





UK Environmental Change Network Terrestrial site location map (<http://www.ecn.ac.uk/images/terr-site-locations-with-labels/view>)

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## Executive Summary

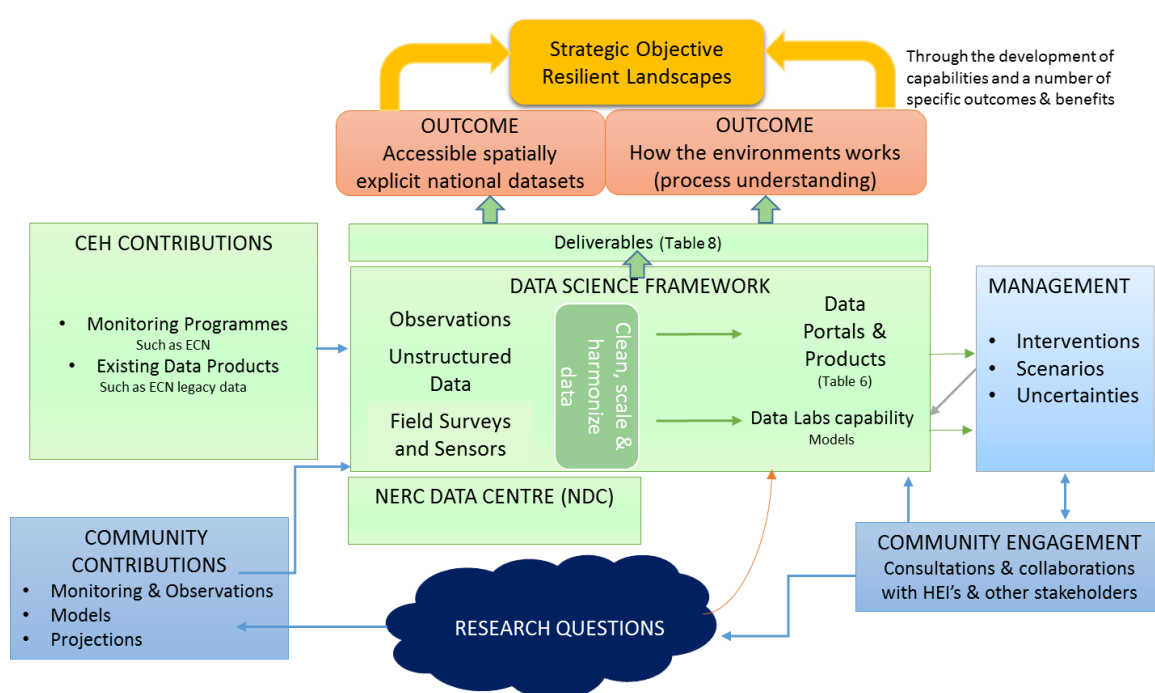
Feedback was sought from Environmental Change Network (ECN) site managers on the role of UK-SCAPE in supporting the network ECN at the site managers meeting on January 27<sup>th</sup>-28<sup>th</sup> 2020. Representatives from collaborating institutions commented not only on the period covered by UK-SCAPE, but also on the longer relationship the network has had with NERC National Capability support. The stakeholders appreciated the role of UKCEH through the processes of co-design, co-delivery and co-development in shaping the ECN. They further commented on the co-dependency conferred by the network for their institutions and sites. While several stakeholders noted that while they did not benefit directly from UK-SCAPE funding, they recognised that funding was required for coordination of the network in addition to collecting monitoring data. They highlighted the risk to the UK environmental science community of failure of the network and the lost opportunities in terms of collaborative working and data if funding is not maintained in the network.

## Contents

Executive Summary .....	3
Introduction .....	4
Stakeholders engagement .....	5
Results and Discussion .....	5
Conclusion.....	9
Acknowledgements.....	9
Appendix 1 UK ENVIRONMENTAL CHANGE NETWORK CONSULTATION.....	11
External stakeholder 1 .....	11
External stakeholder 2 .....	12
External stakeholder 3 .....	13
External stakeholder 4 .....	14
External stakeholder 5 .....	15
UKCEH 1 .....	16
UKCEH 2 .....	17
UKCEH 3 .....	18

## Introduction

The UK Environmental Change Network (ECN - a multi-agency long-term ecosystem research network) held a site managers meeting Monday 27<sup>th</sup> and Tuesday 28<sup>th</sup> January 2020 at UKCEH Lancaster. The purpose of the event was to update and exchange information and, to a limited extent, horizon scan for the future. During the meeting, all site managers were made aware that UKCEH's coordination and data providing roles from Cairngorm, Wytham and Moorhouse sites were funded through the five-year UK-SCAPE programme. The Natural Environmental Research Council as part of a National Capability Science Single Centre award funds UK-SCAPE. The aim of the UK-SCAPE programme is to undertake research and provide national-scale data and models designed to deliver new integrated understanding of the environment to tackle environmental challenges (Fig 1).



Green: UKRI/NERC NC funded activities Blue: Community activities

**Figure 1: The conceptual framework of UK-SCaPE underpinning activities**

Following a series of presentations (Table 1) which highlighted the various activities wholly or part funded via the UK-SCAPE program the attendees were invited to discuss the role of UK-SCAPE in the context of the ECN network and their institutions.

**Table 1. Series of UK-SCAPE presentations delivered to representatives at the ECN site managers meeting prior to consultation**

Title	Presenters
Current status of the ECN data work	Katie Muchan and Bev Dodd
Publishing the ECN datasets and the data paper (Sue Rennie)	Sue Rennie
Current projects and papers using ECN data	Don Monteith
State tagging for environmental data quality assurance	Michael Tso

## Stakeholders engagement

All site managers were considered stakeholders in the context of ECN and UK-SCAPE. The site managers of the three sites managed by UKCEH staff and part funded by UK-SCAPE (Cairngorms Wytham and Moorhouse) were considered stakeholders as they utilised the services of the ECN coordination team. The opinions of the representatives from Cairngorms Wytham and Moorhouse were not substantially different from the other site representatives, and we have refrained from quoting them in this report.

The aim of this stakeholder consultation exercise was to collect the site managers' views on the role of UK-SCAPE funding on the present and future of the ECN network from their perspective. A two-phase approach to the consultation was designed as not all stakeholders were in the room. Colleagues from James Hutton Institute, responsible for the ECN sites at Glensaugh and Sourhope connected via a video link.

Initially all site managers were asked to note individually their thoughts in each of the three processes identified as critical by UK-SCAPE i.e.

**Co-design** - Ensuring UK-SCAPE outcomes in terms of ECN are fit for purpose to support the UK science base

**Co-delivery**- Working with partners to deliver more than we could alone

**Co-development** - Maximising opportunities to build on UK-SCAPE science and scientific collaboration

Site managers were asked to consult when more than one representative of the site was present and complete a simple SWOT (Strengths Weaknesses Opportunities & Threats) analysis table (Table 2). Site managers from Rothamsted and North Wyke, which are funded by the same institution, were asked to consult so an institutional perspective was presented. Colleagues from James Hutton Institute participated in the meeting via a remote link. They also completed the SWOT table, emailed their thoughts. All participants were asked to comment on drafts of this report to ensure their views were fully and accurately represented.

## Results and Discussion

There was much commonality in the responses written by the site managers, which are summarized in Table 2 and provided in full in Appendix 1.

Table 2 Summary SWOT analysis following consultation with ECN site managers on the role of UK-SCAPE funding in terms of the ECN network

<b>The Present</b>		<b>The Future</b>	
<b>Strength</b>	<b>Weakness</b>	<b>Opportunity</b>	<b>Threat</b>
<b>Co-design</b>			
<b>Ensuring UK-SCAPE outcomes in terms of ECN are fit for purpose to support the UK science base</b>			
<p>Long-term, standardised methods providing baseline data on ecological and environmental data. Can communicate openly with ECN management to develop ideas and receive information. Standardised protocols ensure between-site consistency and comparability. Published datasets with DOI provide recognition of activity and free access to data. Substantial use of ECN data for HEI teaching purposes. Sites can develop complementary side research and projects to enhance data/student placements.</p>	<p>Lack of flexibility to select methods more suitable to site needs. Length of time to make data available on website. Monitoring doesn't generate enough research outputs to attract funding for data analysis. The "business model" encourages others to use data, but this model inefficient. More use could be made of ECN data by other big projects, e.g. NERC Multiple Centre projects when co-located. Stagnant protocols.</p>	<p>Expressed global need for long-term environmental monitoring. A collective and coherent voice from partners to influence decisions. New protocols can be rolled out at sites for opportunistic monitoring e.g. volcanic eruption. Possibility of broader representation on STAG. Scientific and analytical review of all data to ensure we are robust and feeding into European and global initiatives e.g. eLTER, ILTER, IPBES.</p>	<p>Global interest in using long-term monitoring not matched by funding. Monitoring doesn't generate enough research outputs to attract wider funders. BREXIT and UK Govt. future vision. Partner management structures and understanding at higher levels is a threat to sites. Continuity can be dependent on views of single money managers.</p>
<b>Co-delivery</b>			
<b>Working with partners to deliver more than we could alone</b>			
<p>Network of partners already established and communicating well. Data communication networks encouraged. Power in numbers (network of networks).</p>	<p>Different partners have different funding and objectives. Possibility of diverging objectives. No time available to train willing volunteers.</p>	<p>Sites can develop side research and projects to enhance data/student placements. Collaborative research projects making use of site</p>	<p>Funding.</p>

<b>Co-development Maximising opportunities to build on UK-SCAPE science and scientific collaboration</b>			
Network of partners Feeds into other networks	Incentive is for scientific output, but reality is funding is for data collection only.		Concerns about double funding. Insignificant within wider networks / lack of recognition. Internal conflict/competition (funding)

Five collective themes were identified relevant to the UK-SCAPE funding which are summarised in Table 3.

While several stakeholders noted that they could not benefit directly from UK-SCAPE funding, they recognised that this funding was essential for coordination and management of the network. Further, they considered that continued participation in the network strengthened the position of their sites within their organisations. The level of co-dependency varied but one representative commented that the support offered by ECN coordinator had been very important in saving his site.

The funding provided by UK-SCAPE to WP2 Data infrastructure was also recognised as a vital function enabling visibility for their sites in addition to curation and access to their data. The recent data paper in Earth System Science Data (Impact factor 10.95) led by Sue Rennie and the assignment of Digital Object Identifiers (DOIs) by the Environmental Information Data Centre (EIDC) for ECN datasets was greatly appreciated with external stakeholders. This was noted as a strength associated with co-delivery between external institutions and UK-SCAPE. External site managers commented as a strength of UK-SCAPE program "Data distribution network" and "Database/ QA; DOIs."

Several stakeholders considered that UK-SCAPE and previous National Capability funding had enabled impact through UKCEH staff's curation of the public facing ECN website. The site descriptions, and features such as the 'Explore ECN summary data' and 'Why the research matters' section of the website were much appreciated. Stakeholders from Rothamsted remarked that they had distributed selected 'Why it matters' flyers at their open day as they felt they presented the science well and in a manner accessible to the public.

One representative commented that in terms of impact through co-delivery it was "Already being demonstrated via Climate scenario modelling". They further commented that there is "Potential for integrated real time modelling of environmental fluxes".

"Delivering scientific papers" was echoed by many as a strength of the ECN coordination team. This clearly required central resourcing in order to have impact. Actions such as editing the 20-year ECN special issue published in Ecological Indicators (Impact factor 4.8) was recognised as a clear example of impact through co-delivery, but it was also recognised that a repeat of this would not be possible under the current level of UK-SCAPE funding. By the same token one representative commented "Site analysis by others have value within the sites (no time for analysis)" highlighting that while they could not analyse their own



data, (due to time restrictions) they appreciated the benefit enabled by the fact that ECN data was available for others to analyse and publish.

Some representatives, however, suggested that opportunities to have impact have been missed. For example, one stakeholder wrote "ECN data often not promoted and over looked by other groups even these within CEH" while another commented in the opportunity cell of the Co-development line i.e. opportunity to maximising and build on UK-SCAPE science and scientific collaboration "Explore possibilities of ASSIST using ECN data e.g. AWS, beetle, soil data."

The long-term, standardised methods providing baseline data on ecological and environmental data was recognised as a strength of the network. The role of UKCEH organising the Steering group and STAG meetings was considered vital and clear evidence of co-design. However, several also commented as a weakness that protocols were no longer being reviewed. One representative commented as an opportunity "New technologies to make protocols easier". Current UK-SCAPE funding is not sufficient for a review of protocols desired by stakeholders.

All site managers are facing reduced resources for long term monitoring and this prompted external representatives to comment "Unrealistic expectations that are difficult to reconcile in current financial situation" was a threat to ECN. While others wrote, "Withdrawal of funding puts all work in jeopardy"; "Limited resources at ECN mean that opportunities will invariably be missed" and "Lack / reduction of central co-ordination weakens the network and the "wins" of taking part".

One representative called for ECN to consider linking the natural and human dimensions of the sites when they wrote "Develop social science – involving public". Some sites are more responsive than others to this suggestion. For example, the ECN site in the Cairngorms is embedded into the long term socio-ecological research platform (LTSER) in the Cairngorms. The team have also recently won a BBSRC citizen science exploration grant entitled "Identifying synergies between citizen science and Long-Term Socio-Ecological Research (LTSER) in the Cairngorms National Park". It is hoped that this small grant may pave the way for greater integration between the place-based long-term monitoring community such as ECN members and the citizen science community.

Table 3 Positive and negative aspects of the UK-SCAPE program from the perspective of site managers.

<b>Theme</b>	<b>Positive aspects of UK-SCAPE funding</b>	<b>Negative aspects of UK-SCAPE funding</b>
Coordination	Active role to ensure standardised protocols, data quality assurance and encourage network publications. Vital role to encourage network continuity (e.g. letter of support for member sites)	Due to reduced funding limited network analysis as UKCEH site managers only funded to collect data and provide to coordination unit so analysis dependant on objectives of other WPs
Impact	Data publications and analysis (WP1.1 and WP2). Continuation of data collection at three sites in the network (WP7) thus benefiting the external	UK-SCAPE funding focused on monitoring at the UKCEH three sites with no staff time for network analysis by site-based research teams or funding of other sites in



	stakeholders. Existence of the network provides advantage for other funding such as eLTER-PLUS an EU project that has data accessibility aims aligned with ECN – UKCEH staff have ensured that all sites are equally represented in the eLTER databases ensuring visibility of monitoring data.	network. Similar resource constraints in network institutions has reduced their ability to analyse the monitoring data. Network analysis therefore conducted by others and a fear was expressed that impact is lost as site managers to not have opportunity to explore data and report change in environmental trends.
Protocols	Continuation of the strong leadership in standardising protocols.	No resources dedicated to reviewing protocols in the light of new technologies
Resources	The fact that UKRI recognise the benefit of continuing to fund ECN, although in a much reduced state, was noted as positive as once stopped the stakeholders believed the network would be lost	The reduced frequency of sampling at the three UKCEH sites, and lack of funding to (i) provide identification of beetles for external sites, (ii) analyse data and (iii) fund a review of protocol were highlighted by stakeholders
Legacy	By funding the coordination UK-SCAPE empowers site managers in other institutes to attract funding to monitor long-term environmental trends at their site (co-dependency)	Although strong protocols reliance on few key staff recognised as potential problem for UKCEH and the network e.g. only one person in Alice Holt with plant identification skills

## Conclusion

This report is co-authored by the UK-SCAPE stakeholders in the form of ECN site managers. They highlight the vital role of coordination of the network and the role historic and present funding (UK-SCAPE program) has in achieving a vibrant, integrated and impactful network. Relative to the historical level of support for ECN coordination and management provided by NERC National Capability funding, the current level of resource available via UK-SCAPE was seen as a serious threat to the network's continued viability. In addition to supporting the work through the processes of co-design, co-delivery and co-development they spoke of the co-dependency for their institutions as members of the network. This report will form part of UKCEH's reporting to the UK-SCAPE program mid-term review which will ensure stakeholders opinions are relayed to the program managers.

## Acknowledgements

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## Appendix 1 UK ENVIRONMENTAL CHANGE NETWORK CONSULTATION

Monday 27<sup>th</sup> January 2020

The five-year UK-SCAPE programme, is funded by the Natural Environmental Research Council as part of a [National Capability](#) Science Single Centre award. The aim of the UK-SCAPE programme is to undertake research and provide national-scale data and models designed to deliver new integrated understanding of the environment to tackle environmental challenges. It will improve our understanding of the consequences of interventions in the UK landscape and allow researchers to answer high-level questions relating to the environment. A small proportion of UK-SCAPE project funds UKCEH delivery in the ECN. The aim of this stakeholder consultation exercise is to collect your views on the present and future of the ECN network from your perspective. In 5 min please write individually your thoughts in each of the cells below and then we will discuss them with the aim of co-designing, co-delivering and co-developing in the future.

The responses of the non-UKCEH representatives are presented first followed by the responses from the three UKCEH site managers

### External stakeholder 1

	The Present		The Future	
	Strength	Weakness	Opportunity	Threat
Co-design Ensuring UK-SCAPE outcomes in terms of ECN are fit for purpose to support the UK science base	Uniform protocols Published data	Need to look at protocols to see if improvements can be made	More long term data Develop social science – involving public New protocols	Funding Site development Losing the ECN site
Co-delivery Working with partners to deliver more than we could alone	Contact with other sites to trouble shoot	Not all sites have equal funding	Growing new sites as the ECN name gets more mainstream New technologies to make protocols easier	Will sites drop away due to no future funding No central funding to help smaller sites
Co-development Maximising opportunities to build on UK-SCAPE science and scientific collaboration	Delivering scientific papers – becoming part of the Europe wide/ worldwide partnership		More group site visits to see what ideas that can help your site	Will ECN get lost in the larger picture??

## External stakeholder 2

	The Present		The Future	
	Strength	Weakness	Opportunity	Threat
<p>Co-design Ensuring UK-SCAPE outcomes in terms of ECN are fit for purpose to support the UK science base</p>	<p>This open consultation. Robust data management system and record keeping via current ECN. Data availability</p>		<p>A collective and coherent voice from partners to influence decisions</p>	<p>Unrealistic expectations that are difficult to reconcile in current financial situation</p>
<p>Co-delivery Working with partners to deliver more than we could alone</p>	<p>Already being demonstrated via Climate scenario modelling</p>	<p>“Needy” partners or those that have individual agendas</p>	<p>Building on already established links with collaborators. Facilitating data analysis in a coherent way by unifying separate data sets</p>	<p>With drawl of funding puts all work in jeopardy</p>
<p>Co-development Maximising opportunities to build on UK-SCAPE science and scientific collaboration</p>	<p>Combined experience so already know what does and doesn’t work. Already we have learned some lessons</p>		<p>Potential for integrated real time modelling of environmental fluxes? Updated as more data added therefore immediate sight of impact of changes made?</p>	

### External stakeholder 3

	The Present		The Future	
	Strength	Weakness	Opportunity	Threat
Co-design Ensuring UK-SCAPE outcomes in terms of ECN are fit for purpose to support the UK science base	Established protocols Strong methodology	Inability to adapt without approval for change in circumstances	Collective agreement for changing policies	Datasets not robust
Co-delivery Working with partners to deliver more than we could alone	Data distribution network Paper authorship Support Site comparison – data aspect of network is more than sum of individual sites	Lack of autonomy Knowledge gaps Funding	Collaborative working – other organisations Funding stream Availability for other organisations to work on the site to strengthen datasets	Potential loss of control of site management Knowledge gap
Co-development Maximising opportunities to build on UK-SCAPE science and scientific collaboration	Development opportunities Number crunching stats Developments e.g. apps etc Opportunities to join other networks Visibility		Furthering current present opportunities Use of data etc apps Understanding national development methods, therefore feedback and new ways of working and thinking Not isolated site	NRW not wanting to go in this direction

## External stakeholder 4

Note Filled in from a research point of view but ECN [site] is funded by FC who may have other priorities

	The Present		The Future	
	Strength	Weakness	Opportunity	Threat
Co-design Ensuring UK-SCAPE outcomes in terms of ECN are fit for purpose to support the UK science base	Provides central repository for data enabling all ECN network to be involved in network bids for funding Established protocols, gov uniform data	No advantage of new UKCEH UK-SCAPE only funds UKCEH sites No benefit to site in terms of funding or integrated approach to bids Not taking on board new more relevant measures	Relevant to scientific community but ECN site funding for AH is from the F.C. who get little benefit Data collected by ECN do not answer the questions relevant to UK forests	ECN not seen as important by FC. Little intervention from CEH with core FC funding. Not relevant to Forestry
Co-delivery Working with partners to deliver more than we could alone	Common protocols and data sets more valuable than single site Safety in numbers – expertise Site analysis by others have value within the sites (no time for analysis)	No central resource to enable cross site working between sites No central funding to ensure analysis	Network funding bids and inclusion in future bids stronger together	CEH not really interested in non-CEH sites even when part of the network “if CEH not supporting why should we”? Withdrawal of support due to funding cuts
Co-development Maximising opportunities to build on UK-SCAPE science and scientific collaboration	Integration of existing science e.g. ECN soils sampling of high importance to C. seq [sequestration] modelling React to occurrences e.g. Volcano monitoring	ECN data often not promoted and over looked by other groups even these within CEH	Stronger as network expertise to go for funding schemes not available to individual sites Joining with other networks	Limited resources at ECN mean that opportunities will invariably be missed Lack / reduction of central co-ordination weakens the network and the “wins” of taking part. CEH networks cross compete rather than work together

## External stakeholder 5

	The Present		The Future	
	Strength	Weakness	Opportunity	Threat
Co-design Ensuring UK-SCAPE outcomes in terms of ECN are fit for purpose to support the UK science base	STAG Regular meetings – review Workshops – specific scientific outputs On-line Database /QA Online tools – capture data summaries protocol			
Co-delivery Working with partners to deliver more than we could alone	Database/ QA Why it matters – useful overviews of research Papers Inform policy DOIs	Looking for novel ‘research’ research across all sides + funding + time limited Collecting soil data is expensive, up to now there is no outputs		
Co-development Maximising opportunities to build on UK-SCAPE science and scientific collaboration	eLTER/DEIMS		Explore possibilities of ASSIT using ECN data e.g. AWS, beetle, soil data Window to advertise datasets globally – develop international research	



## UKCEH 1

	The Present		The Future	
	Strength	Weakness	Opportunity	Threat
Co-design Ensuring UK-SCAPE outcomes in terms of ECN are fit for purpose to support the UK science base	Long-term, standardised methods providing baseline data on ecological and environmental data. Sites can develop side research and projects to enhance data/student placements.	Length of time for make data available on website. Stagnant protocols	EU is currently showing increased interest in ecology and long-term monitoring. Funding availability for network infrastructures. Possibility of broader representation on STAG.	Funding. BREXIT. UK Govt. Management structures and understanding at higher levels is a threat to sites.
Co-delivery Working with partners to deliver more than we could alone	Network of partners already established and communicating Power in numbers (network of networks)	Different partners have different funding and consequently objectives therefore possibility of diverging objectives.	Collaborative research projects making use of site	Funding.
Co-development Maximising opportunities to build on UK-SCAPE science and scientific collaboration	Network of partners Feeds into other networks	Incentive is for scientific output, but reality is funding is for data collection and curation only.		Concerns about double funding. Internal institutional conflict /competition for funding

## UKCEH 2

	The Present		The Future	
	Strength	Weakness	Opportunity	Threat
Co-design Ensuring UK-SCAPE outcomes in terms of ECN are fit for purpose to support the UK science base	ECN protocol have been published a long time ago -> consistency and regular. Meetings of STAG to discuss how additional protocol can bring ECN into 21 <sup>st</sup> century (DNA barcoding, EO, and integrated	To date ECN somewhat struggling and adherence to sampling protocols/methods that are outdated/not good to access climate change Lack of funding to make changes / explore new protocols in parallel to existing monitoring  Lack of QA of ECN monitoring data/data gathering	Scientific rigorous assessment of the data and sampling frequency etc. and whether all we do still makes sense More space and time to enable collaboration and idea development Oxford university colleagues students etc.	EU/UK government withdrawing support for our costly people -> resource and staff hungry
Co-delivery Working with partners to deliver more than we could alone	The ability to have more people to cover more sites and to be more resilient to organisational change	Having to please more than one master	Same as above	monitoring activities Collapse of funding streams
Co-development Maximising opportunities to build on UK-SCAPE science and scientific collaboration		Currently not the time to do anything beyond barely keeping the core monitoring going Too insular??	Holding meetings to bring together scientist from the different monitoring schemes as well as data scientists to help with integration of science and data, and discuss ? to future=proof by exploring which additional data to collect	Perception of public that this not important

### UKCEH 3

	The Present		The Future	
	Strength	Weakness	Opportunity	Threat
Co-design Ensuring UK-SCAPE outcomes in terms of ECN are fit for purpose to support the UK science base	Established datasets can be added to	A lack of joint up planning may lead to incomprehensive outcomes	Influence data capture at wider (European) scale	'siloed' in UK only methodology
Co-delivery Working with partners to deliver more than we could alone	ECN provides good value for money to UK-SCAPE	UK-SCAPE does not provide sufficient funds to sustain ECN data delivery	Long term funding to maintain time series	Reduced funding leading to degradation of time series
Co-development Maximising opportunities to build on UK-SCAPE science and scientific collaboration	New monitoring can build on established ECN protocol	New monitoring may not be compatible with existing monitoring	European compatibility and development	Lack of interest in Euro-wide monitoring