

Natural Capital Indicators: Annex 2a Freshwaters: Openwaters, wetlands and floodplains

Natural England's Natural Capital Indicators Project aims to identify key attributes for measuring change in natural capital in England, at a range of scales. Key indicators have been identified for the quantity, quality and location of ecosystems. We have not identified suitable repeated measures for value of benefits, which could be used as indicators. This note summaries the indicators for Freshwaters: openwaters, wetlands and floodplains.

Summary of Key Indicators

See table below for further detail and related data sets

1. **Extent of habitat:** lakes/standing water, river, reservoir, canal, pond, reedbed, raised bog, fen, coastal & floodplain grazing marsh, active floodplain.
2. **Quality**
 - Hydrology & geomorphology: naturalness of: water levels, flows, flooding, aquifer function, and lake hydrological regime, plus extent of artificial drainage, lack of physical modifications & obstructions.
 - Nutrient/chemical status – of soil and water.
 - Soil/sediment: carbon, peat depth.
 - Species composition: naturalness of biological assemblage (number of trophic levels and community composition in each), lack of invasive species.
 - Vegetation: ratio of vegetation to bare soil, surface vegetation roughness, proportion of peat mass actively forming peat, vegetation next to water bodies.
 - Cultural: nature, landscape, culture and history, quietness, facilities, accessibility.
 - Geodiversity: active geomorphological processes; condition of designated geosites.
3. **Location of:**
 - Habitats intercepting water pollution (in relation to the source, pathway and receptor).
 - Naturalness of habitat distribution.
 - Flood mitigating land in relation to infrastructure & settlements.
 - Connectivity and transition to terrestrial & marine habitats.
 - % population who can access a minimum of 2ha accessible green space / blue space within 2 miles of home.
4. **Ecosystem service flows** (specific to individual services):

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- Measurement of the service: amount of clean water, carbon sequestered and greenhouse gases fixed, maintenance of wildlife habitats and species, regulation of flooding, water quality. Practices that relate to experiential and physical, scientific and educational use.

The project also identifies and reviews datasets for measuring the attributes. Data sets are only included if they are regularly updated. Gaps in data are also identified, where appropriate data sets have not been found.

This note summarises the results of this project for the Broad Habitat of Freshwaters; openwaters, wetlands & floodplains, for the key ecosystem services in the table below. NB This note covers the Broad Habitat rather than catchments. Please also see the separate notes on the method followed and for other Broad Habitats in catchments.

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Freshwaters, open waters, wetlands & floodplains: provisioning and regulating services			Ecosystem services					Data sources
Asset attribute	Indicator category	Indicator	Water supply	Water quality	Flood protection	Maintenance of nursery pops & habs	Climate regulation	
Quantity	Extent	Coastal & floodplain grazing marsh			X	X		Priority Habitat Inventory
Quantity	Extent	Lakes & standing waters	X			X		CEH UK Lakes Portal
Quantity	Extent	Lowland Fens				X	X	Priority Habitat Inventory
Quantity	Extent	Lowland raised bog				X	X	Priority Habitat Inventory
Quantity	Extent	Modified waters eg reservoirs and canals	X					Canal and Rivers Trust Open Data, OS VectorMap District, CEH Inventory of reservoirs
Quantity	Extent	Ponds				X		Countryside Survey, OS VectorMap District
Quantity	Extent	Reedbeds				X	X	Priority Habitat Inventory
Quantity	Extent	Rivers	X			X		Environment Agency River Catchments; OS MasterMap Water Network Layer
Quantity	Extent	Active flood plain			X			Water Framework Directive (WFD)
Quality	Hydrology & geomorphology	Extent of artificial drainage	X	X	X	X	X	None identified
Quality	Hydrology & geomorphology	Lack of physical modifications					X	River Habitat Survey; WFD; CSM (only for Sites of Special Scientific Interest)
Quality	Hydrology & geomorphology	Natural aquifer function recharge & discharge	X					Environment Agency; Groundwater Management Units; WFD
Quality	Hydrology & geomorphology	Naturalness of flooding regime			X	X	X	Flood Map for Planning (Rivers and Sea)
Quality	Hydrology & geomorphology	Naturalness of flow regime	X		X	X		CEH Hydrological Summary; CSM (only for Sites of Special Scientific Interest); WFD; CEH National River Flow Archive
Quality	Hydrology & geomorphology	Naturalness of lake hydrological regime			X	X		WFD
Quality	Hydrology & geomorphology	Naturalness of water level regime	X	X	X	X	X	None identified
Quality	Hydrology & geomorphology	River continuity - lack of obstructions				X		CSM (only for Sites of Special Scientific Interest); Environment Agency; Potential sites of hydropower opportunity
Quality	Nutrient (& chemical) status	Nutrient and chemical status of water bodies		X		X		WFD; Upland Water Monitoring Network; Environmental Change Network; Countryside Survey; Urban Waste Water Treatment Directive compliance; Water Quality Data Archive; Defra Environmental Statistics; CSM (only for Sites of Special Scientific Interest)
Quality	Nutrient (& chemical) status	Soil nutrient status		X			X	Countryside Survey; LANDIS; Representative Soil Sampling Scheme (Rothamstead/ADAS); Agricultural Land Classification; LTMN (mainly only on NNRs)
Quality	Soil/sediment processes	Soil carbon/organic matter content		X		X	X	Countryside Survey; LANDIS; Geochemical Baseline Survey of the Environment; LTMN (mainly only on NNRs)
Quality	Soil/sediment processes	Peat depth		X		X		LTMN (mainly only on NNRs)
Quality	Species Composition	Invasive non-native species					X	JNCC; pressure from invasive species; Environment Agency Invasive species Data; CSM (only for Sites of Special Scientific Interest)
Quality	Species Composition	Naturalness of biological assemblage number of trophic levels & community composition in each level		X		X		None identified
Quality	Vegetation	Proportion of peat mass actively forming peat	X	X		X	X	None identified
Quality	Vegetation	Vegetation next to water bodies		X	X	X		CSM (only for Sites of Special Scientific Interest)
Quality	Vegetation	Surface/vegetation roughness		X	X			None identified
Quality	Vegetation	Vegetation cover/bare soil		X	X		X	None identified
Spatial config.		Distribution of habitats, in relation to water quality source-pathway-receptor		X				None identified
Spatial config.		Distribution of flood mitigating land in relation to infrastructure & settlements			X			None identified
Spatial config.		Naturalness of Spatial config. of habitats				X		None identified
Spatial config.		Transition and connectivity of aquatic, terrestrial and marine habitats					X	None identified
ES flow		Availability of water for abstraction	X					UK Government Water Abstraction Tables; Environment Agency; Groundwater Management Units water resource availability; CEH Hydrological Summary;
ES flow		Carbon sequestered & green house gases fixed, by soil/vegetation					X	None identified
ES flow		Water quality (chemical & biological, including pH, viral & bacterial)		X				WFD; Upland Water Monitoring Network; Urban Waste Water Treatment Directive compliance; Water Quality Data Archive; Defra Environmental Statistics
ES flow		Maintenance of sustainable ecosystems/life cycle stages				X		None identified
ES flow		Regulation of flow regime for peak events			X			CEH Hydrological Summary; Environment Agency; Risk of Flooding from Rivers and Sea; CEH National River Flow Archive

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Freshwaters, open waters, wetlands & floodplains: Cultural & Geodiversity Services					Data Source
Asset attribute	Indicator category	Indicator	Cultural Services	Geodiversity services	
Quantity	Extent	Coastal & floodplain grazing marsh	X		Priority Habitat Inventory
Quantity	Extent	Lakes & standing waters	X		CEH UK Lakes Portal
Quantity	Extent	Lowland Fens	X		Priority Habitat Inventory
Quantity	Extent	Lowland raised bog	X		Priority Habitat Inventory
Quantity	Extent	Modified waters eg reservoirs and canals	X		Canal and Rivers Trust Open Data
Quantity	Extent	Ponds	X		Countryside Survey
Quantity	Extent	Reedbeds	X		Priority Habitat Inventory
Quantity	Extent	Rivers	X		Environment Agency River Catchments; OS MasterMap Water Network Layer
Quality	Nature	Visibility of wildlife	X		None identified
Quality	Nature	Presence of flagship species	X		None identified
Quality	Nature	Presence of rare (red list) species	X		None identified
Quality	Nature	Species diversity	X		Countryside Survey
Quality	Nature	Naturalness of watercourses	X		Water Framework Directive
Quality	Nature	Favourable condition of SSSIs	X		CSM (only for Sites of Special Scientific Interest)
Quality	Nature	Favourable condition of designated geosites	X	X	CSM (only for Sites of Special Scientific Interest)
Quality	Landscape, seascape & urban green space	Size of environmental space (ha)	X		None identified
Quality	Culture & history	Designated Historic Environment Assets (World Heritage Sites, Scheduled monuments (% at risk), Historic Parks & Gardens, Listed Buildings, Conservation Area, registered battlefields)	X		Historic Environment Record
Quality	Quietness	Tranquility	X		CPRE Tranquility mapping, Defra Strategic Noise Mapping
Quality	Accessibility	Mean number of perimeter access points per km	X		None identified
Quality	Accessibility	Public Rights of Way / permissive paths; footpaths, bridleways, byway – length, density (km/ha)	X		OS master Map, Public Rights of Way
Quality	Accessibility	Presence of paths accessible to all – e.g. wheelchairs, pushchairs - length, density (km/ha)	X		None identified
Quality	Formative geological processes	Active geomorphological processes; terrestrial, coastal & marine		X	None identified
Spatial Configuration		% population who can access 2ha of green space within 2 miles of home	X		None identified
ES flow	Experiential & physical use	Number of visits	X		MENE: Monitor of Engagement with the Natural Environment
ES flow	Experiential & physical use	Duration of visits	X		MENE: Monitor of Engagement with the Natural Environment
ES flow	Experiential & physical use	Range of activities undertaken (number of people carrying out each activity, frequency, time spent)	X		MENE: Monitor of Engagement with the Natural Environment
ES flow	Scientific/educational	Number of research projects; PhD / Masters projects	X		None identified
ES flow	Scientific/educational	Number of school visits	X		None identified