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Making hidden urban systems legible, from heat and material flows to the lived experience conventional maps leave out.

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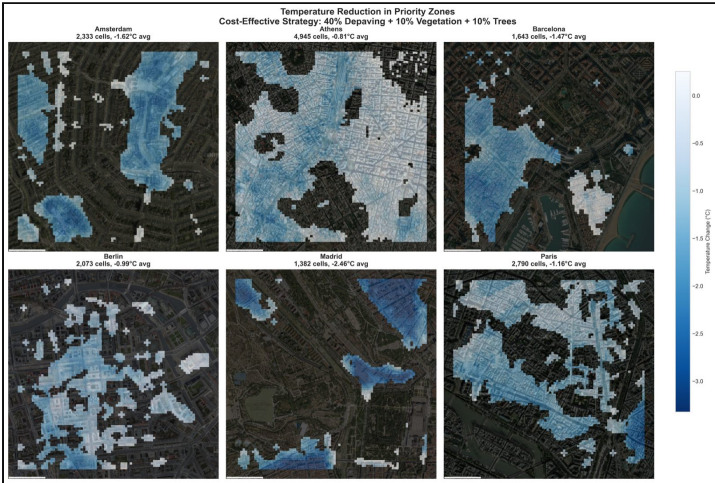
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SHAPING COOL CITIES

MSc thesis: multi-source urban-heat modelling with 600 metre spatial-block cross-validation.

An urban-heat study fusing Landsat thermal imagery, 3D building morphology, street networks and street-level computer vision across six European cities at 30 metre resolution, from my Bartlett MSc thesis: the model tests how much neighbourhood heat variation these sources explain together and where their relationships differ by city.



ROLE

Researcher and developer

SCALE

Six European cities

CAPABILITIES

Climate analytics, GeoAI, Data fusion, Urban research

- A six-city comparative study of Amsterdam, Athens, Barcelona, Berlin, Madrid and Paris at 30 metre resolution, integrating four source families in one reproducible pipeline.
- Spatial GroupKFold validation with 600 metre blocks, designed to keep neighbouring cells out of opposing train and test folds.
- SHAP-based interpretation showing that the mix and influence of surface, morphology, network and street-view variables vary by city; attribution is reported as predictive association, not intervention effect.
- A bounded scenario analysis and vulnerability-weighted priority map, published with the methodology and code so the assumptions and limits can be inspected.

Claim boundary: This is an observational thesis, not a causal intervention study. The candidate radii and scenario bounds were chosen before modelling; the strongest tested de-sealing result occurred at the upper search bound, so it does not establish a non-linear threshold. SHAP importance is not an intervention effect, and the study did not run leave-one-city-out transfer tests or real-world before-and-after validation. The outputs are research hypotheses and screening priorities that require local testing.

CASE STUDY [Read on gerardoezequiel.xyz](#) REPOSITORY [Code and methods](#) ↗

CITYLOOPS: URBAN CIRCULARITY ASSESSMENT

Co-authored a city-scale material-flow and stock method with 18 indicators, designed for facilitated application in five pilots.

A city-scale material-flow and stock accounting method with system-wide indicators, developed within Horizon 2020 CityLoops, Closing the Loop for Urban Material Flows, and adapted from Eurostat's economy-wide framework for urban circularity decisions.

ROLE

Co-author · Horizon 2020 grant 821033

SCALE

Five CityLoops pilot cities

CAPABILITIES

Material-flow accounting, Material-stock accounting, Circularity indicators, Data visualisation

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- Named as one of four authors of CityLoops deliverable D4.4, Urban Circularity Assessment Method.
 - An evaluation of 29 urban material-flow methods followed by a city-scale adaptation of Eurostat economy-wide material-flow accounting.
 - Ten scale indicators and eight circularity indicators, paired with material-flow and bottom-up building-stock accounts.
 - A reproducible path from data collection and mass balancing to Sankey diagrams, indicators and a city dashboard, prepared for five pilot cities.

Claim boundary: The method estimates and interprets urban material flows and stocks from the best available evidence. It does not claim to audit every tonne moving through a city.

CASE STUDY [Read on gerardoezequiel.xyz](#) DOCUMENT [D4.4 method PDF](#) ↗

CENTRINNO: URBAN ECOSYSTEM CARTOGRAPHY

Co-authored a nine-pilot cartography combining geospatial context, community and material-flow mapping.

A shared urban-ecosystem mapping methodology and cartographic infrastructure for nine European pilot cities, developed within Horizon 2020 CENTRINNO, New CENTRAlities in INdustrial areas as engines for inNOvation and urban transformation.

ROLE

Co-author · Horizon 2020 grant 869595

SCALE

Nine European pilot cities

CAPABILITIES

Urban-system mapping, Participatory cartography, Material-flow mapping, Research methods

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- Named as one of six authors of CENTRINNO deliverable D2.2, Cartography Alpha Version.
 - A common method joining geospatial context mapping, community mapping and material-flow mapping.
 - Nine pilot cartography pages paired with internal KUMU workspaces for collaborative data collection, analysis and visualisation.
 - A public methodology and resource library intended to make the cartographic process repeatable beyond the original pilots.

Claim boundary: In this project, urban ecosystem refers to the local resources, infrastructures, communities and material relationships involved in circular regeneration. It is not a biodiversity survey or a species-modelling claim.

CASE STUDY [Read on gerardoezequiel.xyz](#) DOCUMENT [D2.2 cartography PDF](#) ↗

SOCIAL SUPERBLOCKS

A spatial allocation method for Barcelona's home-care service that moved from neighbourhood demand to contiguous service zones, using the social-superblock model to connect urban form with how care is organised.

ROLE

Researcher and spatial data analyst

SCALE

Barcelona

CAPABILITIES

Spatial optimisation, Urban services, Genetic algorithms, Neighbourhood analysis

- A thesis deposited in the Universitat Politècnica de Catalunya institutional repository under its original-language title.
- A spatial allocation model built for Barcelona's home-care service within the Superilles Socials programme.
- Genetic-algorithm optimisation of contiguous service zones, evaluated against demand, compactness and neighbourhood indicators.
- A method that translates the superblock from a street-design concept into a framework for organising neighbourhood-scale care.

Claim boundary: This case documents the research method and its institutional context. It does not claim that the model was implemented as Barcelona's final operating allocation or that it independently improved care outcomes.

CASE STUDY [Read on gerardoezequiel.xyz](#) PUBLICATION [UPC thesis record](#) ↗
