Ecosystem accounts for urban areas

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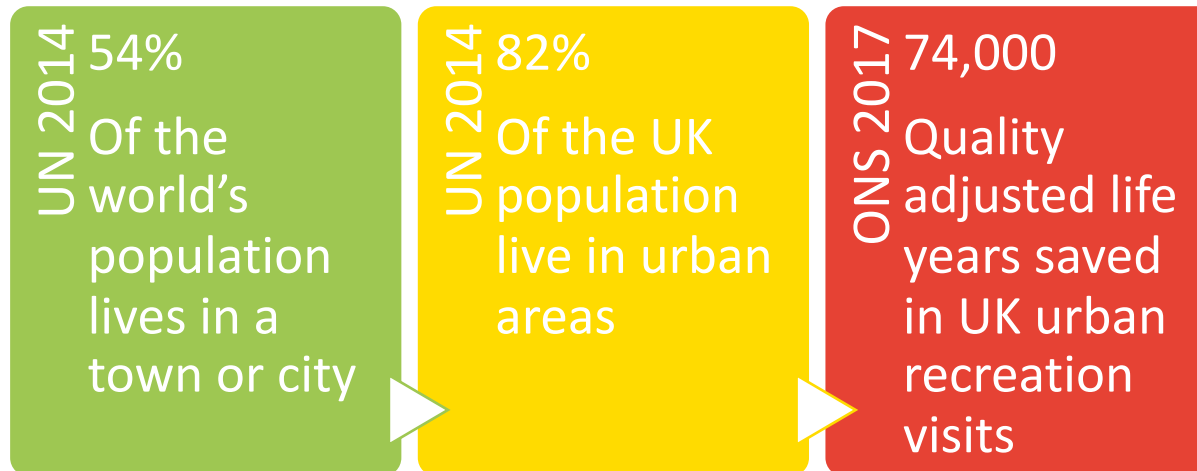# Motivation

UN 2014 — 54% Of the world's population lives in a town or city

UN 2014 — 82% Of the UK population live in urban areas

ONS 2017 — 74,000 Quality adjusted life years saved in UK urban recreation visits

What are we trying to achieve?

- Accounts for urban areas which demonstrate and monitor changes in value of services and the extent and condition of natural capital assets in the urban environment

- Support to private and public land managers to prioritise investment and make informed decisions

There are significant differences between urban accounts and ecosystem accounts for other areas

Extent

• Highly modified landscape with different types of ecosystems but few completely natural areas

Ecosystem services

• A different range of services dominated by cultural services and particular regulating services

Condition

• Capacity to deliver services sustainably is strongly influenced by non-ecological factors such as access and proximity to green spaces

Valuation

• Potential to use hedonic pricing

Extent and spatial units
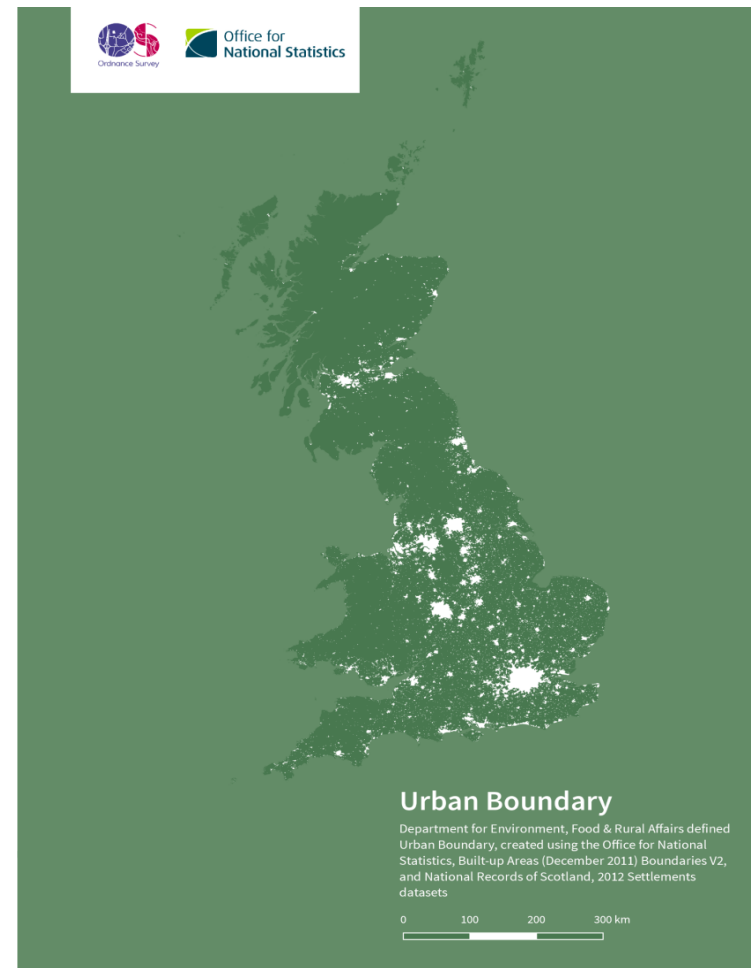
Land cover or population?

Areas may be defined as urban if they have a population over 10,000

Land cover sources preferred, but need to identify contiguous areas. Scale matters!
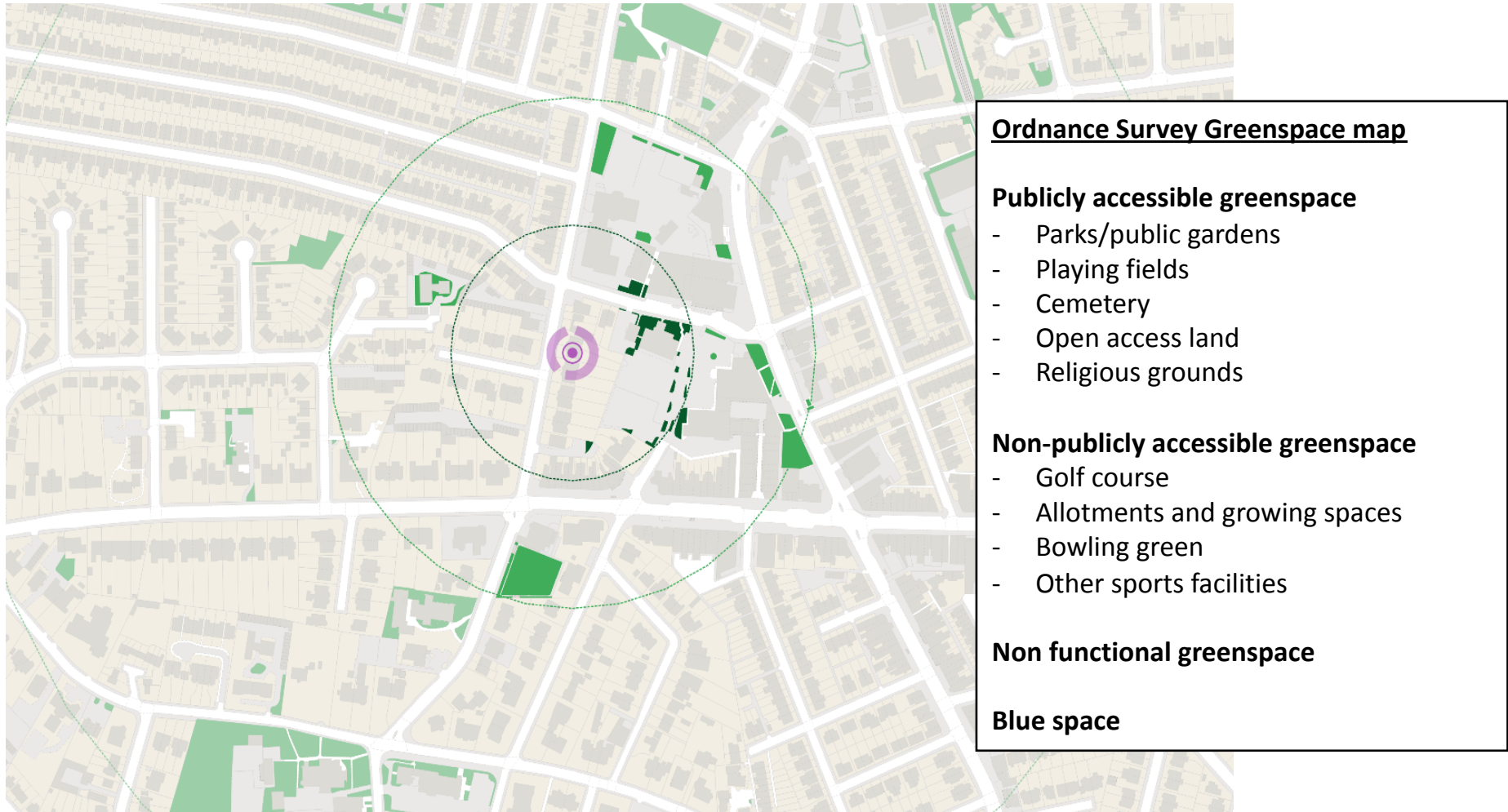
It may be useful to include large areas of natural capital surrounded by urban land such as large parks and rivers

Cadastre or grid square?

Per Arild will discuss this further

Urban Boundary

Department for Environment, Food & Rural Affairs defined Urban Boundary, created using the Office for National Statistics, Built-up Areas (December 2011) Boundaries V2, and National Records of Scotland, 2012 Settlements datasets

0   100   200   300 km

Other data sources are needed in order to identify the nature and extent of urban natural capital

Ordnance Survey Greenspace map

Publicly accessible greenspace
- Parks/public gardens
- Playing fields
- Cemetery
- Open access land
- Religious grounds

Non-publicly accessible greenspace
- Golf course
- Allotments and growing spaces
- Bowling green
- Other sports facilities

Non functional greenspace

Blue space

Natural Land Cover Area Within 100m, 200m, 500m...

Private outdoor space data also available, but hard to identify private greenspace

Ordnance Survey maps

Private outdoor space

In combination, they provide different kinds of extent account

	GB 2015 ('000 ha)
Urban area	1,768
Natural Land Cover	549
Of which, Functional green space	125
Of which, Publicly accessible greenspace	85
Blue space	21
Private outdoor space	529

	GB 2015 ('000 ha)
Urban and suburban	1,212
Coastal margins	4
Enclosed farmland	403
Freshwater	9
Marine	4
Mountains, moors and heaths	11
Semi-natural grassland	34
Woodland	89

Ecosystem services

Provisioning	Regulating	Cultural
Food	Air filtration	Recreational enjoyment
Fibre	Water filtration	Scientific and educational interactions
Water	Protection against noise, smell and visual pollution	Heritage and aesthetic interactions
Fuel/energy	Flood, erosion and landslide protection	Symbolism
	Temperature regulation	Existence
	Carbon sequestration	

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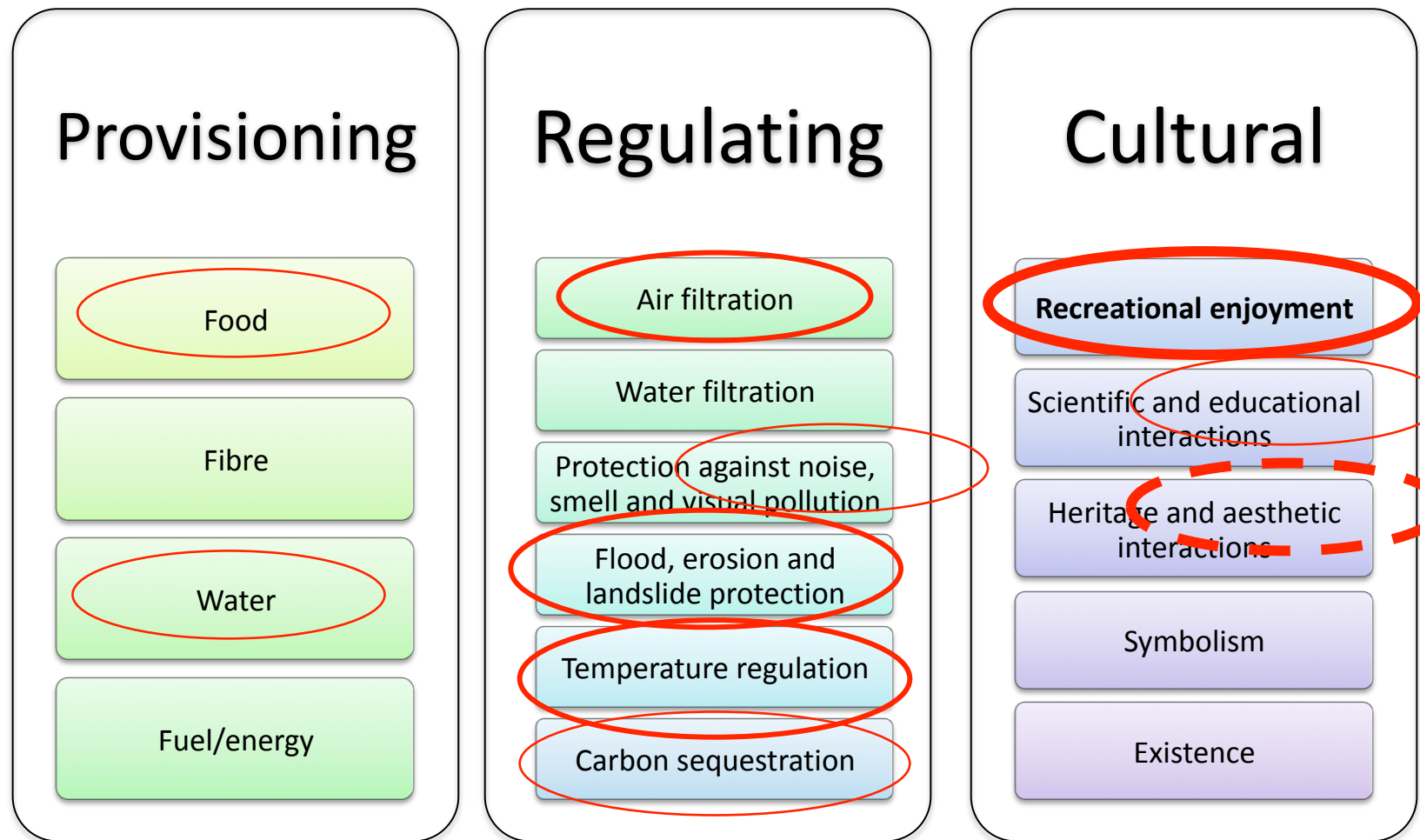
Condition Indicators related to recreation and 'amenity'

| Urban account UK	Non-accounting review of indicators UK	Revised UK account proposals	EU proposals
	Area of urban green space		Land taken for built up areas per person; % urban green space
Average distance to functional green space		% population within x metres of y area of accessible green space	
	Urban street trees	Urban street trees	
Private gardens extent			
Parks awarded Green Flag status		Parks awarded Green Flag status	
		Air pollutant concentrations	Air pollutant concentrations

Condition Indicators related to urban cooling, flood protection and air filtration

Urban account UK	Non-accounting review of urban indicators UK	Revised UK account proposals	EU (MAES/KIP-INCA) proposals
	Position of trees to provide cooling	Hot days	Hot nights/days
Vegetation near road/rail	Urban street trees	Urban street trees	
Sustainable urban drainage (SUDs)	SUDs		
		Vegetation cover	Vegetation cover
Permeability	Degree of compaction	Soil sealing	Imperviousness; soil sealing
		Vegetation cover	Vegetation cover
		Air pollutant concentrations	Air pollutant concentrations

Valuation cultural services – recreation and amenity

Options, strengths and weaknesses

- David Barton to discuss
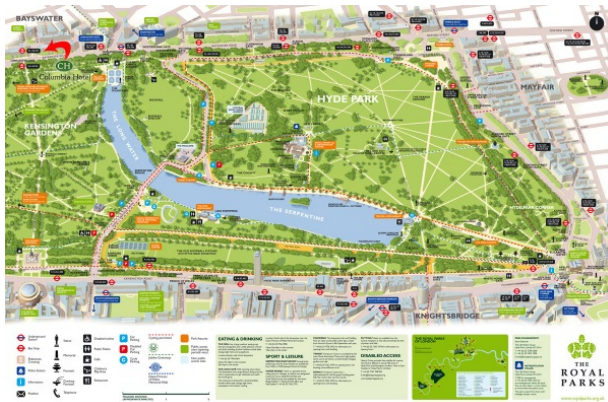
Cultural

Recreational enjoyment

Scientific and educational interactions

Heritage and aesthetic interactions

Symbolism

Existence

Discussion points (for Francois?)

- Does it make sense to focus the accounts on assets <u>within</u> an urban area?

- What spatial detail do we need in order to understand the nature of the assets?

- What would be the best spatial units to use?

- What condition indicators give the best indication of the capacity of the assets to provide services?

- Which services are most important and how should we best value them?

- Can hedonic values ever be used directly within this accounting approach?

Ecosystem services account (UK)

Service	Value £m	Type of valuation
* Food – farms	13	Exchange
* Food - allotments	11	Exchange (net of costs)
* Pollination	?	Replacement cost?
* Public water supply	59	Exchange
* Carbon sequestration	78	Between exchange and welfare
* Flood protection	?	Avoided damage?
* Air filtration	222	Between exchange and welfare
Local climate regulation - vegetation	166	Exchange
Local climate regulation - shade	?	Welfare
Noise mitigation	14	Welfare
* Nature based recreation – travel costs	2,100	Exchange
* Nature based recreation – free trips	3,700	Welfare
Education	1	Exchange?
Physical health	4,400	Welfare
* Amenity	6,500	Exchange (double counts some of the above)

* indicates of particular Oslo interest

It is a cross cutting habitat account
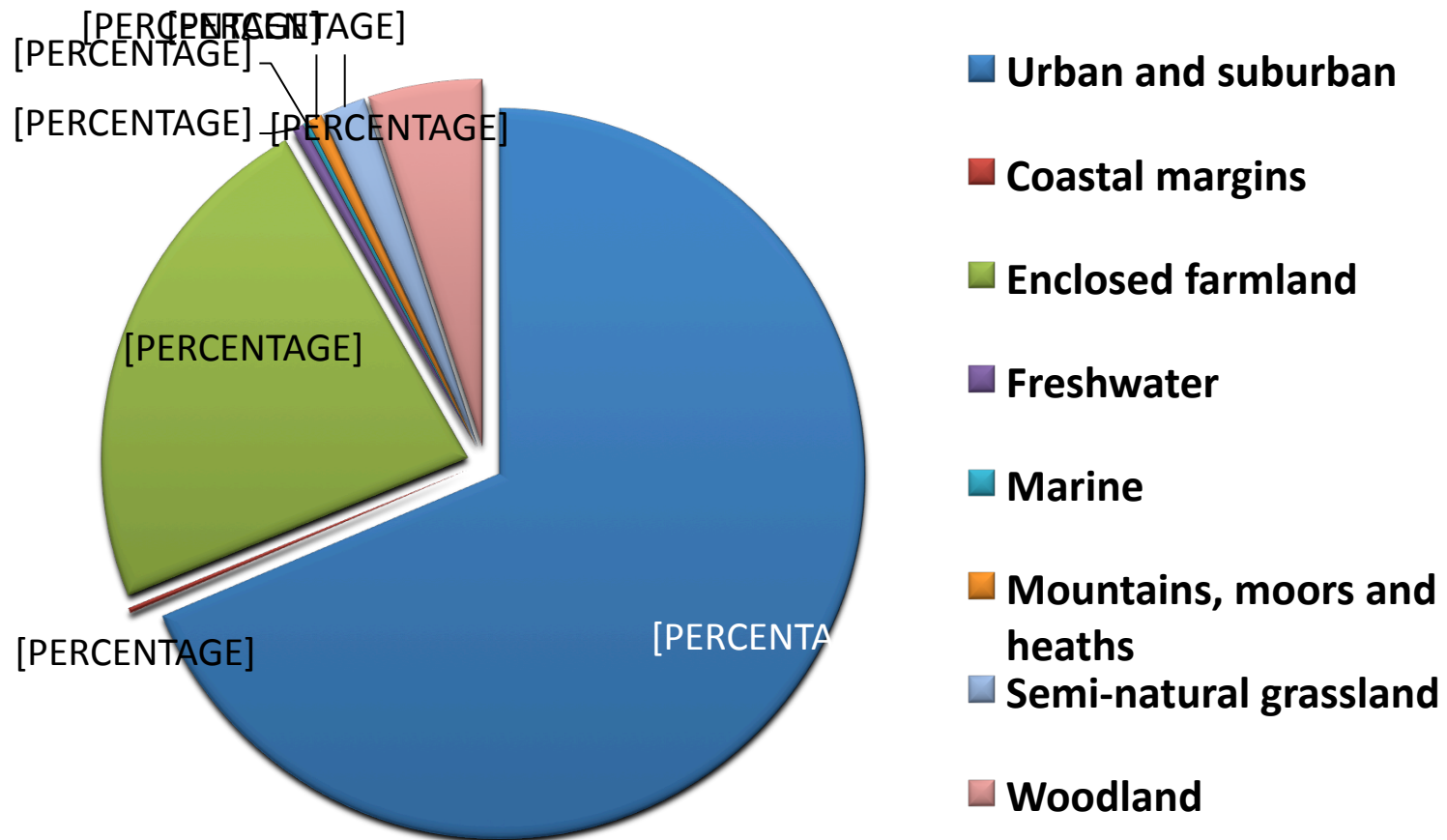
NB Woodland land cover (even at 25 metre raster) only accounts for 30% of urban trees

Condition Indicators related to recreation and 'amenity'

Category	eftec/Defra/ONS	Natural England	MAES
Water related	SUDs Permeability Water quality	SUDs Degree of compaction Surface/vegetation roughness Naturalness of water level regime	Imperviousness Soil sealing (net change) Available soil water capacity Surface water quality Bathing water quality Connection to sewer
Structure	Private gardens extent	Blue space Vegetation cover/bare soil/concrete Urban green space with low vegetation Urban green space with vegetation > 1m Woodland, scrub and hedge Green space not semi-natural Open mosaic habitats Semi-natural habitats	% urban green space % natural area % agricultural area % abandoned area
Climate related		Position of trees to provide cooling	Hot nights/days Urban temperature
Air quality			NO2, PM emissions Air pollutant concentrations Exposure to air pollution NO2, PM concentrations

Condition Indicators (2)

Category	eftec/Defra/ONS	Natural England	MAES
Access to greenspace	Average distance to functional green space Location of blue space Access points ANGSt Green Flag status Paths and bridleways; car parks		
Soil related	Carbon content	Soil chemical status	Soil bulk density Soil organic carbon Soil biodiversity Earthworms Sites with contaminated soil
Connectivity	Contiguous habitats	Proximity to other habitats Green grids	Connectivity of green spaces Fragmentation of green space
Woodland	Vegetation near road/rail	Urban street trees, canopy cover Distribution of trees etc wrt blds, tpt routes	Canopy coverage Foliage damage crown dieback
Noise			Noise levels Exposure to noise

The State of the Green Belt

August 2018

Condition Indicators (3)

Category	eftec/Defra/ONS	Natural England	MAES
Biodiversity	Species abundance (bees, birds)	Trophic levels, community composition	Number and abundance of bird species
	Species diversity	Vegetation structure	Number of lichen species
			% of urban ecosystems covered by Natura 2000
	Vegetation age/height/width/size		
	SSSI condition		
Pressures			Land taken for built up areas (per person!)
			Invasive alien species (new introductions?)
			Population density
			Articial area per inhabitant
			Length of road network per area
			% built-up area
			Weighted urban proliferation (urban sprawl)
			Number of invasive species
Miscellaneous	Green roofs, walls	Building-integrated vegetation	