

Preliminary summary of key points from workshop

1. Background

- 1.1. The ecosystem services shown were identified as the key ones for each of five landscape types: lowland agriculture, uplands, urban, freshwater wetlands and rivers, and coastal wetlands.
- 1.2. Only indicators identified as the most reliable ones during the workshop have been included in this preliminary analysis.
- 1.3. The indicators shown in Table 1 (page 3 onwards) are those provided by workshop participants. The list is not comprehensive, and some of the indicators shown under particular landscapes may also be applicable to other landscapes. We have not attempted to show this here.
- 1.4. Indicators of ecosystem services (flows) are shown in bold in Table 1. The colour coding of indicators indicates their ease of measurement as perceived by the workshop participants: green, easy; amber, moderate; red, hard.
- 1.5. Some indicators proposed by participants were actually measures of impact rather than ecosystem services. For example, levels of pollutant inputs to a system measure the potential impact on a system rather than the ability of the system to continue to function in the presence of these pollutants. These types of proposed indicators have been excluded from the analysis.

2. Stocks and flows

- 2.1. Many of the indicators proposed for regulating ecosystem services are measures of stocks or processes rather than actual ecosystem services or benefits.
- 2.2. Measuring the quantity and quality of stocks is important, but it is an incomplete picture of the status of ecosystem services. In most cases, we do not have a complete understanding of the relationship between these stocks and the ecosystem services they provide. This is an area in which research under the BESS programme will be contributing to knowledge.

3. Regulating services

- 3.1. There are few service/flow type indicators for the regulating services included. The only easy-to-measure indicators of regulating service flows are indirect ones such as perceptions, although these are likely to be of variable reliability.
- 3.2. Direct measures of regulating service flows tend to be harder to measure, e.g. carbon fluxes and sediment fluxes.
- 3.3. There are few measures, even of stocks, in relation to the regulation of air quality and noise. This probably reflects the relatively lesser importance of biodiversity in these regulatory processes.

4. Provisioning services

- 4.1. Provisioning services have a wide range of potential service-based indicators, principally relating to yields such as from crops, fisheries or fuel production.
- 4.2. Some provisioning, e.g. water provision, is much harder to measure than other forms of provisioning, e.g. food and fuel.
- 4.3. Many of the suitable indicators for provisioning services are available from existing data sources such as agricultural statistics.

5. Cultural services

- 5.1. Cultural ecosystem services have a wide range of both stock and flow type indicators.
- 5.2. For recreation and tourism, there is an abundance of potential flow-type indicators, relating to visitor behaviour.
- 5.3. Other cultural services, such as cultural identity and aesthetic appeal, are more difficult to assess quantitatively.
- 5.4. The broad range of cultural services in the original NEA proved challenging because of their subjective and fuzzy nature and this may be reflected in Table 1. It should be noted that the NEA2 now recognises only two cultural services *per se*: Environmental Setting and Wild Species Biodiversity. Cultural identity, spiritual experience, recreation etc. are now considered by NEA2 as goods or benefits which are underpinned by those services.
- 5.5. A different set of indicators may be appropriate to the new NEA2 typology, since some of the proposed indicators in Table 1 reflect goods rather than services. However, Wild Species Biodiversity should be straightforward to monitor since these types of data are collected routinely.

6. Links to the proposed NIA monitoring and evaluation framework

- 6.1. Most of the indicators proposed in the draft NIA monitoring framework are covered by the indicators featured in the workshop summary table.
- 6.2. The emphasis of the draft NIA monitoring framework is on indicators of amounts of capital stocks. In contrast, the indicators in the workshop summary table provide more examples of ecosystem service flow-type indicators, as well as the basic stock-type indicators.
- 6.3. The workshop summary table provides significantly more indicators than the draft NIA monitoring framework in relation to regulating services.
- 6.4. The indicators in the workshop summary table are more specific than those in the draft NIA monitoring framework. Many of these specific indicators are generally applicable. The use of common indicators across the NIAs would facilitate monitoring and evaluation of the whole NIA programme.
- 6.5. Whatever indicators are selected for NIA monitoring, it is important that baseline levels for these indicators are established, either within NIAs or in similar areas outside, so that the impact of the NIAs can be evaluated in a robust way.

Table 1. Indicators for provision of key ecosystem services

Only indicators perceived as 'reliable' indicators included

Colour coding is according to perceived ease of measurement (green = easy; amber = moderate; red = hard)

Direct measures of services and benefits are shown in bold

	Lowland farmland	Uplands	Urban areas	Freshwaters & wetlands	Coastal wetlands
REGULATING SERVICES					
Climate regulation					Extent of inter-tidal mudflat/saltmarsh
	RSPB CALM toolkit				
		Extent and quality of peat			Sediment depth
	FC Climate Calculator toolkit				
		Net C balance of peat			C balance of sediments
Pollination	Area of wild flower meadows and verges				
	Biomass of pollinators				
Soil quality regulation	Soil nutrient status (N, P, C)				
	GAEC status				
Hazard regulation					Area of foreshore
				Washland or floodplain area	
			Proportion of soft to hard land surface		
			Extent of SUDS		
			Reduction of flood risk		

					Plant structure
					Sediment flux
Water quality regulation		Stream invertebrates	Stream invertebrates	Stream invertebrates	
		Water colour			
			Diffuse pollution levels		
			WFD status	WFD status	
		Utilities water quality index			
			Angler perceptions	Angler perceptions	
				Water abstraction rate	
				Algal density and cover	
		P content of water			
		Soil N & P status			
Noise regulation			Tranquility measures		
Air quality regulation			Urban trees		
			Perceptions of air quality		
			NOx abatement rate		

PROVISIONING SERVICES

Fresh water provision				Water abstraction rates	
		Flow rates		Flow rates	
				Water depth	
		Change in infiltration rates		Change in infiltration rates	
Food production	Stocking density	Livestock stocking density			Livestock stocking density

	Livestock yields	Livestock yields			Livestock yields
	Farm gate (market) prices	Farm gate (market) prices			Market prices
	Crop yields				
				Wild fish catches	Wild fish catches
					Shellfish yields
					Wildfowl yields
Fuel and energy	Woodland restock area				
	Biomass fuel crop yields				
	Woodchip production				
	Area of biomass crops				
	Agricultural statistics				

CULTURAL SERVICES

Recreation and tourism			Extent of accessible green space		
		MENE data		MENE data	MENE data
		No. of grouse shooters			No. of wildfowlers
		No. of visitors	No. of visitors to green space	No. of visitors	No. of visitors
			Distance travelled	Distance travelled	
					No. of watersports participants
					Boat moorings
			No. of allotments		
		Diversity of ecosystem-related recreation opportunities			
				Fishing licences	Fishing licences

				Degree of public access e.g. area of CROW land and footpath length
			Level of recreation by residents	
		Visitor expenditure		
		Presence and status of iconic species		
Cultural identity		Number of designations - landscape, biodiversity and heritage		
		Local dialects, stories, place names		
		Localism in food and drink production		
		Population turnover (in- or out-migration)		
		Perceptions of place		
Aesthetic appeal				Bird numbers
				Index of naturalness of landscape (infrastructure development)
				Geodiversity
				Perceptions of landscape and biodiversity