Striking a match: How to ignite a passion for soils

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Abstract
Initiating and sustaining interest in soils in the general community has historically been a difficult task. In the Northern Rivers region of NSW Australia, the development, by a group of farmers, of a monitoring tool adapted from the United States Department of Agriculture (USDA) Soil Health Card model has created a soil literate and informed group of proactive farmers. The Northern Rivers Soil Health Card (NRSHC) has been around for over 8 years and still finds interested audiences amongst farmers all over Australia. This paper proposes that the process of creating the NRSHC and the continued presence of a dedicated soil extension officer for over 15 years have been powerful factors in igniting a passion for soils amongst a group of north coast farmers. It is argued that ongoing support and an extension presence has resulted in a farming population with high 'soil literacy'. The instigation of a formal single purpose, region wide soils group and its activities could be said to have been stimulated by previous soil extension activities particularly the development of the NRSHC.

Key Words
Soil health monitoring, farmer participation, co-learning, soilcare

Introduction
Soils extension has always been a challenging area in which to work. For too long soils have been considered boring and some would argue that society subconsciously sees soils as both renewable and stable (Trudgill, 2006). Despite most farmers agreeing that the soil is the mainstay of their operations few, in the past, have found any need or desire to delve into the profile in great detail. Soil science is complex and in the past was often presented in ways that were not relevant to farmer's day to day operations. The solution to a greater understanding and connection with the soil need not be difficult. For long term behaviour change, many extension practitioners would argue that participation and farmer led activities lead to greater understanding, capacity and activity than other, more traditional, forms of adult education. Participation by farmers has been employed in the past for philosophical and practical reasons with the assumption that refining within a farm context would be more successful, (Wander and Drinkwater, 2000) but form of participation often involves taking a draft prepared by technical experts to a 'lay' person for comment. Others have pointed out that farmers' knowledge and input should be "used as a first iteration" for soil quality evaluation (Liebig et al 1996) an approach used in the development of the Northern Rivers Soil Health Card (NRSHC) on the north coast of News South Wales. What makes this case study interesting and the point that this paper seeks to highlight is the fact that participation in the development of a Soil Health Card, (SHC) prompted an increase in the farming community's activity and capacity around soil health.

The spark: Development of a Northern Rivers Soil Health Card
The NRSHC was developed in 2001-2002 by a group of primary producers representing a range of north coast industries in horticulture, dairy and cropping. The participants came together because they wanted to know more about the state of their soils than just the results of their regular laboratory tests. They wanted to improve the health of their soils without huge increases in inputs, and wanted to investigate the usefulness of alternatives to synthetic fertilisers. The NRSHC (Figure 1) was developed through a two facilitated workshops based on a format developed by the USDA (Tugel *et al.* 2001), available through the website (USDA, 2005) and a customised TAFE (Technical and Further Education) course. The workshops were conducted before and after the TAFE soils course which provided information on the range of soil health indicators that could be monitored, and the different field tests that could be used. It was thought that in providing a structured learning activity such workshops those involved in the card development would be better able to select both the indicators and the field tests that would be useful and repeatable on farm. During this process the groups also had access to technical expertise when required. The steps followed were:

1. Workshop 1: To define soil health
2. TAFE Soils course: one half day per week for 9 weeks
3. Workshop 2: To select soil health indicators and design layout for the card
4. Use and refinement of SHC in field.

In a 2006 scoping survey on the Alstonville plateau farmers (Northern NSW, Australia) it was found that, of the 32 publicly funded soil focused projects carried out over the past 5 years, the NRSHC was considered the most useful by farmers with over 30% of respondents indicating it was the most useful activity (*pers comm*).

Northern Rivers Soil Health Card (Page 8)

TEST RESULTS

Date: _____ Location / management: _____(draw a sketch map overleaf)

Soil Type: _____ Productivity: _____ Days since 20mm Rain: ____ Soil Moisture: dry / moist / water logged

RESULT► / TEST▼	POOR 1 ---------- 2 ---------- 3	FAIR 4 ---------- 5 ---------- 6	GOOD 7 ---------- 8 ---------- 9	SITE SCORES (1 - 9) 1	2	3	4	5	Av.
1. GROUND COVER	Less than 50% ground cover (ground plants or mulch)	50% to 75% ground cover (ground plants or mulch)	More than 75% ground cover (ground plants or mulch)						
2. PENETROMETER	Wire probe will not penetrate.	Wire probe penetrates with difficulty to less than 20 cm.	Wire probe easily penetrates to 20 cm.						
3. INFILTRATION	Water level drops less than 2 cm in one minute.	Water level drops by from 2 to 5 cm in one minute.	Water level drops more than 5 cm in one minute.						
4. DIVERSITY OF MACROLIFE	Fewer than two types of soil animals.	Two to five types of soil animals.	More than five types of soil animals.						
5. ROOT DEVELOPMENT	Few fine roots only found near the surface.	Some fine roots mostly near the surface.	Many fine roots throughout.						
6. SOIL STRUCTURE	Mostly in clods or with a surface crust, few crumbs.	Some clods but also many 10 mm crumbs.	Friable, readily breaks into 10 mm crumbs.						
7. SLAKING 5 cm depth → 20 cm depth →	Aggregate broke apart in less than one minute.	Aggregate remained intact after one minute.	Aggregate remained intact after swirling.						
8. EARTHWORMS	0 - 3	4 - 6	more than 6						
9. ACIDITY 5 cm depth → 20 cm depth →	pH 5 or lower	pH 5.5	pH 6 to pH 7						
10. LEAF COLOUR	Stunted plants, leaf discolouration.	Some variation in growth and colour.	Appropriate leaf colour and uniform plant growth.						

NB Numbers resulting from the different tests are not intended to be combined to give an overall value of soil health.

Figure 1. The Northern Rivers Soil Health Card.

Fuelling the fire: A Role for long term designated soils extension personnel

The continued presence of a designated soil extension officer for over 15 years and the creation of the NRSHC has ensured that soils have gained and maintained a high profile in regional agriculture. This has encouraged landholders to think about their soil foremost and provided a sound platform for them to launch their own actions and inquiries. It would appear that these factors have established an environment where co-learning and dialogue are fostered allowing all those involved to "share a discourse about soil health issues, and thus relieve the pressure upon soil science alone to solve all soil health problems" (Lobry de Bruyn and Abbey 2003).

The level of activity around soil health issues has skyrocketed in the Northern Rivers of NSW. On first taking up the post as soil advisory officer I was informed that it was always difficult to get farmers to attend soils workshops and most people were really not that interested. Now people are not only interested they are running their own projects and in some cases working to their own priorities.

Fanning the flames: SoilCare and its activities

Following the development of the NRSHC a core group of farmers decided to start their own landcare group specifically focussed on soil and land issues. SoilCare is a farmer directed group devoted to soil health issues in the Northern Rivers region of NSW. From an initial group of 17 the group now has a member base of 145 spread across the whole region. Membership is family based, every membership covering individuals. Members of the group come from the farming community as well as universities and state government departments.

Capturing wider support

In the four and half years since its inception, SoilCare has developed five industry specific Soil Health Cards and five accompanying draft soil health best management practices for major regional industries. They are also embarking on groundcover demonstrations in the macadamia and banana industries. They have secured funding for ongoing eduction in collaboration with NSW TAFE from the national government and are

running courses and special interest focus groups where a greater level of technical information will be presented in a practical on farm setting. The funding and support for this work came through the regional natural resource management authority, the Northern Rivers Catchment Management Authority (NRCMA) after the success of the NRSHC with its ability to stimulate action and learning made an impact.

Large public events: The SoilCare Expo
SoilCare expo is a biennial soils field day/show that has run very successfully for the past 7 years with over 300 people attending the event organised entirely by SoilCare. The one day show allows farmers and other landholders can come to one place where they are able to speak with all the 'players' in one space. Both public and private 'providers' have the opportunity showcase their work with soils. SoilCare also includes a series of seminars and workshops by an invited speaker both national and international. Speakers who have presented include Dr Marten Stapper, Dr Lukas Van Zwieten, Bob Shaffer and Dr Lyn Abbott and Gary Zimmer. It is further evidence of the increased interest, activity and capacity of the local farming community.

Spot fires: Wider interest in the NRSHC
Since its inception there have been numerous enquiries about the NRSHC from outside the region and outside the state of NSW. A local farmer introduced it at a healthy soils meeting convened by Land and Water Australia aNational government research and development organisation, and it has been showcased regularly at regional rural producers meetings and regional agricultural shows. Articles about the card have appeared in local newspapers and state-wide agriculture publications. Members who are also involved in local farmers' markets have showcased it at these venues. One committed member has garnered support from CSIRO (Commonwealth Scientific and Industrial Research Organisation) researchers in evaluating and assessing the tests chosen. More recently (2010) it has been exhibited at an organic soil symposium in Hawaii .The NRSHC is now included in the teaching materials for courses designed for farmers from a range of training bodies such as the Industry and Investment NSW (formerly Dept. Primary Industries), and NSW TAFE.

Observations from the Northern Rivers experience
Despite the debate about minimum data sets (MDS) for soil quality or health assessment and the scientific community's questions about the validity of qualitative information collected there are substantial benefits to be realised in developing and encouraging the use of farmers devised soil health monitoring tools. The interest it raises and the capacity for assessing, observing and documenting any number of indictors builds the capacity of any land manager engaged in such an activity. In this case it has undoubtedly acted as a catalyst and inspired further in-depth investigation of soil health and management, motivating a group of farmers in the Northern Rivers region of NSW Australia to ongoing interest in advocacy, learning and continual improvement in the management of their soil. In an era of shrinking government services and increased public awareness of natural resource management issues this can only be a positive step for the often forgotten natural resource, soil. Lobry de Bruyn and Abbey (2003) and Wander and Drinkwater (2000) have both pointed out the necessity for just this situation where individual farmers take on some of the responsibility for managing the soil resource under their control.

The timeliness of the initial NRSHC development activity and subsequent formation of SoilCare cannot be discounted coinciding as it did with a national focus on Australia's soil resource. However this national promotion, has not translated to the level of ongoing interest and engagement seen in the Northern Rivers region of NSW. A combination of direct farmer involvement from the beginning, a history of state funded soil extension support and continued input and support for workable self directed projects has fostered a continued interest in soils, creating a group of farmers who have the competency, networks and interest to maintain a self directed soil group.

Developing a SHC is a tool for deeper interest and engagement by any group of people interested in soils, eg farmers, primary students working in school food gardens; secondary school students doing geography/ agriculture/ environment; tertiary students learning soils/agriculture. It is important to remember that it is not necessarily the scientific accuracy or rigour of the tool that is paramount but the process used to develop it. The SHC's strength lies in its ability to act as a vehicle for dialogue between disparate groups and as a catalyst for further activities which only increase the understanding of soils and how they function in the broader ecosystem. "even though many on-farm measures may fail to produce information that scientists would accept….the importance of on-farm or in-context resource assessment must be recognised" (Wander and Drinkwater 2000).

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