Greenspace for health and wellbeing: types of measures

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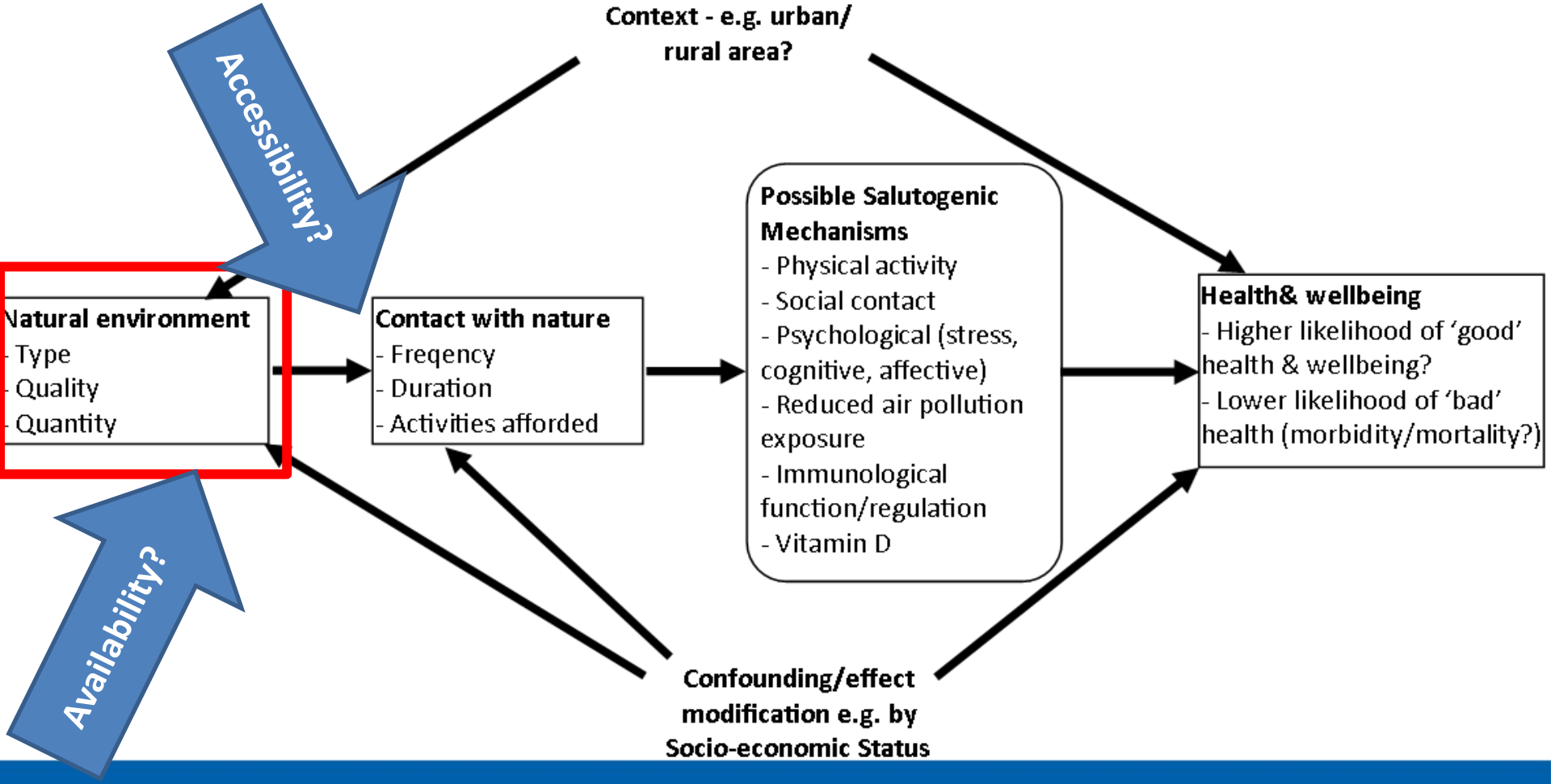
Existing evidence indicates exposure to greenspace may be a significant resource for human health and wellbeing

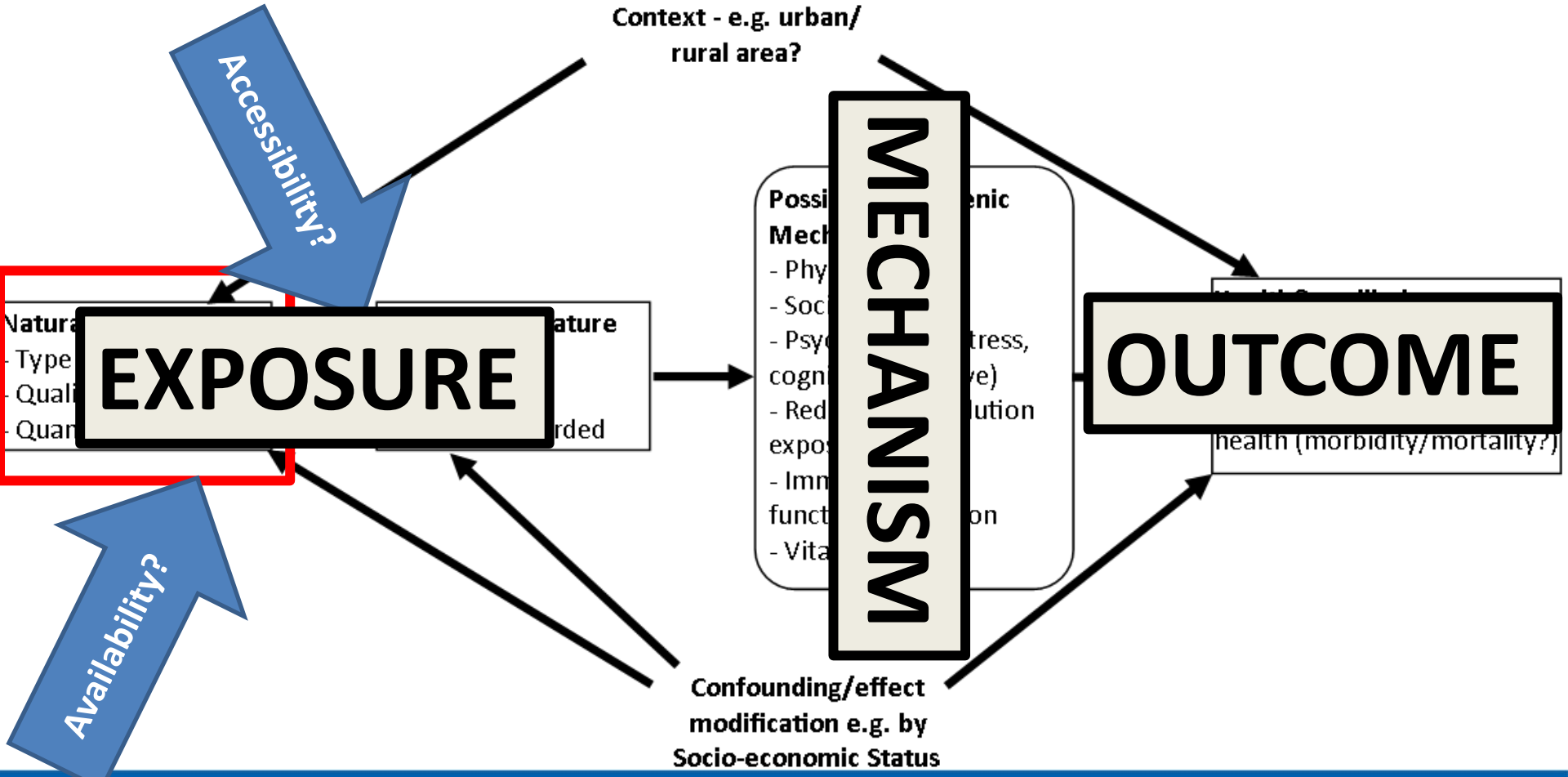

www.nt.co.uk

Green Space – Health Pathways



Adapted from Hartig et al 2014 Nature & Health. Ann Rev PH

Green Space – Health Pathways



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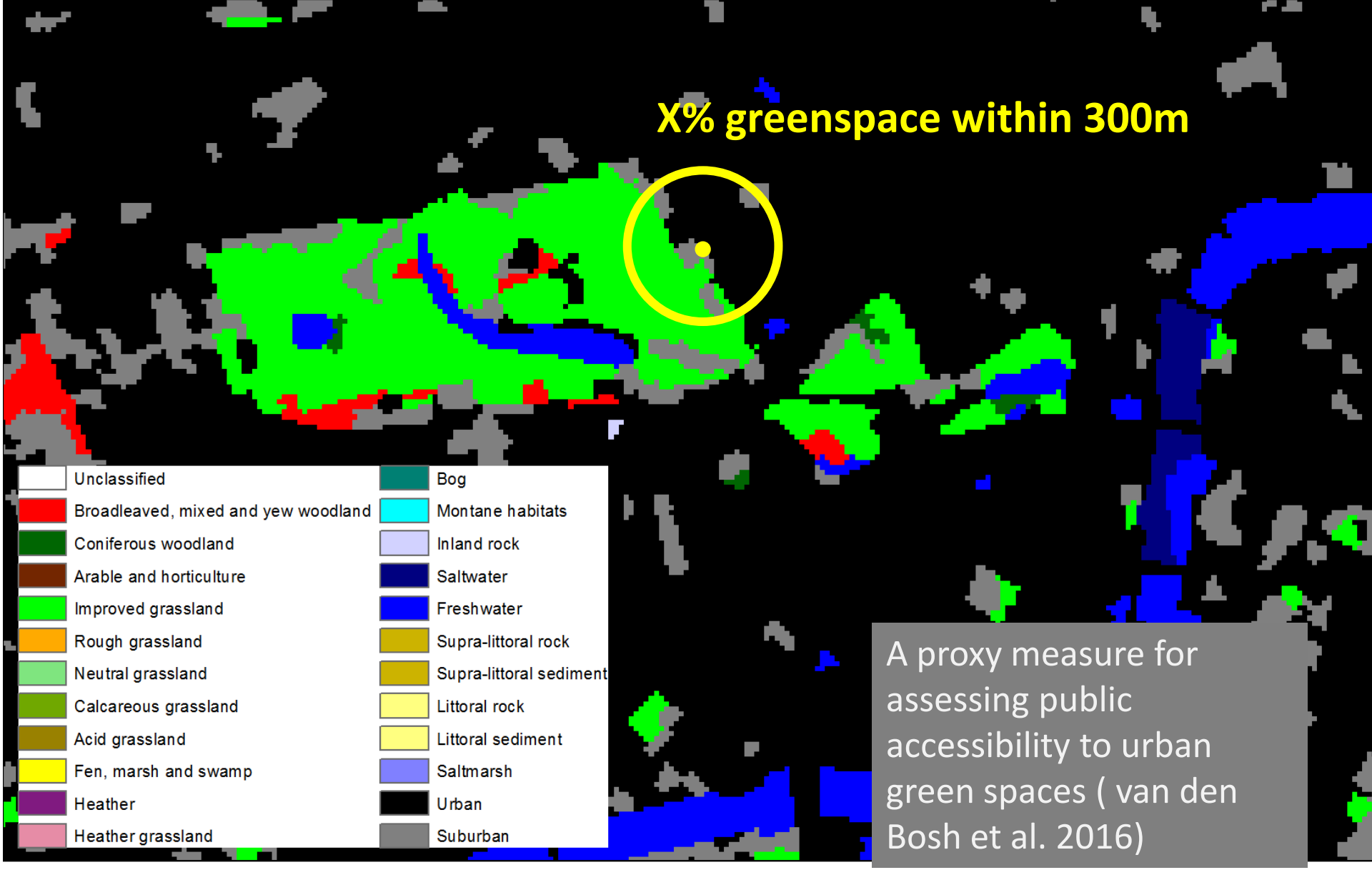
What greenspaces are people are exposed to? And how are they exposed?

- Exposure process
  - Visits?
  - Views?
  - Live nearby?
- Does size of green space matter?
- Does type/quality of green space matter?
  - Inland water – canals, rivers, ponds?
  - More ‘natural’, wooded areas or flat grassland?



CEH Landcover Map 2007 25m cells

Residential proximity

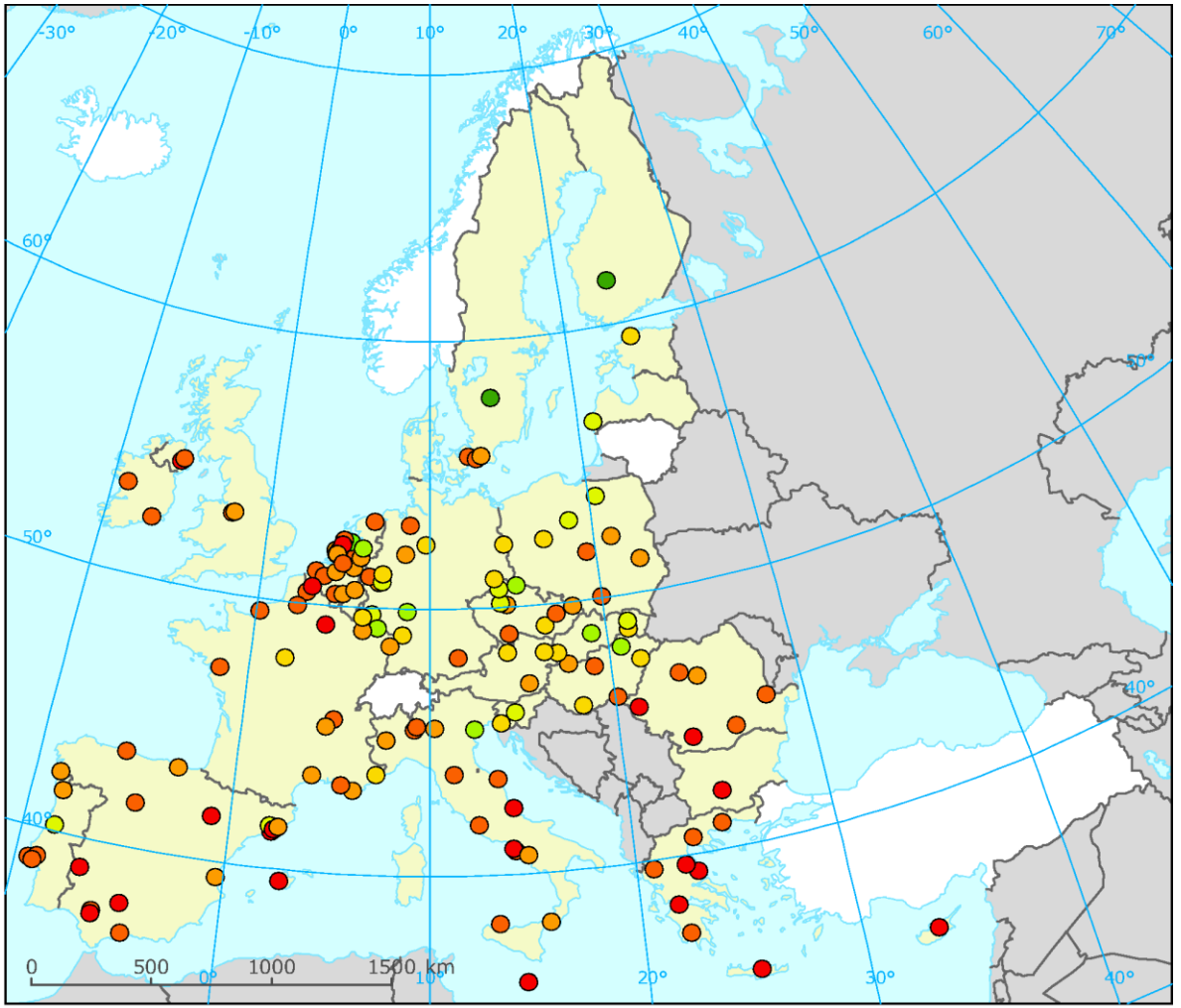
- A key method of exposure estimation
- Especially for secondary datasets where all we know is home location
- Accuracy depends on several factors:
  - What environmental data do we have (timing, spatial resolution, quantity/type/quality)?
  - Spatial resolution of location data (address, postcode, town, statistical area…)?
  - Timing of location data (current – maybe with length of time here, place of birth, lifetime address history)?

Land cover data & health outcomes

- Various options…

Urban Atlas

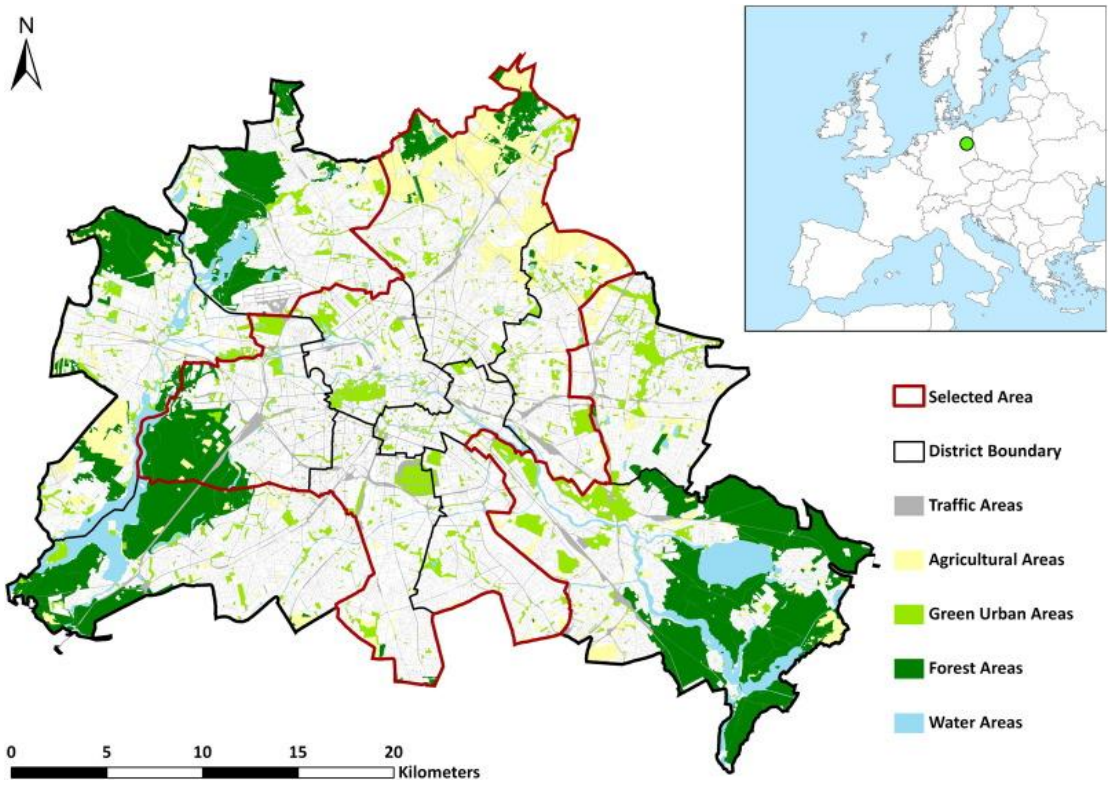
- 305 cities
- 26 in UK
- At 2006
  - Update frequency?
  - Insufficient coverage



Example study Urban Atlas and health

- Berlin - Amount of green space in a 1 km buffer that leads to the largest positive effect on life satisfaction is 35 ha or 11% of the buffer area.

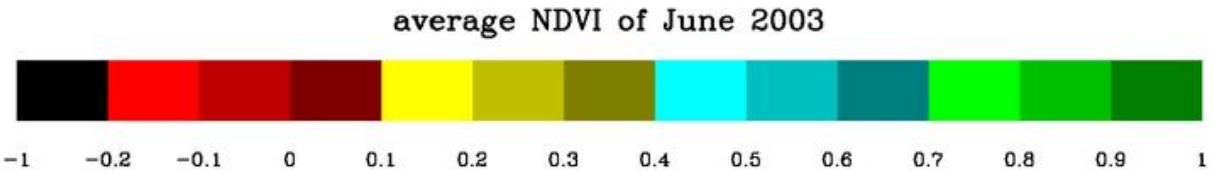
- 75% of the respondents have less green space available.



Bertram & Rehdanz 2015 Ecological Economics 120: 139-152

NDVI (Normalised Difference Vegetation Index

- Satellite-derived – indicator of living 'greenness' – ranges -1 to +1
- Indicator of 'greenery'
- High resolution data (30m) openly available on global scale



Example study NDVI and health

- Spain - Green spaces are associated with better general and mental health across strata of urbanization, socioeconomic status, and genders (Triguero-Mas et al. 2015)

- Mechanism unlikely to be due to physical activity

Environment International 77: 35-41

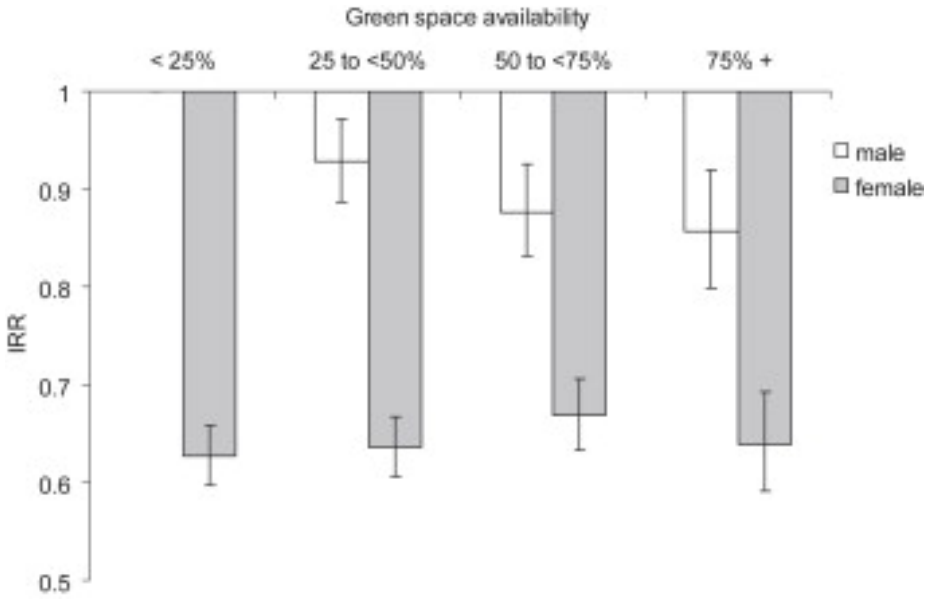
CORINE Coordination of Information on the Environment

- EU-wide land cover map data (EEA)
- Minimum mapping unit 25 ha (35 rugby pitches)
- Utility when linking to health?

http://www.eea.europa.eu/publications/COR0-landcover

Example study of CORINE and health

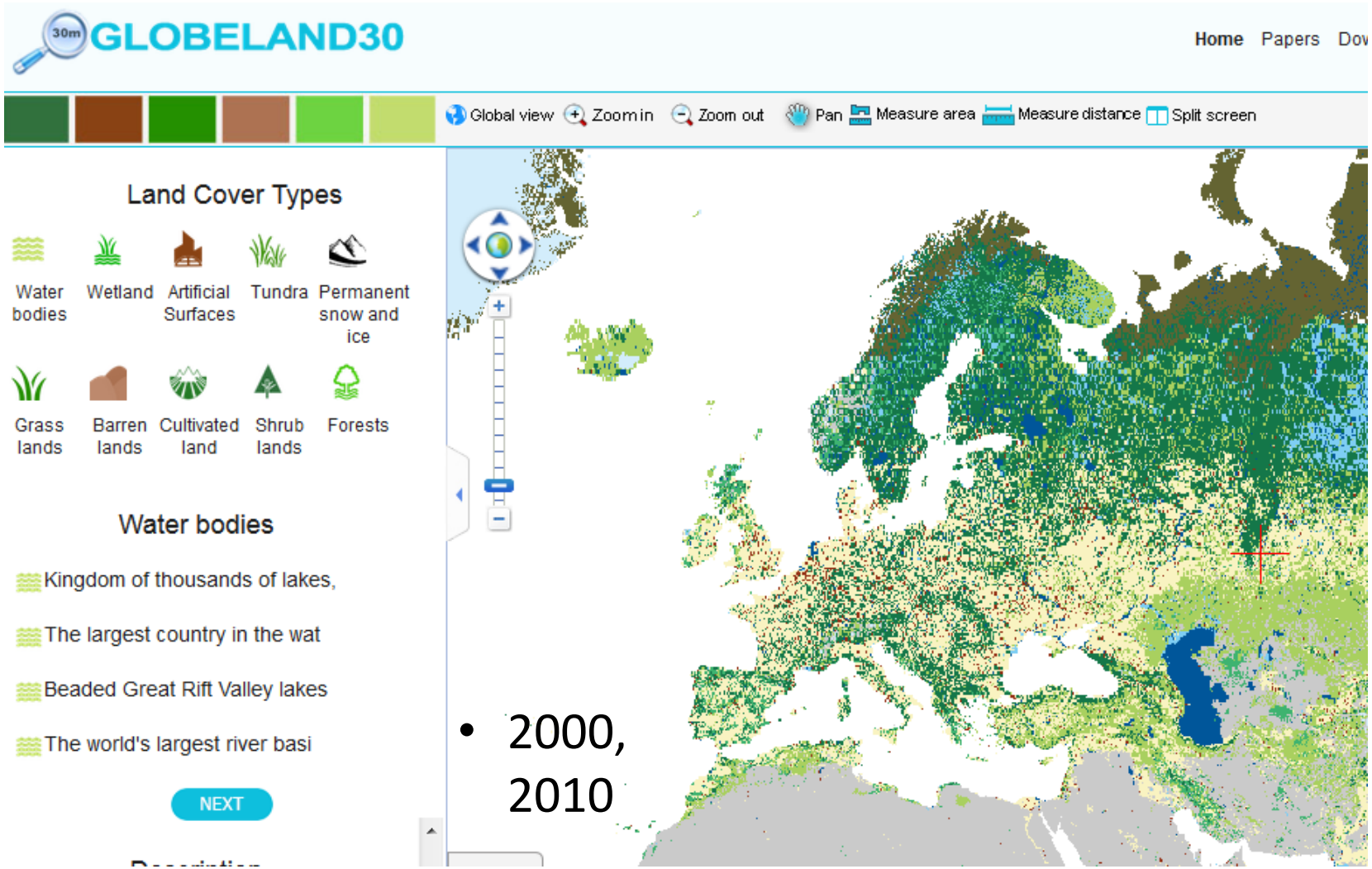
- Decrease in male cardiovascular and respiratory disease mortality rates with increasing greenspace
- No effect for women



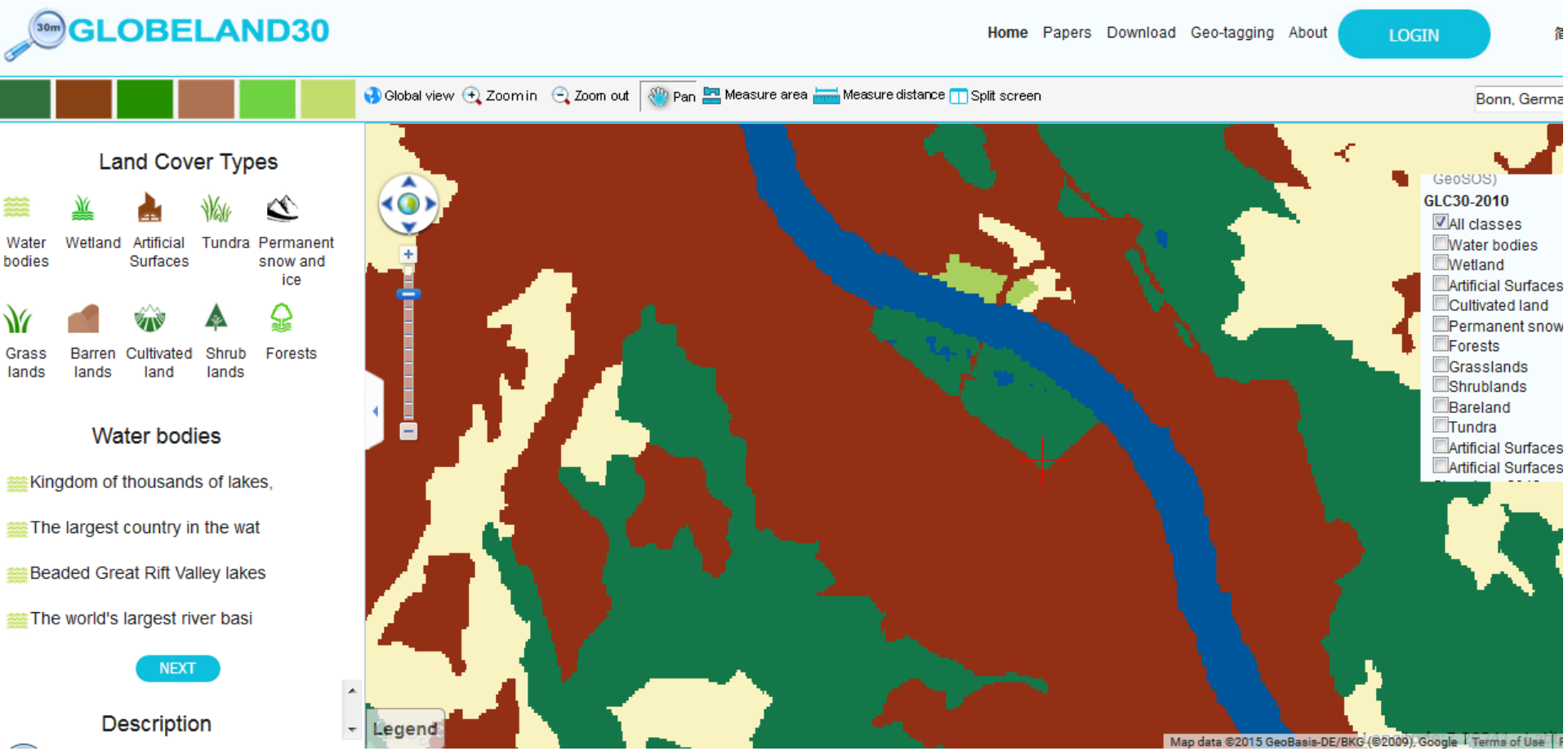
The interaction between gender and urban green space availability, in their relationship with respiratory disease mortality. Incidence rate ratios (IRRs) given relative to the reference group (males in the wards with least green space, IRR = 1.0) and bars indicate 95% confidence intervals. The interaction effect was significant (Wald test $\chi 2 = 32.2$, $p < 0.0001$).

Richardson & Mitchell 2010 Social Science & Medcine 71:568

Global Land Cover 30m (China)



- 2000, 2010



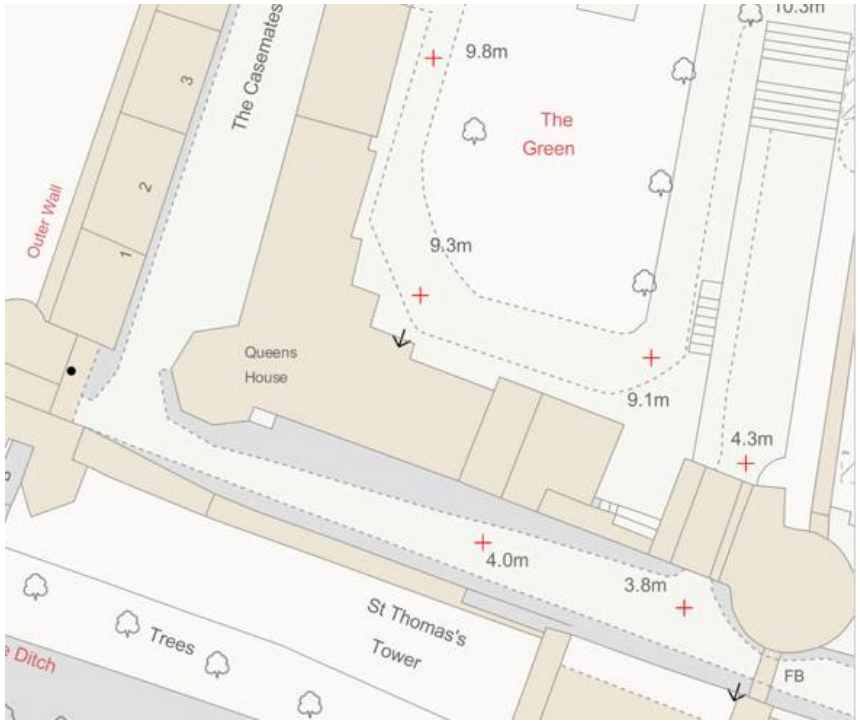
- No current published material using Globeland30 for environment – health research
- Potentially useful resource

What do we do?

- Most of our existing research has used either:
  - Generalised Land Use Database
  - CEH Land Cover Map 2007

GLUD (Generalised Land Use Database)

- 2001, 2005 (unlikely to be updated)
- Classified every Ordnance Survey Master Map land parcel into 9 land use classes (based on OSMM data)

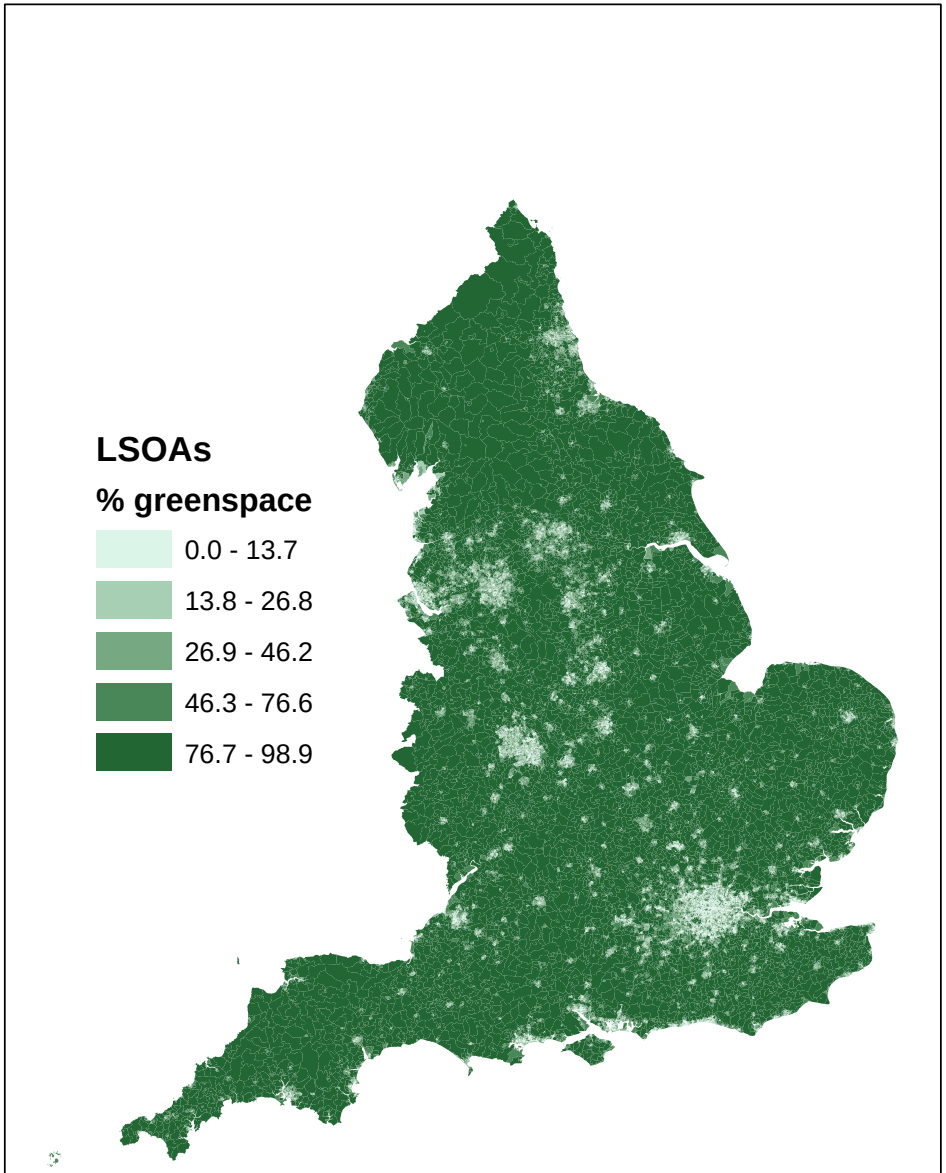


https://data.gov.uk/dataset/land_use_statistics_generalised_land_use_database

Included:

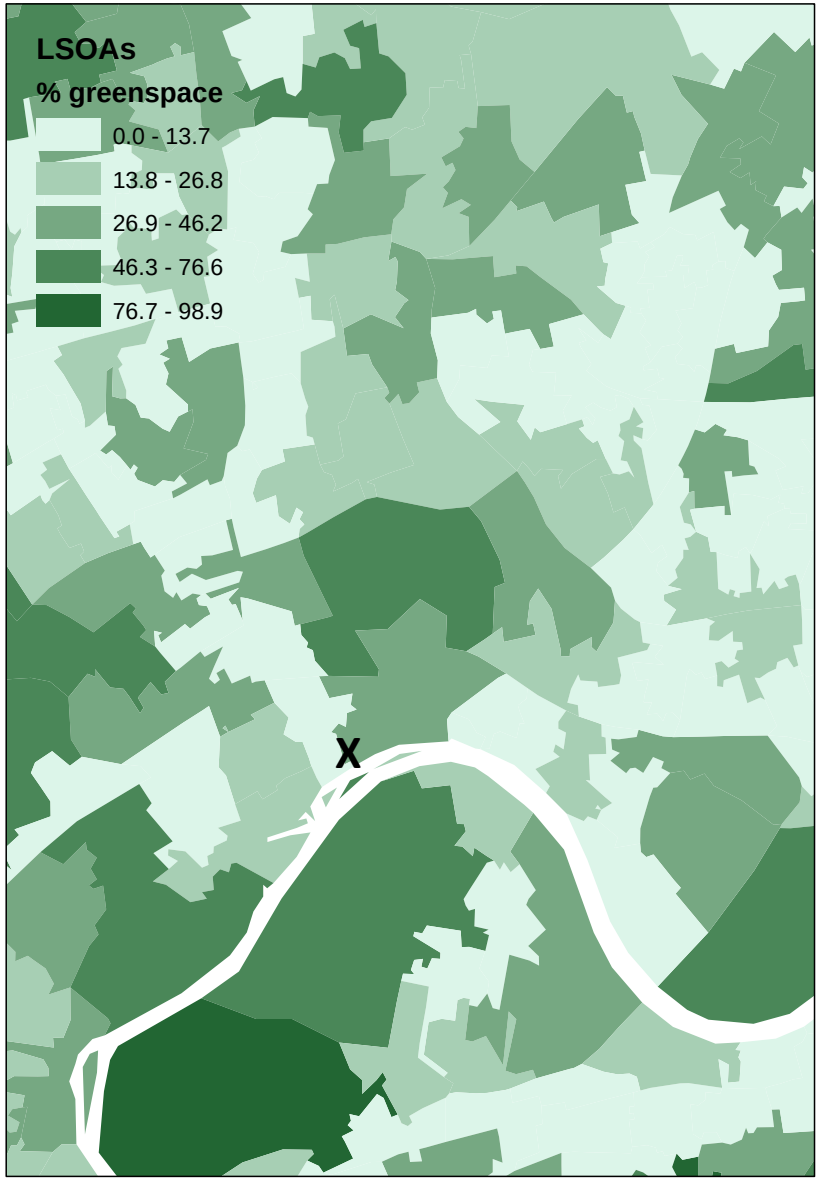
- Greenspace
- Water
- Domestic building
- Non-domestic building
- Domestic gardens
- Paths
- Roads
- Etc.

- Raw data is very detailed – but huge (c. 1 GB for 10kmx10km area)



GLUD → LSOA

- GLUD statistics show the area of different land types for LSOAs
- Permits linkage of GLUD e.g. to BHPS, Census data where we just know LSOA
- Produced by DCLG



- Artificial boundaries
- Doesn't account for proximity/wider neighbourhood
- But captures all 'greenspaces' (even very small), and we have evidence from various analyses that it 'works' at population scale

Examples of GLUD and health

Life Expectancy

- Small area density of ‘green space’ per GLUD 20011 and mortality rates

- > green space density associated with lower all cause and cardiovascular mortality

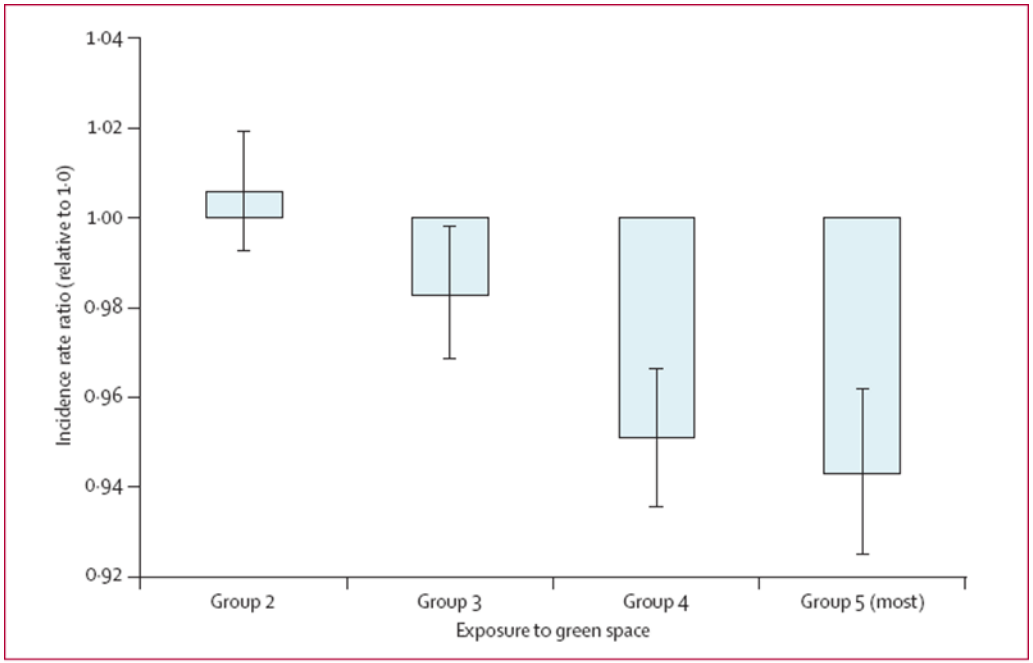


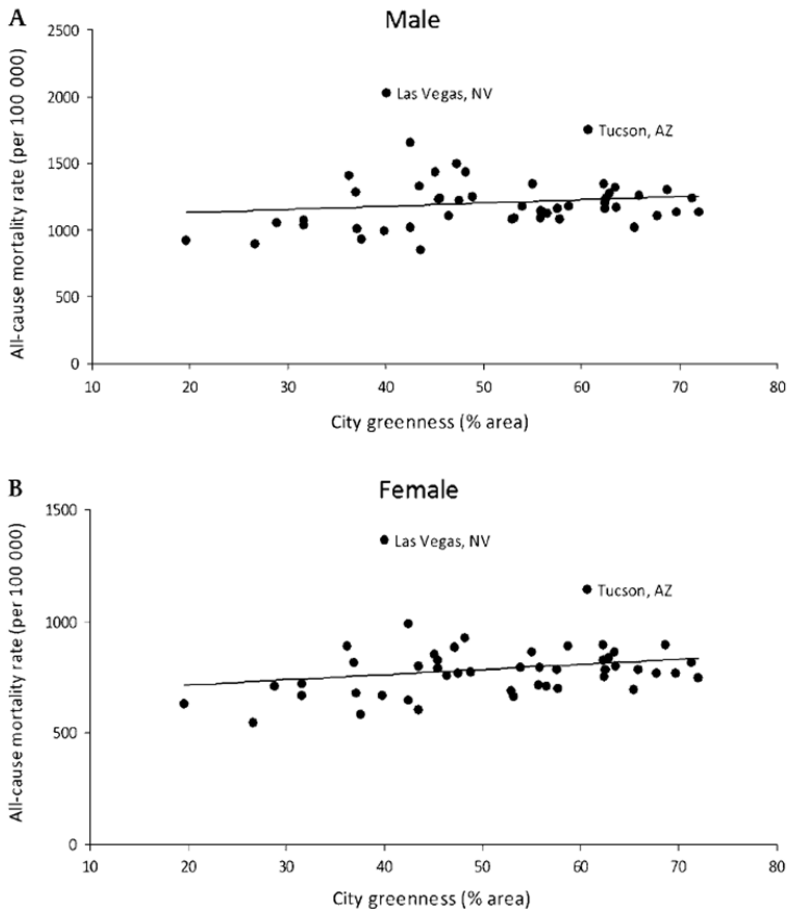
Figure 1: **Incidence rate ratios for all-cause mortality in groups of exposure to green space, relative to group 1 (least exposure to green space)**
Error bars indicate 95% CIs.

Mitchell, R & Popham, F (2008). Lancet, 372, 1655-1660

Mortality and Greenspace

US cities: higher green space density associated with higher all cause mortality

Figure 1 Relationship between all-cause mortality (age-standardised rate) and city greenness for (A) males and (B) females. Unadjusted linear best-fit predictions have been superimposed. The two outlying cities have been labelled.



Richardson EA, et al (2011) Green cities and health: a question of scale? J Epidemiol Community Health.

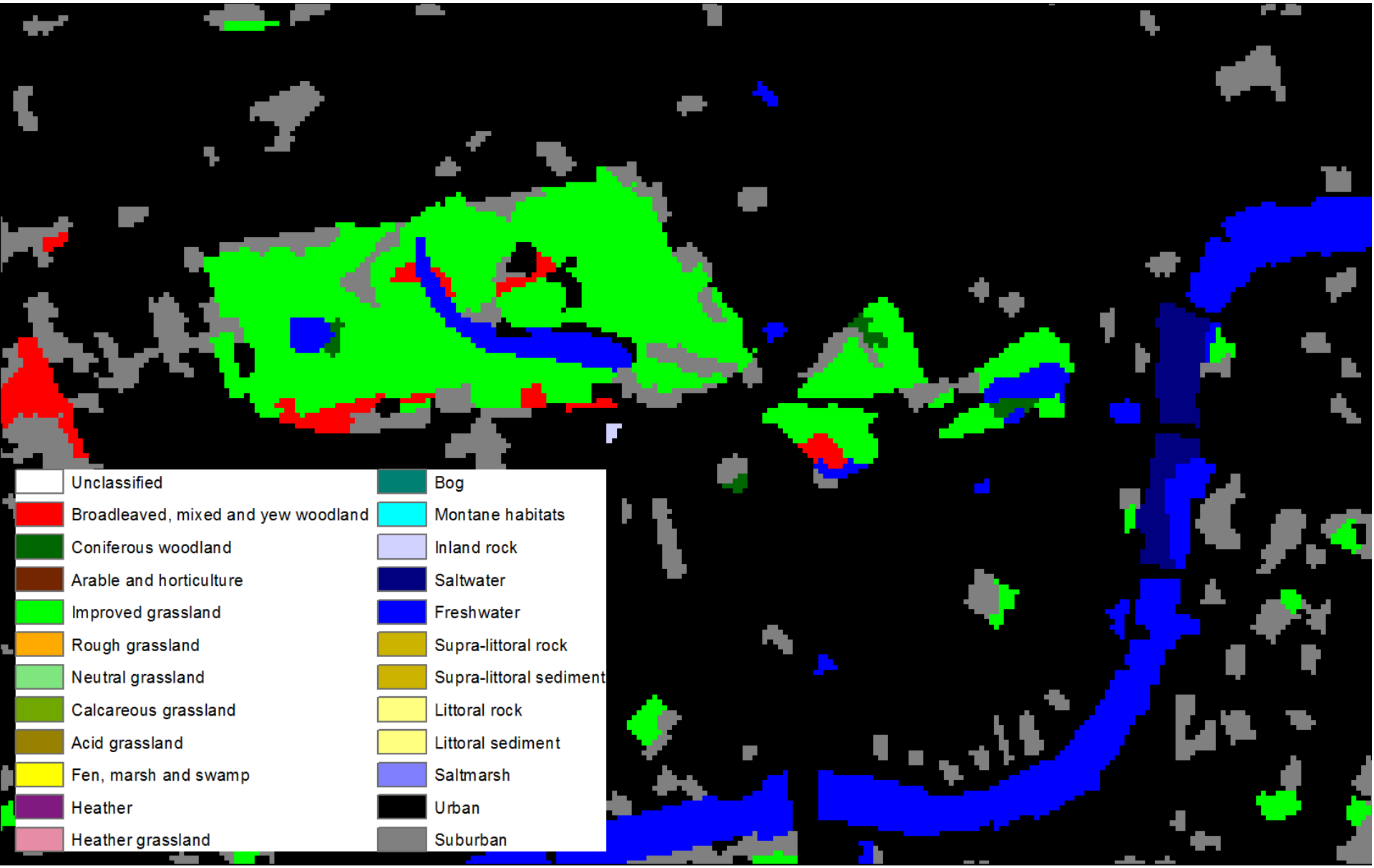
CEH Land Cover Map 2007

- 23 Land Cover classes
- Mapped to very high resolution (25m grid)
- More detail on environment type
- Minimum land parcel size 0.5 ha – so misses small patches

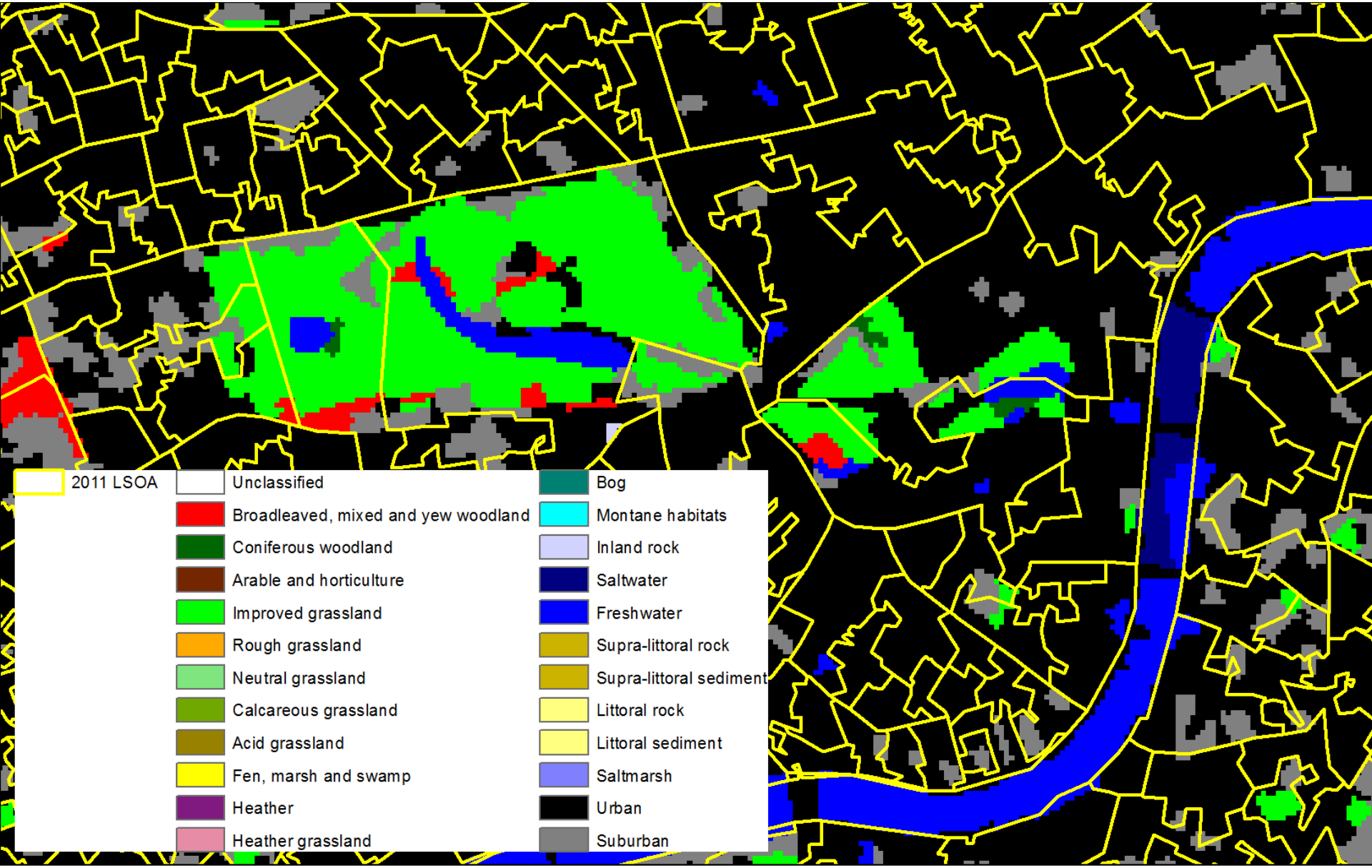
http://www.ceh.ac.uk/services/land-cover-map-2007

Beyond Greenspace

- Most studies consider natural areas as homogenous ‘greenspace’
- Evidence is mixed and sometimes contradictory
- Crude definitions of ‘greenspace’ used?
- Gives no indication of type, quality or biological diversity of the local environment



CEH Landcover Map 2007 25m cells



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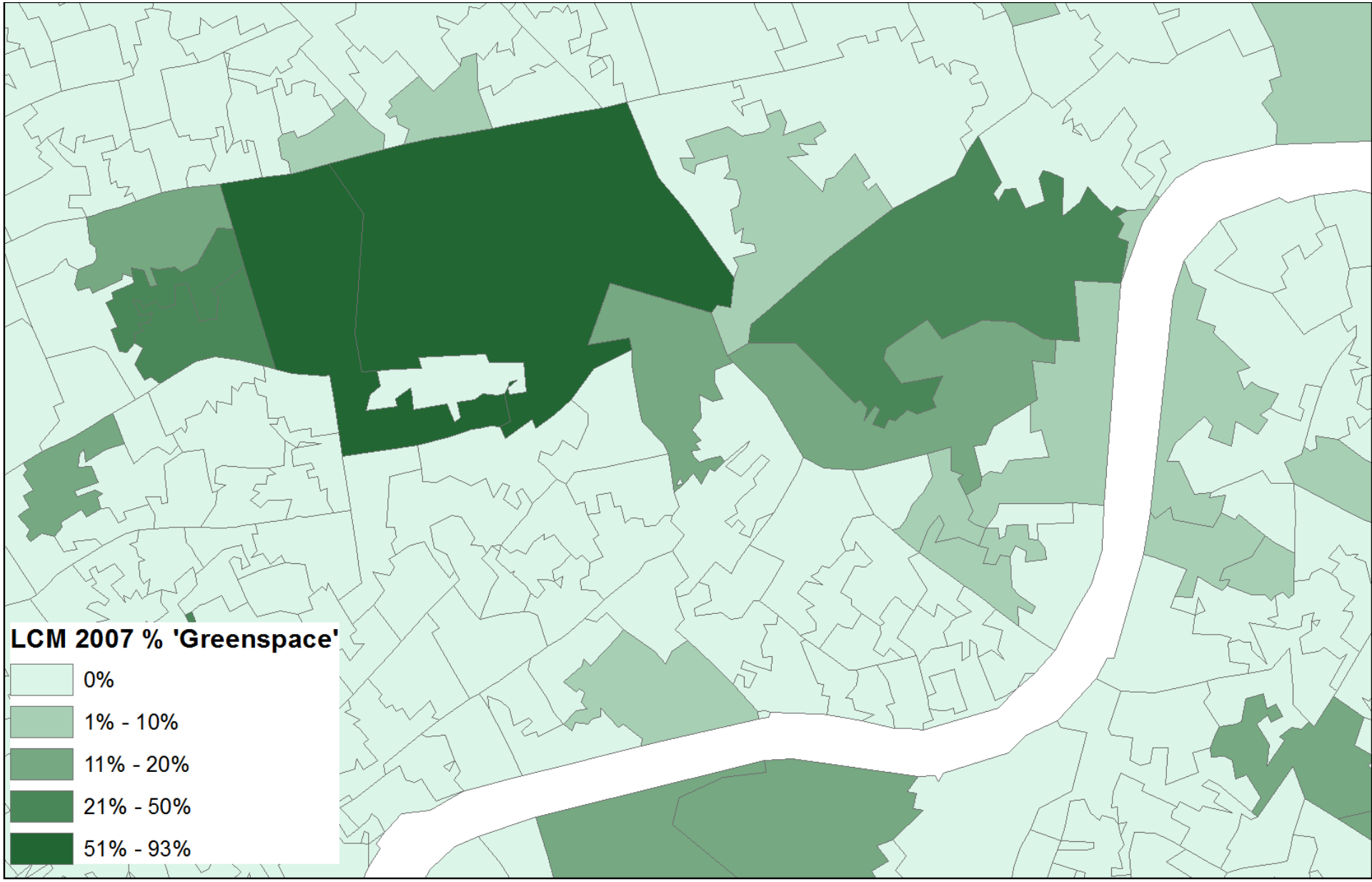
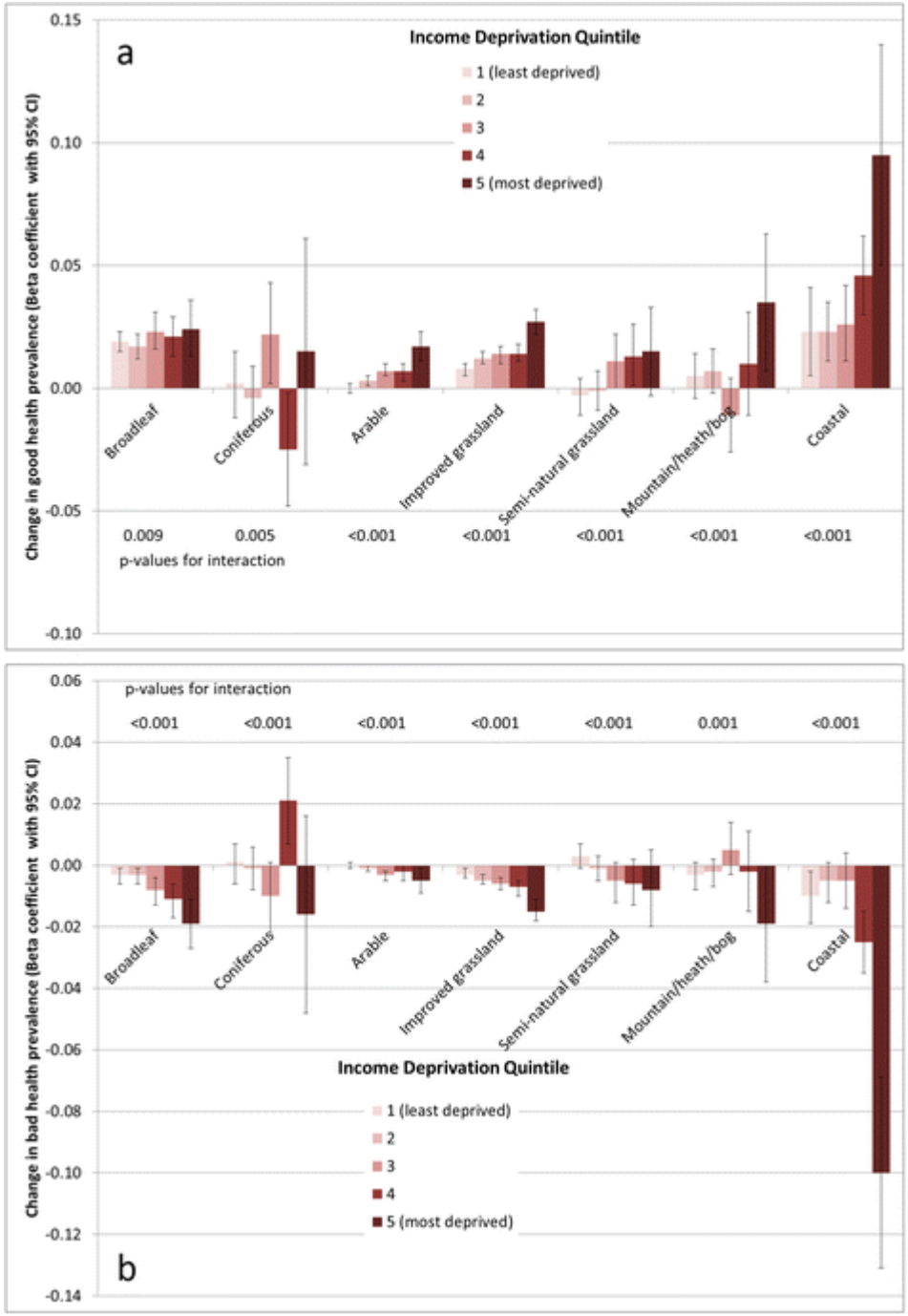


CEH Landcover Map 2007 25m cells

- Type of land cover is important for health
  - broadleaf woodland
  - arable and horticulture
  - improved grassland
  - saltwater
  - coastal
- Diversity of LC



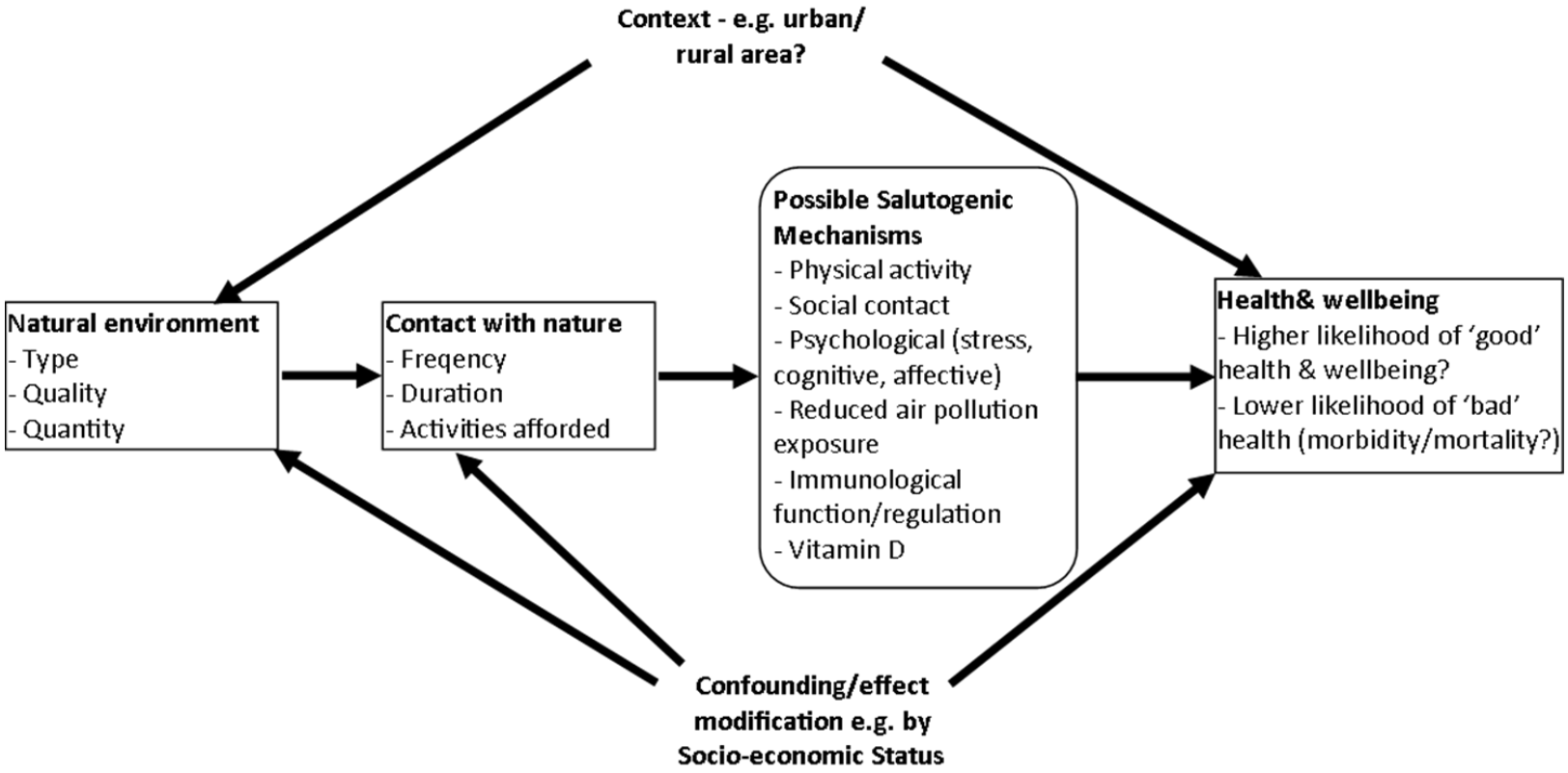
Wheeler et al. 2015 J. Health Geographics 14:17

Coastal proximity

- How do we deal with coast and water more generally?
  - Area density's are not an appropriate metric in this context
- Significant associations with distance to coast:
  - individuals reported significantly better general health and mental health when living nearer the coast (White et al. 2013)
  - Positively associated with good health and an increase in people reporting good health among populations residing closer to the sea (Wheeler et al. (2012)Health and Place 18 (5): 1198-1201)

Availability, Accessibility?

- Availability – simple?
  - Presumes that where green/blue space is locally available, people can/will use it or benefit from it
- Accessibility – allow for accessible features – access points – data?
- Scale?



- Many possible pathways between greenspace health
- Important to use most appropriate environmental data to identify the right pathways and health outcomes at the right scale.

Any questions?

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