



**Cyfoeth  
Naturiol  
Cymru**  
**Natural  
Resources**  
Wales

# The State of Natural Resources Report (SoNaRR): Assessment of the Sustainable Management of Natural Resources.

## Annex.

## Technical Annex for Chapter 7 Part 1

Natural Resources Wales

Final Report

## About Natural Resources Wales

We look after Wales' environment so that it can look after nature, people and the economy.

Our air, land, water, wildlife, plants and soil – our natural resources - provide us with our basic needs, including food, energy, health and enjoyment.

When cared for in the right way, they can help us to reduce flooding, improve air quality and provide materials for construction. They also provide a home for some rare and beautiful wildlife and iconic landscapes we can enjoy and which boost the economy.

But they are coming under increasing pressure – from climate change, from a growing population and the need for energy production. We aim to find better solutions to these challenges and create a more successful, healthy and resilient Wales.

## Evidence at Natural Resources Wales

Natural Resources Wales is an evidence based organisation. We seek to ensure that our strategy, decisions, operations and advice to Welsh Government and others are underpinned by sound and quality-assured evidence. We recognise that it is critically important to have a good understanding of our changing environment.

We will realise this vision by:

- Maintaining and developing the technical specialist skills of our staff;
- Securing our data and information;
- Having a well resourced proactive programme of evidence work;
- Continuing to review and add to our evidence to ensure it is fit for the challenges facing us; and
- Communicating our evidence in an open and transparent way.

## The State of Natural Resources Report (SoNaRR) Report Contents

This document is one of six annexes to the State of Natural Resources Report.

Chapter 1	Introduction to the State of Natural Resources Report (SoNaRR): An assessment of sustainable management of natural resources
Chapter 2	Understanding drivers of change in natural resource use
Chapter 3	Summary of extent, condition and trends of natural resources and ecosystems in Wales
Chapter 4	Resilient Ecosystems
Chapter 5	Well-being in Wales
Chapter 6	Identifying Unsustainable Management
Chapter 7	Towards sustainable management of natural resources
Chapter 8	Assessment of the sustainable management of natural resources
Annex	Technical Annex for Chapter 3
Annex	Technical Annex for Chapter 7 (Part 1)
Annex	Technical Annex for Chapter 7 (Part 2)
Annex	Method for assigning confidence to evidence presented
Annex	Record of confidence assessments
Annex	Acronyms and Glossary of terms

All of the SoNaRR documents can be downloaded from the NRW website:  
[www.naturalresources.wales/sonarr](http://www.naturalresources.wales/sonarr).

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## Draft Indicators to support the Risk Register

The State of Natural Resources Report (SoNaRR) aims to assess whether Wales' natural resources are being sustainably managed. To do this, there needs to be a way of measuring change in natural resources and broad habitats from one SoNaRR to the next. Indicators are a recognised way of doing this as they are representative of certain aspects of the environment and provide a base measurement to work from.

In taking the risk register forward, we need to develop a framework of indicators and metrics to provide information on the state of natural resources and the priorities for action.

### Indicators and Policy Targets

The Indicators listed in the following tables have been chosen from information included in previous chapters. The relevant **National Indicators**, as published by Welsh Government in March 2016, are included in the list.

The most recently published status of the Indicator is presented as current condition and/or trend. Where this information is not available the status is represented by "unknown".

It is important to note that the indicators presented in this Annex are the first set of indicators being put forward to assess change for future SoNaRRs and may not be a complete list. These may change or evolve in future, particularly following conversations with stakeholders. It is a developing process and we do not necessarily have all of the information available on these suggested indicators at this time.

### Part 1 – State and resilience of Natural Resources

Indicators that assess whether:

- Natural resources are continuously declining or are being used faster than can be replenished;
- The health and resilience of our ecosystems is being compromised; this includes targets not being met or 'limits' in danger of being breached

Note: Where an indicator has an existing target relevant to Wales, we are suggesting it could be used as an initial indication of the above. Where Policy Targets exist, achievement of the target is indicated. Meeting the target does not necessarily mean the resource is being sustainably managed as further consideration is needed in relation to the means of management and the optimisation of benefits.

Annex Table 7.1 Indicators of the state and resilience of natural resources.

Natural Resource	Indicator Name	Components Measured	Data Quality	Current Status	Year	Latest Reported Trend	Overall Trend	Achieving Target?
Animals plants and other organisms	Condition of SAC and SPA species features on sites in Wales	Mammals, fish, amphibians, reptiles, invertebrates, plants		Mostly unfavourable  Birds 86% favourable Mammals 68% favourable <sup>1</sup>	2013			2010 Biodiversity target  No <sup>2</sup>
	State of Nature  Species on the interim Section 7 list  State of Welsh Priority Species	Combination of abundance and distribution  Terrestrial invertebrates, vertebrates, fungi, lichens and bryophytes				<b>Invertebrates:</b> 21% declining, 25% improving, 54% little change <sup>3</sup> <b>Vertebrates:</b> 37% declining, 21% improving, 42% little change <sup>3</sup> <b>Fungi and lichens:</b> 29% declining, 27% improving, 44% little change <sup>3</sup> <b>Bryophytes:</b> 47% declining, 24% improving, 29% little change <sup>3</sup>	Some declining  Some improving 2006/07 - 2016 <sup>3</sup>	No target
Animals plants and other organism	<b>National Indicator 44</b> Status of priority species (distribution)	Development work required by Welsh Government						



Natural Resource	Indicator Name	Components Measured	Data Quality	Current Status	Year	Latest Reported Trend	Overall Trend	Achieving Target?
	<b>Marine Strategy Framework Directive</b> Abundance of marine species groups	Marine bird abundance  Seal abundance and distribution  Cetacean abundance and distribution  Zooplankton biomass  Fish abundance and biomass	Good. OSPAR common indicator	Information will be available following UK Marine Strategy Framework Directive indicator assessments		In general, on track to achieve Good Environmental Status by 2020. The recovery stocks of some types of fish, elasmobranchs and shellfish unlikely by 2020 <sup>4</sup>	To be reported in 2018	UK marine waters achieve Good Environmental Status by 2020 under the Marine Strategy Framework Directive
<b>Air Quality</b>	Areas affected by deposition – sulphur, nitrogen	Area of sensitive habitat area exceeding critical loads for acidification and eutrophication, Wales		90% habitat area exceed critical load NO <sub>2</sub>  74.4% habitat area exceed Critical load SO <sub>2</sub> <sup>5</sup>		Improving 1995-1997 to 2011-2013 <sup>5</sup>	Improving	No target

Natural Resource	Indicator Name	Components Measured	Data Quality	Current Status	Year	Latest Reported Trend	Overall Trend	Achieving Target?
Air quality	Background ozone concentration	Change in background ozone concentration				Ozone levels in the Northern hemisphere increased by ~10% between 1987 and 2007 <sup>6</sup>	Declining last 20 years <sup>6</sup>	No target
Water Resource	Availability of water for abstraction			60% of water bodies, have water that is reliable for people to abstract for at least 95% of the time for new consumptive abstractions <sup>7</sup>	2014	Not available		No Target
	Impact of hydraulic conditions on Natura 2000 protected sites.			45 of 112 (40%) Natura 2000 protected sites <sup>8</sup>	2015	Not available		No Target
	WFD water bodies failing objectives because of changes to flows and water levels			29 (3%) water bodies failing objectives <sup>9</sup>	2015	Not available Maybe in 2021		All WFD Water bodies achieve Good Status by 2015  <b>No</b>

Natural Resource	Indicator Name	Components Measured	Data Quality	Current Status	Year	Latest Reported Trend	Overall Trend	Achieving Target?
Soils	<b>National Indicator 13</b> Concentration of carbon and organic matter in soil	Soil carbon and organic content of topsoil (0-15cm)		109.8 gC/kg <sup>10</sup>	2013/14	Topsoil carbon concentrations are generally stable <sup>11</sup>	Maintained 1978-2013	No target
		Soil quality		unknown		Deteriorated across all habitats apart from woodlands <sup>12</sup>	Declining 1990-2011	No target
		Soil erosion		unknown			unknown	No target
		Soil compaction		unknown			unknown	No target
Freshwater	<b>National Indicator 45</b> (part) % freshwater water bodies achieving good or high overall status	Water Quality Ecology River Flow Groundwater quantity	good	37% of all freshwater water bodies in good or better overall status <sup>9</sup>	2015	Not available Maybe in 2021	unknown	All WFD water bodies achieve Good Status by 2015  No
Marine waters	<b>National Indicator 45</b> (part) % Coastal and Estuarine water bodies achieving good or high overall status	Coastal and estuarine water	Good	29% of our estuarine and coastal waters in good or better overall status <sup>9</sup>	2015	Not available Maybe in 2021	unknown	All WFD water bodies achieve Good Status by 2015  No

Natural Resource	Indicator Name	Components Measured	Data Quality	Current Status	Year	Latest Reported Trend	Overall Trend	Achieving Target?
	Marine litter	Beach litter Litter on seafloor Floating litter	Good. OSPAR common indicator	Information will be available following UK Marine Strategy Framework Directive indicator assessments		In general, on track to achieve Good Environmental Status by 2020 <sup>4</sup>	To be reported in 2018	UK marine waters achieve Good Environmental Status by 2020 under the Marine Strategy Framework Directive

#### Annex Box 7.1.1 National Indicator 43: Area of healthy ecosystems in Wales

The methodology for this indicator is to be finalised by Welsh Government.

Interim Indicator: To be measured initially through the extent of terrestrial semi-natural habitat, presented as losses and gains of broad habitat group by area (hectares).

**Semi-natural habitats in Wales cover a total of 626,100 ha (30% of the Welsh land surface)<sup>13</sup> [M].**

## Part 2 – Well-being – by benefits

Indicators that assess whether :

- The benefits from ecosystems services are being optimised; and
- The contribution to well-being of ecosystem service provision is improving or declining

The range of benefits for well-being have been selected on the basis that they can be more easily measured. Other benefits (for example, contribution to community cohesion) may need to be developed further.

Note: Where an indicator has an existing target relevant to Wales, we are suggesting it could be used as an initial indication of the above. Where Policy Targets exist, achievement of the target is indicated. Meeting the target does not necessarily mean the resource is being sustainably managed – as further consideration is needed in relation to the means of management and the optimisation of benefits.

Annex Table 7.2 Indicators of well-being and the benefits of natural resources.

Benefit	Existing Indicator	Components measured	Data Quality	Current Status	Year	Latest reported trend	Overall trend	Achieving Target?
Food	To be determined							
Fibre (including timber)	To be determined							
Energy	National Indicator 12 Capacity of renewable energy equipment installed	Capacity (in MW) of renewable energy equipment installed		1,810.3 Mega Watts installed capacity of sites generating electricity from renewable sources <sup>a</sup>	2014	Increase from 428.5 MW to 1,810.3 MW <sup>14</sup>	Improving 2003 - 2014 <sup>14</sup>	
	Proportion of energy generated from renewable sources			10% Electricity generated from renewable sources	2013 <sup>15</sup>	Increase from 3.5% to 10.1%	Improving 2005 - 2013 <sup>15</sup>	

<sup>a</sup> Welsh Government are considering which source of data to use. The Indicator described here may not be the published National Indicator

Benefit	Existing Indicator	Components measured	Data Quality	Current Status	Year	Latest reported trend	Overall trend	Achieving Target?
Energy	<b>National Indicator 42</b> Emissions of greenhouse gases attributed to the consumption of global goods and services in Wales	Development work required by Welsh Government						
Clean water	Drinking Water Quality	Public and private water supply		0.05% of tests of public water supply failed to meet the European Union (EU) and national standards <sup>16</sup>	2014	Decrease from 1.6% to 0.05% <sup>16</sup>	Improving 1991 - 2014	
				8.7% of tests of private water supplies failed to meet the EU and national standards <sup>16</sup>	2014			
	Bathing Water Quality			100% designated bathing	2015	Increase from 70% to 100% designated bathing	Improving 1990 - 2014	Bathing Water Directive Yes

Benefit	Existing Indicator	Components measured	Data Quality	Current Status	Year	Latest reported trend	Overall trend	Achieving Target?
				waters complied with the revised Bathing Water Directive <sup>17</sup>		waters complied with the minimum standards of bathing water directive		
Clean air	<b>National Indicator 4</b> Levels of nitrogen dioxide pollution in the air	These figures were published as part of an ad-hoc request to StatsWales You can find the data published for the request on the <a href="#">Stats Wales website</a> <sup>18</sup>						
	Annual emissions to air	Nitrogen dioxide Particulate matter					improving, 1990 – 2013 <sup>19</sup>	No <sup>20</sup>
		Nickel Polycyclic aromatic hydrocarbons						No <sup>20</sup>



Benefit	Existing Indicator	Components measured	Data Quality	Current Status	Year	Latest reported trend	Overall trend	Achieving Target?
Clean air	Annual emissions to air	Sulphur dioxide Lead Ammonia NMVOC Carbon monoxide					Improving 1990 - 2013 <sup>19</sup>	Yes <sup>20</sup>
Equable Climate	Public Attitudes and Behaviours relating to Climate Change	Awareness of climate change  Concern about climate change  Associated behaviours	The data is currently being collected as part of the new National Survey, and will be first reported in 2017.					
	Daily mean temperature					0.7°C rise in daily mean temperature <sup>21</sup>	Declining 1914 – 2006	
	Change in summer rainfall					24% decline in summer rainfall <sup>21</sup>	Declining 1914 - 2006	
	<b>National Indicator 41</b> Emissions of greenhouse gases within Wales	Territorial emissions of greenhouse gases by sector (million tonnes carbon)		46.4 Million tonnes carbon dioxide equivalent <sup>22</sup>	2014	18% reduction from base year <sup>22</sup>	Improving Base year – 2014 <sup>22</sup> (base year is 1995 for fluorinated	

Benefit	Existing Indicator	Components measured	Data Quality	Current Status	Year	Latest reported trend	Overall trend	Achieving Target?
		dioxide equivalent)					greenhouse gases and 1990 for carbon dioxide, methane and nitrous oxide)	
Hazard regulation	Public Attitudes and Behaviours relating to Flood Risk	Awareness of flood risk Concern about flood risk Associated behaviours		The data is currently being collected as part of the new National Survey, and will be first reported in 2017.				
	<b>National Indicator 32</b> Number of properties at medium or high risk from flooding from rivers and the sea	Total number of properties (residential and non-residential) at high or medium risk of flooding from rivers and the sea		61,000 properties at high or medium risk of flooding <sup>23</sup>	2014	Not available		No target

Benefit	Existing Indicator	Components measured	Data Quality	Current Status	Year	Latest reported trend	Overall trend	Achieving Target?
Wildlife	<a href="#">See Animals and Plants in Natural Resource Table</a>							
	Public Attitudes and Behaviours relating to Biodiversity <sup>24</sup>	Awareness of biodiversity change	High (Official Statistic)	38%	2014	First year of data collection		
		Concern about biodiversity change		43%				
		Associated behaviours		36%				
Aesthetic	<b>National Indicator 26</b> Percentage of people satisfied with local area as a place to live			The data is currently being collected as part of the new National Survey, and will be first reported in 2017.				
	Quality and diversity of the visual and sensory landscape <sup>25</sup>	% landscapes evaluated as outstanding or high quality in relation to visual and sensory benefits	High	50% (landscape outside of Cardiff and Swansea)	2015	The area (outside of Cardiff and Swansea) evaluated as outstanding or high has increased from 49% to 50% (2012-2015)	Improving	Yes

Benefit	Existing Indicator	Components measured	Data Quality	Current Status	Year	Latest reported trend	Overall trend	Achieving Target?
Aesthetic		% diversity of landscapes in relation to visual and sensory benefits	High	Development with Built Land 4.63%  Lowland landscapes (Lowland valleys and Rolling Lowlands) 36.7% (outside of Cardiff and Swansea)	2015	Development with Built Land at 4.63% increased by 0.1% (21 km <sup>2</sup> ).  Lowland landscapes (Lowland valleys and Rolling Lowlands) decreased from 36.9% to 36.7% (0.2%).  (outside of Cardiff and Swansea) (2012-2015)	Declining	
	Quality and diversity of the historic landscape <sup>25</sup>	% historic landscapes evaluated as outstanding or high quality	High	83%  (outside of Cardiff and Swansea)	2012	Next results 2017	unknown	
		% diversity of historic landscapes		to be confirmed				
Recreation and health	Access to All Greenspace	to be developed						

Benefit	Existing Indicator	Components measured	Data Quality	Current Status	Year	Latest reported trend	Overall trend	Achieving Target?
	Percentage of people who visit the outdoors for informal recreation <sup>24</sup>	% of population who visit the outdoors at least once every 4 weeks	High (Official Statistic)	84%	2014	Decrease 84% (2014) 88% (2011)	Variable 84% (2014) 88% (2011) 85% (2008)	
	Linked to <b>National Indicator 28</b> Percentage of people who take part in environmental volunteering <sup>24</sup>	% of population who have volunteered with an environmental group at least once in the last 12 months	High (Official Statistic)	12%	2014	First year of data collection Next results in 2017	unknown	
	Percentage of adults who meet the Physical Activity target through participation in outdoor recreation in Wales <sup>24</sup>	% of population who undertake Moderate or High Physical Activity for a total of 150 minutes per week through outdoor recreation	High (Official Statistic)	28%	2014	Decrease 28% (2014) 32% (2011)	Variable 28% (2014) 32% (2011) 29% (2008)	WG / WHO target

### Annex Box 7.1.2 National Indicator 14: The Ecological Footprint of Wales

An ecological footprint is an indicator of the total environmental burden that society places on the planet. It represents the area of land needed to provide raw materials, energy, food, as well as absorb pollution and waste created and is measured in global hectares<sup>26</sup>.

*“The total ecological footprint of Wales is estimated at 10,05 million global hectares (gha), or 100,500 square kilometres (approximately 4.8 times the land area of Wales). Based on current population levels, this equates to about 3.28 gha per capita. This is estimated to be roughly 1.2- 1.8 times the global average”<sup>27</sup>.*

### Annex Box 7.1.3 Evidence Gaps

The assessment of well-being in Chapter 5 clearly demonstrates the important benefits that ecosystems support in our towns and cities. Chapter 6 set out the difficulty in building a comprehensive picture of the management of our urban systems. Information and data on ecosystems in urban areas are compartmentalised, and we have been unable to complete an assessment of the resilience attributes.

For this reason, there is no composite indicator for the resilience of urban systems included in Tables 1 or 2. We believe this is an important gap that we propose to address through engagement and collaboration with our partners in the public and third sectors. In time we hope this will inform a more integrated understanding of natural resources in towns and cities with appropriate indicators.

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(“Accessed” refers to the date the link was last accessed)

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