

# LANDMAP, landscape and a changing climate

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## Introduction

The **risks for Wales from a changing climate** are outlined in the UK Climate Change Risk Assessment 2017 Evidence Report: Summary for Wales. The updated UK Climate Projections (2018) also provide information on how our climate may change in the future. The information will help decision makers and users of the information understand the range of risks, and potential opportunities, from the changing climate and advise how we can adapt in response.

**Landscapes** are the settings in which we live, work and experience life, they reflect the interrelationships between natural resources, culture and economy. Many environmental resilience and place-based planning challenges that shape our future wellbeing and prosperity are best addressed at a **landscape-scale**. As well as being a scale of working, landscape is a valued resource, landscape characteristics and qualities contribute to a sense of place, identity, well-being and quality of life as well as delivering multiple benefits. In Wales, LANDMAP is a key landscape evidence resource where landscape characteristics, qualities and influences on the landscape are recorded and evaluated into a nationally consistent data set. LANDMAP therefore provides an excellent baseline resource to consider how a changing climate may impact upon landscape.

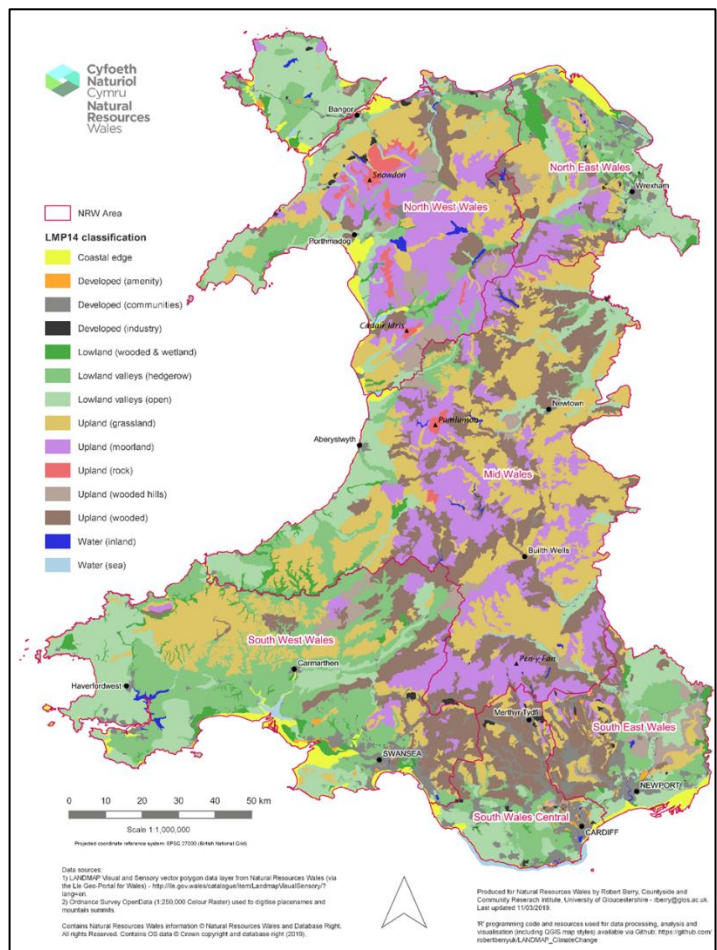
The changing climate of Wales is likely to have significant direct (e.g. changing land cover) and indirect (e.g. by influencing land use decisions) impacts on landscape character, local distinctiveness and quality. Flooding and drought events, more frequent extreme weather, coastal erosion, wildfires, diseases affecting tree cover and changing land cover, habitats and species ranges are examples of how the landscape may change to a greater or lesser degree, in the short or long term. Landscape changes may also be evident from mitigation measures, such as renewable energy generation, water resource management and adaptation through the planned expansion of woodland.

**Landscape character can provide an important communication tool** to raise awareness and understanding of the risks and opportunities of climate change because people relate to landscapes as places to live, work and enjoy. It is therefore opportune to bring together information on the impacts from a changing climate and apply them with a landscape perspective.

The 45 **LANDMAP Visual & Sensory** landscape types were collated into two new classifications, one of 14 landscape types and a further simpler version of 9 types (LMP09).

LMP14 formed the landscape types for reporting the potential impacts of climate change on landscape character and quality.

The map on the right shows the spatial distribution of the 14 Landscape Types plus the NRW Operating Areas used for Area Statements.



The 'LANDMAP, landscape and a changing climate' contract was awarded to the **Countryside and Community Research Institute (CCRI)**, University of Gloucestershire. Their brief was to identify and communicate the impacts of projected climate changes for Wales in 2050 on landscape character and qualities through:

Narratives on  
 - Landscape  
 - Climate Change

Maps & Statistics (km<sup>2</sup> and %)  
 - At a national level  
 - At example authority level

Spatial Data  
 - GIS

## The outputs

**Landscape Narratives** for 14 landscape types p100, plus background context p182 and landscape susceptibility to climate change p115. See example from the coastal edge below.

Landscape narrative: Coastal edge	
<ul style="list-style-type: none"> <li>The coastal edge landscape type – 2.45% of the area of Wales covered by LANDMAP - comprises great variety from the inter-tidal zone (beaches, mud and rocks) and small islands, dunes, coastal wild land, cliffs and cliff tops. The rocky headlands and cliffs showcase geological formations.</li> <li>Characteristic features are the remains of anti-invasion defences, fishing, maritime trade, features from relict industrial mineral mining and quarrying, coastal navigation (lighthouses, daymarks and coastguard houses) and sea defences - including timber groynes and breastwork defences, and more recent beach nourishment and rock beach structures.</li> <li>Settlement is sparse. Some areas marked by nearby development; 20<sup>th</sup> century housing and amenity land, mostly golf courses and caravan sites.</li> <li>Only a very small proportion (11.7%) of this landscape type is enclosed, mostly with stone walls (9.05% of land area) and sometimes with fences (1.73%). Some use of headlands and dunes for rough grazing. Tree cover is also sparse, prevailing winds can create a distinctive windblown tree profile.</li> <li>Rough grazing has conserved extensive areas of medieval and earlier archaeology, which extends also into the inter-tidal zone, including fossil forests exposed on beaches areas affected by the rise in sea levels around 6,000 years ago.</li> <li>These landscapes have distinct sense of the birdlife and vegetation from coastal heaths, dunes and gorse scrub and their associated colours that are particular to these areas. Often impressive rock faces, screes and shingle.</li> <li>There is widespread access, including via coastal tracks and paths, to these landscapes and their valued panoramic views, sense of remoteness and wildness.</li> <li>They are frequently associated with low levels of light pollution and landscapes of outstanding or high importance for their scenic quality and character and highly valued seascapes often part of a designated Heritage Coast, National Park or AONB, generally associated with attractive views.</li> </ul>	

Legend	Level of anticipated change	Description
	High -ve	Key characteristics and qualities are vulnerable and would be adversely affected by expected climate changes resulting in a significant impact on character.
	Moderate -ve	Some key characteristics and/or qualities are vulnerable and may be adversely affected by expected climate changes resulting in a noticeable impact on character.
	Low -ve	Key characteristics and qualities are more resilient and will only be affected in a limited way by expected climate changes. Impacts will only result in minor changes in character.
	No change	No discernible changes are anticipated to character or quality
	Low +ve	Key characteristics and qualities would be beneficially affected in a limited way by expected climate changes. Impacts will only result in minor changes in character.
	Moderate +ve	Some key characteristics and qualities are vulnerable to expected climate changes and may be beneficially affected resulting in a noticeable impact on character.
	High +ve	Key characteristics and qualities would be beneficially affected by expected climate changes resulting in a significant impact on character.

**Climate Change Narratives** for 14 landscape types p114, plus background context p159

Landscape character type: Coastal Edge	
<p><b>Outcomes of change</b></p> <p>The most significant changes are likely to be caused by sea level rise, compounded by warmer wetter winters (leading to more flooding in winter months) and more frequent and intense storms (again causing flooding, and storm surges with negative impacts on low lying areas).</p> <ul style="list-style-type: none"> <li>Sea level rise is likely to have a significant impact on coastal edge landform, vegetation and habitat, archaeological assets, transport and settlement. The coastline shape is likely to alter with loss of salt-water marshes and inundation of low-lying land, particularly in estuarine areas. Overall there will be a loss of land and erosion is likely to increase, although the level of accretion may also increase in some places.</li> <li>Salt water intrusion will impact the coastal vegetation and land use, damaging agricultural land and protected natural habitat with losses of up to 2,300 ha of Natura designated coastal habitat by 2100. Fresh water aquifers in coastal areas may also be affected by salt water intrusion.</li> <li>Sea level rise and storm surges will threaten coastal settlements and road/rail transport links, which may require stronger flood defence systems (e.g. higher, more extensive, and/or new embankments) for protection.</li> <li>Archaeological sites and ancient landscapes along the coast edge, either in low-lying locations or on exposed cliffs, will be at risk of damage and loss due to coastal erosion and increased storm events.</li> </ul>	
<p><b>Summary of landscape change</b></p> <ul style="list-style-type: none"> <li>The coastal edge is at significant risk of a wide variety of changes. The shape of the coastline may alter along with loss of some specific landscape features such as sand dunes and salt marsh in some areas.</li> <li>The coastline may become less diverse as a result of specific plant communities (e.g. salt marsh, dunes) with a reduction in the areal extent of low-lying coastal edge. Some coastal freshwater habitats may be lost, reducing diversity across the landscape.</li> <li>Flood protection structures such as embankments may become more visible, and storm damage on settlements, transport structures, and on archaeological assets more frequent and visible.</li> </ul>	

Summary of potential impacts: Coastal Edge								
Expected climate change	Warmer mean temperatures			Hotter, drier summers			Warmer, wetter winters	More frequent extreme weather
	Rise in sea levels	Longer growing season	Migration of pests, invasive species, diseases	Drying out, desiccation, erosion, of wetlands and soils	Stress on trees and plants	Wild fires		
Landform								
Field boundaries								
Tree cover								
Vegetation								
Surface water								
Settlement & Structures								
Archaeological assets								

## Maps & Statistics (km<sup>2</sup> and %)

### National level p18

Summary table p17

LMP14 and LMP09 types p20-21, plus:

NRW Areas (Area Statements) p22-29

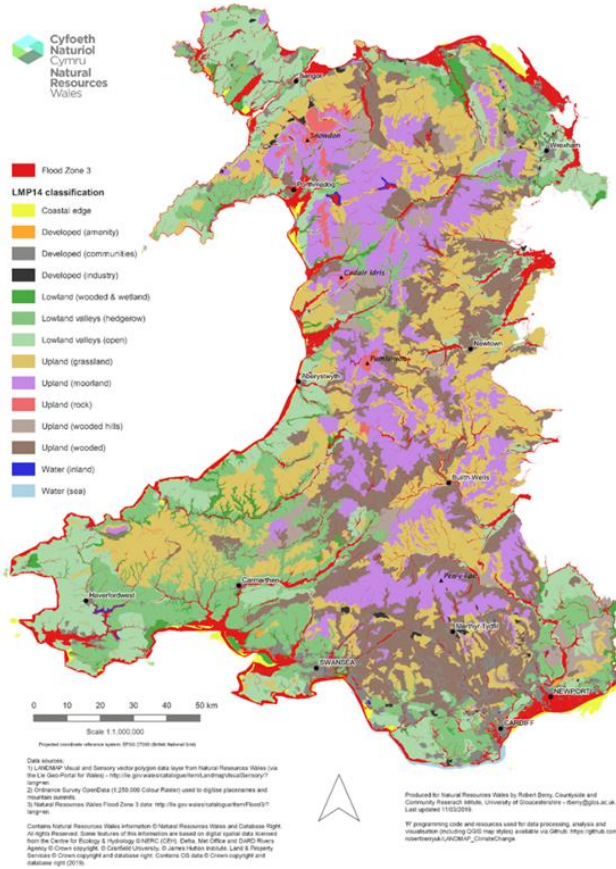
Areas <1m contour p32-33

Flood Zones 2 p34-35

Flood Zone 3 (example below) p36-37

Dominant field boundaries p38-41

Visual & Sensory evaluations p42-44



### Example authority level maps p45

Denbighshire (example below)

Ceredigion

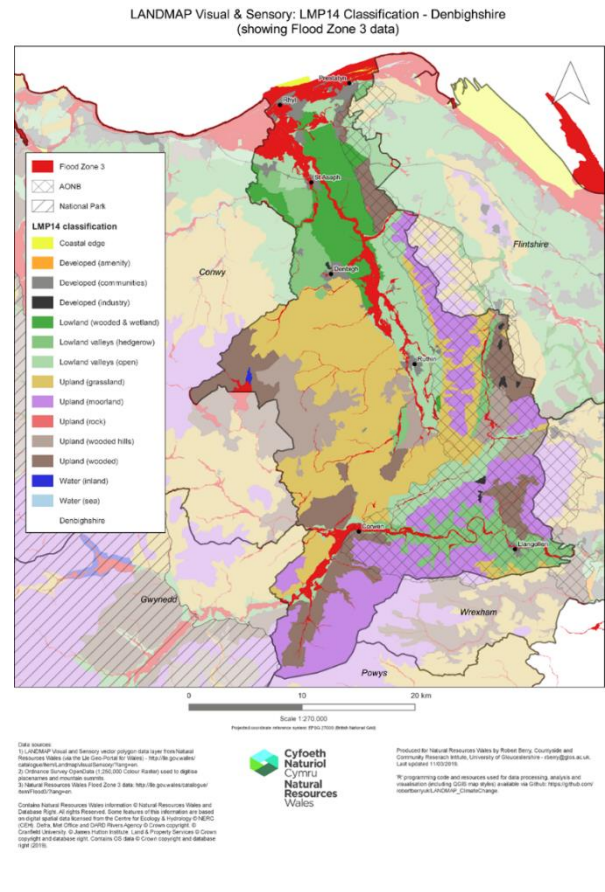
Monmouthshire

Caerphilly

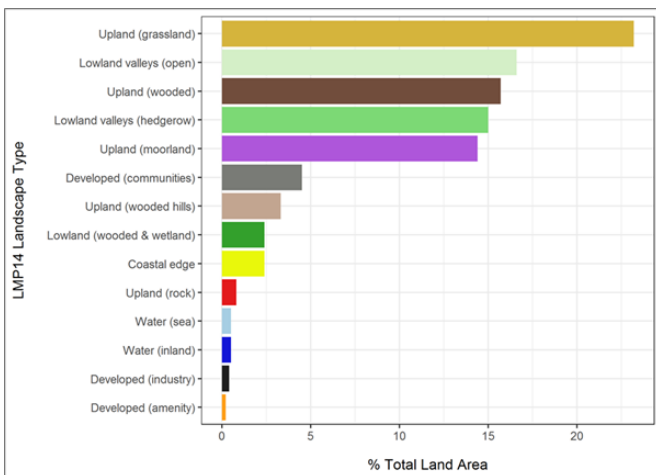
Blaenau Gwent

Newport

Torfaen

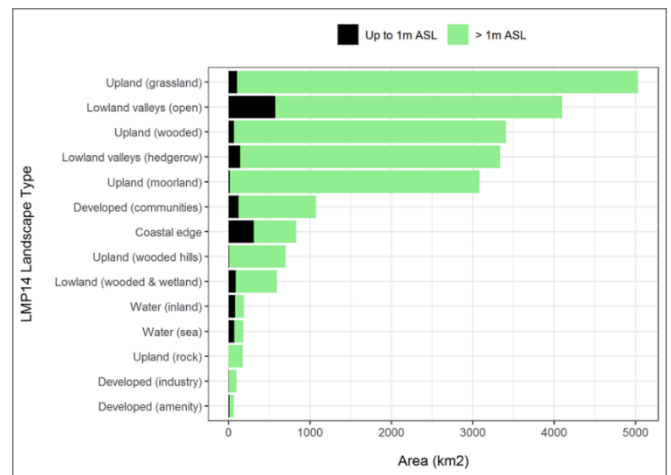


### LMP14 landscape types with Flood Zone 3 p36



Area statistics for LMP14 landscape types (all-Wales) p21

### Denbighshire (Incl. AONB) p74



Area statistics for LMP14 landscapes up to 1m above sea level p33

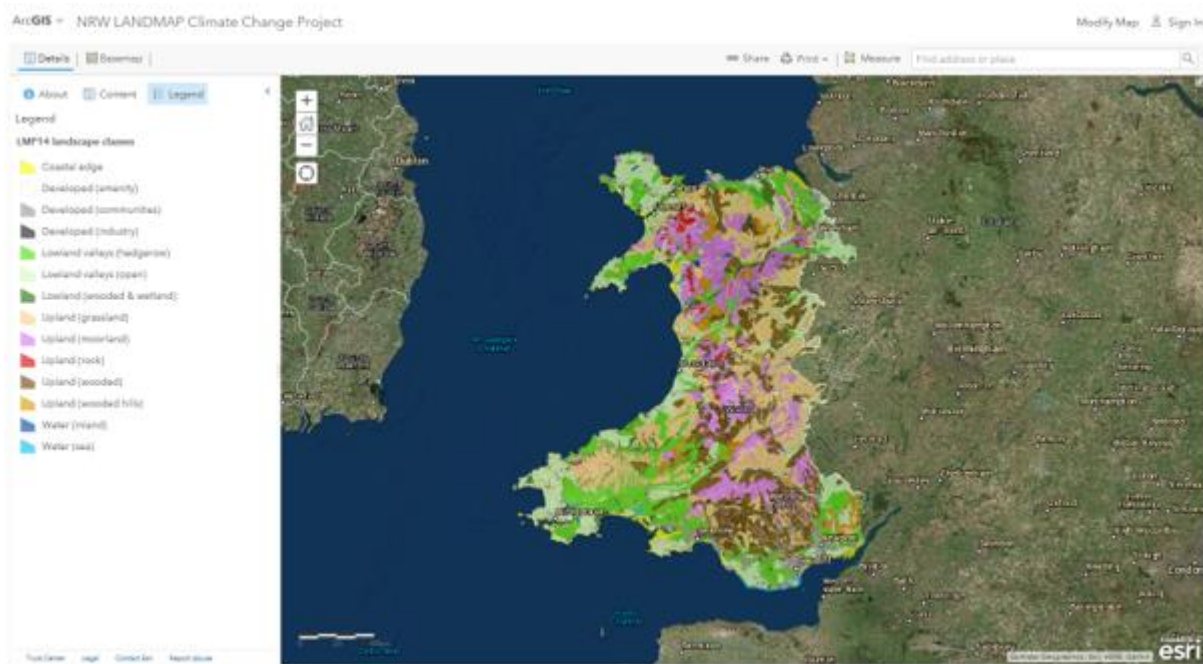
## Spatial Data

### GIS LANDMAP\_VS\_ClimateOnly.shp

The original LANDMAP Visual & Sensory aspect areas are linked to the new 9 and 14 landscape types, the GIS layer records the new landscape classifications. This information will be added to the existing Visual & Sensory spatial database in 2019.

### Web map <https://arcg.is/19yiDe0>

An online interactive map with selectable base maps, LMP14 and LMP09 classifications, NRW Operating Areas (relating to Area Statements), Flood Zones 2 & 3, areas <1m contour, field boundaries and landscape Visual & Sensory evaluations.



## NRW Report No 314. LANDMAP, Landscape and a Changing Climate

**Berry, R., Dwyer, J., Gaskell, P., Lake, J., Powell, J. and Young I. 2019. LANDMAP, Landscape and a Changing Climate. NRW Report No: 314, 278 pp, Natural Resources Wales, Bangor.**

Accessible from the web page [www.naturalresources.wales/landmap](http://www.naturalresources.wales/landmap)

Link to the report <https://cdn.naturalresources.wales/media/688626/eng-landmap-landscape-and-a-changing-climate.pdf?mode=pad&rnd=13198928933000000>

## What next

Using landscapes we recognise we can communicate and raise awareness of the challenges and opportunities from the changing climate, recognisable landscapes can also provide a basis for discussions on landscape change, adaptation and resilience.

Further work may explore visualisations of potential landscape change and possible adaptation actions associated with landscape types in addition to engaging with strategic and place-based climate change assessments, projects and adaptation plans in Wales.

## Contact

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