence to the then government's claims of a commitment to a sustainable New Zealand.

Strategic soil conservation advocacy and champions

Influential to government's support for the regional SLUI also was the presence of soil conservation advocates in strategic positions within central government at the time. The government programme that funded SLUI was administered through the Ministry of Agriculture and Forestry³⁰⁹. The Minister of Agriculture at the time was ranked second in cabinet and a key advisor to the minister was an individual with a history in soil conservation work and advocacy. Likewise, a number of key positions in the Ministry of Agriculture and Forestry were held by people who had been trained and had worked in soil conservation previously in their careers.

Timing is everything

Within six months of the main storm event in 2004 efforts were underway to establish SLUI. The relative speed at which the regional council instigated work on SLUI is attributed to have been critical to gaining local community support for the initiative and the eventual support of government. The very visual impact of the storm, including the wide spread landslides and downstream flooding provided a powerful catalyst for support that the regional council is unlikely to have otherwise gained. The speed in rolling out SLUI was possible because it was based on the model of soil conservation that had been employed by catchment boards prior to the 1989 local government reforms. Expertise in and advocacy for soil conservation remained within the regional council and amongst scientists and farmers in the region, and, as already mentioned, was present in government, also.

Quantitative evidence for soil conservation's effectiveness

The relative failure by soil conservationists to provide clear quantitative evidence for the effectiveness and value of soil conservation was a factor attributed to government's cessation of fund-

³⁰⁹ The Ministry of Agriculture and Forestry was re-organised into the Ministry of Primary Industries in 2012.

ing for, and the lack of public appreciation of soil conservation in the late 1980s (Steel, 1991 ; Clough & Hicks, 1993). In contrast in relation to SLUI, the government and the regional council allocated funds for work developing models for not only providing quantitative indicators to target soil conservation in catchments at most risk of delivering sediment into water ways (see for example Dymond & Shepherd, 2006), but also monitor the effectiveness of on-farm works (Manderson & Mackay, 2013). This work has enabled the quantitative estimation of erosion reduction and sediment-yield reduction linked to SLUI. In addition, estimated projections of the long term effectiveness of current works can be assessed (Manderson & Mackay, 2013). The quantitative performance indicators for SLUI, this research argues, adds legitimacy and weight to the investment value in SLUI for central government and for the ongoing lack of community opposition to the regional council's funding of SLUI.

Farmer implementation of soil conservation

Soil conservation to reduce and mitigate hill country erosion is an accepted aspect of most hill country farmers' management in the Manawatu-Whanganui region. In spite of the lack of regional or national support after the 1989 reforms, soil conservation continued to be implemented by many hill country farmers in the region, although to a lesser extent. The extent and targeting of soil conservation by farmers is influenced by a range of factors including the level of discretionary income available, the labour and time available to implement and maintain the works and the extent soil erosion impacts on the farm business relative to other priorities. Soil conservation is one of many activities hill country farmers undertake in the operation of their farm business. The relatively poor returns received by sheep and beef farmers in New Zealand over the past 20 years has impacted directly on farmers ability to not only spent money on implementing soil conservation works but also on their investment in fertiliser and farm infrastructure. Sheep and beef farming is the predominant form of farming in the region's hill country.

The mode of intervention used by the regional council in SLUI was familiar to many hill country farmers. Likewise, the on-farm management practices to mitigate and reduce the risk of erosion were not radically different to those used historically. This familiarity facilitated the acceptance and participation of farmers in SLUI. The financial incentives associated with SLUI to assist in the implementation of on-farm works was also a significant motivation for farmers.

Particularly highlighted and valued by farmers are the specific tailoring of the whole farm plan and eventual work plan to reflect their specific farm and personal circumstances. In addition, the interaction and input from regional council field staff that they trust, and who are familiar with and understanding of the practical realities of farming was highlighted. Some farmers commented on how they had gained motivation to undertake and extend the amount of soil conservation they under took as a result of this external interaction.

Accepted norms as to what constitutes good farming both enhance and detract from improved soil management of highly erodible hill country in the Manawatu-Whanganui region. Many farmers continue to prioritise the clearing of gorse and scrub from hill country seeing it as a sign of poor or lazy farming. The advantages gorse and scrub provide in protecting highly erodible land are outweighed by the desire to conform to accepted 'good farming' practice. Conversely, the grazing of cattle on highly erodible land is managed carefully in winter and during wet periods to avoid exacerbating soil damage and loss.

Conclusion

Ultimately, farmers' sustainable management of their soil resource is shaped by a complex mix of factors. However, this research illustrates that the extent to which farmers prioritise soil conservation and improved soil management activities can be enhanced through policy initiatives. In particular, this research highlights that farmers respond to a policy initiative that is specifically tailored to individual farm circumstances, incorporates input and advice for farmers from trusted intermediaries with practical farming know-how, and provides financial assistance to implement works on-farm.

Central government support for an initiative to improve on-farm soil management is more likely when clear quantitative metrics can illustrate the value of the initiative to government. Likewise, support from government is more likely achieved when the outcomes of the soil management initiative can be illustrated as consistent with and/or complementary to the government's priorities.

Adverse climatic events that dramatically illustrate the broader implications of poor soil management are an opportunity to garner community and government awareness of the issue. However, the window of opportunity provided by such events is limited. Advocates for improved soil management need to be ready to mobilize resources to capture as quickly as possible the potential political advantage provided by such an event. Support for policy initiatives to support on-farm improvement in soil management will also be enhanced if key individuals spread throughout levels of decision making have knowledge of and are advocates for soil management.

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