Soil Monitoring Action Plan (Implementation)

Briefing for CAMERAS Monitoring Coordination Group - 25 March 2013

Prepared by Helaina Black (JHI), Patricia Bruneau (SNH), Karen Dobbie (SEPA) on behalf of the Soil Focus Group.

1. Background

Soils provide a range of essential functions vital for our life on earth. However, soils are subject to a range of pressures which can lead to the degradation or loss of these functions. In turn, loss of soil function can lead to a range of environmental and socioeconomic impacts. It is therefore imperative that we know if our soils are being managed in a sustainable way and adequately protected so that they are not being degraded. Development of the Soil Monitoring Action Plan (MAP) has identified the need for soil data and information for a wide range of policy, management and planning issues beyond soil protection *per se*. Further information on the development of the Soil MAP can be found in the Soil MAP Report Update 2, 1 November 2012 (CAMERAS Paper).

It is well recognised that Scotland has a solid base of historical soil data, including that from the National Soil Inventory of Scotland. These data have been widely used by a variety of stakeholders over many years. However, a major limitation in moving forward is the lack of information on whether or how Scotland's soils are changing, and if this is leading to soil degradation. In contrast with air and water, there is no systematic monitoring of Scotland's soils to provide regular up-dates on the state of our soil resource and to address known limitations in spatial resolution and with the advanced age of existing data. The few active soil monitoring activities that do exist are targeted on specific issues or locations. The soil MAP sets out a strategy for a more integrated approach to soil monitoring in Scotland with a view to addressing soil data needs for multiple purposes; its implementation will provide the soil data necessary for current and future stakeholder needs.

2. Prioritisation

A number of short-range tasks for monitoring have been identified that would fulfil specific requirements of the soil MAP (Table 1). These were prioritised as they could be delivered by linking to existing activities or by using existing data resources. Further discussion is required with the groups undertaking these existing activities to determine the feasibility of implementing this approach.

Additional monitoring tasks were identified, but as they require further development they have been allocated to a series of Task and Finish (T&F) groups which should be initiated to finalise the specific monitoring actions required, as discussed in section 3 below.

Finally, there is a remaining gap in our understanding of the soil monitoring needs of organisations outwith Government and agency bodies e.g. local authorities, land managers, etc. A follow-up survey is required to address this gap, which could also link to the Scottish Soil Database and Website (SSDW) activities.

Table 1. Short-range tasks for monitoring

Issues	Links to on-going activities	Related area which benefit	Lead organisation
Soil carbon and peatlands Establish baseline for the status of soil carbon in Scotland's peatlands Audit of cumulative impacts on peatland soil	SNH Green Stimulus Peatland Restoration Project Plan	Climate change Biodiversity Scottish Soil Framework	SNH
Soil erosion in agricultural land How widespread is erosion of agricultural soils?	SEPA catchment walks	Water quality GAEC / agriculture Scottish Soil Framework	SEPA
Soil sealing What is the current extent of sealing on soils (i.e. current baseline) What quality of soil has been lost? What are the implications of current development plans for soils?	No on-going activities but feasible given existing data resources	Planning Scottish Soil Framework	The James Hutton Institute,
Soil nutrient status Status and trends in soil nutrients with a focus on agricultural soils	RESAS research programme (outputs from the NSIS2)	Water quality Scottish Soil Framework	The James Hutton Institute
Forest soils Establish robust baseline for monitoring forest soils in Scotland	Forestry Commission Scotland	Climate change Scottish Soil Framework	FCS
Soil biodiversity Baseline for Scotland's soils	RESAS soil biodiversity research	Biodiversity Scottish Soil Framework	The James Hutton Institute, CEH

3. Task and Finish groups, organisation and remit

Task and Finish (T&F) groups are proposed as a practical way of finalising monitoring actions identified during the initial development of the soil MAP (Soil MAP Report Update 2, 1 November 2012). These groups would be set up for a limited period of time to bring together the relevant expertise to prioritise monitoring tasks, identify delivery mechanisms and organisations to be involved. Table 2 identifies the proposed T&F groups along with organisations that should be represented on them and the main issues to be considered. These groups are not comprehensive and it is expected that others may be required as the programme develops. Specific requirements have also been identified and will be provided to each group (Table 3). Table 4 lists a range of questions that the T&F groups will be asked to consider. The T&F groups would be coordinated via the Soil Focus Group with support from the Integrated Monitoring Programme group. The T&F groups should be set up based on existing networks to avoid duplication of effort. CAMERAS support will be required to identify individuals and groups which could take part and lead these activities.

Table 2. Task and Finish (T&F) groups: expected contributing organisations and main issues covered

Task and Finish Group	Lead	CAMERAS	MRPs	Other organisations	Linkages	Soil functions for monitoring	Suggested main issues to consider linked to SSF Soil Outcomes (not exclusive)
Agriculture	JHI	QMS, SEPA, SNH	SRUC, JHI, Rowett, Moredun	NFUS, Crofting Commission, CEH,	Link to discussions on SRDP, build on farmer collected data (e.g. SRUC)?	Food and fibre production Regulating Carbon / GHGs Habitats/biodiversity Human and animal health Sustainable soils	• food production (SO8) • erosion (SO2) • compaction (SO3) • soil carbon (SO1) • climate change (SO4) • biodiversity (SO5)
Woodland & Forestry	FCS or FR	SNH, FCS	JHI	Commercial forestry (CONFOR?)	Build on existing initiative between JHI and FCS on soils.	Fibre production Regulating Carbon / GHGs Cultural heritage Habitats/biodiversity Sustainable soils	• soil carbon (SO1) • erosion (SO2) • compaction (SO3) • timber production (SO8) • climate change (SO4) • water quality (SO7) • biodiversity (SO5)
Peatland	SNH	FCS, SNH, SEPA	JHI	NFUS, Env Link, CEH	Link to Peatland Plan	Carbon / GHGs Regulating Habitats/biodiversity Cultural heritage Sustainable soils	• soil carbon (SO1) • biodiversity (SO5) • climate change (SO4) • water quality (SO7) • flooding (SO6)
Sealing	JHI	SEPA, SNH,		BGS / local authorities		Providing platform Regulating Cultural heritage Carbon / GHGs	• development (SO10)
Contaminated land	SEPA			local authorities / BGS	Link to Dealing with land contamination in Scotland (2009) report outcomes	Food and fibre production Regulating Human and animal health	• soil contamination (SO9) • development (SO10)
Urban	SEPA or BGS	SEPA, SNH, FCS	JHI	BGS, local authorities, CSGN	Start with Glasgow as case-study?	Providing platform Cultural heritage Regulating Carbon / GHGs Habitats/biodiversity Human and animal health Sustainable soils	• soil carbon (SO1) • development (SO10) • soil contamination (SO9) • flooding (SO6) • climate change (SO4) • biodiversity (SO5) • water quality (SO7)
Catchments / water quality	SEPA	SEPA, SNH	JHI, SRUC	Scottish Water / DPMAG / RBMP	Link to CREW	Regulating, Sustainable soils,	• water quality (SO7) • flooding (SO6) • erosion (SO2)

Task and Finish Group		Lead	CAMERAS	MRPs	Other organisations	Linkages	Soil functions for monitoring	Suggested main issues to consider linked to SSF Soil Outcomes (not exclusive)
relevant to all groups	**Integrated monitoring programme**	JHI / BIOSS	SEPA, SNH, FCS,	All MRPS	NFUS, Crofting Commission, NGO	Link to RESAS research activities and SG Underpinning Capacity	ALL	ALL
	Innovations in monitoring	JHI	SEPA, SNH, FCS,	All MRPS	CEH, BGS, Universities	Link to RESAS research activities and SG Underpinning Capacity	ALL	ALL

Table 3. Tentative list of issues to be considered in T&F groups (not comprehensive) highlighting relevant policy areas outwith the Scottish Soil Framework

Issue	Action	T&F group owner	Outcome	Related policy / user
Monitor the effectiveness of restoration on peatland soils and associated benefits	Completion of the peatland inventory and update on degradation status of the peat soils. Devise monitoring strategy for peatlands Include • Emissions abatement • Water related issues • Biodiversity	Peatland	National to site level evidence including annual (?) information on how many sites are under restoration affecting soils, and how they are being restored, for example. Strategy to assess condition of peat soils as relating to different benefits	Habitats Directive for designated sites Emissions abatement - Climate Change Act Scottish Biodiversity Strategy – ecosystem services
Soil monitoring data needed to comply with IPCC Technical Guidelines	Review soil data requirements for current and revised IPCC Guidelines and determine whether existing resources are sufficient	Peatland / Agriculture / Woodland and Forestry	National reporting	Climate change
Monitor contribution of forest /woodland soils to climate change mitigation	Establish representative baseline for the status of carbon in forest soils	Woodland and forestry	Status of SOC in forest soils – national picture. Build on on-going activities	Climate Change Act, Land Use Strategy
Monitoring of forest / woodland soils as they relate to multiple benefits	Determine whether current approaches and data are sufficient to monitor for multiple benefits from woodland and forest soils	Woodland and forestry	Soil condition for multiple benefits	Climate Change Act, Land Use Strategy
Monitoring capacity of agricultural soils to maintain food production	Determine whether existing resources and data are sufficient to monitor for soil quality as it relates to food production	Agriculture		Food security

Issue	Action	T&F group owner	Outcome	Related policy / user
Monitoring compliance with GAEC for soil quality	Determine whether existing resources and data are sufficient to monitor for SOM, erosion, compaction and sludge regulations Improve integration of existing compulsory monitoring activities Establish what is required to monitor actual erosion as opposed to modelled erosion risk Is it possible to monitor compaction?	Agriculture	Compliance monitoring (build on existing activities) Can we get all soils sent to commercial labs analysed for soil carbon? What would that tell us? Would it be useful?	Climate Change Act SRDP Compliance with GAEC Sludge (Use in Agriculture) Regulations
Monitoring success of agri-environment schemes as they relate to soils	Determine soil information relevant to assess success of schemes and whether the current level of soil monitoring is adequate	Agriculture	Evaluation of sustainability of agri-scheme	Scottish Biodiversity Strategy
Other waste management regulations	Consider the outcomes of the recent SEPA review of the application of organic materials to land	Agriculture / Woodland and Forestry		Waste Management Licensing Regulations
Monitoring soils to improve water quality and reduce flooding	What data are required and can local engagement provide useful data e.g. catchment walks	Catchments – linking to freshwater	Catchment walks –what can the data be used for re. monitoring – collate the data and assess what use it is	Water Framework Directive, Controlled Activities Regulations.
Monitor the impact of sealing on soils	Determine what data can be brought together to provide monitoring of sealing impacts on soil functions. In particular carbon, food production and soil cultural heritage	Infrastructure	Produce annual estimates for sealing (GMES data) by land class, rare soil and carbon	Planning
Monitor the quality of soils in urban areas and how they relate to multiple functions	Using Glasgow LA as a case study, establish what soil monitoring would be required and whether existing resources and data can meet these needs	Urban	Strategy for monitoring of soil quality to address local authority level needs	Water quality Flooding Contaminated land
Innovation in soil monitoring	Remote sensing and aerial photograph	All	Underpinning capacity	
Innovation in soil monitoring	Rapid in-situ methods	All	Underpinning capacity	
Compatibility in soil monitoring	Standard protocols for sampling and analyses	All	Underpinning capacity	

Table 4. Monitoring requirements – targeted questions for T&F group discussion

General issues	Further detail
What information is needed that includes soil data?	• At what spatial scale is this information needed?
	• How often does this information need to be updated?
	• How will it be used e.g. spatial map, location values, etc.?
What soils data are needed?	• What spatial scale does the data need to be collected at?
	• How often does the data need to be updated?
How should monitoring be carried out?	• What existing data sources should be used as a baseline?
	• If no existing baseline, what should the baseline include?
	• What sampling strategies are needed and who should do the sampling?
	• What analytical approaches are needed and who should do the analyses?
	• How should monitoring be carried out?
What opportunities are there for innovation and non-specialist engagement?	

4. Communicating monitoring

Data and information collected from existing and future soil monitoring activities will continue to be disseminated though the usual channels by lead/funding organisations (e.g. commissioned research reports, scientific publications).

In addition, it is envisaged that all relevant data collected will ultimately be collated and stored in the Scottish Soil Database and made available to stakeholders via the accompanying website. This will required additional resource for the analysis, interpretation and presentation of soil monitoring data which still remain to be resolved. Further development of the soil MAP would require this information with distinct routes of dissemination from the soil MAP to SSDW.

5. Next steps

A stepped timetable for delivery in 2014 is proposed in Table 5. A comprehensive and integrated soil monitoring programme for Scotland will take time to fully implement and it is envisaged that further prioritisation will be required. A revised timetable would be produced after the T&F Groups have reported.

Table 5. Timetable for delivery of specific tasks and proposals for organisations involved

	2013						2014		
	Mar	April	May	June	July - Sept	Oct - Dec	Jan - Mar	Lead organisation	Other organisations
Set up T&F groups to define monitoring priorities (per sector)	X	X						SFG monitoring subgroup	JHI, SNH, SEPA
T&F groups to deliver tasks		X	X	X				See table 2	See table 2
Reporting to CAMERAS					X			SFG monitoring subgroup	
Collate information from T&F groups and analysis of monitoring needs					X			SFG monitoring subgroup	SNH, SEPA, JHI
Devise soil monitoring network					X	X	X	JHI / BioSS	FCS, SNH, SEPA
Finalise soil MAP programme							X	SFG monitoring subgroup	