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	Related area which	Lead
	activities	benefit	organisation
Soil carbon and peatlands	SNH Green Stimulus	Climate change	SNH
Establish baseline for the status of	Peatland Restoration	Biodiversity	
soil carbon in Scotland's peatlands	Project Plan	Scottish Soil	
Audit of cumulative impacts on		Framework	
peatland soil			
Soil erosion in agricultural land	SEPA catchment walks	Water quality	SEPA
How widespread is erosion of		GAEC / agriculture	
agricultural soils?		Scottish Soil	
		Framework	
Soil sealing	No on-going activities	Planning	The James
What is the current extent of sealing	but feasible given	Scottish Soil	Hutton
on soils (i.e. current baseline)	existing data resources	Framework	Institute,
What quality of soil has been lost?			
What are the implications of current			
development plans for soils?			
Soil nutrient status	RESAS research	Water quality	The James
Status and trends in soil nutrients	programme (outputs	Scottish Soil	Hutton
with a focus on agricultural soils	from the NSIS2) Framework		Institute
Forest soils	Forestry Commission	Climate change	FCS
Establish robust baseline for	Scotland	Scottish Soil	
monitoring forest soils in Scotland		Framework	
Soil biodiversity	RESAS soil biodiversity	Biodiversity	The James
Baseline for Scotland's soils	research	Scottish Soil	Hutton
		Framework	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 Fi	inish 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
8 3. P	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	Completion of the peatland inventory	Peatland	National to site level evidence	Habitats Directive for designated
of restoration on peatland	and update on degradation status of the		including annual (?) information on	sites
soils and associated	peat soils.		how many sites are under restoration	Emissions abatement - Climate
benefits	Devise monitoring strategy for peatlands		affecting soils, and how they are being	Change Act
	Include		restored, for example.	Scottish Biodiversity Strategy –
	 Emissions abatement 		Strategy to assess condition of peat	ecosystem services
	 Water related issues 		soils as relating to different benefits	
	Biodiversity			
Soil monitoring data	Review soil data requirements for	Peatland /	National reporting	Climate change
needed to comply with	current and revised IPCC Guidelines and	Agriculture /		
IPCC Technical Guidelines	determine whether existing resources	Woodland and		
	are sufficient	Forestry		
Monitor contribution of	Establish representative baseline for the	Woodland and	Status of SOC in forest soils – national	Climate Change Act, Land Use
forest /woodland soils to	status of carbon in forest soils	forestry	picture. Build on on-going activities	Strategy
climate change mitigation				
Monitoring of forest /	Determine whether current approaches	Woodland and	Soil condition for multiple benefits	Climate Change Act, Land Use
woodland soils as they	and data are sufficient to monitor for	forestry		Strategy
relate to multiple benefits	multiple benefits from woodland and			
	forest soils			
Monitoring capacity of	Determine whether existing resources	Agriculture		Food security
agricultural soils to	and data are sufficient to monitor for soil			
maintain food production	quality as it relates to food production			

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 agrienvironment 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 agrischeme	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	 At what spatial scale is this information needed?
that includes soil data?	 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	What existing data sources should be used as a
carried out?	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 -	Oct -	Jan -	Lead	Other
					Sept	Dec	Mar	organisation	organisations
Set up T&F groups	\ /								
to define								SFG monitoring	JHI, SNH,
monitoring	X	X						subgroup	SEPA
priorities (per								Subgroup	JLFA
sector)	/ \	/ \							
T&F groups to								See table 2	See table 2
deliver tasks								See table 2	See table 2
Reporting to								SFG monitoring	
CAMERAS								subgroup	
Collate information									
from T&F groups								SFG monitoring	SNH, SEPA,
and analysis of								subgroup	JHI
monitoring needs					$/ \setminus$				
Devise soil								JHI / BioSS	FCS, SNH,
monitoring network								JUI / DI022	SEPA
Finalise soil MAP								SFG monitoring	
programme								subgroup	