Urban Sprawl Index and Geodesign

Hrishikesh Ballal

September 2023

GEODESIGN HUB

The problem

- Do you think systematically about the future?
- How do you engage different stakeholders?
- How do you handle conflicts and disagreements?

The problem

Lack of participation for participatory budgeting in Peterborough

Guardian sustainable business
Samarco dam collapse: one year on from Brazil's worst environmental disaster

The News & Advance
Forest juggles rapid growth, infrastructure planning

Trudeau visits Italian town still recovering from 2016 earthquake
Prime Minister Justin Trudeau and wife Sophie Gregoire-Trudeau are escorted by officials as they visit Amatrice, Italy on Sunday, May 28, 2017. The area was effected by an earthquake that occured in August 2016. THE CANADIAN PRESS/Sean Kilpatrick
Joanna Smith, The Canadian Press
Published Sunday, May 28, 2017 6:33AM EDT

Structured Negotiations

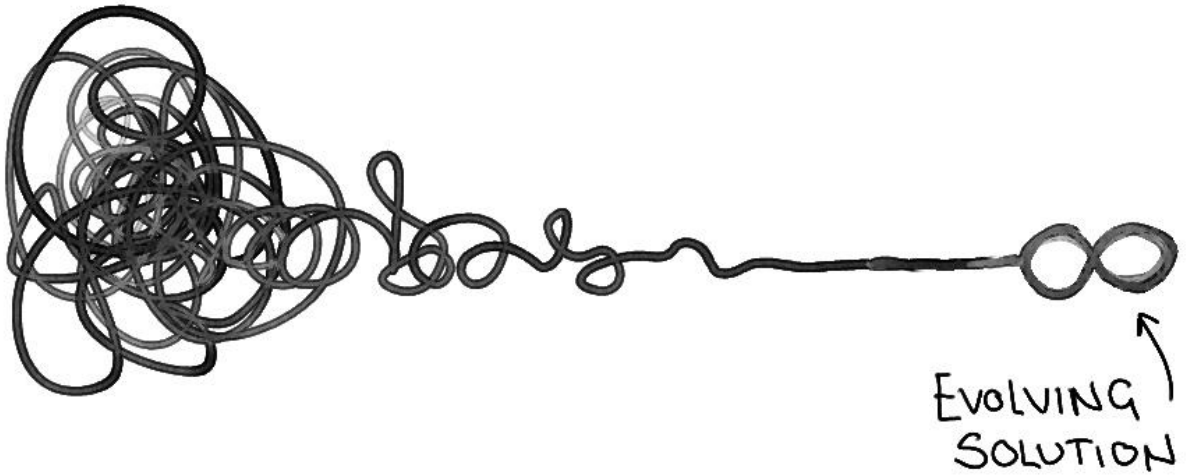


Image Source: https://ithinkidesign.wordpress.com/

Geodesign Hub

- Focused on generation of consensus and agreement
- Easy to learn, setup and use (and most importantly to understand) – you can be trained in 30 mins.
- It used in the situations of political conflict, contested sites, setting up complex negotiations and strategic agreements

When should you use it?

- Single or multi-issue disputes
- Diverse stakeholders
- Two- or multi-party conflicts
- Parties are willing but are stuck
- Preventive interventions
- Last ditch effort to avoid further costly processes

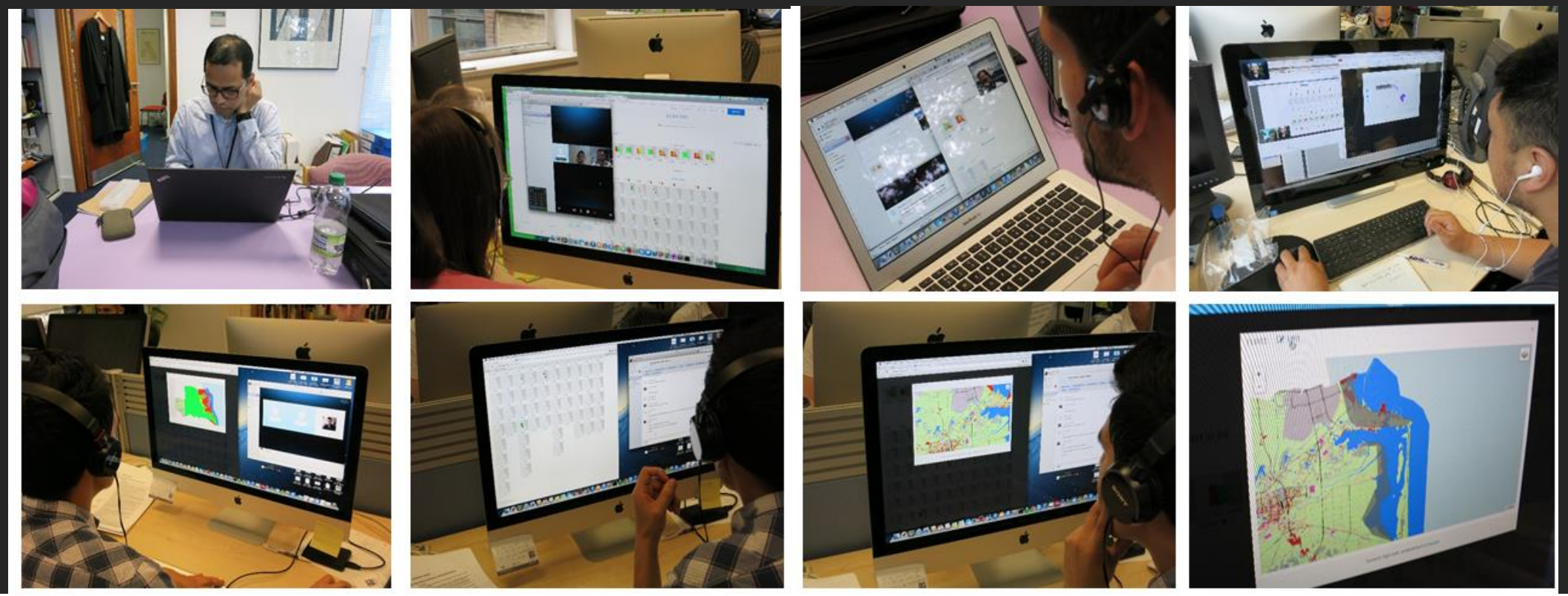
Digital Capacity

- How are decisions made? (Collaboration)
- Digital record of negotiations (Analytics)
- Development of a consensus and agreement via negotiations (Co-ordination)

Personal Meetings

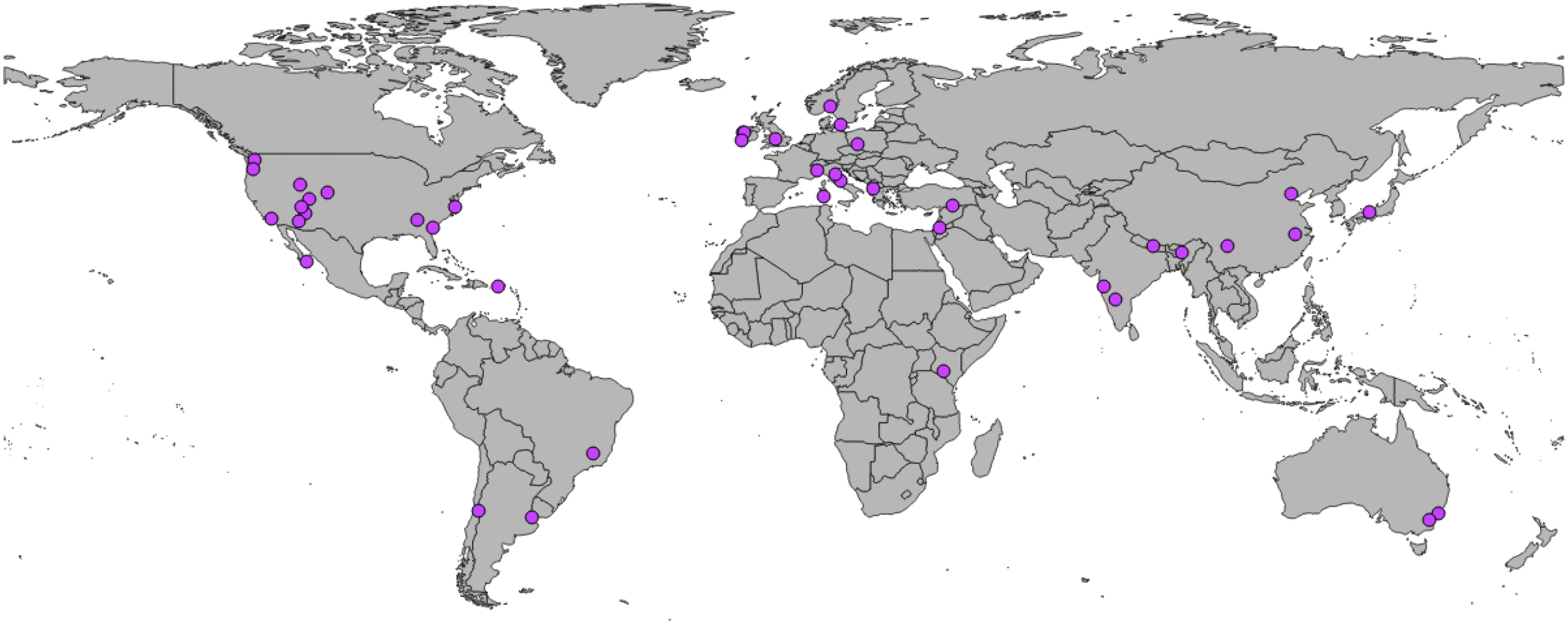
In person with everyone in the same room

Design Workshops



Online meetings

Everyone online and in different locations



Projects on the platform

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Bandera Street, Santiago, Chile

INTERVENTIONS FOR STREET DESIGN AND NEW MOBILITY

STREET SPACE ALLOCATION

Bandera Street is one of the most busy and major thoroughfare in central Santiago. In this project we explored the impacts of different policies: pedestrianization, closing off parking etc. on the street.

TACTICAL URBANISM

Geodesignhub suited the purpose to rapidly come up with an early stag e masterplan including the selection of key interventions whereas we chose 'Street Anatomy' to help envision the impact of such interventions in the pedestrian network.

NEW MOBILITY

Understanding street life / streetscape in the context of e-bikes, bicycles and autonomous vehicles is critical and we exported the data out of Geodesignhub using the API to integrate with external analysis tools.

POLICY ANALYSIS

The street analysis is done through a semi-automated geo-computational method, that allows to collect data from any given typical cadastral map that graphs the kerb and property lines. Using the comprehensive API, we exported the data out of Geodesignhub and used external tools for this analysis.

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POST-DISASTER REHABILITATION AND RECOVERY STRATEGY

Norcia, Perugia, Italy

PUBLIC ENGAGEMENT

The town of Norcia in in the province of Perugia in south-eastern Umbria in central Italy. The area around the town is known for its scenery and is a base for mountaineering and hiking. In late 2016, a couple of powerful earthquakes struck the region causing major damage in the town. We used the public voting features in Geodesignhub to share the results of this work to the general public.

RECOVERY VS. REHABILITATION

Geodesignhub was used to develop a medium term rehabilitation strategy and understand the impact of policies for recovery. The software was used to develop a series of interventions and organize efforts towards long term rehabilitation of citizens. We utilized data from the National Seismological Centre and other labs to support the analysis.

AGENCY CO-ORDINATION

As a part of the geodesign workshop, there were participants from the emergency response agencies, the office of the mayor and other experts. Working together the experts and citizens were able to negotiate and analyse trade-offs in their preferred sequence of actions. Open source plugins developed by Geodesignhub were utilized to understand the negotiated outcomes.

https://www.geodesignhub.com/webinar

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MULTI-JURISDICTION GEODESIGN FOR MANAGEMENT OF COASTAL GEORGIA

gia, USA

nonstrated a innovative use of a collaborative geodesign framework, to address cale, multi-jurisdictional planning, by evaluating the impacts from designs evaluated at the county and regional level in real-time. Stakeholders organized in s and two regional, conducted simultaneous evaluation at the county and

MULTI-JURISDICTION

The region of Coastal Georgia consists of ten counties: six coastal counties and four contiguous inland ones. Some counties have vigorous economies projected to grow with high rates of in-migration as well as natural growth, others face population decline.

CO-ORDINATION

The aim of this study was for ten single-county teams working at the county scale and two regional teams, each looking at issues of conservation and development through a series of iterations and negotiations, to generate and compare alternative designs scenarios for the future of the coast of Georgia.

NEGOTATIONS

County design teams delineated areas for design and planning policies, as well as projects for implementation while accessing both county-level and regional views. A regional level team prioritized ecological conservation, another prioritized economic development, toward region-wide plans incorporating all county plans.

SIGN

"Geodesign fosters collaborative decision making. It helps practitioners see connections between geography and society. Participants from various backgrounds and points of view can run what-if scenarios and assess the consequences of those assumptions".

- Planning Director of the Coastal Regional Commission

GEODESIGN HUB

agement context. In this case, the community : themes: economic development, tourism Jsing Geodesignhub, complex negotiations can be gy and utilizing existing data.

ES EMENT

Aussel farming is the nic activity in the tivity has been going ries. The community ed in developing n new infrastructure e.g. the Pier and pport the growth of industry.

FINANCIAL DECISION MAKING

The community wanted to engage all the citizens to develop a management strategy and implementation schedule for interventions and understand the financial implications.

Geodesignhub provided the platform for structured negotiations and accommodated the different viewpoints of all the citizens in the community. Using the open source financial model and analysis tools, the community was able to develop a consensus driven, negotiated economic and administrative management strategy.

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Sprawl Indicators

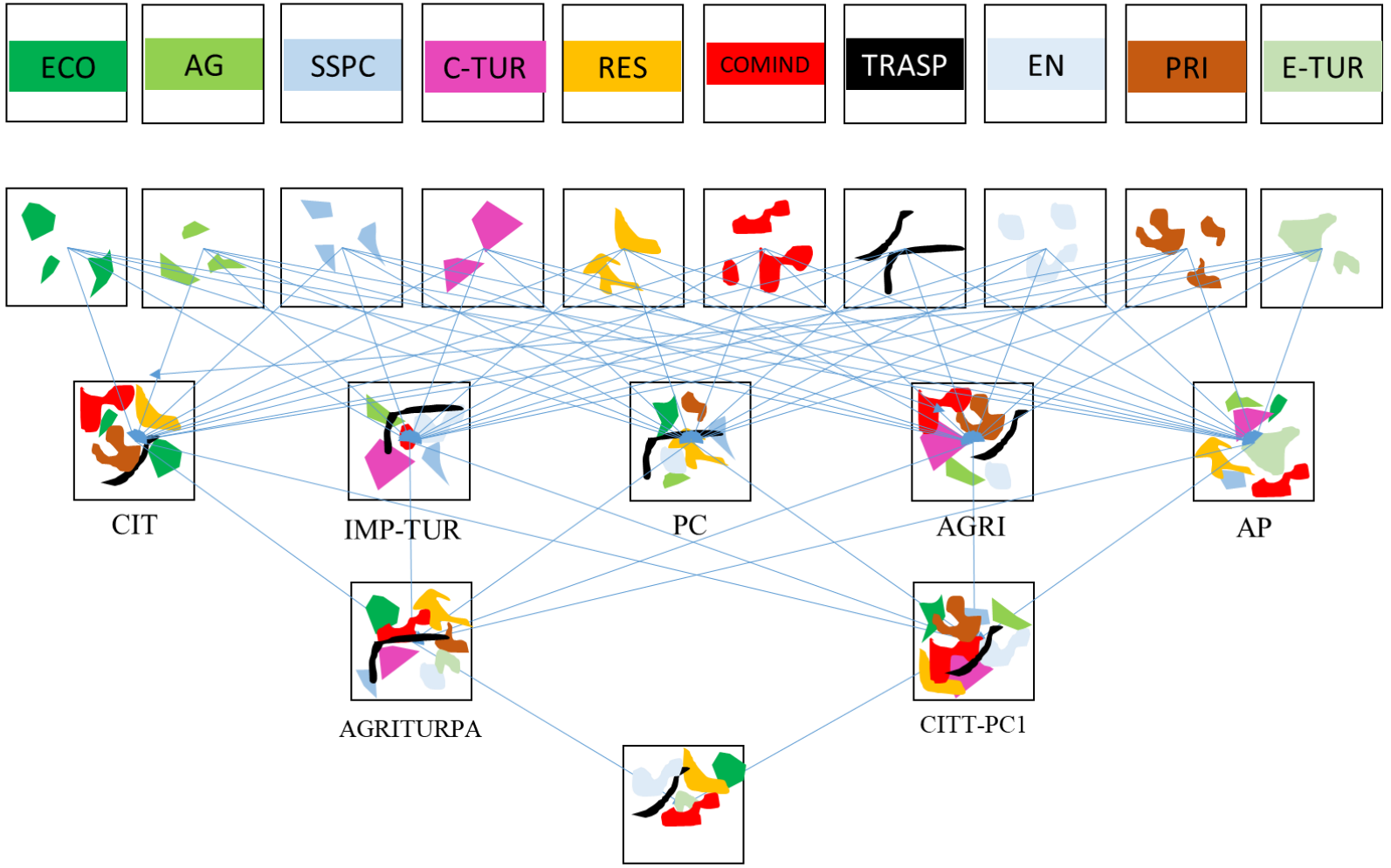
Evaluation Maps

First Design Cycle

Second Design Cycle

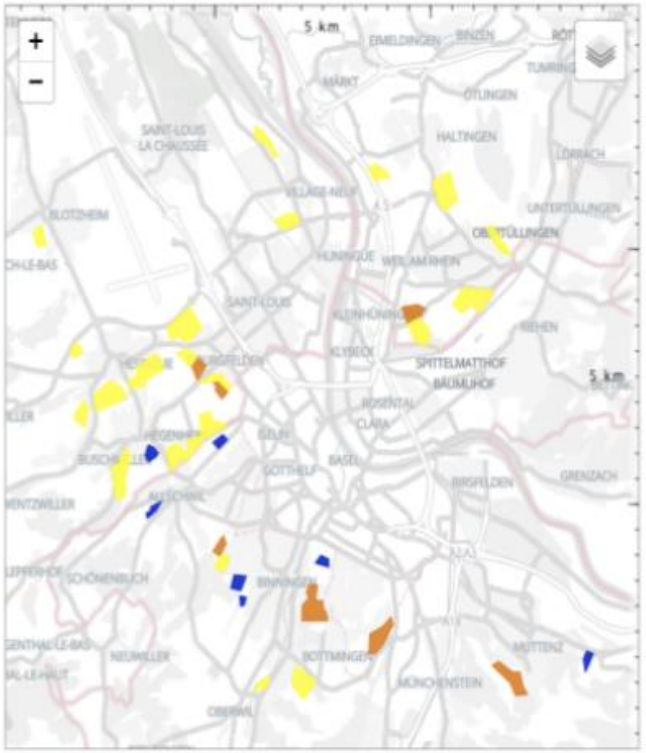
Third Design Cycle

Fourth Design Cycle

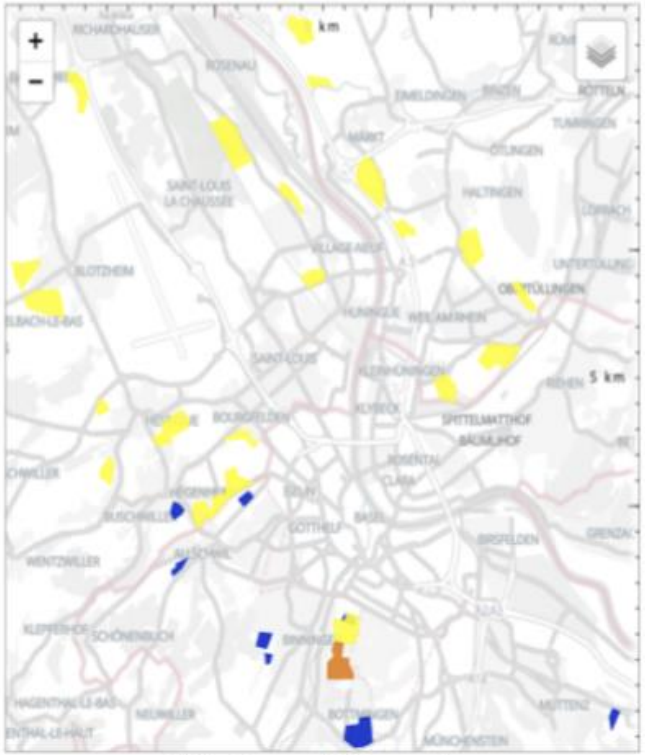


Basel 2040

ALLOCATIONS

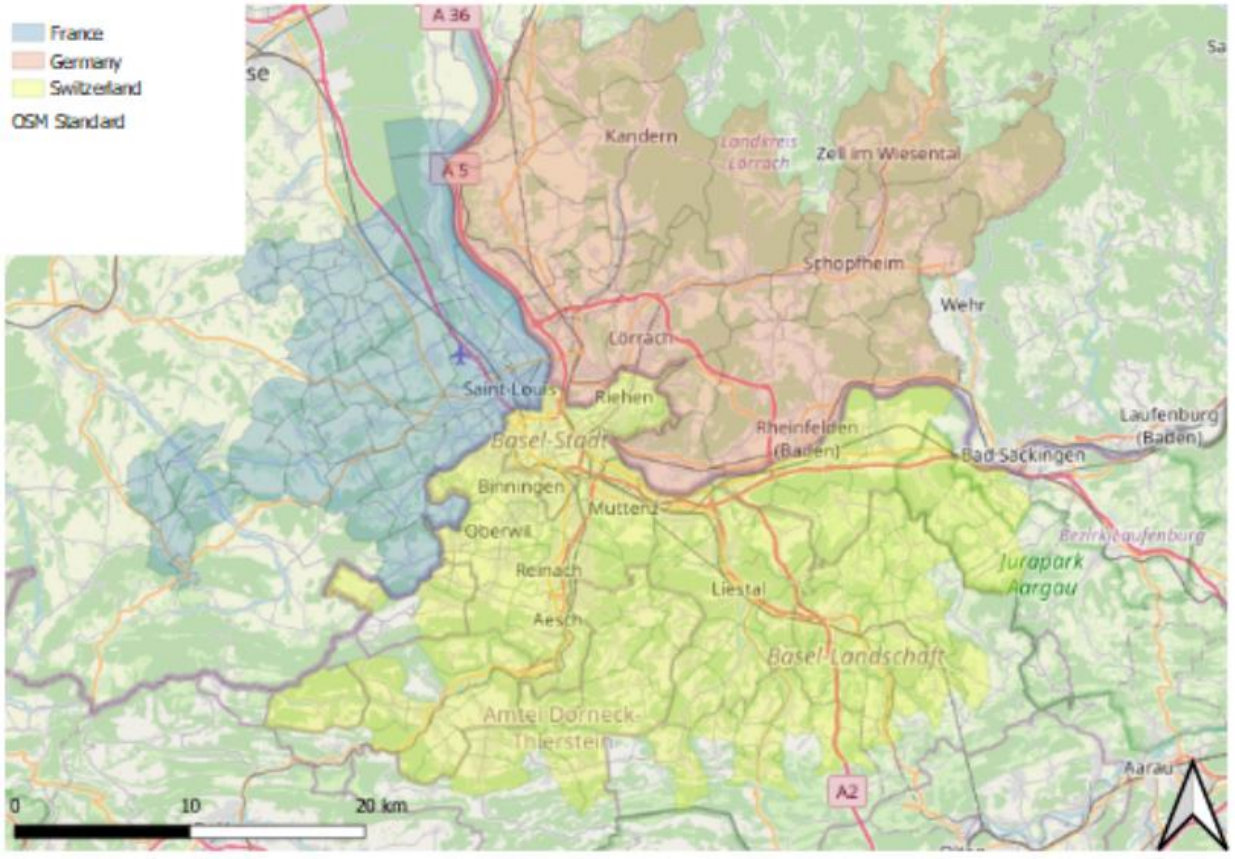


Low Spread Scenario



High Spread Scenario

Basel


France
Germany
Switzerland
OSM Standard
A 36
A 5
A2
Kandern
Landkreis Lörrach
Zell im Wiesental
Schopfheim
Wehr
Lörrach
Saint-Louis
Riehen
Basel-Stadt
Rheinfelden (Baden)
Bad Säckingen
Laufenburg (Baden)
Binningen
Muttenz
Oberwil
Reinach
Liestal
Aesch
Basel-Landschaft
Jurapark Aargau
Bezirk Laufenburg
Amtei Dorneck-Thierstein
Aarau
0
10
20 km

Trend

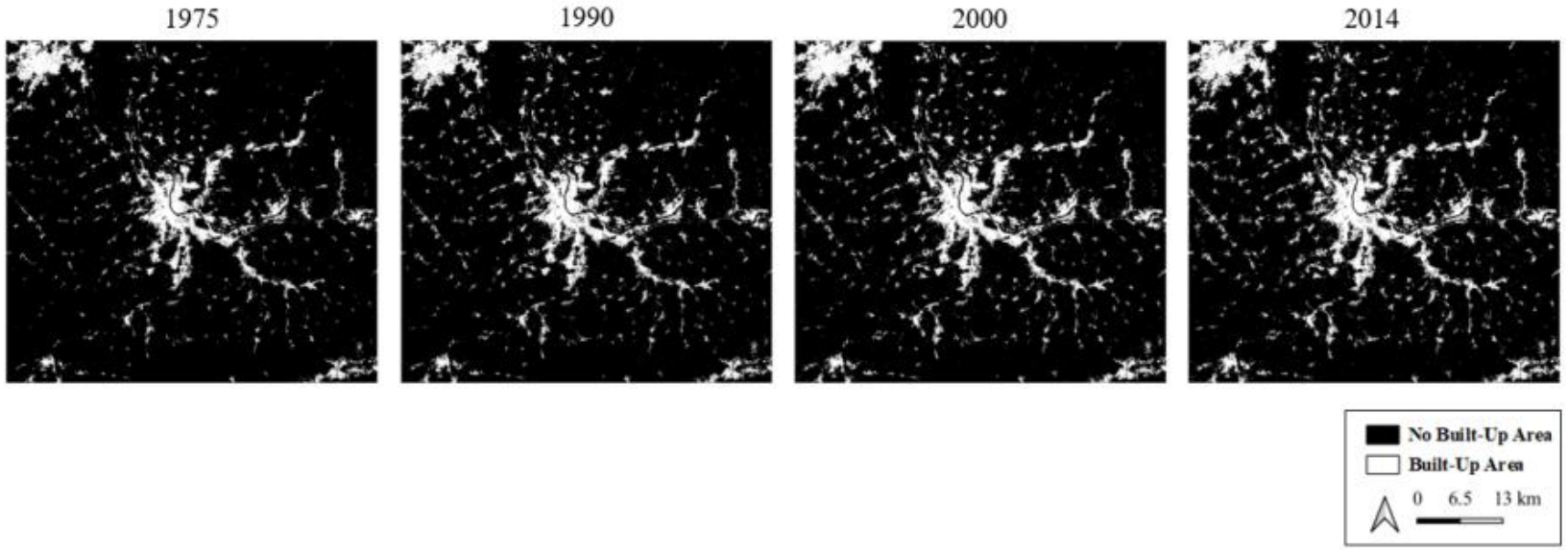
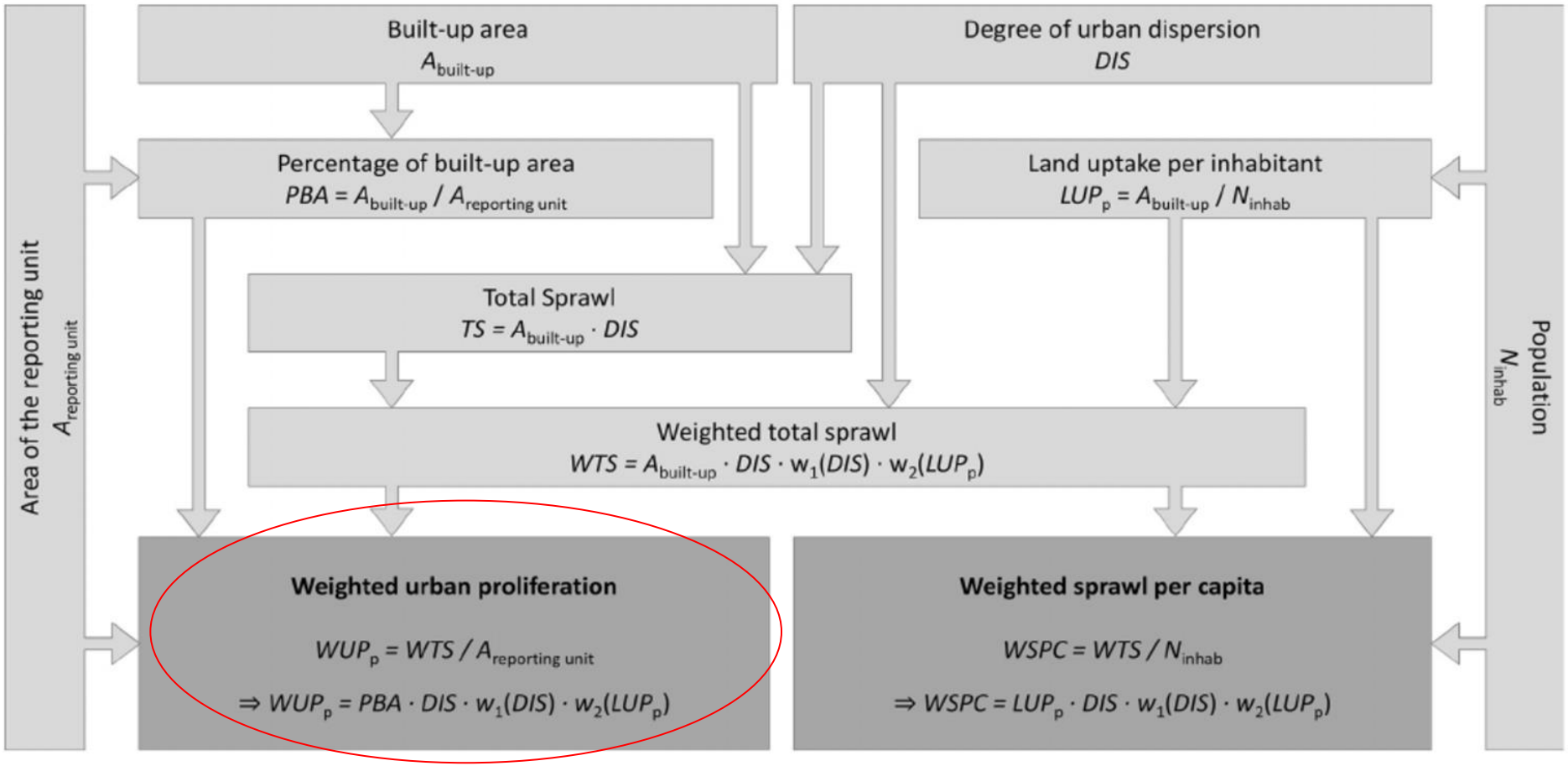


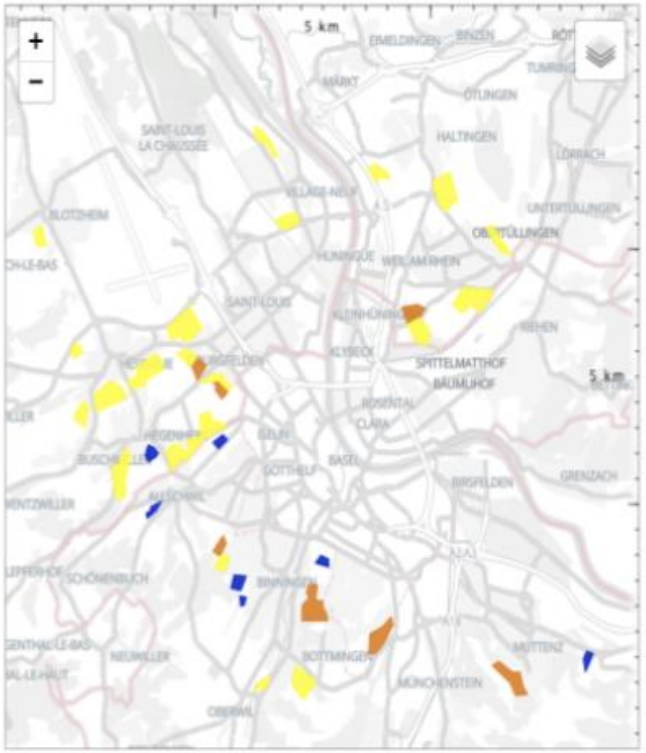
Figure 4.2. *Basel Agglomeration Built-Up Area from 1975 to 2014*



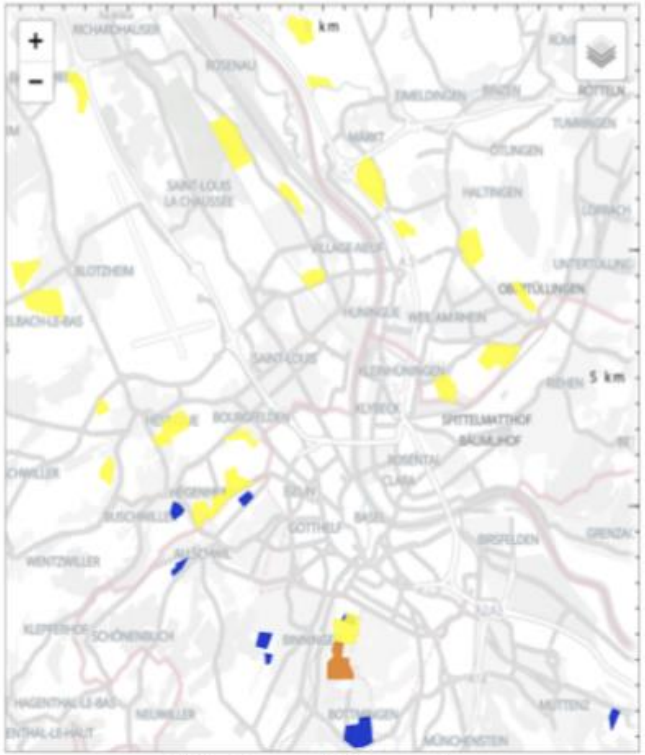
Source link: https://journals.plos.org/sustainabilitytransformation/article?id=10.1371/journal.pstr.0000034

Basel 2040

ALLOCATIONS

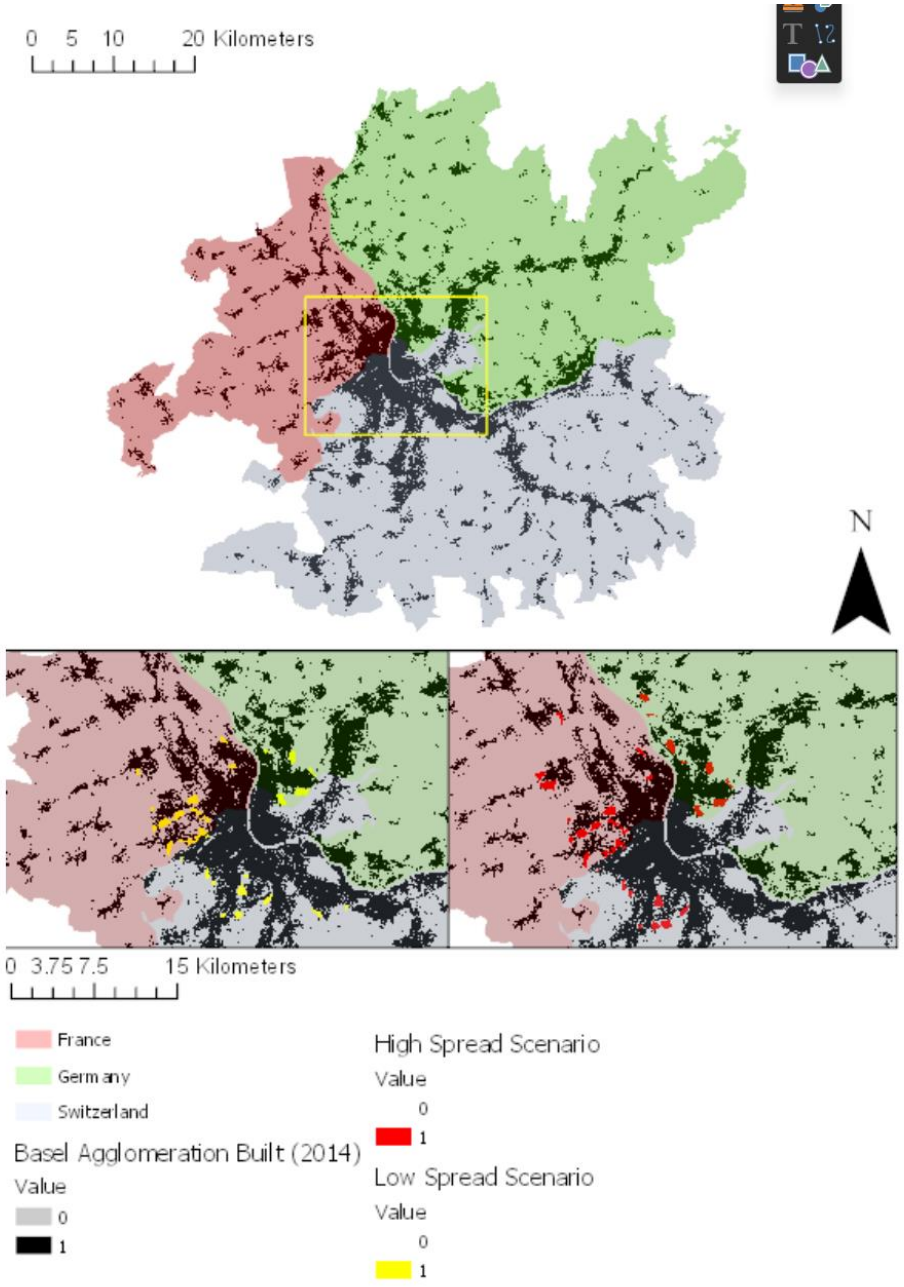


Low Spread Scenario

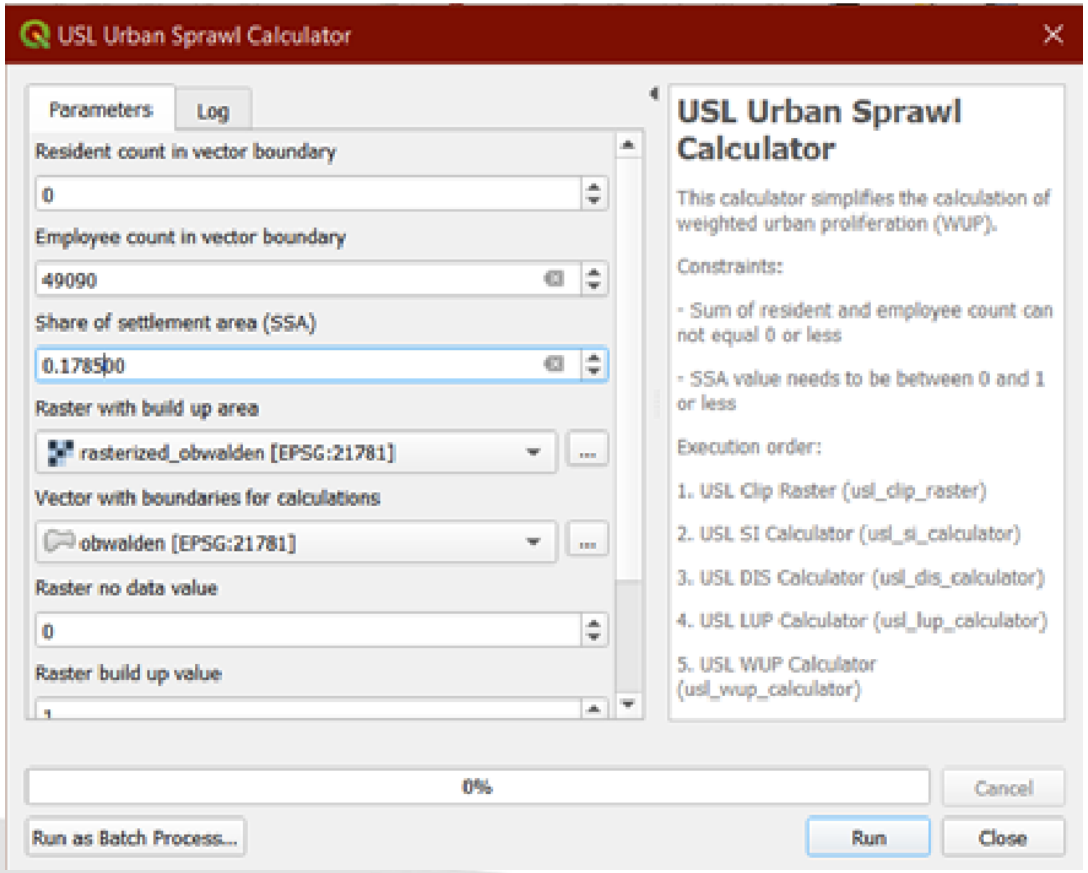


High Spread Scenario

Future GHSL


0 5 10 20 Kilometers
N
0 3.75 7.5 15 Kilometers
France
Germany
Switzerland
Basel Agglomeration Built (2014)
Value
0
1
High Spread Scenario
Value
0
1
Low Spread Scenario
Value
0
1

Data needed



- Global Human Settlements Layer
  - Available for all over the world
  - From 1975 (every five years)
- Current and Planned landuse (Geodesign)

Github

Urban Sprawl Calculation Service

API

Aim and objectives

Target objects:

top 20 cities in the ‘Ease of Living’ Index of the 100 Smart Cities Mission in India

The main deliverable for this project will be two things:

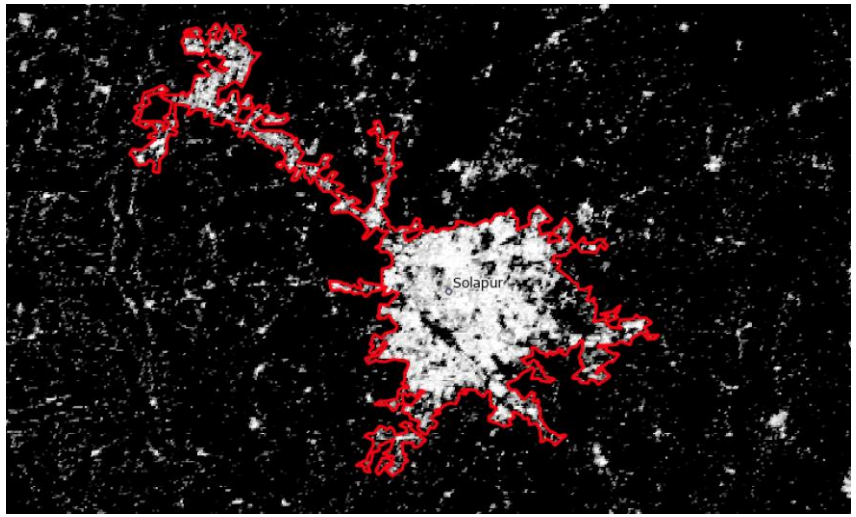
1. Build a “built up raster” for the top 20 cities for two years
- Define the scope of the boundary/urban agglomeration

1. Prepare data for the top 20 cities especially two metrics within the urban areas:
- Total resident count
- Total employment count

Geospatial - Potential Boundary Methods

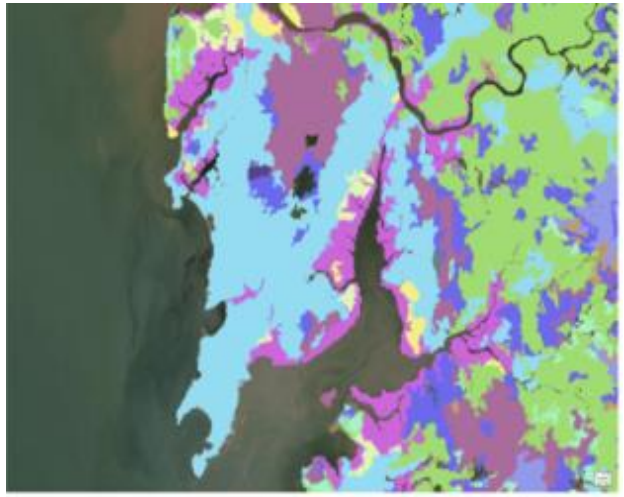
Census Boundaries

Google Maps API



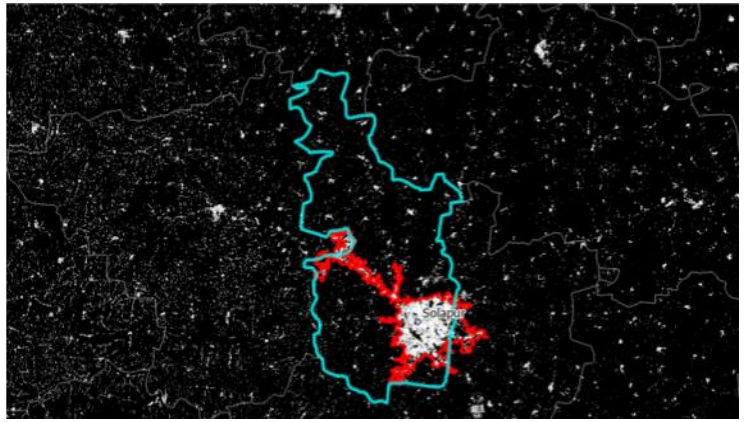
GHSL Derived Boundary

Imagery

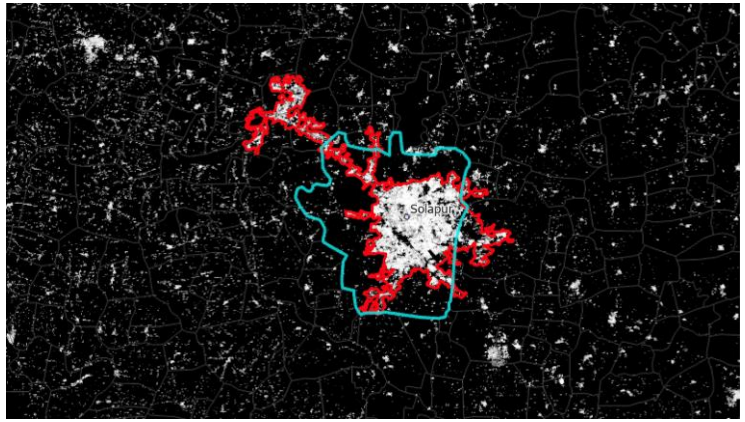


Classified Imagery

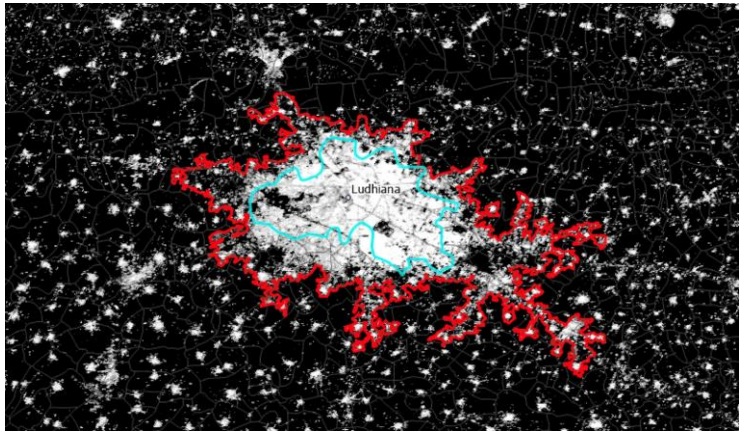
Geospatial - Alternative Boundary Methods



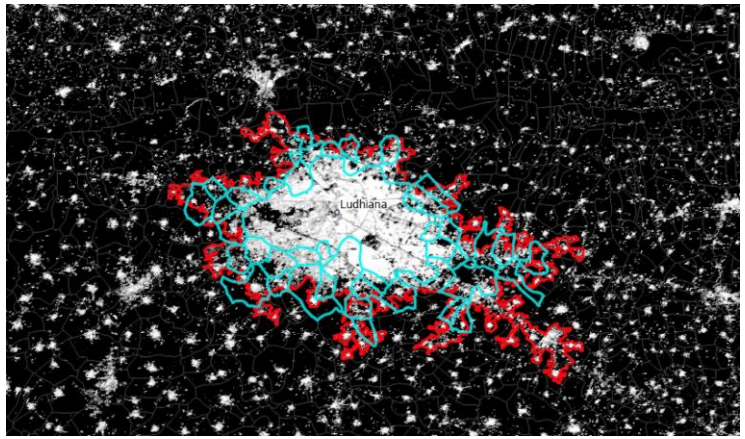
Sub-District Boundary



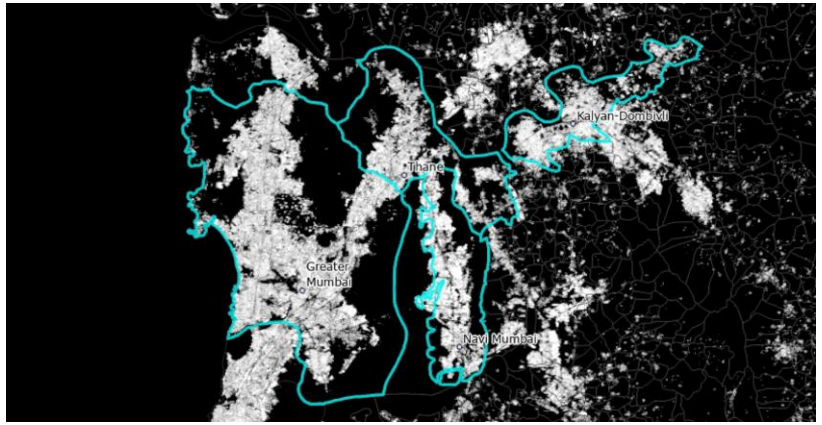
Town/Village Boundary - Solapur



Town/Village Boundary - Ludihana

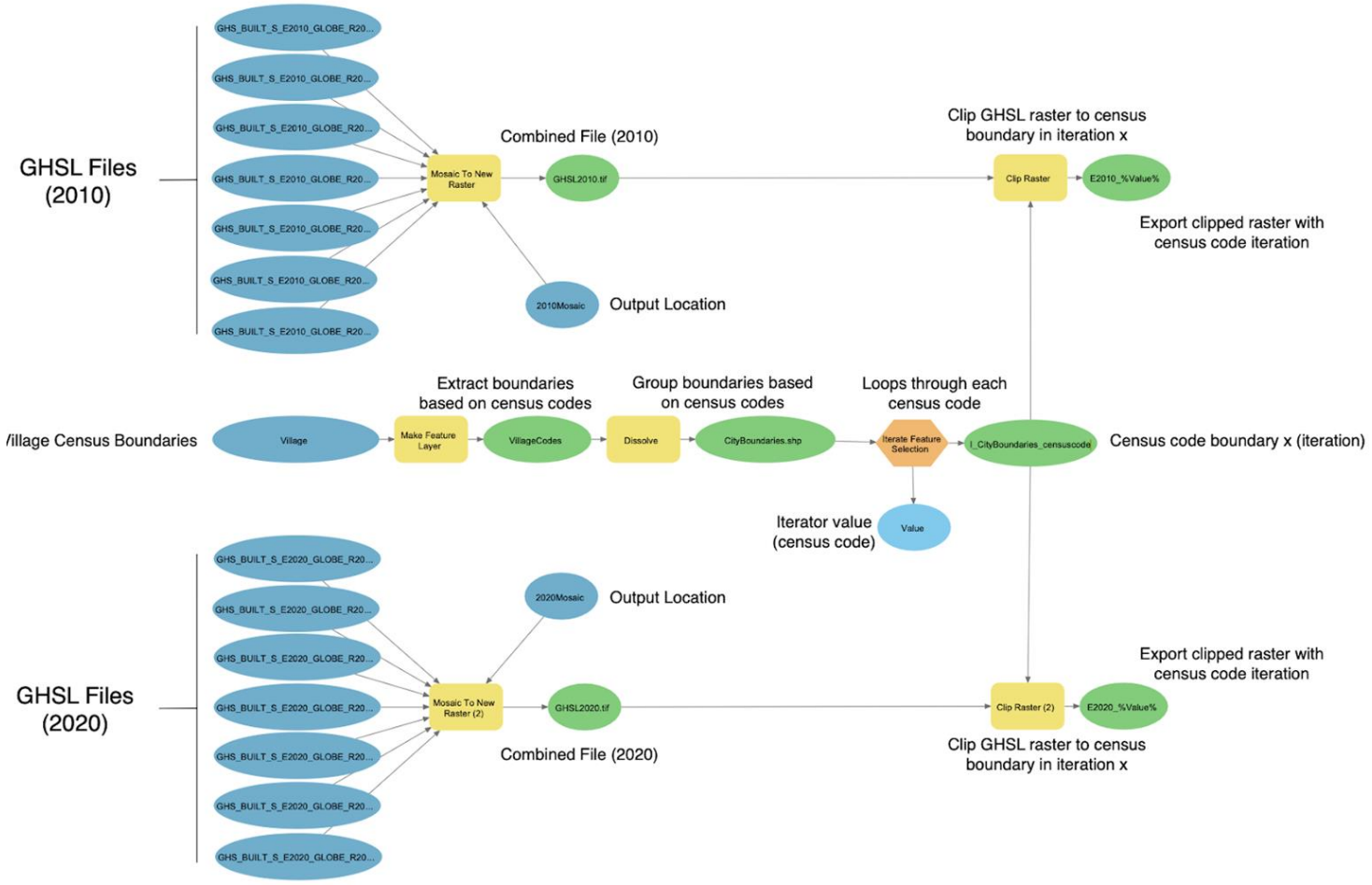


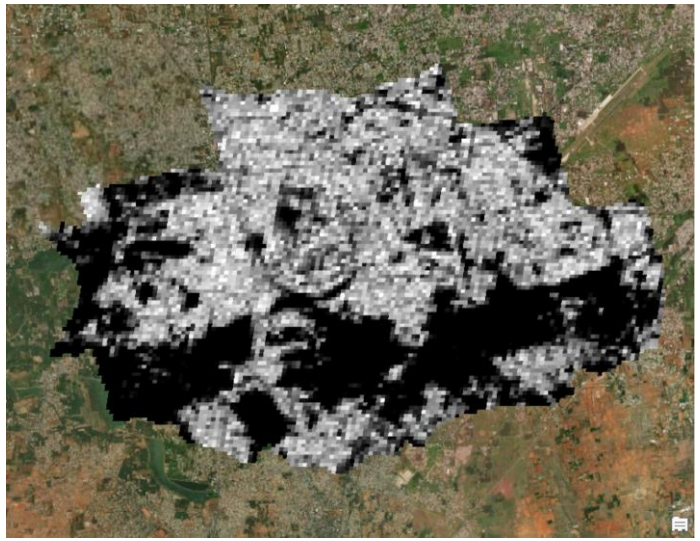
Grouping Multiple Town/Village Boundaries - Ludihana



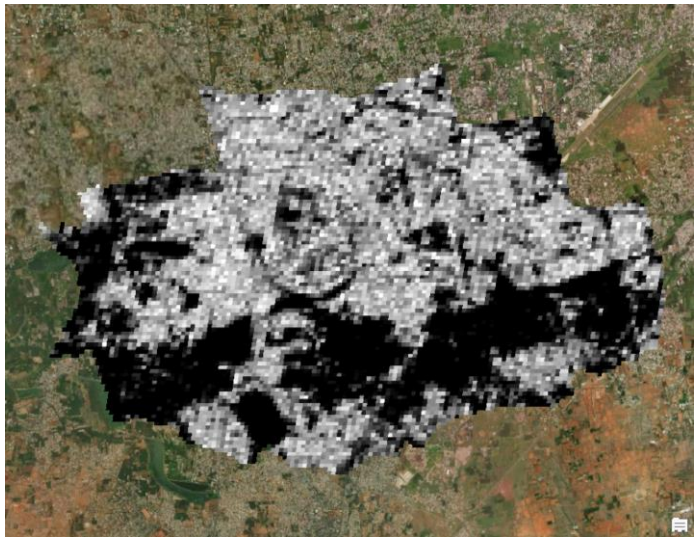
Converging cities definitively split by administrative boundaries.

Geospatial - GHSL Data



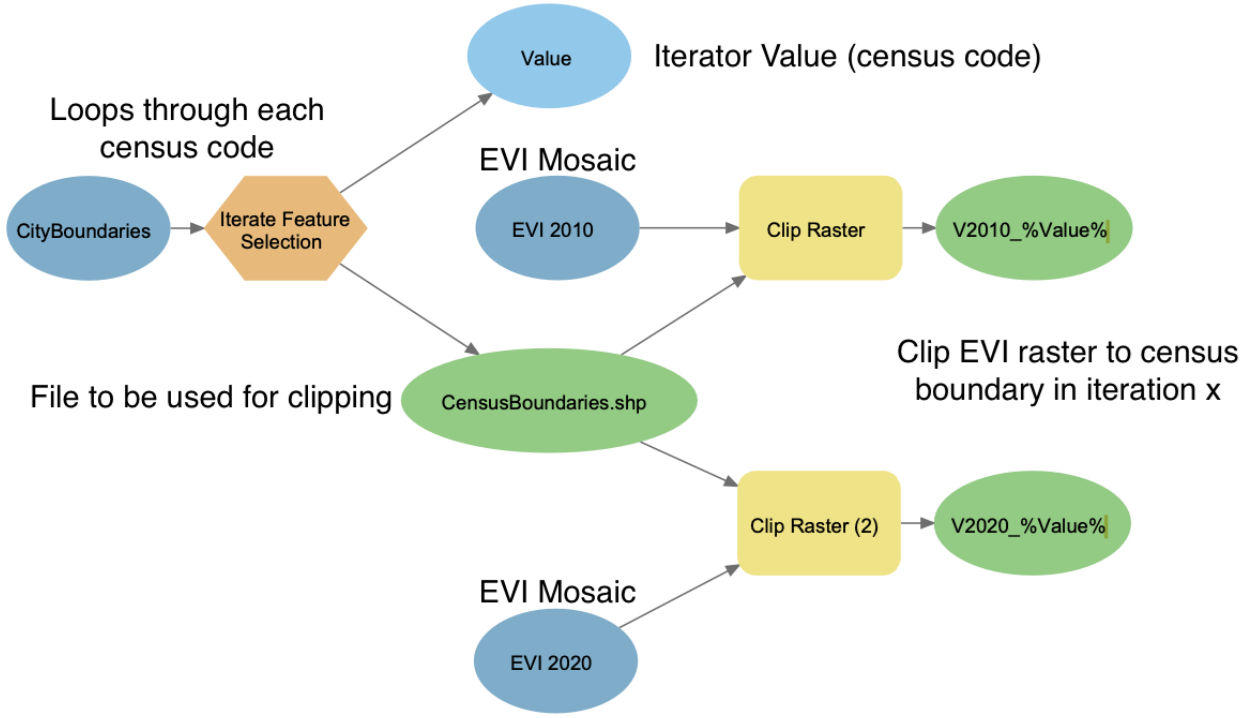


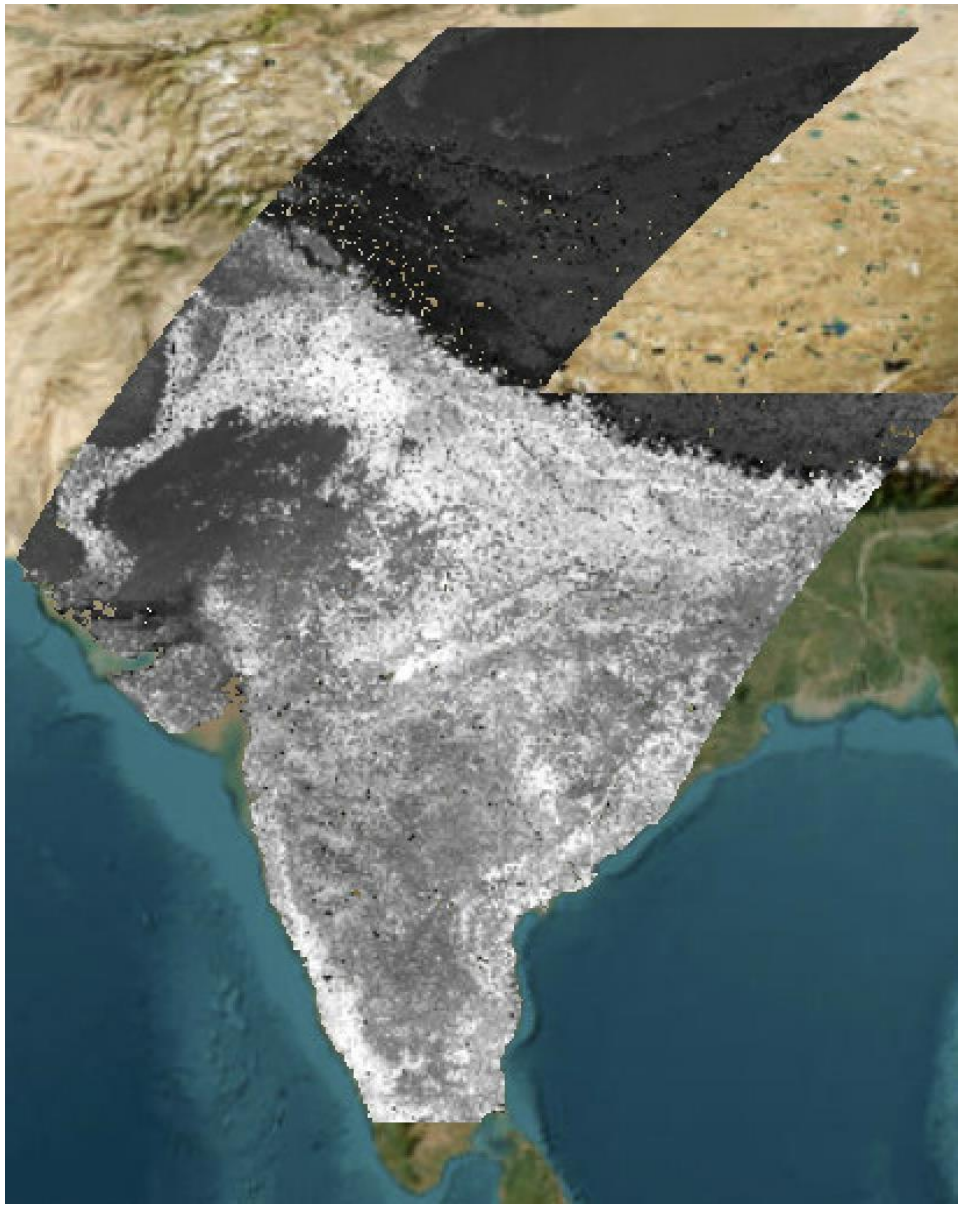
e2010_803984, GHSL clips of Coimbatore in 2010



e2010_803984, GHSL clips of Coimbatore in 2020

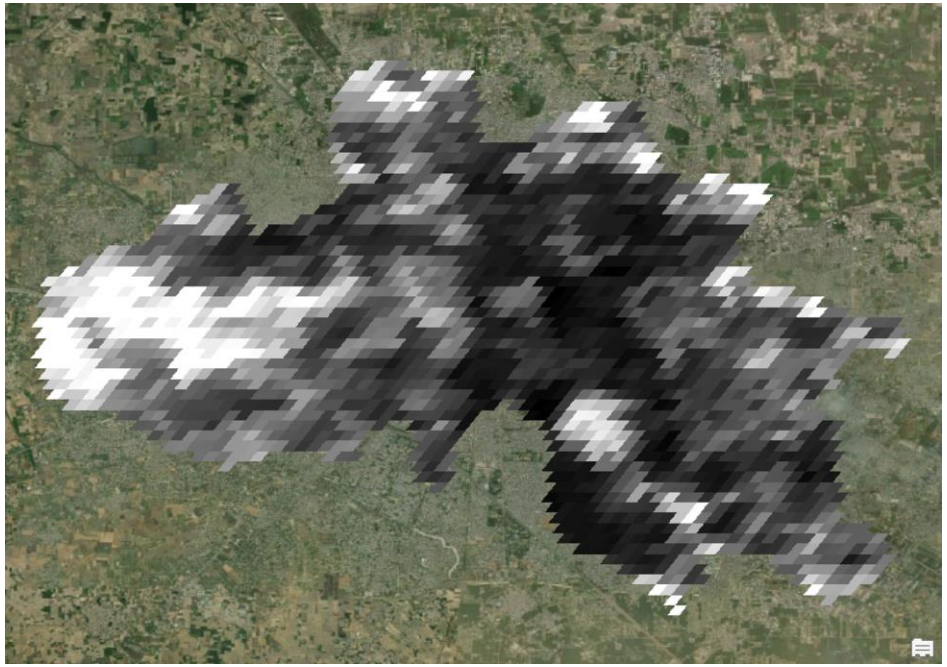
Geospatial - EVI Data



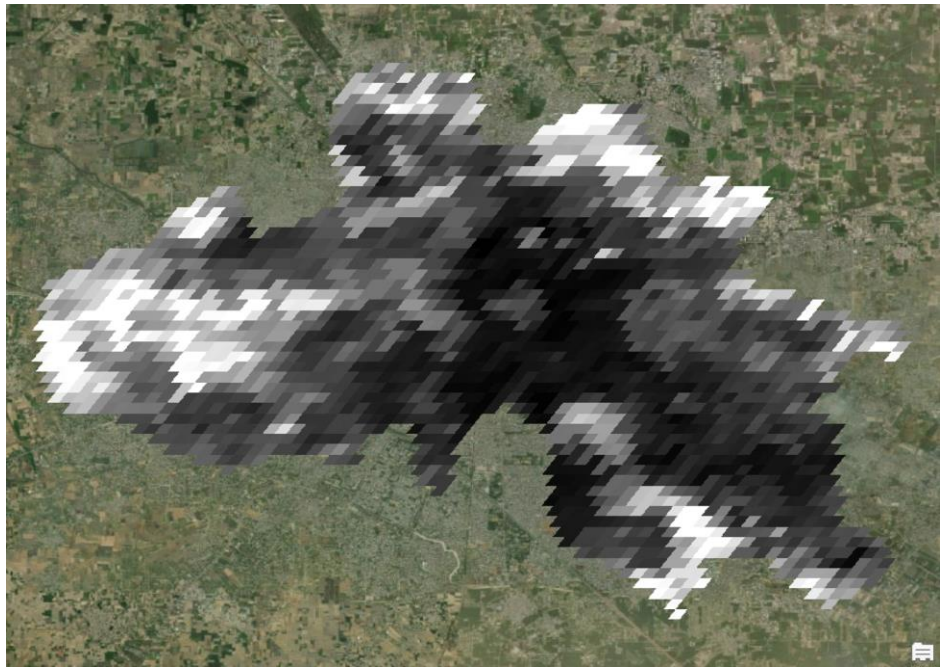


- Highest NDVI/EVI value over 16 day period
- High(ish) resolution, 250m
- Eliminates cloud cover issue
- Larger file extent
- Avaliable in the same time period for both years

Geospatial - EVI Data



V2010_800196, EVI clips of Ludhiana in 2010



v2020_800196 , EVI clips of Ludhiana in 2020

Population and employment

- **2010:** Information taken directly from the census 2011. The population and working population of each geographical unit belonging to the defined city limits was added up.
- **2020:** Using the population prediction forecast for each state made by the Government of India, we calculated the projection of both indicators using the following formula:

State's growth rate = (projection for 2020 - census 2011) / each State's census 2011 x 100%

Estimated population = the citie's Census 2011 x (1 + the state's growth rate)

For example:

		? estimation

Estimation: 11,034,555 x (1 + (20,193,000 - 16,788,000) / 16,788,000) = 13,272,621

Thank you!

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