

Biodiversity 2020: Developing indicators for measuring success

Technical Discussion Paper

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Purpose of this discussion paper

This document discusses the technical issues and options for developing a set of headline indicators to track progress with the new Strategy for England's Wildlife and Ecosystem Services, Biodiversity 2020, to be published in August 2011. It also invites comments on the scope and detail of the indicators.

Background

The new Strategy includes a commitment to publish a compact set of indicators and provides a suggested framework of indicator topics, grouped around the four priority areas set out in the Strategy.

The use of indicators is proposed for two reasons:

- The new Strategy provides a response to the international goals and targets for the Convention on Biological Diversity (CBD), agreed in Nagoya in 2010. Parties to the Convention agreed to use indicators to report progress towards these goals and targets at the national level.
- Indicators provide a means of synthesising and communicating complex information to a broad audience, allowing a wide range of organisations and individuals to judge progress for themselves. They are used to inform policy decisions in non-biodiversity sectors that have an important impact on biodiversity conservation.

In England, we are fortunate in having access to a great deal of information relevant to biodiversity change, including data on a broad spread of species and habitats collected by professionals and expert amateurs. This information provides an essential source of evidence for reviewing the impact of policies and actions to conserve biodiversity and restore ecosystem services.

Defra has published England Biodiversity Indicators annually since 2003¹. These indicators were recently reviewed to ensure that they were based on the best available data sources and reduced to a compact set of 26 robust indicators. The new Strategy marks a change in direction for biodiversity policy and addresses wider challenges set by the CBD and so a reconsideration of indicators is appropriate. However, it is likely that many of the current indicators will remain relevant, especially where they provide information on status of wildlife or the pressures on the natural environment. We therefore anticipate refining and augmenting the existing indicators, rather than replacing them with a completely new set.

In addition to reflecting CBD commitments, we will need to align the indicators with indicator frameworks being developed at the UK², European³ and global levels so that reports on progress in England towards internationally agreed targets and legislative commitments are consistent and place the least burden on data suppliers.

As noted above, the proposed indicators are based on information from many sources, including those collected by volunteers and NGOs. The indicators must also be effective at

¹ Latest update: www.defra.gov.uk/statistics/environment/biodiversity/england-biodiversity-indicators/

² In the UK, the Marine Strategy Framework Directive (MSFD) [//www.defra.gov.uk/environment/marine/msfd/](http://www.defra.gov.uk/environment/marine/msfd/) will require a set of indicators. It is likely that any indicators developed for the MSFD would be integrated into the new Strategy indicator set. Similarly, it is likely that UK and country indicators will be developed for reporting on the Water Framework Directive www.defra.gov.uk/environment/quality/water/water-quality/ and these too could be integrated into the new Strategy indicators.

³ Indicators will be required for the new European Biodiversity Strategy [//ec.europa.eu/environment/nature/index_en.htm](http://ec.europa.eu/environment/nature/index_en.htm)

communicating with a broad audience. It follows that the indicators must be widely owned and used. **We therefore invite comments on the options presented in this paper. Comments should be submitted to biodiversity@defra.gsi.gov.uk, by 11th Nov 2011.** Comments and suggestions should be made using the response form provided.

Indicator framework

A framework of proposed indicator topics (elements to measure) is set out below (Table 1). The table shows the relationship between the indicator topics; the priority areas and outcomes set out in the new Strategy; and the twenty international targets agreed under the Convention on Biological Diversity (the 'Aichi' targets, Annex 1). Further detail on data availability and options for development is given in the following section on options for development.

Proposed indicator topics for the new Strategy				
Strategy priority areas	Proposed indicator topics	Availability of data and existing indicators	Related Strategy headline outcomes ⁴	Related Aichi targets ⁵
A more integrated, large-scale approach to conservation on land and at sea	1. Extent and condition of selected habitats	Data available. Some indicator development required.	1, 2	5, 15
	2. Extent and condition of protected sites	Data and indicators available.	1, 2	5, 10, 11
	3. Habitat connectivity	Data available. Some indicator development required.	1	5, 11
	4. Status of priority species	Data available. Some indicator development required.	3	12
	5. Trends in abundance and distribution of selected species (birds, butterflies, bats and plants)	Data and indicators available.	1, 2, 3	5, 7, 12
	6. Status of habitats and species providing essential services (e.g. water quality, water regulation, carbon capture, pollination and public enjoyment)	Data available. Some indicators available and some development required.	1, 2	14, 15
	7. Genetic diversity in native breeds of farm animals and cultivated varieties of agricultural and horticultural crops	Data available. Some indicator development required.	3	13

⁴ 1 = habitats and ecosystems; 2 = marine; 3 = threatened species; 4 = people

⁵ All targets covered except 16, Access & Benefit Sharing ; 17, Action planning and 18, Traditional knowledge

Putting people at the heart of biodiversity policy	8. Awareness, understanding and support for biodiversity conservation.	Data and indicators available.	4	1
	9. Taking personal action for biodiversity	Data and indicators available.	4	1, 20
	10. Valuation and accounting for biodiversity	Data and indicator require development ⁶ .		2
	11. Integrating biodiversity considerations into local decision making	Data available. Some indicator development required.	1	1, 2
	12. Innovative financial mechanisms.	Data and indicator require development ⁷ .		3, 20
	13. Sustainable consumption	Data and indicator require development.		4
	14. Expenditure on domestic and international biodiversity	Data and indicators available.		20
Reducing environmental pressures	15. Trends in pressures on biodiversity (climate change impacts, pollution, invasive species)	Data available. Some indicators available and some development required.		8, 9, 10
	16. Integration of biodiversity into key production sectors (agriculture, forestry, fisheries)	Data and indicators available.	1, 2, 3	4, 6, 7, 10, 11, 12
Improving our knowledge	17. Availability of biodiversity data and information for decision making	Data available. Some indicator development required.		19

Table 1. Proposed indicator topics for the new Strategy

Options for development of indicators

Indicators for the new Strategy will be published by Defra and treated as Official Statistics. To ensure impartiality, their production will be overseen by Government Statisticians. The work of Government Statisticians in Defra is subject to the Code of Practice for Official Statistics which sets the standards for assuring that the statistics are produced objectively and impartially to high professional standards. Defra statistics are subject to periodic review by the UK Statistics Authority.

Each indicator may contain one or more separate measures, each of which will be assessed separately to identify whether it is changing and if so, whether this change is improving or deteriorating with respect to the priorities and outcomes of the strategy.

Table 2 below sets out for each of the proposed indicator topics:

⁶ Indicators may not be appropriate - progress could be assessed by other means.

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- Their **relevance** to the outcomes and priorities for action in the Strategy and the targets of the European Union Biodiversity Strategy ([//ec.europa.eu/environment/nature/biodiversity/policy/index_en.htm](https://ec.europa.eu/environment/nature/biodiversity/policy/index_en.htm)).
- The **availability** of existing indicators or of potential data sources for new indicators (for use in indicators, datasets need to be of a certain quality, with a time series available and with plans in place for regular updates).
- The **development options** for the indicators. At this stage there is no presumption that it will be feasible or useful to develop indicators for all of the topics. There may be better ways of tracking progress on some aspects of the Strategy.

Relevance, availability and development options for biodiversity indicators for the new Strategy

Note: Status refers to the extent of development required. GREEN – No development or minor refinement required because existing indicators are relevant to new strategy. AMBER – Some development required because existing indicators, though relevant, do not cover all aspects required by the new strategy. RED – significant development required because there are no existing indicators or because of uncertainty in the ongoing supply of underpinning data.

1. Extent and condition of selected habitats

Relevance to England Strategy	<ul style="list-style-type: none"> • Outcomes 1A on priority habitat condition; 1B ‘more’ areas for wildlife; and, 1D on habitat or ecosystem restoration. Also relevant to priority 1.1 on establishing coherent and resilient ecological networks.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> • Target 1 on the status of species and habitats; and target 2 on maintaining and restoring ecosystems.
Relevance to Aichi targets	<ul style="list-style-type: none"> • Target 5 on stemming the loss of natural habitats and target 15 on ecosystem resilience and contribution to carbon stocks.
Availability of existing indicators	<ul style="list-style-type: none"> • Status of priority habitats (England and UK) www.defra.gov.uk/statistics/environment/biodiversity/england-biodiversity-indicators/; jncc.defra.gov.uk/biyp • Status of priority habitats in existing indicator is assessed using previous UK Biodiversity Action Plan ‘reporting rounds’. The last reporting round was in 2008.
Status	<ul style="list-style-type: none"> • RED. Significant development required to identify suitable data for both the extent and condition of priority habitats.
Potential data sources	<ul style="list-style-type: none"> • Extent and condition of priority habitat features on Sites of Special Scientific Interest (SSSI). • Woodland and other Habitat Inventories www.natureonthemap.naturalengland.org.uk/ • Agri-environment scheme options for priority habitats. • Woodland Grant Scheme uptake. • Data on habitat loss and gain entered by local biodiversity partnerships on to the Biodiversity Action Reporting System (BARS), ukbars.defra.gov.uk/, which will over time integrate data

	<p>from the agri-environment schemes.</p> <ul style="list-style-type: none"> • Countryside Survey (e.g. for hedgerows). • Land Cover Map and possible future developments of remote sensing data. • Sample surveys of habitat condition. • Expert assessment of trends in both extent and condition of selected priority habitats, coupled with more formal assessment of condition through Natural England’s integrated monitoring programme (subject to availability – future plans to be agreed)
Development options	<ul style="list-style-type: none"> • Continue to use an indicator based on expert assessment of trends for selected habitat (if and where available) • Develop new indicators on: <ul style="list-style-type: none"> ○ Extent and condition of priority habitat features on Sites of Special Scientific Interest (SSSI), supplemented by priority habitat area under appropriate management through, for example, agri-environment schemes. ○ Extent of well sampled priority habitats recorded through Countryside Survey or remote sensing data such as the Land Cover Map. ○ Losses and gains of priority habitat areas recorded on BARS • Make better use of trends in abundance and distribution of selected species as a proxy indicator.
2. Extent and condition of protected sites	
Relevance to England Strategy	<ul style="list-style-type: none"> • Outcome 1A on SSSI condition and 1C on area of land conserved for biodiversity. The indicator is also relevant to priorities 1.1 and 1.2 on establishing coherent and resilient ecological networks on land and at sea.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> • Target 1 on the status of species and habitats and 2 on maintaining and restoring ecosystems.
Relevance to Aichi targets	<ul style="list-style-type: none"> • Target 5 on stemming the loss of natural habitats; target 10 on maintaining the integrity and functioning of vulnerable ecosystems; and target 11 on conserving areas of land and water for biodiversity.
Availability of existing indicators	<ul style="list-style-type: none"> • Extent and condition of protected sites (England and UK) www.defra.gov.uk/statistics/environment/biodiversity/england-biodiversity-indicators/ jncc.defra.gov.uk/biyp
Status	<ul style="list-style-type: none"> • GREEN. Minor refinement required to include all regularly updated terrestrial, freshwater and marine areas.
Potential data sources	<ul style="list-style-type: none"> • Natural England databases of protected site condition and extent.
Development options	<ul style="list-style-type: none"> • Refine the existing indicator to incorporate data on new marine designations, and possibly to add information on National Parks and Areas of Outstanding Natural Beauty. • Further refine the existing indicator to show condition data from marine site monitoring, as details become available.

3. Habitat connectivity	
Relevance to England Strategy	<ul style="list-style-type: none"> • Outcome 1 generally, as a as a measure of the coherence of the habitat network. Also relevant to priority 1.1 on establishing coherent and resilient ecological networks.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> • Target 2 on maintaining and restoring ecosystems.
Relevance to Aichi targets	<ul style="list-style-type: none"> • Target 5 on addressing fragmentation of natural habitats; and target 11 on conserving areas of ecologically representative and well connected ecosystems.
Availability of existing indicators	<ul style="list-style-type: none"> • Habitat connectivity for broadleaved woodland and neutral grassland in the UK jncc.defra.gov.uk/biyp. • UK indicator can be disaggregated to provide a similar indicator at England scale. • The existing indicator uses a model of ‘functional’ connectivity; it assesses how likely it is that a notional woodland or grassland species can move through the landscape between blocks of semi-natural habitat, through intervening patches of more intensively managed land. It is based on periodically updated field data from Countryside Survey (updated infrequently (8-10 years)).
Status	<ul style="list-style-type: none"> • AMBER. Some development work required to resolve data supply and communication issues for the existing indicator or to provide an alternative indicator that is easier to update and more readily communicated.
Potential data sources	<p>A connectivity indicator requires information on the <u>precise location</u> and extent of the biodiversity resource. Options include:</p> <ul style="list-style-type: none"> • Semi-natural habitat boundaries in Countryside Survey. • Land Cover Map and possible future developments of remote sensing data. • Woodland and other habitat inventories. • Data on habitat loss and gain entered by local biodiversity partnerships on to the Biodiversity Action Reporting System (BARS), ukbars.defra.gov.uk/. • Species distribution data accessed via the National Biodiversity Network Gateway
Development options	<ul style="list-style-type: none"> • Apply existing indicator methodology to alternative data sources such as the Land Cover Map or other remote sensing information (subject to resolving issues with data compatibility over time). • Develop new indicator of ‘structural’ connectivity or fragmentation measures based on, for example, site boundary data on nationally and internationally protected sites; local sites (where available); woodland and other habitat inventories; Nature Improvement Areas and other landscape-scale initiatives. • Develop a new indicator based on changes in abundance and distribution of species that require high degrees of connectivity in the landscape.

4. Status of priority species	
Relevance to England Strategy	<ul style="list-style-type: none"> • Outcome 3 on the status of wildlife. The indicator is also relevant to priority 1.3 on targeted action for species.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> • Target 1 on the status of species and habitats.
Relevance to Aichi targets	<ul style="list-style-type: none"> • Target 12 on preventing extinction and improving the conservation status of threatened species.
Availability of existing indicators	<ul style="list-style-type: none"> • Status of priority species www.defra.gov.uk/statistics/environment/biodiversity/england-biodiversity-indicators/ incc.defra.gov.uk/biyp • Status of priority species in the existing indicator is assessed using previous UK Biodiversity Action Plan three-yearly 'reporting rounds'. The last reporting round was in 2008.
Status	<ul style="list-style-type: none"> • RED. Significant development required to identify suitable data, if reporting round data are no longer available..
Potential data sources	<ul style="list-style-type: none"> • Structured species surveillance schemes operated by the voluntary sector. • Unstructured species surveillance by the voluntary sector accessed via the National Biodiversity Network (NBN) Gateway data.nbn.org.uk/ . • Site based monitoring of threatened species by Natural England, the Environment Agency and others, as part of an integrated monitoring programme. • Species actions recorded on BARS. • Expert assessment of trends for a selected set of priority species based on partial evidence from a range of data sources undertaken on a voluntary basis by agency and external experts (if available).
Development options	<ul style="list-style-type: none"> • Continue to use an indicator based on expert assessment of trends for selected species (if and where available) • Develop new indicators based on: <ul style="list-style-type: none"> ○ Changes for a representative sample of priority species for which reliable data showing change in distribution and/or abundance over time are available (from structured surveillance). ○ Changes in the status of threatened species on protected sites from agency-led integrated monitoring programmes. ○ Changes in distribution for a selection of species taken from NBN gateway records. ○ Measures to conserve species at risk of extinction, recorded through BARS.

5. Trends in abundance and distribution of selected species (birds, butterflies, bats and plants)	
Relevance to England Strategy	<ul style="list-style-type: none"> Outcome 3 on the status of wildlife. Could be used as a proxy measure for outcome 1A on condition of priority habitats. The indicator is also relevant to priority 1.1 on coherent ecological networks (and possibly to 1.2 if suitable marine data can be identified).
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> Target 1 on the status of species and habitats.
Relevance to Aichi targets	<ul style="list-style-type: none"> Target 5 on addressing fragmentation of natural habitats; Target 7 on sustainable management of farmland and woodland; Target 12 on preventing extinction and improving the conservation status of threatened species.
Availability of existing indicators	<ul style="list-style-type: none"> Abundance of wild birds, bats, butterflies in England; Changes in plant species richness in the wider countryside www.defra.gov.uk/statistics/environment/biodiversity/england-biodiversity-indicators/. The same data are also currently used to underpin the UK indicator incc.defra.gov.uk/biyp.
Status	<ul style="list-style-type: none"> GREEN. Minor refinement required to ensure adequate representation across taxonomic groups, subject to data availability.
Potential data sources	<ul style="list-style-type: none"> Structured species surveillance schemes operated by the voluntary sector. Unstructured species surveillance by the voluntary sector accessed via the NBN Gateway data.nbn.org.uk/. Countryside Survey. Marine species data available through, for example the Ocean Biogeographic Information System www.iobis.org/
Development options	<ul style="list-style-type: none"> Possibly refine existing indicators to include additional information for other taxonomic groups where there are long-term, high quality data sets providing a time series (e.g. for terrestrial invertebrates).
6. Status of habitats and species providing essential services (e.g. water quality, water regulation, carbon capture, pollination and public enjoyment)	
Relevance to England Strategy	<ul style="list-style-type: none"> Outcome 1C on areas of particular importance for ecosystem services. The indicator is also relevant to priority 2.1 by increasing awareness of the link between biodiversity and human wellbeing.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> Target 2 (on maintaining and restoring ecosystems and their services).
Relevance to Aichi targets	<ul style="list-style-type: none"> Target 14 on ecosystems providing essential ecosystem services; and target 15 on ecosystem resilience and the contribution of biodiversity to carbon stocks.

<p>Availability of existing indicators</p>	<ul style="list-style-type: none"> • Proportion of large size classes of fish in surveys from the North Sea (as a measure of capacity to sustain long-term fisheries). • Number of visits to nature reserves (as a measure of the public enjoyment of the countryside) <p>incc.defra.gov.uk/biyp; www.defra.gov.uk/statistics/environment/biodiversity/england-biodiversity-indicators/.</p>
<p>Status</p>	<ul style="list-style-type: none"> • AMBER. Some development work required for terrestrial ecosystems
<p>Potential data sources</p>	<ul style="list-style-type: none"> • Extent and condition of selected priority habitats (see indicator 1). • Structured surveillance schemes operated by the voluntary sector. • Unstructured surveillance by the voluntary sector accessed via the National Biodiversity Network (NBN) Gateway data.nbn.org.uk. • Countryside Survey. • Fixed site water quality monitoring undertaken by the Environment Agency. • Monitoring Engagement with the Natural Environment survey www.naturalengland.org.uk/ourwork/enjoying/research/monitor/default.aspx. • Defra public attitudes survey www.defra.gov.uk/statistics/environment/public-attitude/.
<p>Development options</p>	<ul style="list-style-type: none"> • Within the terrestrial environment, develop new indicators, based on: <ul style="list-style-type: none"> ○ Diversity and/or abundance of species known to provide services (e.g. pollinating insects). ○ Extent and condition of habitats that are important for carbon capture, water quality or water supply (e.g. blanket peat bogs, rivers and streams). A new long-term river water quality indicator is being developed by the Environment Agency and equivalent bodies across the UK. The indicator would be based on a range of chemical and biological quality measures and would also be used for reporting on compliance with the Water Framework Directive. ○ Public enjoyment of the countryside (e.g. access to green space, visits to the Countryside).
<p>7. Genetic diversity in native breeds of farm animals and cultivated varieties of agricultural and horticultural crops.</p>	
<p>Relevance to England Strategy</p>	<ul style="list-style-type: none"> • Priority 1.4 on maintaining agricultural genetic diversity.
<p>Relevance to EU Biodiversity Strategy</p>	<ul style="list-style-type: none"> • Target 3 on increasing the contribution of agriculture to biodiversity, particularly to action 3 on conserving agricultural genetic diversity.
<p>Relevance to Aichi targets</p>	<ul style="list-style-type: none"> • Target 13 on genetic diversity in cultivated plants and farmed animals.

Availability of existing indicators	<ul style="list-style-type: none"> • Effective population size in UK native breeds of cattle and sheep (which provides a measure of total population size and rates of in-breeding) jncc.defra.gov.uk/biyp. • The existing indicator of farm animal genetic diversity is complex and has proved difficult to present and interpret. Problems with ongoing data supply have limited the assessment of change to two data points.
Status	<ul style="list-style-type: none"> • AMBER. Some development work required to address data supply issues for the existing indicator and to cover cultivated plants.
Potential data sources	<ul style="list-style-type: none"> • Native breed societies' records and rare breed registers www.rbst.org.uk/watch-list/main. • Breeds at risk register www.defra.gov.uk/fangr/breeds-at-risk-register/. • Indicators and data developed by the Food and Agriculture Organisation's Commission for Genetic Resources for Food and Agriculture www.fao.org/nr/cgrfa/en/. • Conservation of rare breeds through agri-environment schemes. • UK National Inventory of plant genetic resources for food and agriculture www.grfa.org.uk/.
Development options	<ul style="list-style-type: none"> • Refine the existing UK native breeds indicator to broaden the number of species included. • Investigate methods for presenting genetic diversity to a non-specialist audience. • Investigate the available data on ex-situ and in-situ agricultural and horticultural crops. • Assess indicators developed by the Food and Agriculture Organisation's Commission for Genetic Resources for Food and Agriculture

8. Awareness, understanding and support for biodiversity conservation.

Relevance to England Strategy	<ul style="list-style-type: none"> • Outcome 4 on engagement and awareness and priority 2.1 on awareness of the link between biodiversity and human wellbeing.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> • No specific targets relevant.
Relevance to Aichi targets	<ul style="list-style-type: none"> • Target 1 on awareness of the values of biodiversity and the steps that people can take to conserve it.
Availability of existing indicators	<ul style="list-style-type: none"> • Public attitudes to biodiversity; Proportion of households undertaking wildlife gardening. www.defra.gov.uk/statistics/environment/biodiversity/england-biodiversity-indicators/.
Status	<ul style="list-style-type: none"> • GREEN. Minor refinement required to improve the temporal scope of the indicator.
Potential data sources	<ul style="list-style-type: none"> • Defra Public Survey of Attitudes and Behaviours towards the Environment. • Euro-barometer surveys ec.europa.eu/public_opinion/index_en.htm.

Development options	<ul style="list-style-type: none"> Investigate additional data sources such as the Euro-barometer and Natural England’s project, ‘Monitoring Engagement with the Natural Environment’.
9. Taking personal action for biodiversity	
Relevance to England Strategy	<ul style="list-style-type: none"> Outcome 4 on engagement and awareness and priority 2.1 on awareness of the link between biodiversity and human wellbeing.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> No specific targets relevant.
Relevance to Aichi targets	<ul style="list-style-type: none"> Target 1 on awareness of the values of biodiversity and the steps that people can take to conserve it; Target 20 on mobilising resources.
Availability of existing indicators	<ul style="list-style-type: none"> Hours spent in conservation volunteering in England and in the UK: www.defra.gov.uk/statistics/environment/biodiversity/england-biodiversity-indicators/; jncc.defra.gov.uk/biyp.
Status	<ul style="list-style-type: none"> GREEN. No development required.
10. Valuation and accounting for biodiversity	
Relevance to England Strategy	<ul style="list-style-type: none"> Priority 2.2 on better accounting of the values of biodiversity and ecosystem services.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> No specific targets relevant.
Relevance to Aichi targets	<ul style="list-style-type: none"> Target 2 on integrating biodiversity values into national accounting.
Availability of existing indicators	<ul style="list-style-type: none"> None available.
Status	<ul style="list-style-type: none"> RED. Significant development required to identify suitable data and metrics.
Potential data sources	<ul style="list-style-type: none"> Extent and condition of priority habitat features on Sites of Special Scientific Interest (SSSI). Woodland and other Habitat Inventories. www.natureonthemap.naturalengland.org.uk/. Countryside Survey (e.g. for hedgerows). Land Cover Map and possible future developments using remote sensing data.
Development options	<ul style="list-style-type: none"> Develop an index of natural capital. Natural capital accounts will be developed by the Office of National Statistics and Defra. The development is at an early stage and no details of the data sources or methodology are available. It could involve tracking changes in land cover, and then attributing a value to that change using valuation methodologies such as those set out in the National Ecosystem Assessment uknea.unep-wcmc.org/

11. Integrating biodiversity considerations into local decision making	
Relevance to England Strategy	<ul style="list-style-type: none"> • Priority 2.2 on decision making.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> • No specific targets relevant.
Relevance to Aichi targets	<ul style="list-style-type: none"> • Target 1 on awareness of the values of biodiversity and the steps that people can take to conserve it; Target 2 on integrating biodiversity values into national and local development.
Availability of existing indicators	<ul style="list-style-type: none"> • Number of Local Wildlife Sites in positive management. data.gov.uk/dataset/ni-197-improved-local-biodiversity.
Status	<ul style="list-style-type: none"> • GREEN. Some further development may be required to broaden the scope of the indicator to other areas of local decision making.
Potential data sources	<ul style="list-style-type: none"> • Local authority annual reporting on number of Local Sites in positive management (required under the Department of Communities and Local Government single data list).
Development options	<ul style="list-style-type: none"> • Possibly supplement the existing indicator using information on data downloads from the National Biodiversity Network Gateway by Local Authorities, if available.
12. Innovative financial mechanisms.	
Relevance to England Strategy	<ul style="list-style-type: none"> • Priority 2.3 on developing new and innovative financing mechanisms.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> • No specific targets.
Relevance to Aichi targets	<ul style="list-style-type: none"> • Target 3 on positive incentives; Target 20 on mobilising resources.
Availability of existing indicators	<ul style="list-style-type: none"> • None available.
Status	<ul style="list-style-type: none"> • RED. Significant development required to identify suitable data.
Potential data sources	<ul style="list-style-type: none"> • Water utility investment in habitat restoration through Asset Management Plans. • Data on losses and gains from Biodiversity Offset pilots.
Development options	As an area of emerging policy, no specific development options have been identified yet. An indicator may not be the best way of tracking progress in this area.
13. Sustainable consumption	
Relevance to England Strategy	<ul style="list-style-type: none"> • Priority 2.1 on engaging significantly more people in biodiversity issues.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> • Target 6 on averting global biodiversity loss.

Relevance to Aichi targets	<ul style="list-style-type: none"> Target 4 on sustainable production and consumption.
Availability of existing indicators	Some relevant indicators are included in the UK Sustainable Development Indicators sd.defra.gov.uk/progress/national/ , but there are no indicators of global impacts of domestic consumption.
Status	<ul style="list-style-type: none"> RED. Significant development required to develop an indicator from available data.
Potential data sources	<ul style="list-style-type: none"> UK trade statistics www.statistics.gov.uk/STATBASE/Product.asp?vlnk=1119 UK certification scheme data
Development options	<ul style="list-style-type: none"> Further research is needed to develop methods for calculating an indicator of the global impact of domestic economic activity, and this could include production of 'footprint' type indicators for land use, water and carbon.

14. Expenditure on domestic and international biodiversity

Relevance to England Strategy	<ul style="list-style-type: none"> Priority 2.3 on developing new and innovative financing mechanisms.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> No specific targets relevant.
Relevance to Aichi targets	<ul style="list-style-type: none"> Target 20 on mobilising resources.
Availability of existing indicators	<ul style="list-style-type: none"> Expenditure on domestic and global biodiversity (in the UK and in England) jncc.defra.gov.uk/biyp; www.defra.gov.uk/statistics/environment/biodiversity/england-biodiversity-indicators/.
Status	<ul style="list-style-type: none"> GREEN. No significant development required; minor refinement may be required as international indicators develop.
Potential data sources	<ul style="list-style-type: none"> UK Government Departmental expenditure accounts.
Development options	<ul style="list-style-type: none"> None planned. Further options may emerge from the consideration of indicators for Convention on Biological Diversity Resource Management Strategy.

15. Trends in pressures on biodiversity (climate change impacts, pollution, invasive species)

Relevance to England Strategy	<ul style="list-style-type: none"> Theme 3, generally, on reducing direct pressures.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> Target 5 on combating invasive alien species.
Relevance to Aichi targets	<ul style="list-style-type: none"> Target 8 on pollution; Target 9 on alien invasive species; Target 10 on anthropogenic pressures on vulnerable ecosystems.

<p>Availability of existing indicators</p>	<ul style="list-style-type: none"> • Extent of invasive species. • Climate change impacts on timing of biological events in spring (the spring index). • Changes in abundance of climate sensitive species. • Input of hazardous substances into the marine environment. • Cetacean by-catch. • Biological water quality. • Air pollution impacts on sensitive habitats (nitrogen and sulphur) • jncc.defra.gov.uk/biyp; www.defra.gov.uk/statistics/environment/biodiversity/england-biodiversity-indicators/.
<p>Status</p>	<ul style="list-style-type: none"> • AMBER. Some development work required to address weaknesses in existing invasive species and climate change indicators and to expand the scope of the indicators on pressures in the marine environment.
<p>Potential data sources</p>	<ul style="list-style-type: none"> • Structured wildlife surveillance schemes operated by the voluntary sector. • Unstructured wildlife surveillance by the voluntary sector, modelled to remove bias, accessed via the National Biodiversity Network Gateway. • Countryside Survey. • Environmental Change Network www.ecn.ac.uk/. • Water quality assessments from the Environment Agency. • Data on beach and benthic litter collected by the Centre for Environment, Fisheries and Aquaculture Science.
<p>Development options</p>	<ul style="list-style-type: none"> • There are potentially a large number of measures that could be included in this topic, and it may be sensible to split the topic into more than one indicator, for example on: <ul style="list-style-type: none"> • Invasive species. The current indicator can be used at UK and England level but is dependent on Countryside Survey data. Options for development include utilising alternative data sources and producing a new indicator on the success of measures to prevent the <i>establishment of new species</i> (rather than on the change in extent of established ones). • Climate change. Further development to better show: <ul style="list-style-type: none"> ○ The impact of climate change (e.g. phenological asynchrony, trends in climate-sensitive 'indicator' species or habitats; balance of local in-migration/extinction). ○ The extent and impact of adaptation responses. ○ The capacity of the landscape to adapt to climate change (see also the habitat connectivity indicator). • Pressures on marine biodiversity from fisheries by-catch, pollution and litter. To complement existing indicators on cetacean by-catch and marine pollution, analysis of data on beach and benthic litter held by the Centre for Environment, Fisheries and Aquaculture Science may provide useful additional information.

16. Integration of biodiversity into key production sectors (agriculture, forestry, fisheries)	
Relevance to England Strategy	<ul style="list-style-type: none"> • Theme 3, generally, on integrating consideration of biodiversity within the sectors which have the greatest potential for direct influence.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> • Target 3 on agriculture and forestry and target 4 on fisheries.
Relevance to Aichi targets	<ul style="list-style-type: none"> • Target 4 on keeping the impacts of natural resource use within safe limits; target 6 on sustainable fish stocks; target 7 on area under agriculture, aquaculture and forestry managed sustainably; target 10 on anthropogenic pressures on vulnerable ecosystems; target 11 on ecologically representative and well connected protected areas and other area-based conservation measures; target 12 on threatened species.
Availability of existing indicators	<ul style="list-style-type: none"> • Area of woodland in sustainable management schemes (UK only, although could be produced for England). • Area of farmland in agri-environment schemes. • Percentage of marine fish stocks harvested sustainably • jnc.defra.gov.uk/biyp; • www.defra.gov.uk/statistics/environment/biodiversity/england-biodiversity-indicators/.
Status	<ul style="list-style-type: none"> • AMBER. To address the integration of biodiversity considerations into the business sector.
Potential data sources	<ul style="list-style-type: none"> • Voluntary corporate environmental reporting. • Co-operative Bank's annual ethical consumerism report www.goodwithmoney.co.uk/ethicalconsumerismreport/. • Environmental discourses in FTSE100 companies www.trucost.com/publications. • Eco-labelling catalogues //ec.europa.eu/ecat/.
Development options	<ul style="list-style-type: none"> • No specific options for indicators on business and biodiversity have been identified. Further investigation of available data sources is required. • There are potentially a large number of measures that could be included in this topic, and it may be sensible to split it into more than one indicator (for example on agriculture and forestry; fisheries and business)
17. Availability of biodiversity data and information for decision making	
Relevance to England Strategy	<ul style="list-style-type: none"> • Priority 4.3 on improving access to data knowledge and information.
Relevance to EU Biodiversity Strategy	<ul style="list-style-type: none"> • No specific targets relevant.

Relevance to Aichi targets	<ul style="list-style-type: none"> Target 19 on improving and sharing knowledge.
Availability of existing indicators	<ul style="list-style-type: none"> None available.
Status	<ul style="list-style-type: none"> RED. Significant development required to develop an indicator from available data.
Potential data sources	<ul style="list-style-type: none"> Public accounts – expenditure on research, monitoring and knowledge exchange. Data availability/ data downloads from the National Biodiversity Network Gateway or other public websites holding biodiversity information (such as MyEnvironment).
Development options	<ul style="list-style-type: none"> Develop new indicators based on: <ul style="list-style-type: none"> Public sector expenditure. NBN data availability and downloads. Website hits on biodiversity related public information websites. An indicator may not be the best way of tracking progress in this area.

Table 2. Relevance, availability and development options for biodiversity indicators for the new Strategy

Relationship between indicators and the outcomes in Biodiversity 2020

The new Strategy contains four outcomes, covering: (1) habitats and ecosystems on land; (2) marine habitats, ecosystems and fisheries; (3) species; and (4) engagement of people. The indicators will be the primary means to measure progress towards the outcomes and they can be directly mapped against the outcomes as shown in Table 3 (below). However it should be noted that the indicators are not intended to be comprehensive of all aspects of all the outcomes (see ‘Comments’ in Table 3). In some cases indicators may be used as ‘proxy measures’ where more direct measures of the outcomes are not available. Additional information on implementation of actions will be provided by the Delivery Plan.

Relevance, availability and development options for biodiversity indicators for the new Strategy			
Outcomes		Relevant indicators topics	Comments
Outcome 1. Habitats and ecosystems on land. <i>By 2020 we will have put in place measures so that biodiversity is maintained and enhanced, further degradation has</i>	1A. Better wildlife habitats with 90% of priority habitats in favourable or recovering condition and at least 50% of SSSIs in favourable	1. Extent and condition of selected habitats; 2. Extent and condition of protected sites; 5. Trends in abundance of	The outcome refers to the proportion of total habitat area in target condition. The existing indicator (2) will show the area of priority habitat within SSSIs in favourable or recovering condition. Options for development of indicator (1) include the area of priority habitat outside SSSIs that is

<p><i>been halted and where possible, restoration is underway, helping deliver more resilient and coherent ecological networks, healthy and well-functioning ecosystems, which deliver multiple benefits for wildlife and people, including:</i></p>	<p>condition, while maintaining at least 95% in favourable or recovering condition;</p>	<p>selected species.</p>	<p>under favourable management in agri-environment and woodland grant schemes. Additional development options for indicator (1) also include the area and condition of priority habitat outside protected sites and not in scheme management. Extent and condition of priority habitats can also be inferred from the status of widespread species associated with priority habitats – indicator (5).</p>
	<p>1B. More, bigger and less fragmented areas for wildlife, with no net loss of priority habitat and an increase in the overall extent of priority habitats by at least 200,000 ha;</p>	<p>1. Extent and condition of selected habitats; 2. Extent and condition of protected sites; 3. Habitat connectivity</p>	<p>The outcome refers to connectivity and the loss and gain of priority habitats.</p> <p>Development options for the connectivity indicator (3) would allow assessment of whether selected habitats, protected areas and areas under restoration management are less fragmented and form bigger areas, although the indicator is likely to be limited by data availability.</p> <p>Development options for indicators (1 & 2) of the extent and condition of selected habitats and protected sites, would allow an assessment of overall extent and net change of some priority habitats. However it is not anticipated that sufficient data will be available in a consistent format for all types and areas of priority habitats to be included within the indicator.</p>
	<p>1C. By 2020, at least 17% of land and inland water especially areas of particular importance for biodiversity and ecosystem services, are conserved through effective, integrated and joined up</p>	<p>2. Extent and condition of protected sites</p>	<p>The outcome refers to proportion of land and inland water effectively conserved through management of protected areas and establishment of Nature improvement Areas,</p> <p>The existing indicator (2) will show the area (and potentially the proportion) of nationally protected areas and European Sites (SSSIs, SACs and SPAs). Options for development of indicator (2) involve the inclusion of information on other designations and integrated management areas such as</p>

	<p>approaches to safeguard biodiversity and ecosystem services including through management of our existing systems of protected areas and the establishment of Nature Improvement Areas;</p>		<p>National Parks, Areas of Outstanding Natural Beauty and Nature Improvement Areas).</p> <p>Data on some local designations (e.g. Local Wildlife Sites) are held locally and are not currently compiled centrally.</p>
	<p>1D. Restoring at least 15% of degraded ecosystems as a contribution to climate change mitigation and adaptation.</p>	<p>1. Extent and condition of selected habitats; 2. Extent and condition of protected sites;</p>	<p>The outcome refers to restoration of degraded ecosystems.</p> <p>Development options for indicators (1 & 2) would allow assessment of the area of selected priority habitats under restoration management in agri-environment schemes, and through other initiatives where they are recorded on the Biodiversity Action and Reporting System.</p>
<p>Outcome 2 - Marine habitats, ecosystems and fisheries. By 2020 we will have put in place measures so that biodiversity is maintained, further degradation has been halted and where possible, restoration is underway, helping deliver good environmental status and our vision of clean, healthy, safe productive and biologically diverse oceans and seas. This will be underpinned by the following:</p>	<p>2A. By the end of 2016 in excess of 25% of English waters will be contained in a well managed Marine Protected Area network that helps deliver ecological coherence by conserving representative marine habitats;</p>	<p>2. Extent and condition of protected sites;</p>	<p>The outcome refers to proportion of English waters within well-managed marine protected areas.</p> <p>The existing indicator (2) will show the area of protected sites in England's Territorial Waters. Plans for assessing the effective management and condition of marine sites are still under development.</p>
	<p>2B. By 2020 we will be managing and harvesting fish sustainably;</p>	<p>16. Integration of biodiversity into key production sectors (fisheries); 6. Status of species and</p>	<p>The outcome refers to sustainable management of fisheries.</p> <p>Indicators (6 & 16) on the status of fish stocks and on size of fish in the North Sea will provide an assessment for all stocks for which there are data. For some stocks there are insufficient data to allow</p>

		habitats providing essential services.	for an assessment - the indicator is therefore, by necessity, based on a representative sample.
	2C. By 2022 we will have marine plans in place covering the whole of England's marine area, ensuring the sustainable development of our seas, integrating economic growth, social need and ecosystem management.	None required.	An indicator is unlikely to be the most appropriate way to track progress.
	Outcome 3 - Species. <i>By 2020, we will see an overall improvement in the status of our wildlife and will have prevented further human induced extinctions of known threatened species.</i>	4. Status of priority species; 5. Trends in abundance and distribution of selected species.	The outcome refers to the status of native species and extinctions. The indicators (4 & 5) will provide information on changes in the abundance and/or distribution of threatened species and of species in the wider countryside. Developments of indicator (4) are likely to be based on a sample or representative selection of species that is restricted by data availability. Assessment of human-induced extinctions in England is likely to require more qualitative approaches based on risk based assessments and expert opinion.
	Outcome 4 - People. <i>By 2020, significantly more people will be engaged in biodiversity issues, aware of its value and taking positive action.</i>	8. Awareness, understanding and support for biodiversity conservation; 9. Taking personal action for biodiversity	The outcome refers to numbers of people with an awareness and engaged in biodiversity issues The indicators (8 & 9) will provide evidence on awareness, understanding and support for biodiversity conservation. They will also show information on volunteering collected by selected NGOs as a clear demonstration of personal action.

Table 3. Relevance, availability and development options for biodiversity indicators for the new Strategy

Annex 1 – Convention on Biological Diversity (CBD) – Strategic plan targets

The CBD Strategic Plan adopted in Nagoya, Japan, in October 2010 includes 20 headline targets for 2020. These targets provide a flexible framework to inform the establishment of national plans, taking into account national circumstances and priorities.

CBD target
Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.
Target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio-economic conditions.
Target 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.
Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.
Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.
Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.
Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.
Target 11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes.
Target 12: By 2020 the extinction of known threatened species has been prevented and their

conservation status, particularly of those most in decline, has been improved and sustained.

Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Target 17: By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels

Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred and applied.

Target 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 2011-2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties.