Review of soil health activities and evaluation methods in the Goulburn Broken Catchment

Final Project Report

PCB Consulting

March 2012

Contents

Introduction

Soil Health has become a focus for investment by Federal and State governments and an area of interest for the community. Currently there are a number of activities and programs in the Goulburn Broken catchment delivered by Department of Primary Industries (DPI), Landcare and producer groups that directly include or cover a component of soil health. This has been driven by a number of factors such as the Federal government's sustainable farming initiatives, carbon farming initiatives, and a growing community interest in exploring options for improving soil health. Much of the current activity and programs conducted in the Goulburn Broken Catchment occur largely in isolation of one another.

Also the Department of Sustainability and Environment (DSE) is currently developing a Soil Health Strategy that will clearly document the environmental services from soils, the nature of soil health problems faced in Victoria, and a clear outline of the key objectives and principles for soil management.

The purpose of this project is to undertake a review of soil health activity in the Goulburn Broken Catchment.

The specific objectives of the review include:

- Analysis of current activities and programs that address soil health and the alignment with the draft DSE Soil Health Strategy.
- Identify potential gaps in the current program.
- Identify common event/activity evaluation questions that would enable information on community interest in soil health to be shared across the catchment.
- Recommendations on key directions for a regional soil health program.

The key outcome for this review is the collection, collation and analysis of data to assist the Goulburn Broken CMA develop directions for a regional Soil Health Program. This report documents the key outcomes of this project.

Project Methodology

In September 2011, PCB Consulting was appointed to undertake a review of soil health activities in the Goulburn Broken Catchment.

There were four stages to the project methodology:

Stage 1: Inception, Project and Consultation Planning

Stage 2 Data Collection

Stage 3: Data Analysis

Stage 4: Final Report Preparation

The methodology used in this project for data collection included a document review, and stakeholder engagement through a regional focus group and interviews.

The document review covered a range of documents held by GB CMA and other relevant authorities/agencies (DPI, DSE). The document review provides the context and background for the project and includes local catchment perspective, state and national perspectives on soil health and soil health programs. Documents reviewed are included in Appendix 1 of this report.

A Regional Focus Group meeting (1) was conducted with regional stakeholders, including key DSE, DPI and CMA staff actively involved in soil health programs or related programs, Landcare Networks and producer group coordinators. The agenda and outcomes of this meeting are included in Appendix 2 and 3 of this report.

One on one person interviews (3) over the phone were conducted to pick up any key stakeholders that were unable to participate in the focus group. A list of key stakeholders participating in the focus group or interviewed are included in Appendix 4 of this report.

The current evaluation materials included materials used by GB CMA and partner agencies (DPI, DSE) and Landcare as part of event evaluation processes were also reviewed. Common event evaluation questions were identified that could be used to enable information on community interest in soil health to be shared.

Project Context and Background

What is Soil health?

Soil health is the condition of the soil in relation to its inherent, or potential capability, to sustain biological productivity, maintain environmental quality, and promote plant and animal health (MacEwan, 2007).

The terms 'soil quality' and 'soil health' are both found in the literature with considerable overlap.

Soil quality is the capacity of soils within landscapes to sustain biological productivity, maintain environmental quality, and promote plant and animal health (MacEwan, 2007). Soil quality provides a useful concept for comparison between different soils as it is concerned primarily with a soils inherent properties that do not change. Soil health is more concerned with the state of a soil at a particular point in time and is a dynamic condition.

Soil resistance is the capacity of the soil system to continue to function without change throughout a disturbance (MacEwan, 2007).

Soil resilience is the capacity of a soil to recover after disturbance (MacEwan, 2007).

Ecosystem service the transformation of natural capital (stocks) into flows providing goods, services and benefits (MacEwan, 2007).

The key to building or maintaining soil health is managing the physical, chemical and biological properties of soil.

Soil physical properties provide the framework in which plant roots and organisms live. Healthy soils require friable, well structured and well aerated soils. This allows water and air to move through the soil and be stored in the soil. Managing soil physical health requires management of soil structure, organic matter and some key chemical properties such as sodicity, calcium and magnesium, as well as controlling soil erosion and compaction.

Soil chemical properties ensure the supply of adequate nutrients and can reduce the effects of contaminants. Managing soil chemical health requires the management of acidity and associated Aluminium, salinity, organic matter and careful management of fertilisers and other chemical inputs.

Soil biological properties encourage active soil biota essential to healthy soils and sustaining agricultural production. Active soil biota ensure vital processes in the soil are maintained such as organic matter breakdown, nitrogen fixation, nutrient cycling, and the formation and maintenance of soil aggregates. They may also play a role in suppression of disease causing organisms and the degradation of pollutants. Management of soil biological health requires management of soil organic matter, acidity, salinity as well as good soil structure and aeration.

It is clear that organic matter plays a critical role in soil health because it influences the physical, chemical and biological properties of soils. Soil organic matter consists of living and decaying plant residues and roots, living and decaying soil biota, and soil humus (stable decomposed organic matter). Much of the scientific literature suggests that soil productivity cannot be sustained without organic matter.

Why is soil health important?

In a recent policy discussion paper prepared for the National committee on Soil Terrain through the Natural Resource Management Ministerial Council (NRMC), Campbell (2008), states that poor soil health and poor soil management *generates significant greenhouse gas emissions, diminishes food production, threatens food security, damages water quality, limits economic options, and directly affects human health*.

Campbell (2008) claims that prevention of soil degradation is much cheaper than trying to restore productive capacity of degraded soil. The key challenge for Australian agriculture according to Campbell (2008) is to develop more sustainable ways of:

- managing soils in the face of changing climate conditions (improving soil physical properties to increase water holding capacity and the overall water balance);
- managing the productive capacity of soils in the face of rising input costs (such as fertilisers and energy); and,
- increasing the resilience of production systems to reduce further degradation of soil health.

Investment in soil health is critical; to get better soil management on the ground *people need to want to change, know what to do and how to do it and they need the capacity to put more sustainable systems and practices into effect* (Campbell, 2008).

Key Directions for Soil Health policy and programs in Australia

The Soils RD&E Working group has produced 'A Stocktake of Australia's current investment in soils research, development and extension: a snapshot for 2010-11'. The report has been published on the DAFF website at http://www.daff.gov.au/soils-report.

The stocktake revealed that Research, Development and Extension investment has been greatest in Soil Chemistry and Soil Carbon sequestration, followed by Agricultural Land Management, Soil and Land Inventory, Soil Biology, Land Capability and Soil Degradation. Soil Physics has been a field with the least investment.

The stocktake has been used to develop a business case for a national cross sectoral soils RD&E strategy under the National Primary Industries RD&E Framework. The Primary Industry Standing Committee (PISC) is expected to consider the need for a cross sectoral soils strategy in March 2012.

History of Soil Health Programs in the Goulburn Broken

A review of past soil health activity and programs in the Goulburn Broken Catchment (included in the Soil Health Action Plan), reveals a long history of extension and research programs across the catchment, starting in 1912 when the Victorian Department of Agriculture launched a major campaign to lime soils (Barr and Carey, 1992).

The review of past soil health extension programs demonstrates a clear shift from 'fixing up' single issues with soil health such as acidity, salinity and erosion to taking a more integrated holistic farm and catchment system approach. The review also highlights a clear shift from government driven research and extension programs to community led initiatives. The challenge facing us is to learn from, and build on, the initiatives taken in the past, and to resist the temptations of denial, postponement, and tinkering with unsustainable designs (Hill, 2001).

Lessons learnt

Management of soil health often requires understanding of complex soil, farm and catchment systems. It often requires changes to land management practices that are managerially challenging, affect the farming system and are accompanied by financial implications– not just the adoption of discrete pieces of technology or products. Public investment in programs that encourage local small groups to explore soil health issues, for example approaches for conserving soil organic matter, enable participants to develop a deeper understanding of complex issues, share the risk associated with change and create peer support in the decision making process.

There are a range of stakeholders in the management of soil health all promoting a wide variety of approaches for managing soil health. There is a need to engage with the community, key industry and government stakeholders to develop a partnership approach to promote soil health as an integral part of the production system. Partnership approaches can build understanding and capacity in the region.

The Goulburn Broken Soil Health Action Plan

In 2002, the Goulburn Broken Soil Health Steering Committee was established to prepare a Goulburn Broken Soil Health Strategy for the Goulburn Broken CMA (Draft Goulburn Broken Soil Health Strategy). The draft Soil Health Strategy is a sub-strategy of the Regional Catchment Strategy (RCS) (2003). In 2005, the Soil Health Action Plan (SHAP – available at www.gbcma.vic.gov.au) was developed to guide and stimulate implementation of the Soil Health Strategy. The action plan was written by a steering committee with input by regional stakeholders at a workshop. This involved farmers, Landcare, regional scientists, regional program leaders and extension staff, and Victorian Farmers Federation representatives. The workshop also identified key priority actions. The Goulburn Broken SHAP was endorsed by the Goulburn Broken CMA Board in October 2006.

The major objectives of the Goulburn Broken SHAP are:

1. To provide a framework for action to improve soil management in the Goulburn Broken Catchment.

2. To improve regional community awareness and knowledge of the agricultural and environmental impacts of soil health.

3. To maintain the long-term productivity and sustainability of the land in the region, and minimise poor soil management.

4. To provide land managers with the tools to monitor and manage soil health.

The Goulburn Broken SHAP is made up of 7 key programs. The main focus of the SHAP is community education, and the promotion of best management practices that control soil acidification and conserve soil carbon.

The SHAP did not have direct funding for implementation; hence actions were aligned to existing programs and deliverables where possible, with some actions flagged until additional funds could be sought. For this reason, no one program held responsibility for delivering or reporting against actions. Actions have been, and continue to be delivered through service delivery agreements and via support to partners and reported as part of normal program reporting processes.

In February 2011, a Review was conducted of the SHAP, by the Goulburn Broken CMA Land and Biodiversity Land Health Program; this was the first review of the SHAP. It reviewed progress to date in implementation of the action plan and identified adaptive responses and future actions where appropriate. A summary of this review is outlined in the table below.

SHAP Intent	**REVIEW OF PROGRESS TO DATE (Feb, 2011)**	**FOCUS IN 2010-2012**
Program 1 - Coordination Program		
Coordination of links with statewide soil health programs. Coordination of community education programs, staff training. Coordination of soil health network. Coordination of funding and reporting in soil health.	Soil health extension, training and projects have been undertaken and have largely continued on an ad hoc basis, no programmed or strategic approach.	*Review Action 1: convene a soil health steering group to assist update of SHAP and identify coordination opportunities e.g. annual projects and funding*. Land Health Forum established.
Program 2 - Community Education		
Developing the	Soil health extension, training and	

awareness and skills of landholders and staff to assess, monitor and manage soil health. Developing soil health monitoring kits.	projects have been undertaken and have largely continued on an ad hoc basis. Thirty kits were developed and training in their use was made available to catchment staff (DPI, CMA and Landcare) during November 2006. Approximately 35-40 staff received training.	*Review Action 2: coordinate community education opportunities across agencies and build the 'soil health' community network.* *E.g. through the CfOC Sustainable Farm Practices bid: Improving land management practices (increasing soil carbon) 2010-2012.* *Review Action 3: determine if training for new agency/extension staff users is required e.g. in using the soil health monitoring kits.*
Program 3 - Best Management Practice		
Promote best management practices through extension programs. Develop best management practice demonstration sites. Partner with industry to develop and promote a shared understanding of best management practice for soil health.	Many BMP elements have been picked up through core extension activities, e.g. land class fencing and native pasture management, erosion control. The Goulburn Broken CMA, Landcare and DPI initiatives cover off on most of the recommended practices.	*Review Action 4: At Land Health Forum level, discuss each 'BMP' management activity, associated current initiatives and priorities for promotion. Determine if there are any gaps.* 2011: 7 year review of WFP in the Goulburn Broken completed.
Program 4 - Whole Farm Planning for Soil Health		
Incorporate soil health into whole farm planning courses. Explore the notion of duty of care for soil health.	The Whole Farm Planning (or FarmPlan21) program has successfully incorporated soil health as an accredited component of all courses. It covers land classing, land capability, soil characteristics, soil testing, interpretation of soil tests and monitoring techniques. *Duty of Care* Preliminary work exploring the concept of an environmental Duty of Care has been undertaken under the Dryland Landscape Strategy (DLS).	*Review Action 5: work together with DPI to understand the outcomes of training and education for attitude and behaviour change.*
Program 5 - Local Government Planning		
Assisting Local	Work with Local Government in	

Government to incorporate soil health issues into strategic and statutory planning processes. Training and information for Local Government staff on soil health issues as they affect planning.	the area of soil health has been limited, largely due to a lack of resources and personnel to develop the relationship and secure buy-in. We have not yet determined appropriate tools or mechanisms of support for Local Government due to a lack of consultation with appropriate Local Government staff.	*Review Action 6: subject to resourcing, further develop our relationship with Local Government to seek their input into appropriate progress and development of land capability assessment tools.*
Program 6 - Monitoring and Evaluation		
Baseline data on landholder attitudes and behaviour. Database for compiling soil health information from regional demonstration sites. Baseline for monitoring soil health -pH and OC. Establish regional Resource Condition Targets for soil health.	There has been no progress in the monitoring and evaluation program. This is largely due to the requirement of additional funds to undertake these activities. There is not likely to be progress in this area without support and investment from State or Federal partners.	*The Land Health Program will evaluate and monitor progress of the SHAP.* Beyond SoilCare: - baseline survey to be completed by end 2012 - pH and SOC data being collected and stored in Arc GIS
Program 7 - Research and Investigation		
Research and investigate significant gaps in knowledge e.g. quantification of the off-site impacts of soil acidification. Quantification of the impacts of the 'do nothing' scenario for pH decline.	There has been little progress in these actions at the regional level; however, many questions have been taken up at a state, federal or international level, for example the roles of soil carbon and biology in soil health and agricultural productivity.	

DSE Soil Health Strategy

A draft Soil Health Strategy was developed by the DSE in 2011. Traditionally the focus of government policy for soil management has been to address threats associated with poor soil health. This historical 'threat based' approach has developed a narrow focus with low levels of investment into understanding why protecting soil health is important.

The aim of this current draft strategy is to enable government and the community to become more proactive in the way soils are valued and managed, rather than only reactive

to the problems that poor soil health can cause. This draft strategy focuses on the health of the soil as an asset and the ecosystem benefits achieved by protecting and maintaining the health of our soils.

DSE has identified the following goals as a way of overcoming the challenges that government action faces and moving towards the achievement of healthier soils for Victoria:

Goal 1	Protect and improve soil health by addressing current known threats to soils and improving soil resilience
Goal 2	Understand and value soil health and services
Goal 3	Maximise the efficiency and effectiveness of government investment in soil health for environmental benefits
Goal 4	Build government, industry and community partnerships to manage for soil health

The strategy defines a new direction for soil health, moving away from a focus on the problems of poorly managed soils to the ecosystem services they provide. Moving to a soil health view reflects the central importance of soils to our whole natural environment as well as our primary production (DSE 2012).

The strategy recognises the importance of describing the soil as a complex system , not simply its constituent parts.

The new approach to soil health presented in this strategy is based on managing our soils as complex systems that produce services that we benefit from: an ecosystem services approach. (DSE 2012)

Moreover the 'system' provides ecosystem services . This ensures the focus is on both managing adverse impacts on soils and also deliberately managing to maintain soil assets and values.

Analysis of Current Community Land and Soil Health Programs in the Goulburn Broken

At a meeting in Yarck in March 2011, community representatives, Landcare, and agency staff, identified a range of soil health related projects, activities and programs currently happening in the catchment. Concerns were raised about the potential duplication of effort in promoting soil and land health in the catchment and the potential for programs to be competing for the same audience.

Key items and actions discussed at meeting:

1. Information exchange is vital, with network links the key way to disseminate information on project activities.
2. Land Health Forum coordinated by GB CMA will be a means for agencies and Landcare Coordinators to exchange information on land health and project activities.
3. Referral process needs to be developed to ensure landholders are not left behind and also to ensure reporting / accountability for community engagement.
4. Results of evaluation from land health events and programs need to be shared to allow for a coordinated and relevant program development.
5. DPI to work with Landcare Coordinators in terms of supporting the community engagement component of the CfOC Base Sustainable Farming Practices Project and associated field days.

Whilst there may be duplication of activities across the region, it is important to recognise the significance of tailoring activities to local groups for practice adoption. This includes the location of workshops, projects and demonstration sites, and the demonstration of practices in the context of local conditions.

Alignment of Current Activity with the DSE Soil Health Strategy

At the Regional Focus Group meeting in Euroa in December 2011, community representatives, Landcare and agency staff identified a range of soil health related projects, activities and programs currently happening in the catchment. These activites have been categorised to broadly align with the State framework and national priorities for soil health.

Improve our evidence base

- Evergraze -resowing and rejuvenating pastures, grazing management, perennial pastures.
- Onfarm consultancy/advisory - fertility mapping on farms.
- Fonterra - nutrient mapping on dairy farms.
- University of Melbourne - carbon mapping in aquatic environments, plant growth and nutrient trials.
- DPI Dairy - Sustaining Productive Dairy Soils - research and extension - soil physical and chemical and biological properties.
- Biological Farmers NLP - conventional versus innovation trials, grazing management, aeration, lime and trace elements.
- Soil Conservation Structures Audit - erosion control structures audit - what condition are they in, stocktake.

Build community and institutional capacity and partnerships

- Soil Forums and Information days - eg Gecko Clan soil forum in Benalla, Riverine Plains Cropping group has run forums and workshops on soil carbon and soil biology, Landcare information sessions, Goulburn Murray Landcare Network future farm forums, Ovens Valley Landcare Network.
- Best Wool Best Lamb groups - include a soil health focus.
- Better Beef groups - include a soil health focus.
- Demonstration sites.
- Grass growers association.
- Grain and Graze.
- Lime trials at Tatong.
- GOTAFE Monitoring and Managing Soils courses.
- Develop land capability mapping for the catchment.

Encourage appropriate Landholder behaviour and actions

- CfOC project - Beyond SoilCare - improving soil condition on private property on Strathbogie ranges and Riverine plains.
- CfOC project - sustainable farming practices - landclass fencing, pasture management, erosion mitigation, revegetation.
- CfOC project - Best Practice Revegetation - erosion management, improve remnant vegetation, ground cover maintenance.
- Woodlands Grants (CfOC) - incentives and management plans that can include soil health.
- CfOC project - Gecko Clan Pasture Cropping Project - soil testing, soil biology assessment, rejuvenating pastures.
- Gecko CLaN, Strathbogie Tableland Landcare Group and Granite Creeks Inc Alternative Fertiliser Trial.
- DPI steep hills project - grazing management, fencing, nutrient management.
- Community Surface Water Management Program - drainage of surface water so that production is not limited, prevent accessions to the water table.
- Landmate Project (state funded) - erosion mitigation, land class fencing.
- Regent Honeyeater Project - revegetation and erosion mitigation.
- DPI Land Health Project (state funded) - erosion stabilisation, soil extension, management, technical advice.
- Superb Parrot Project - revegetation and land class fencing.

- Farm Plan 21/Whole Farm Planning - soils component included in the course, soil testing workshop, sustainability focus, grazing enterprises and lifestyle properties.
- DPI incentives for on-ground works - revegetation and salinity works, tree growing and environmental grants to protect remnant vegetation, water table management and soil biota.

Farmer interest in soil health is high and a range of organisations are working in the soil health space. Partnerships with community and other organisations are working well and feel they have a clear program logic approach to extension. There are a range of programs providing good basic information to landholders that often spark further interest in soils such as the DPI Whole Farm Planning program.

The focus of much of the current soil health activities addresses a range of catchment soil health issues, particularly:

- Soil acidity and nutrient management to manage the productive capacity of soils - such as nutrient mapping, soil testing, liming, exploring alternative fertilisers and managing soil biology.
- Increasing soil carbon, reducing erosion and increasing the resilience of production systems - such as stubble management, grazing management, landclass fencing, establishing perennial pastures, and management of native grasses.

There has been less of a focus on managing soil physical properties in recent years with some exceptions in the irrigation industries.

Further effort may be needed in communication and coordination between organisations involved. There is as sense that landholders are bombarded with information that is repeated by other organisations unaware of what others are doing or inconsistent with other organisations causing confusion. Program evaluation could also be improved. There is some frustration that programs are not building on past efforts, programs are only achieving awareness of basic information and significant adoption and practice change is not being achieved.

Future Directions for a regional approach to soil health

Future directions for a regional approach to soil health have been matched to the key focus areas reflecting State and national priority areas and have also been aligned to the Goulburn Broken SHAP Programs. This framework also matches the key areas put forward by Campbell (2008): developing knowledge, building capacity, and encouraging change.

Focus areas	GB SHAP Program	Future Directions
Improve our knowledge and evidence base Identifying and filling common knowledge gaps, facilitating sharing of data from research and development activities of others in the catchment, and monitoring outcomes of on-ground works.	Program 7 Research and investigation Program 6 Monitoring and Evaluation	• Facilitate sharing of research information including results of trials and demonstrations in the catchment. • Identify common knowledge gaps and facilitate expertise to assist filling knowledge gaps.
Build community and institutional capacity and partnerships Providing opportunities to share information, expertise and building a culture of shared learning in partnership with local communities and businesses, fostering communication and efficiency, and using program evaluation and reporting to improve soil health outcomes and their flow-on benefits for communities.	Program 1 Coordination Program 2 Community Education Program 5 Local Government Planning Program 6 Monitoring and Evaluation	• Facilitating and building a culture of shared learning between all organisations involved in soil health and foster communication and coordination. • Compiling common program evaluation questions to improve program planning and soil health outcomes.
Encourage appropriate Landholder behaviour and actions Working with communities and industry to develop best practice standards for soil health, acknowledge and reward high environmental performance, promote local and regional innovation for better soil health management, and use market interventions where appropriate and required.	Program 2 Community Education Program 3 Best management Practice Program 4 Whole Farm Planning	• Promote best practice soil health management with small adoptable steps for landholders and acknowledge or reward innovative soil health management. • Further develop the program logic for soil health extension with a range of extension programs and approaches to progress landholders from awareness to adoption with partner organisations and community organisations.

Evaluation processes for soil health activities

A regional approach to soil health needs to include an evaluation plan with clear and consistent evaluation processes for participant feedback collation, analysis and storage of data. The evaluation plan needs to clearly outline the objectives of the evaluation and the audiences for the findings of the evaluation. The evaluation plan can be usefully structured around the program logic for the soil health program and included in the Land Health MERI Plan.

Common event/activity evaluation questions are needed that would enable information on community interest in soil health to be shared across the catchment. These common evaluation questions need to be adopted and used by agency and community led projects. The CMA will need to investigate ways this information can be captured, compiled and shared. Compiling and sharing responses to common program evaluation questions can improve program planning and potentially improve program outcomes.

Common event/activity evaluation questions could include:

1. What did you enjoy most about this event/session/activity?
2. What do you intend to implement or trial on your property from this event/session/activity?
3. What further information might be useful to you in relation to improving the soil health and/or management or your property?

Recommendations

Recommendations on key directions for a regional soil health program include:

- **Facilitate sharing of research information including results of trials and demonstrations in the catchment**
    - Investigate ways to capture and share research information and results including historical research. This may involve hosting an annual or biannual forum and inviting researchers and community groups involved in trials and demonstration sites in the catchment to report their results. Research/project reports could also be posted on the CMA website.
    - The CMA could also identify and promote the use and reporting of a common suite of soil tests for monitoring outcomes of on ground works (e.g. pH, organic carbon, microbial biomass and bulk density) to ensure research and demonstration results can be shared and compared. These could be based on and linked to the Soil Quality Monitoring Program (www.soilquality.org.au). This program provides information and resources on all three components of soil health - physical, chemical and biological. A central part of this web resource is the facility for producers to input their soils physical, chemical and

biological properties and for those values to be benchmarked against values for their region.

- **Identify common knowledge gaps and facilitate expertise and research to assist filling knowledge gaps**
    - The Land Health Forum convened by the CMA could assist the CMA to identify common knowledge gaps. A number of knowledge gaps were identified at the Regional Focus Group meeting in Euroa, including:
        - Conceptual models for SOC, acidification process - for extension purposes.
        - Information on how inputs impact on soil health.
        - How to manage different genera of soil biology.
    - The CMA could play a role in facilitating expertise to assist with filling these gaps using expertise in partner organisations such as DPI.
    - The CMA could also encourage longer term trial sites in the catchment. Research could particularly explore managing soils in the face of changing climate conditions - both the wet and the dry (improving soil physical properties to increase water holding capacity and the overall water balance).
- **Facilitate and build a culture of shared learning and collaboration between all organisations involved in soil health**
    - Foster cross communication with all the players and awareness of who is working on what, where, to help to coordinate effort and reduce the risk of landholder confusion and sense of bombardment. There are a range of organisations working in the soil health space in the catchment. There are concerns about the potential duplication of effort in promoting soil and land health in the catchment and the potential for programs to be competing for the same audience.
    - The Land Health Forum could assist the CMA to host training events or forums with expert speakers building capacity in all organisations involved. This would also build a culture of shared learning rather than competition and provide opportunities for cross communication and coordination between organisations.
- **A regional approach to soil health needs to include an evaluation plan with clear and consistent evaluation processes for participant feedback collation, analysis and use of data**
    - An evaluation plan structured around the program logic for the soil health program needs to be developed and incorporated into the Land Health MERI Plan.

  - Common evaluation questions need to be developed for use by agency and community led projects. Common event/activity evaluation questions could include:
    - What did you enjoy most about this event/session/activity?
    - What do you intend to implement or trial on your property from this event/session/activity?
    - What further information might be useful to you in relation to improving the soil health and/or management or your property?
  - The CMA will need to investigate ways this evaluation information can be captured, compiled and shared. Compiling and sharing responses to common program evaluation questions can improve program planning and potentially improve program outcomes.

- **Promote the on farm trialling and demonstration of best practice soil health management with small adoptable steps for landholders and acknowledge or reward innovative practices that improve soil health management**
  - Support and information on how to trial best management practices with clear steps for set up and monitoring could be a useful addition to the current Soil Health Test Kit. On farm trialling of practices is an important phase in the adoption and practice change process. The Land Health Forum could review each best management practice to ensure clear, small adoptable steps for the set up and monitoring of on farm trials and demonstrations. These could be promoted by the current range of projects and activities in the catchment.
  - Local soil health projects and activities that promote best practice and encourage innovation need to be supported. Options for how innovative practices by landholders that improve soil health can be acknowledged through the current Landcare awards program run by the CMA or other award programs should be explored.
- **Further develop the program logic for soil health extension by incorporating a range of extension programs and approaches to progress landholders from awareness to adoption with partner organisations and community organisations**
  - The current program logic used for soil health extension needs to be further refined with partner organisations. There are concerns that soil health programs are only achieving awareness of basic information and significant adoption and practice change is not being achieved. The underlying assumptions in the logic need to be surfaced and tested to ensure appropriate extension approaches are targeted to progress landholders from awareness to adoption.

- The range of landholder motivations in soil health need to be explored to ensure messages and extension approaches are tailored appropriately. For some, the relationships between soil health and productivity gains may be most important while for others the relationship between soil health and ecosystem health and/or human health may be more important.

Appendices

Appendix 1: Documents Reviewed

1. Soil Health Action Plan Review Oct 2010
2. GB Soil Health Action Plan 2006
3. GB CMA Draft Soil Health Strategy 2002 (Internal Document)
4. Notes from March 2011 Yarck meeting (Internal Document)
5. Draft Victorian soil health strategy 2011, DSE (Internal Document)
6. MacEwan RJ (2007) Soil health for Victoria's agriculture: context, terminology and concepts MIS 07898 Final Report, Department of Primary Industries, Bendigo.
7. Campbell A (2008) *Managing Australia's Soils: A Policy Discussion Paper*. Prepared for the National Committee on Soil and Terrain (NCST) through the Natural Resource Management Ministerial Council (NRMMC)

Appendix 2: Agenda of the Regional Focus Group Meeting held in Euroa on 2/12/2011

Meeting Objectives:

- To identify current activities and programs that address soil health in the catchment.
- To identify what is currently working well and not so well with the current activity.
- To identify potential gaps in the current program of activities that need to be considered in a regional approach to soil health in the catchment.
- To identify key soil health information gaps/needs for soil health projects.

Meeting agenda

10 am Arrive tea and coffee

10.15am Welcome - Rhiannon and Mark

10.35 Review of Current Activity -

- What are the current activities, projects, programs that address soil health in the GB Catchment that you are involved in or know about?
- What are the objectives and key activities for each of the projects/programs?

11.00 Analysis of Current Activity -

- What is currently working well or not so well for each of these projects/programs?
- What are the lessons learnt from current and past activities/projects/programs?
- What are the gaps? what other key regional issues/priorities need to be considered in a regional approach to soil health in the catchment?

11.40 Information gaps/needs -

- What soil information is currently used and available for soil health projects/program planning?
- What are the key information gaps/needs?

12.00 Next steps and Close

Appendix 3: Outcomes from the Focus Group meeting in Euroa on 2/12/11

Participants at the focus group reviewed the current activity to identify the key strengths and the lessons learnt for future planning.

What is currently working Well? What are the key strengths of the current activity?	What is not working so well currently?
• farmer interest in soil health • Whole Farm Planning (WFP) is a good door opener • growing recognition from investors of the need to look at the business side of adoption • appealing to the drivers of the problem • partnerships with organisations • program logic approach in extension • private suppliers of information and expertise • DPI/CMA provide independent advice • leading to other benefits - economic, environmental and social • lots of people working in the space	• not pooling the knowledge - repetition • not moving on or building on the knowledge and experience • trials are often short lived • how to move beyond WFP • not getting the adoption of information and the change in management practice, putting the understanding into action • impact of drought on ability to implement changes • not enough expertise and extension experience • cost of private expertise • communication/linkages/coordination - inconsistent messages, bombardment of information • lack of consultation

Key lessons learnt for future programs:

- provide small adoptable steps
- work closely and collaboratively with people, giving everyone a voice
- need to understand what the land managers want to achieve and their motivations
- need to keep activity local
- don't underestimate the community's ability to run these projects/programs
- soil health means different things to different people
- utilise what we have e.g. trial sites
- need some longer term trial sites
- need ways to capture and share information and results

- farmer driven trials and demos generate greater commitment to the trials and demos

Gaps or potential areas for consideration for a regional approach:

- definition of soil health
- management of expectations of project funding
- tailoring messages to match different motivations
- matching expertise with need
- evidence based agriculture approach
- holistic view of soils and its fit into the whole farm system
- communicating the relationships between soils and productivity
- facilitating cross communication with all the players and upward communication
- managing the wet and the dry of the climate
- range of extension approaches to progress from awareness to adoption
- dryland farmers in the SIR

Useful information sources:

- peer reviewed science on matters relevant to sustainable soils management
- practical case studies from MLA, DPI, CMA
- GB soil health kit and procedures booklet
- DPI soil sampling procedure
- chough chat
- field days
- websites e.g. VRO, DPI, Evergraze, GB CMA, ASRIS
- Agnotes
- Potassium for pastures by Hosking
- Trace elements for Victoria by Cadle *et al*
- Potential productivity of pastures by Saul and Koarny
- Target 10 soils and fertiliser course manual
- Incitec Pivot Agronomy Advantage manual
- Better Fertiliser Decisions
- APEN papers
- Grasslands Productivity Program - final report

- Making better fertiliser decisions for grazed pastures in Australia - technical booklet
- Hamilton long term P trial report

Information gaps:

- conceptual models for SOC, acidification process - for extension purposes
- information on how inputs impact on soil health
- how to manage different genera of soil biology, if they are not there how do we get them
- who is working on what where
- historical data/research - what has happened in the past locally and results to build on, past projects courses
- local trial data - sharing of information between research and extension departments and organisations

Appendix 4: Key Project Stakeholders Consulted

Key Stakeholders	Project Engagement Approach
Brad Costin- DPI	Focus group
Mark Cotter - GB CMA	Focus group
Rhiannon Apted - GB CMA	Focus Group
Steve Wilson - GB CMA	Focus group
Neil McLeod- DPI	Focus group
Alison Desmond - DPI	Focus group
Declan McDonald - DPI	Focus group
Kerri Robson- Landcare	Focus group
Cathy Olive- Landcare	Interviewed
Kerstie Lee- Landcare	Focus group
Sonia Sharkey- Landcare	Interviewed
Jacci Campbell- Landcare	Focus group
Jim Shovelton- Mike Stevens & Associates	Focus group
Judy Brookes- Landcare	Focus group
Fiona Hart/Allison Glover- Producer group	Interviewed
Amanda McClaren- Producer group	Focus group
Kerry Goschnick- DPI	Focus Group
Leah DeVries - DPI	Focus Group
Claire Wade - DPI	Focus Group