

Air pollution reduction potentials of multiple GBGI



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Guildford
Living Lab

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Research questions



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- ▶ Which GBGI types are the most effective in reducing air pollution in urban areas?
- ▶ What factors influence the effectiveness of GBGI, and their impact on reducing different air pollutants at micro and urban scales?
- ▶ Which GBGI category(ies) has(have) the highest average performance in reducing air pollution?

Included

- ▶ Quantifiable evidence of air pollution reduction potentials of GBGI
- ▶ Assessment of physical, environmental or other factors influencing the effectiveness of GBGI in reducing various air pollutants
- ▶ Monitoring, modelling and remote sensing methods used for assessing air pollution reduction efficacy of GBGI

Beyond the Scope

- ▶ No literature found on 31 GBGI sub-categories (out of 50);
- ▶ Detailed design and implementation principles of GBGI;
- ▶ Other co-benefits and disbenefits of GBGIs
- ▶ Health and economical impact assessment

Search analysis

50 sub-categories divided under 10 main GBGI category



▶ No literature found for air pollution reduction for 31/51 (~60%) GBGI sub-categories;

▶ 80% (165 papers) were for 6 GBGI types:

- Street trees, green walls, Hedges, Parks, Green roofs, and Grass (other)

57%

▶ Remaining 20% were for 13 other GBGI types.

On-going analysis



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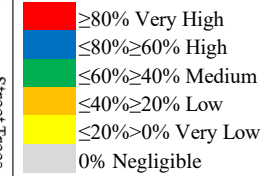


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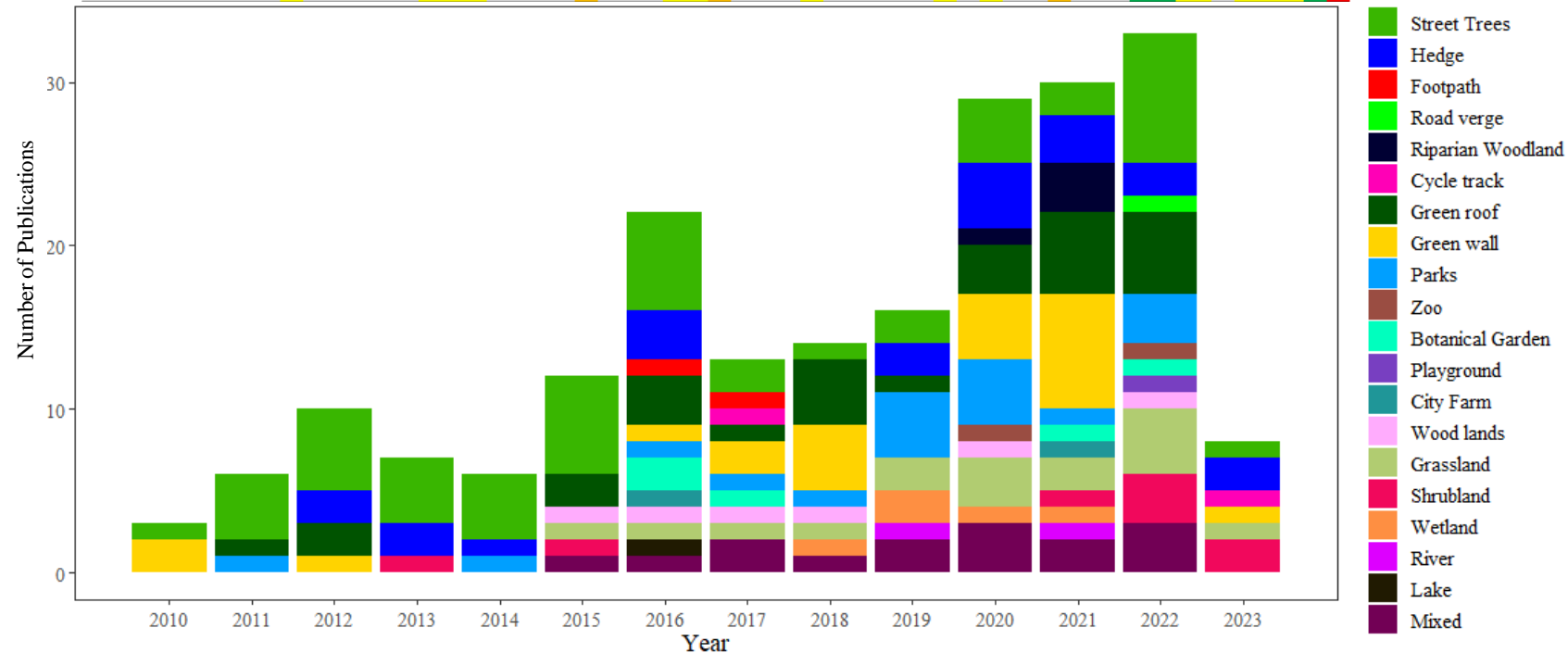
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**A six-point-scale
number of studies
Available**

Hybrid GI	Waterbodies	Other public space	Mixed	Other non-sealed urban areas	Amenity areas	Gardens	Parks	Constructed GI	Linear features
Outdoor swimming pool Rain garden Bioswale	Lake Sea Estuary Reservoir Pond Canal Wetland River City Farm	Adopted public space City Farm	Mixed Cemetery Allotment	Sparsely vegetated land Arable agriculture Wood lands Shrubland Grassland	Sports field School yard playground Golf course Shared open space	Shared common garden area Private garden Balcony	Heritage garden Nursery garden Zoological garden Pocket park Botanical Garden	Green roof Green wall Roof garden Pergola	Riparian Woodland Railway corridor Road verge Footpath Cycle track Hedge Street Trees



**Publications on
GBGI in last years**



On-going analysis

Geographical distribution of reviewed papers

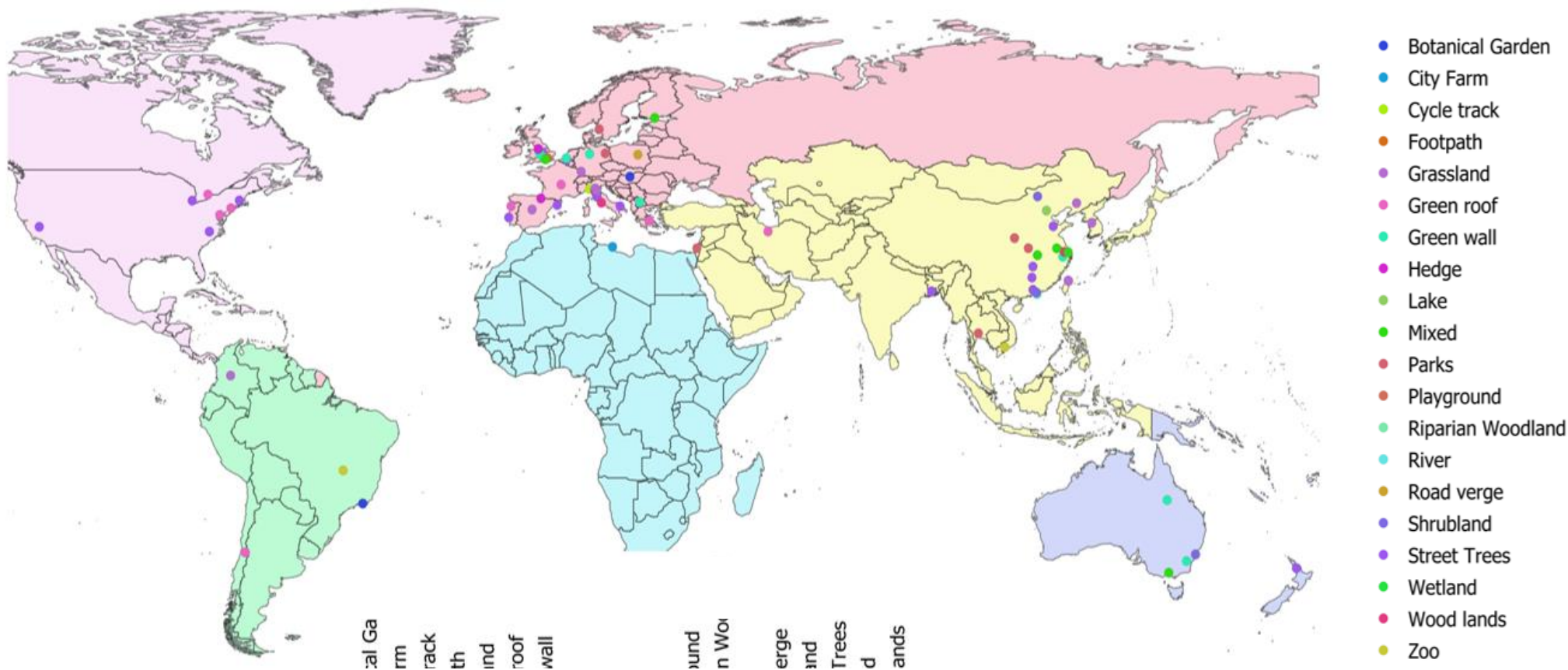
North America 7%

South America 6%

Europe 36%

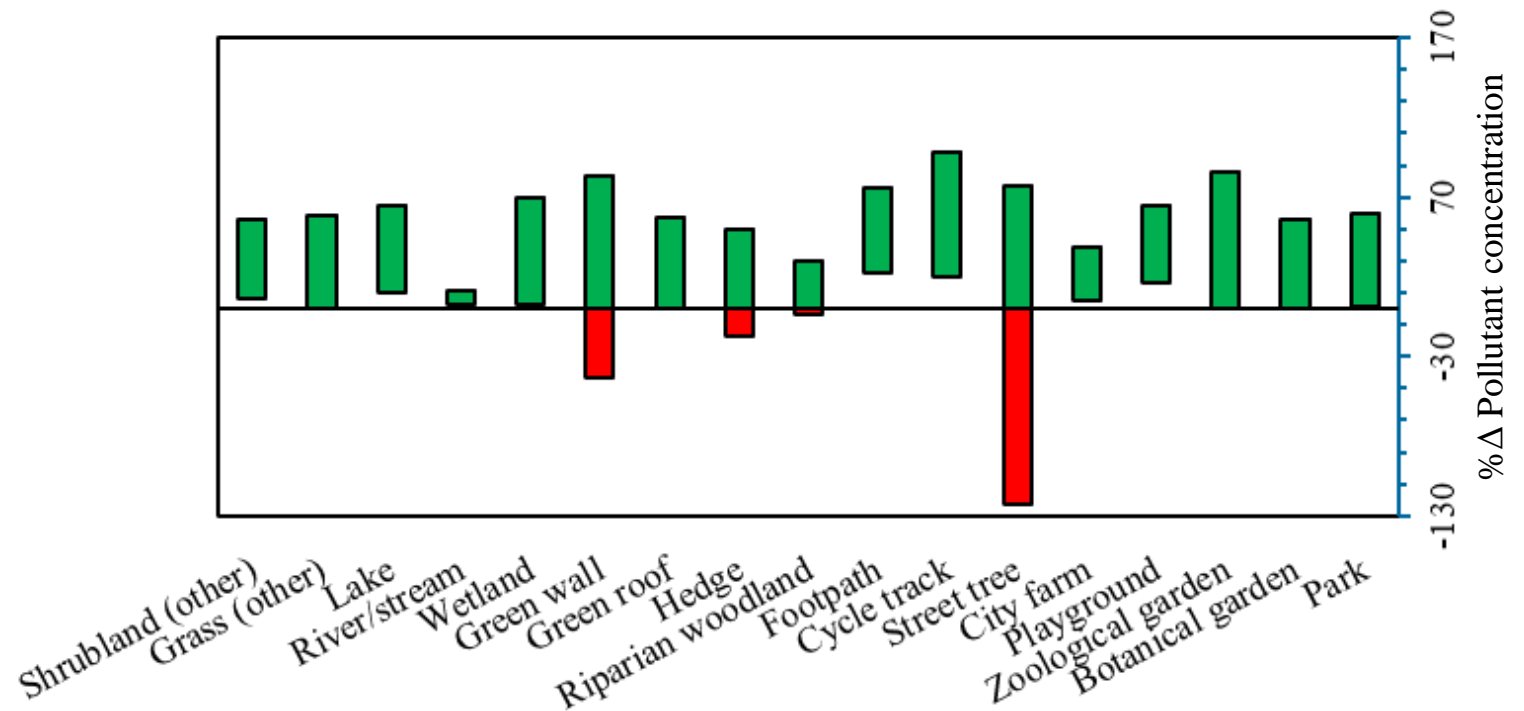
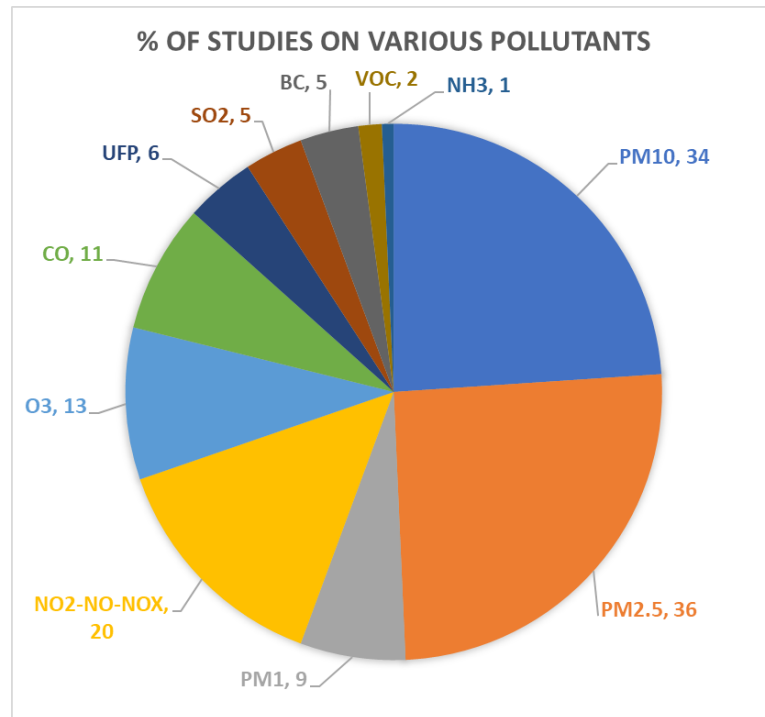
Asia 41%

Oceania & Australia 8%



On-going analysis

- ▶ Majority of the GBGIs showed significant pollutant reduction (average ~55%, highest up to 78%).
- ▶ Linear & constructed GBGI (e.g. trees, hedges) in street canyons showed increased air pollution.
- ▶ Majority of the studies investigated changes in PM concentration.
- ▶ Different forms of GI and their physical characteristics influence air pollution reduction.



Thank you

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