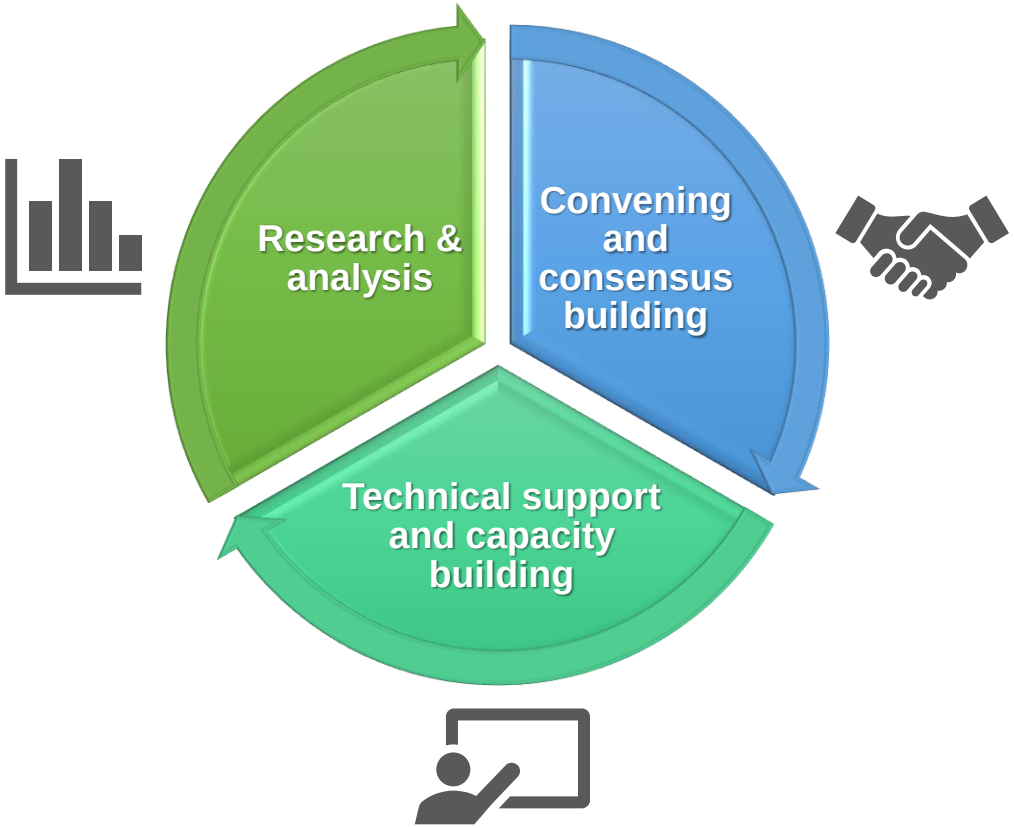
Geospatial and Statistical Integration

Ideas and proposals from recent work at UNESCAP

Daniel Clarke, Statistician, clarke@un.org

8th Plenary Meeting, UN-GGIM-AP

Three key approaches by UN ESCAP



UNITED NATIONS
ESCAP
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2030 Agenda for Sustainable Development

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

Geospatial integration work at ESCAP

1) Disaster risk measurement
2) Urbanisation and population trends
3) Land cover change
4) Oceans sustainability

Importance of GSGF

1. Use of fundamental geospatial infrastructure and geocoding;
2. Geocoded unit record data in a data management environment;
3. Common geographies for the dissemination of statistics;
4. Statistical and geospatial interoperability; and,
5. Accessible and usable geospatially enabled statistics.

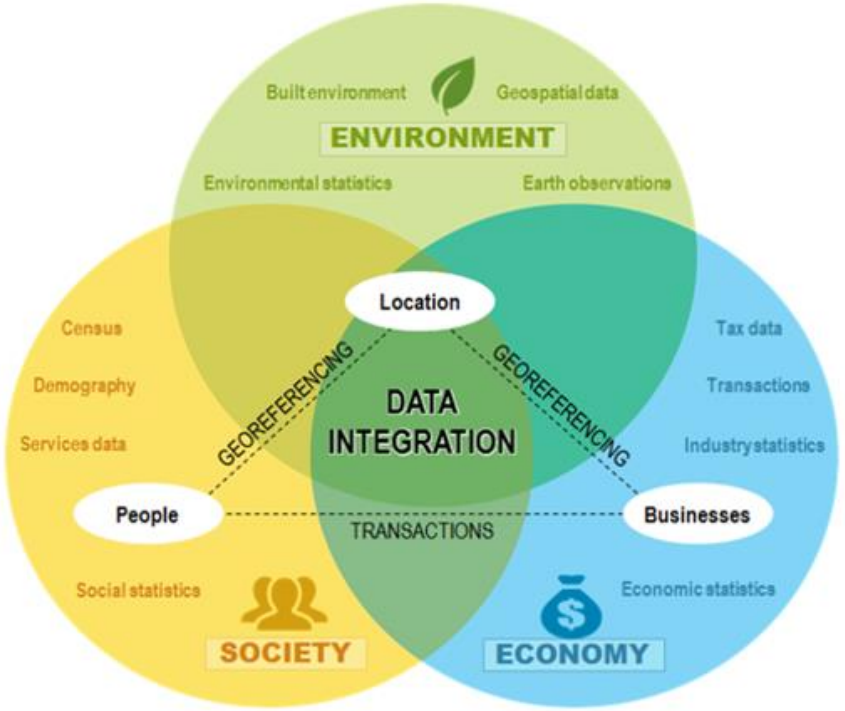
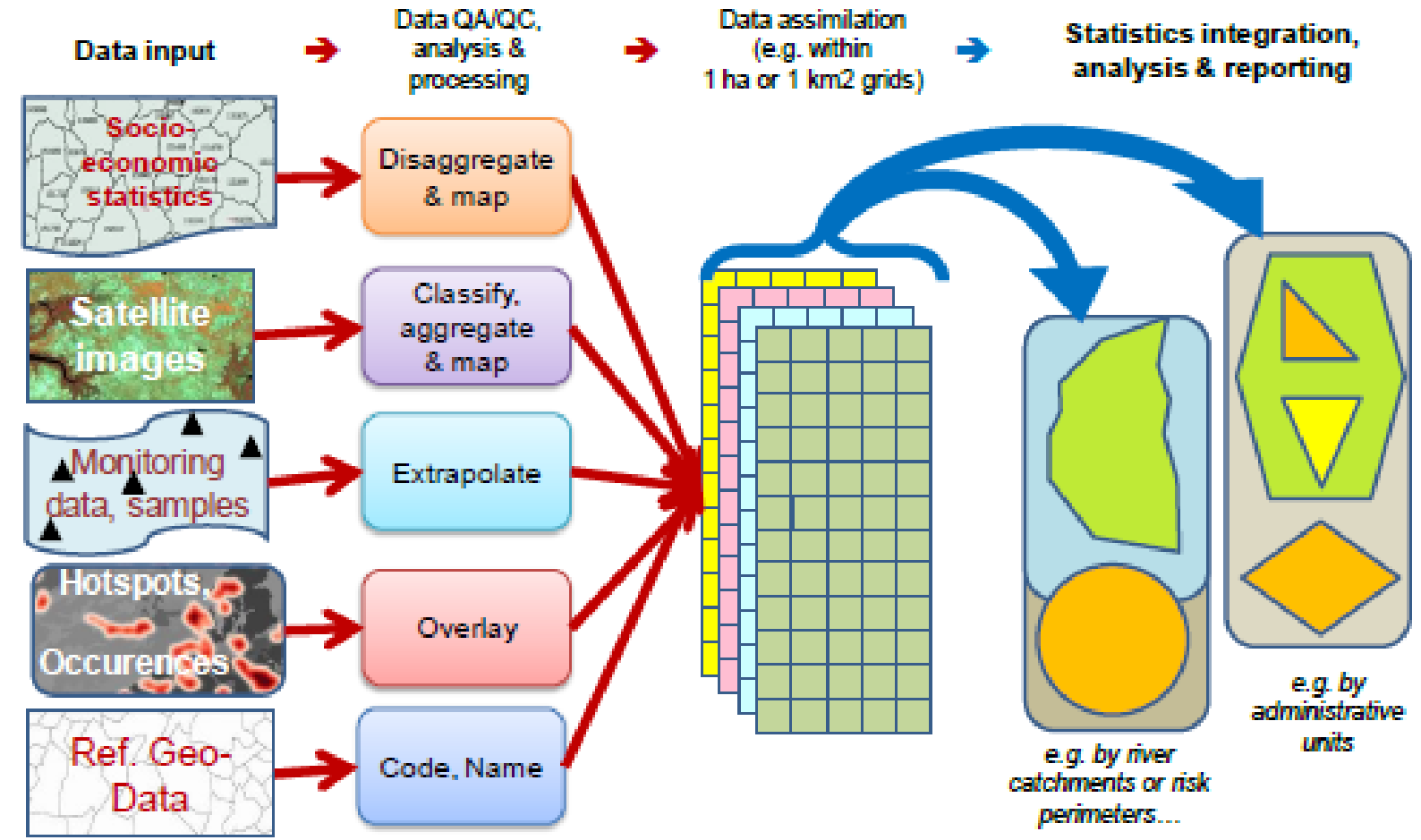


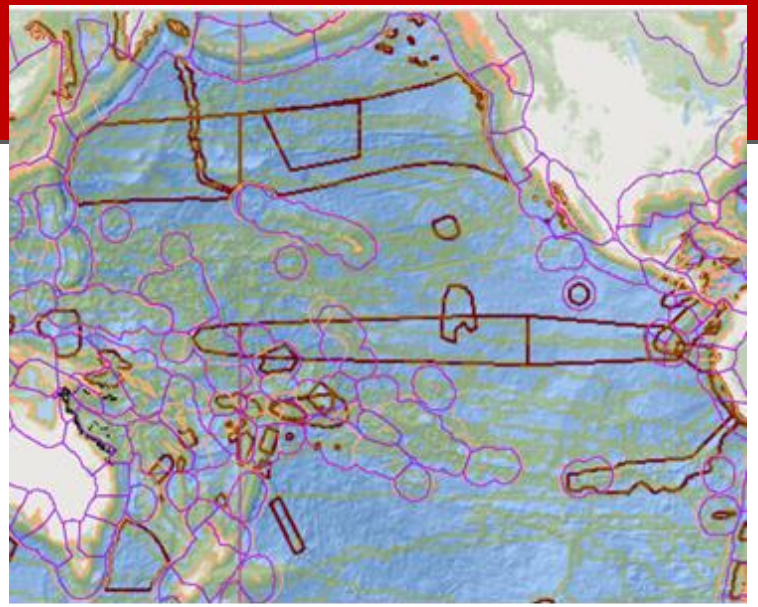
Figure 1 Location as a link between society, the economy and the environment

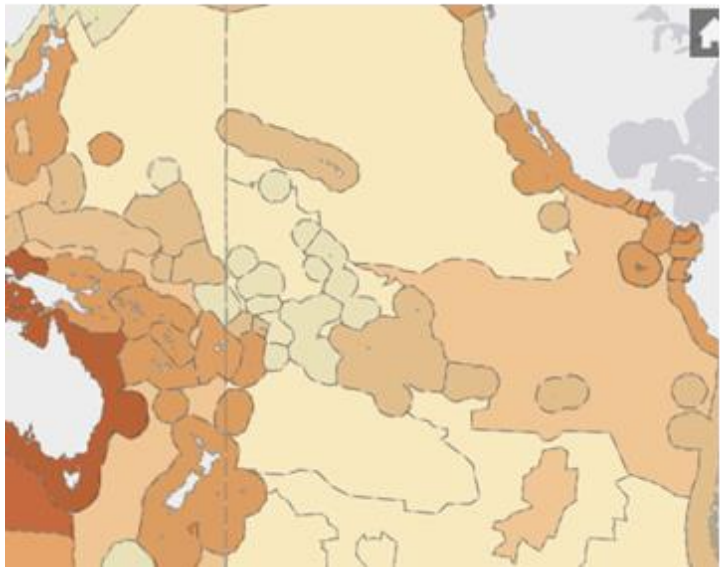
Grid-based Data Assimilation



source: Jean-Louis Weber, CBD Technical Series 77, 2014

Polygon-based integration





Ocean Accounts Portal – a demonstration

https://portal-test-escap.hub.arcgis.com/

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Using ARCGIS Online and ESRI Hub Technology:

Statistical inputs

SUSTAINABLE DEVELOPMENT GOALS

protected planet

UN environment WCMC 40 years

IUCN

esri_oceans

OCEAN HEALTH INDEX SCIENCE

Ecological Marine Units (EMUs)

environment live

TNCMAPS

FishStat

SPREP PROE

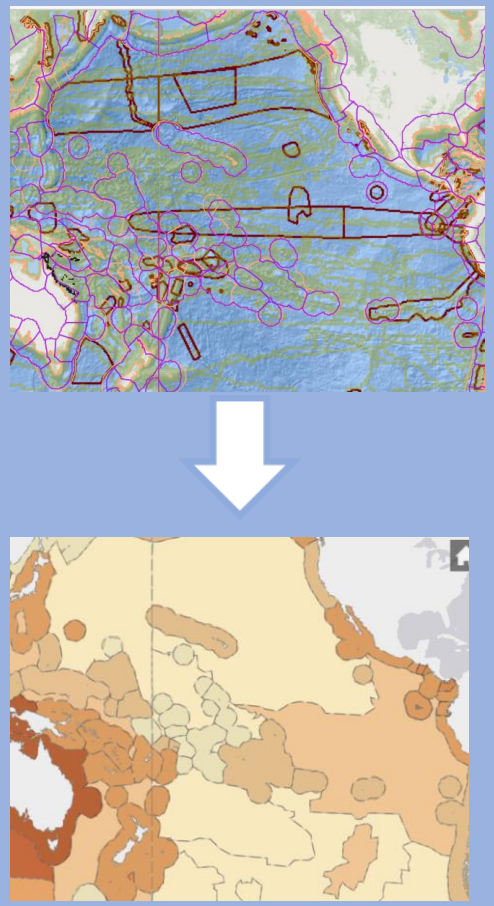
PACIFIC DATA HUB

WELCOME TO NOAA's GeoPlatform

Providing geospatial data, maps, and analytics in support of NOAA's mission

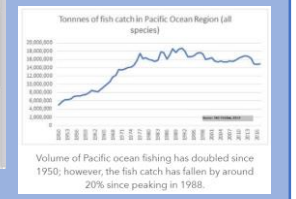
…and much more…

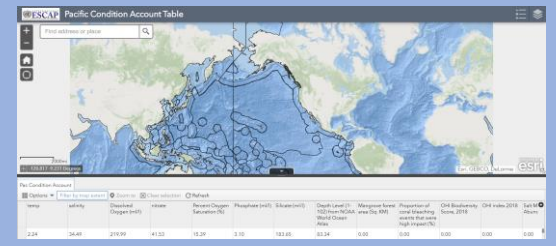
Integration

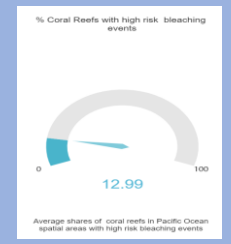


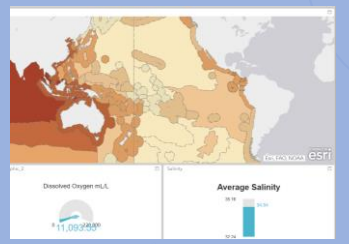
Outputs

Dashboards | Story Maps | Info-Graphics









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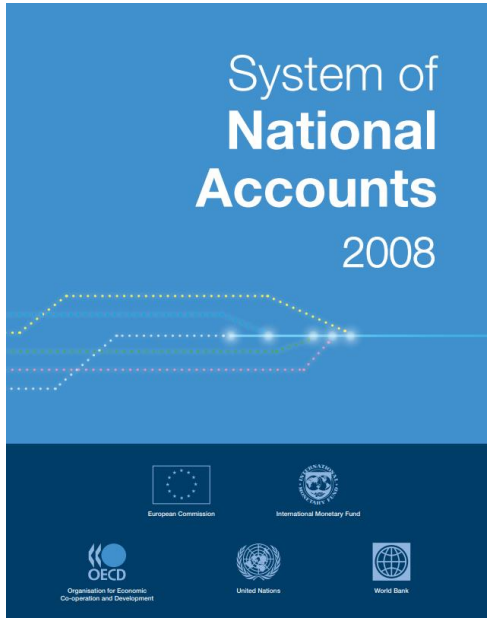
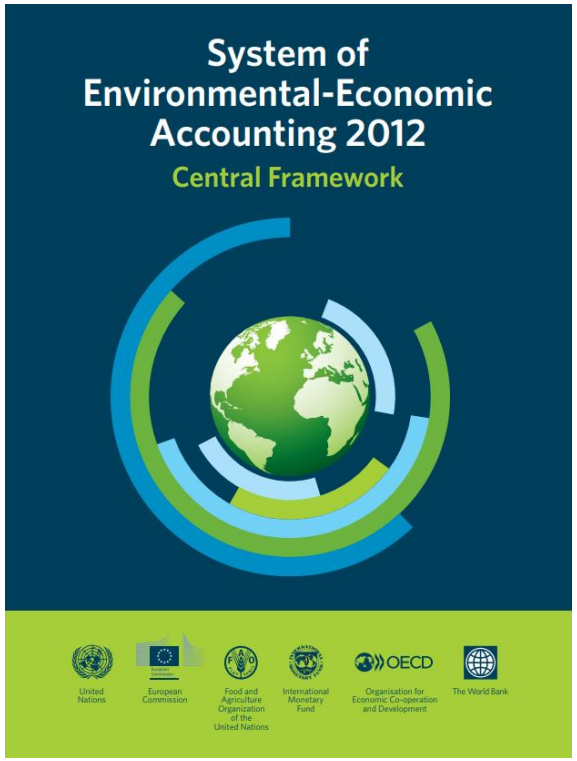
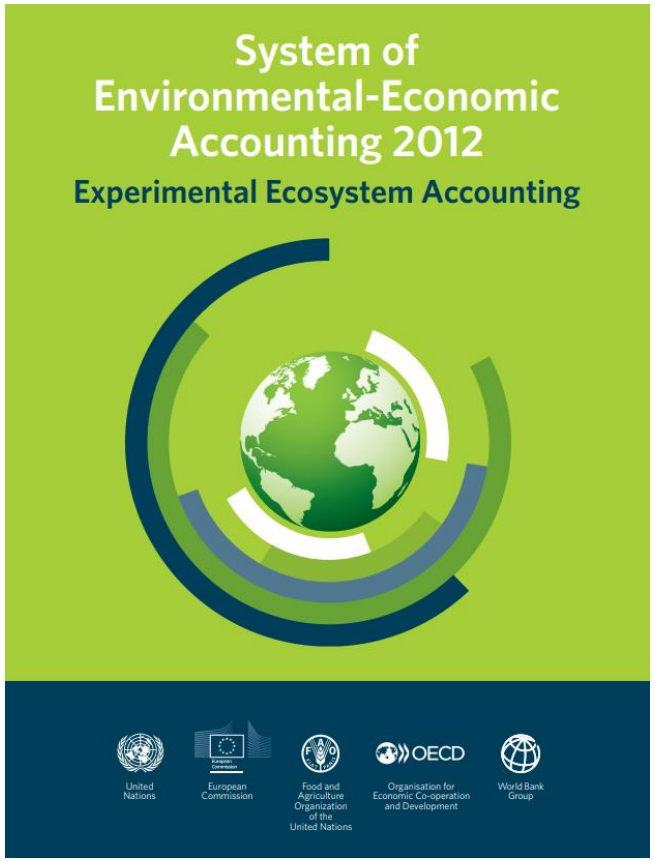
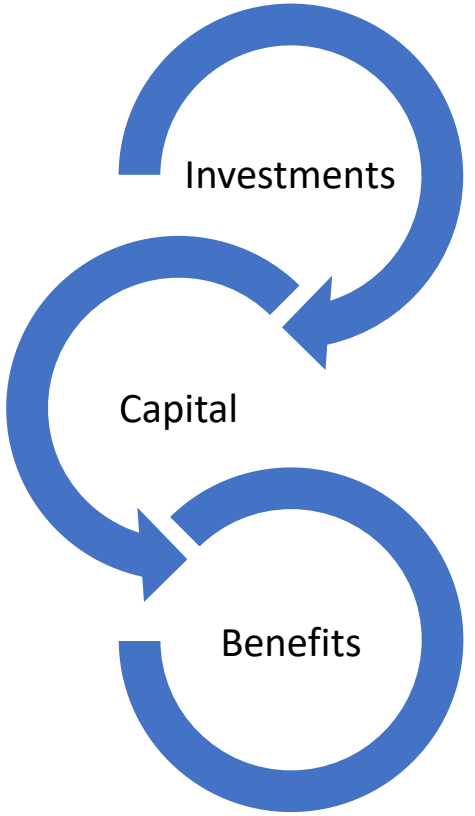
Organised Data









The Pacific Ocean Accounts Portal – some challenges

- Integrating data
  - different data types
  - different spatial units
  - different data custodians
  - different nomenclature
- Integrating people
  - Different skills
  - Different tools
  - Different languages

The Pacific Ocean Accounts Portal – driving innovation?

Integrating data

- What are the best practices for integrating across spatial units?
- What are best practices for integrating data types?

Integrating people

- What lessons can be shared froma demonstration project like the Pacific Ocean Accounting Portal?

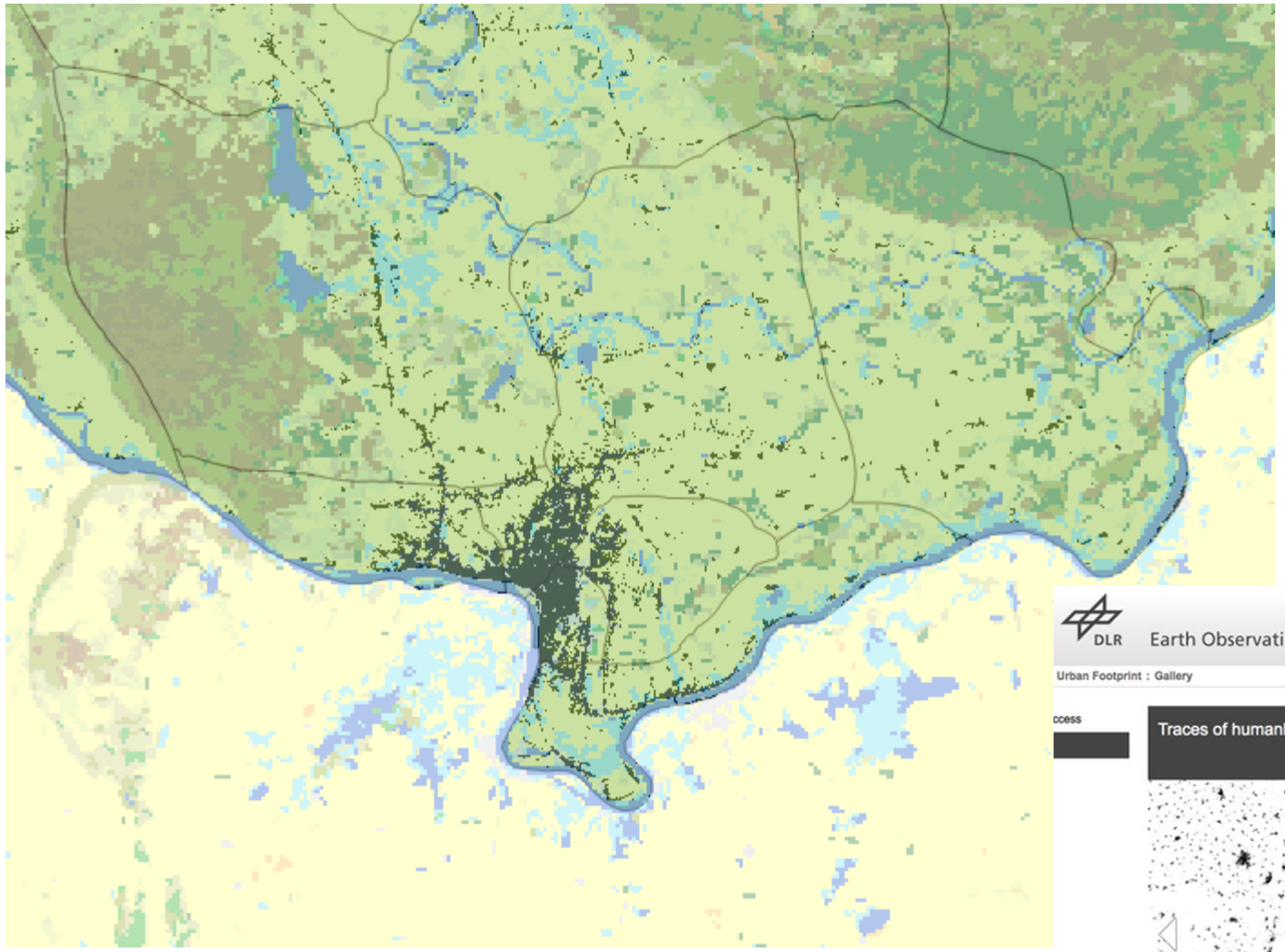
THANK YOU

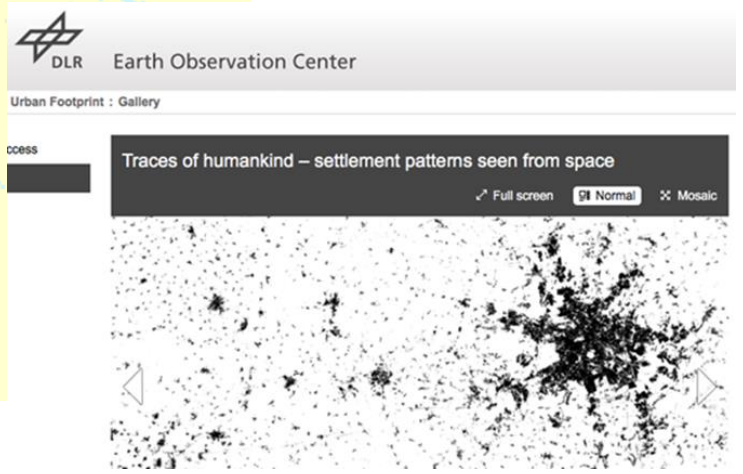
For questions or more info: clarke@un.org

UN-GGIM-AP

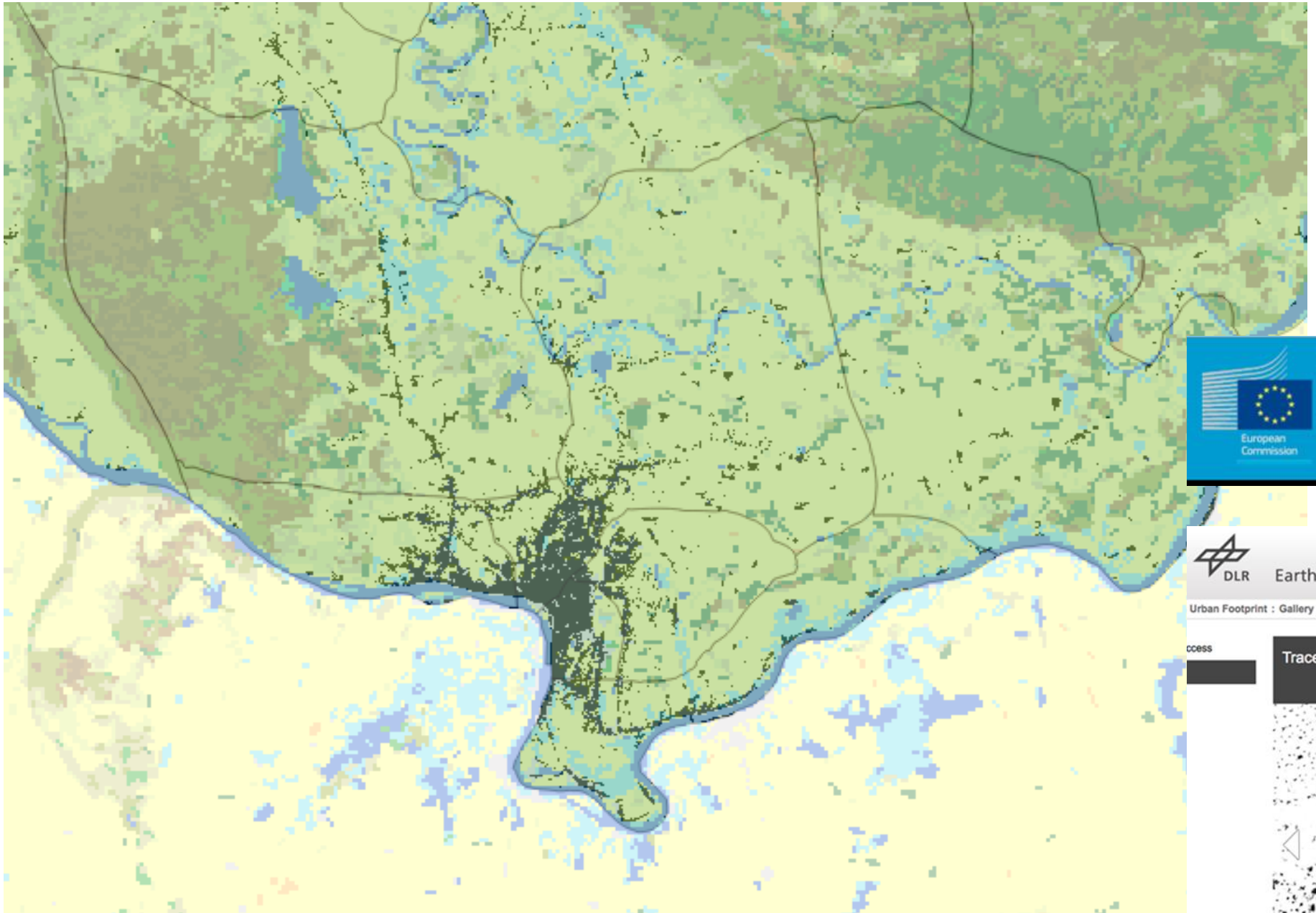
Photo cred.: Patrick J. Nagel

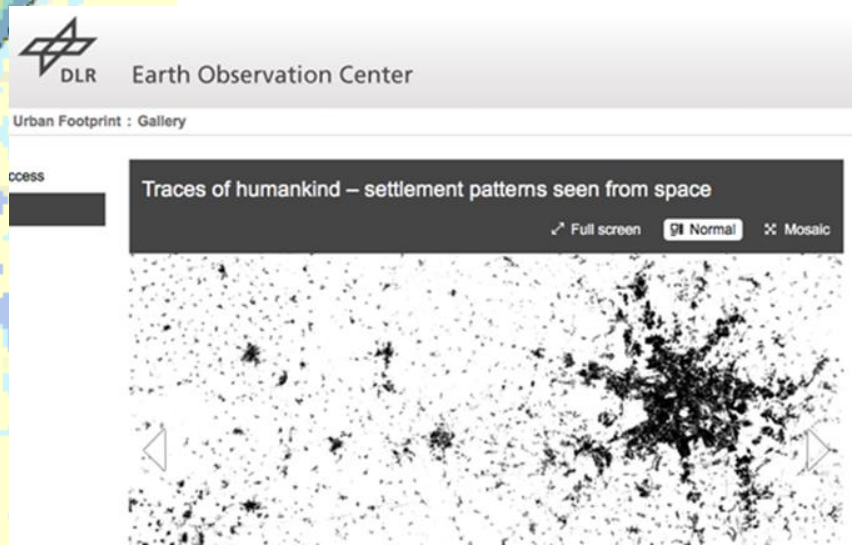
Integration for disaggregated analyses of urban landscapes and population



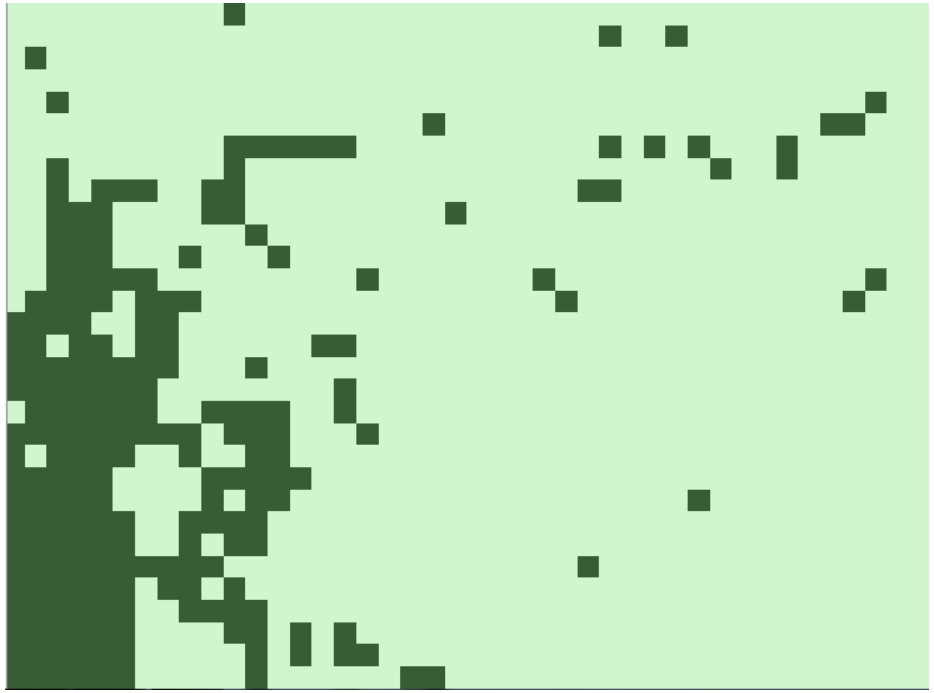


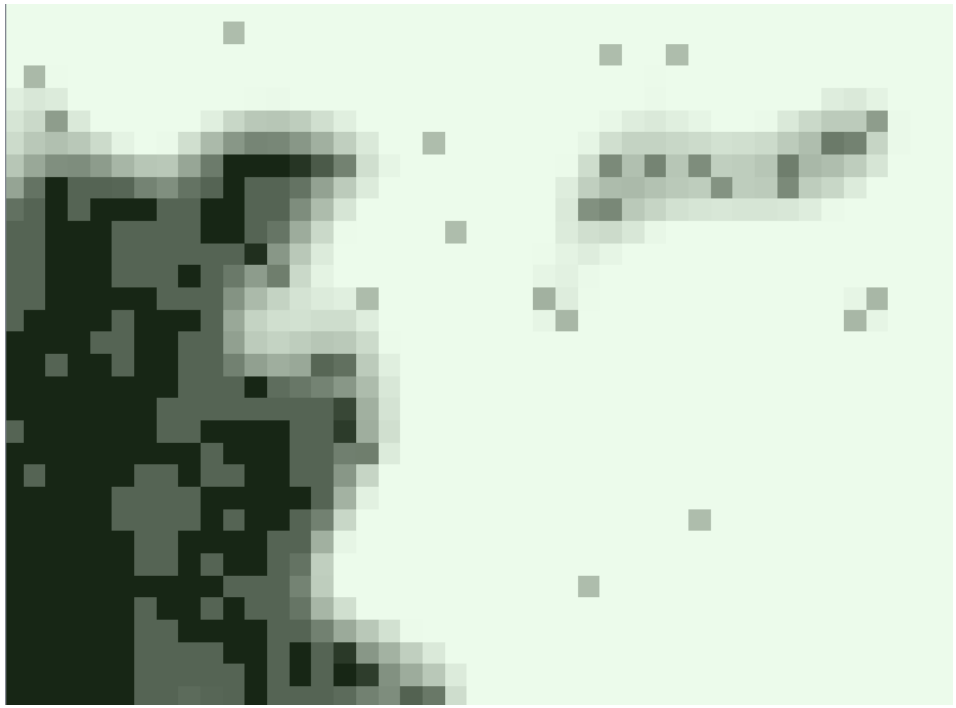
Using remote sensing to describe landscapes





Example outputs of ‘Gaussian field’ Effect





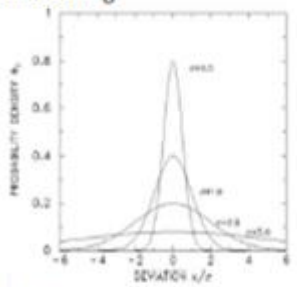
Original data

0	0	0	0	0
0	0	0	0	0
0	0	1.00	0	0
0	0	0	0	0
0	0	0	0	0

Smoothed data, σ =1

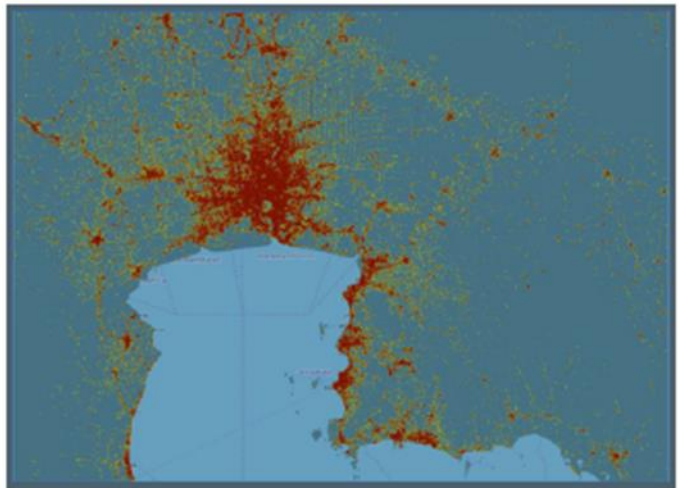
0.00	0.01	0.03	0.01	0.00
0.01	0.06	0.10	0.06	0.01
0.03	0.10	0.15	0.10	0.03
0.01	0.06	0.10	0.06	0.01
0.00	0.01	0.03	0.01	0.00

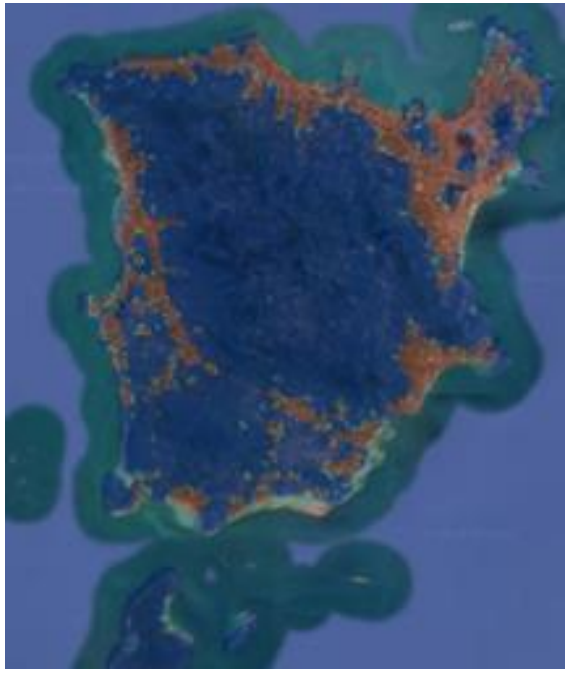
Effect of σ value on smoothing

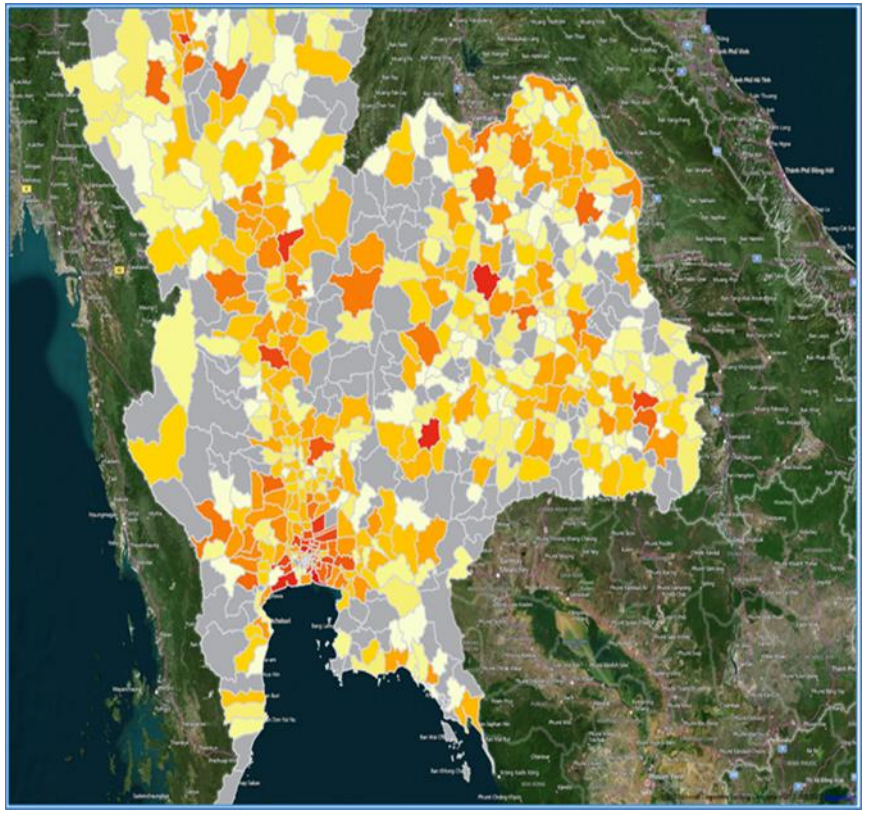


Source:
http://www.asp.ucar.edu/colloquium/1992/notes/part1/node15.html

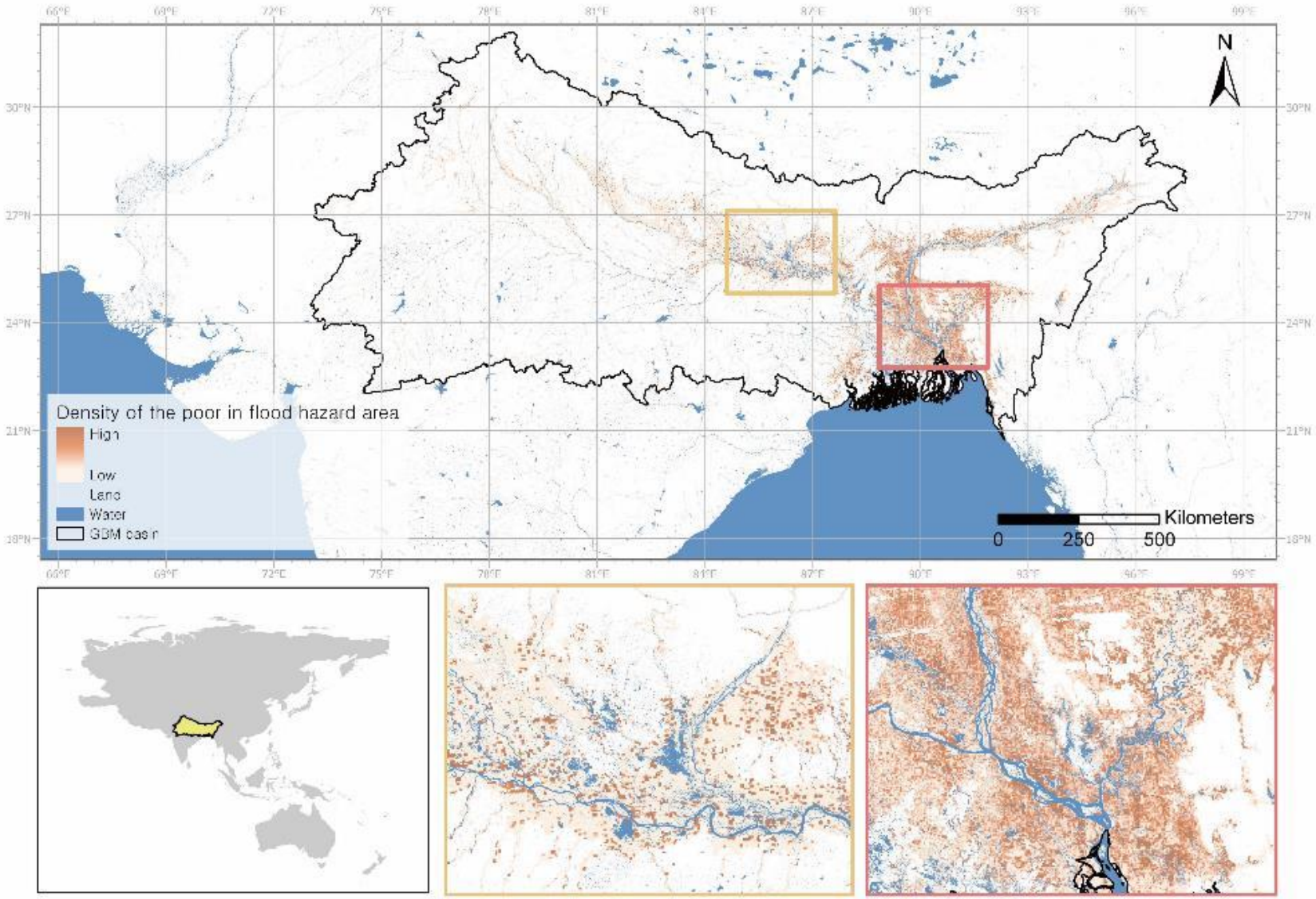
Power of geospatial integration: flexible scales of analysis







Flood exposure for extremely poor households in in the Ganges-Brahmaputra river basin



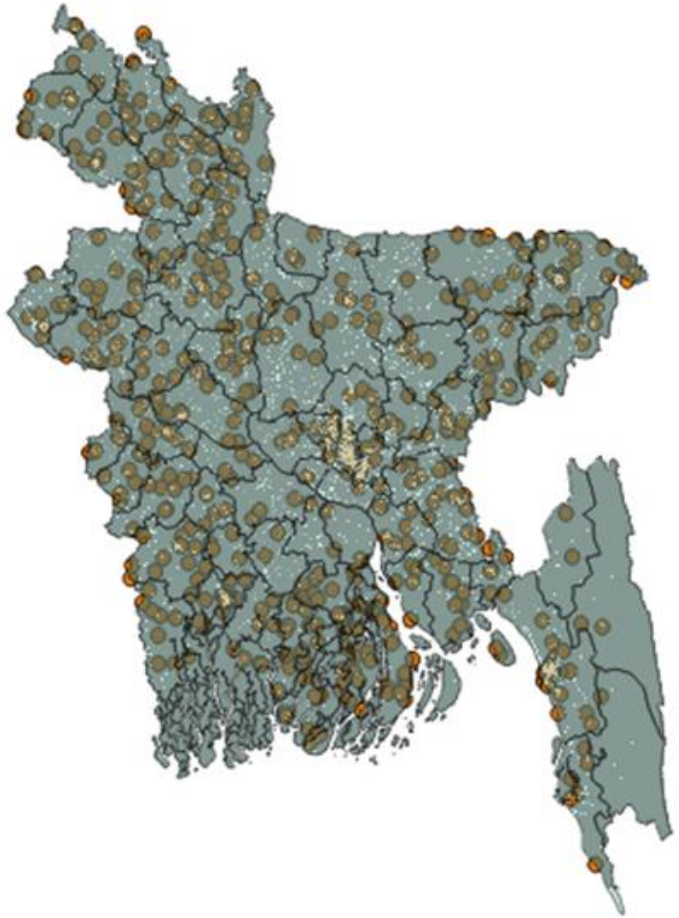
Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

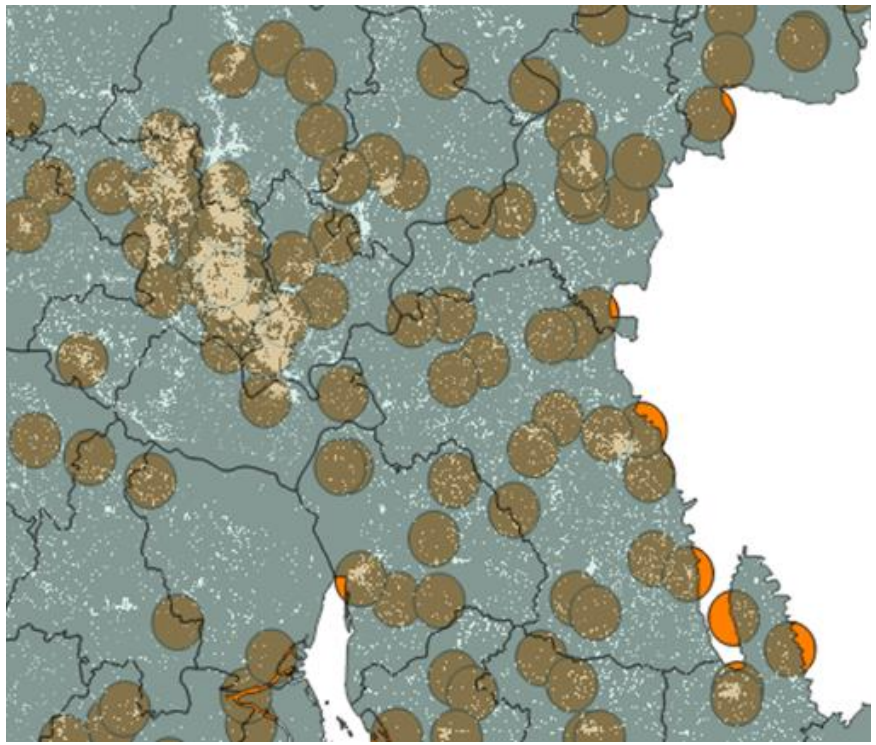
Geo-referencing of Primary Sampling Units (PSUs)

Red Dots: a PSU

Yellow circle: 2km neighbourhood of the PSU

Overlay PSU locations with EO data to describe the landscapes of PSUs



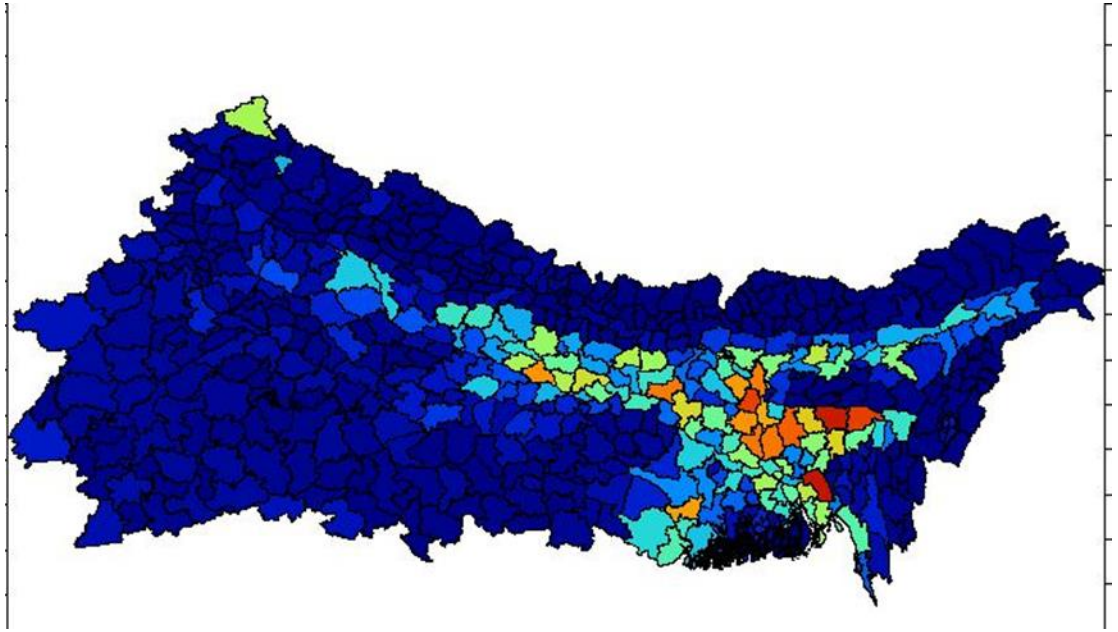


Headlines from results

- Households experiencing extreme poverty are more likely to be exposed to flood hazard than the general population for the GBM region as a whole and in most districts
- How? Compared the estimated rates of exposure to flood hazard for general population and for populations below poverty threshold

Summary of results for exposure to flood hazard areas by administrative regions:

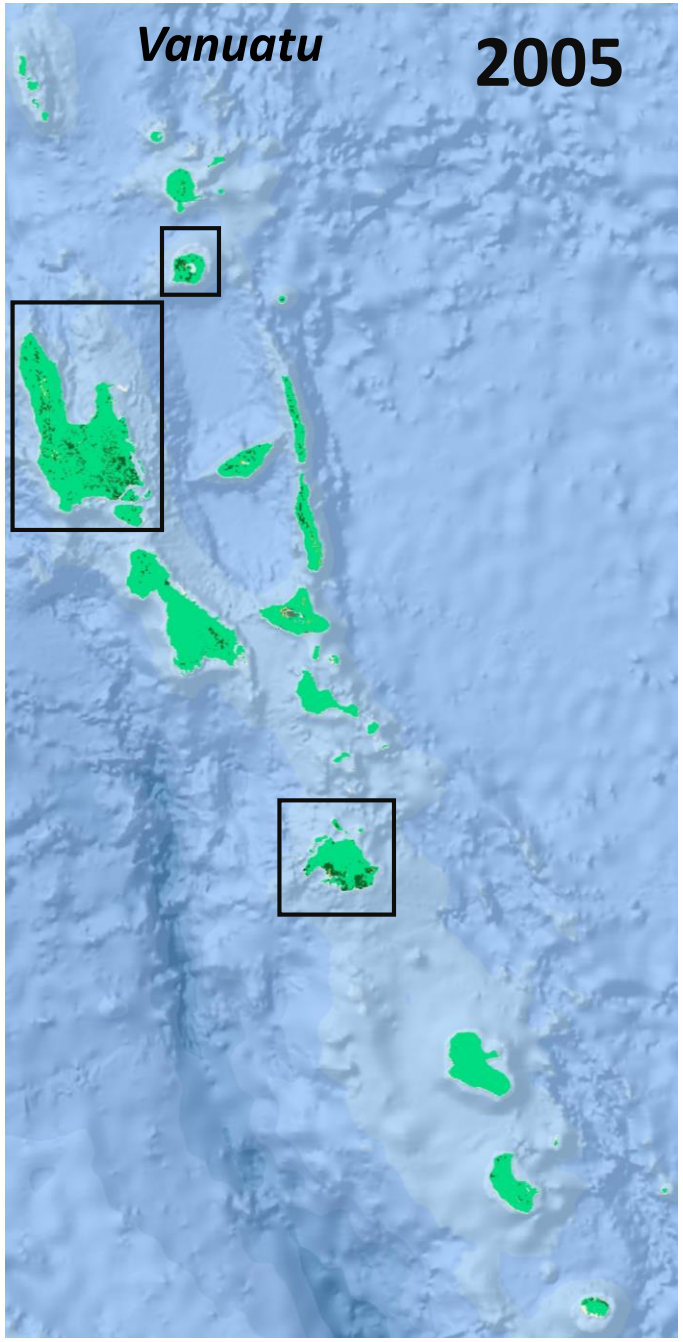
			flood hazard exposure rate, general population (%)	flood hazard exposure rate, among poor (below intl' povery line)				flood hazard exposure rate, general population (%)	flood hazard exposure rate, among poor (below intl' povery line)
Bangladesh	Division				Nepal	province			
	1	Barisal	17.396	20.144		1	Kosi	19.830	11.874
	2	Chittagong	73.653	79.561		2	Jankpur	10.668	7.310
	3	Dhaka	74.608	83.843		3	Bagmati	11.985	13.140
	4	Khulna	40.650	43.207		4	Gandaki	14.237	20.574
	5	Rajshahi	73.957	73.260		5	Lumbini	18.707	22.867
	6	Rangpur	65.623	68.389		6	Karnali	8.595	5.622
	7	Sylhet	84.151	89.089		7	Far West	11.864	24.510
		BGD	66.624	71.398			NPL	14.114	15.431
Bhutan	Prefecture				India	State			
	1	Bumthang	10.249			1	Arunachal Pradesh	20.914	16.989
	2	Chhukha	16.328			2	Assam	69.333	68.678
	3	Dagana	14.965			3	Bihar	46.564	44.514
	4	Gasa	11.336			4	Chhattisgarh	5.130	5.241
	5	Haa	6.325			5	Haryana	7.546	10.629
	6	Lhuentse	9.466			6	Himachal Pradesh	41.934	45.965
	7	Monggar	5.920			7	Jharkhand	10.632	8.883
	8	Paro	16.398			8	Madhya Pradesh	5.294	6.029
	9	Pemagatshel	8.163			9	Manipur	39.939	38.395
	10	Punakha	15.336			10	Meghalaya	21.884	22.151
	11	Samdrupjongkhar	4.281			11	Mizoram	8.369	10.497
	12	Samtse	15.734			12	NCT of Delhi	38.943	46.416
	13	Sarpang	4.441			13	Rajasthan	5.383	6.637
	14	Thimphu	21.980			14	Sikkim	0.708	14.837
	15	Trashigang	8.324			15	Tripura	29.545	27.341
	16	Trongsa	9.864			16	Uttar Pradesh	15.606	19.253
	17	Tsirang	8.508			17	Uttarakhand	15.629	23.149
	18	Wangduephodrang	9.840			18	West Bengal	25.793	26.251
	19	Yangtse	11.595				IND(GBM only)	23.305	26.903
	20	Zhemgang	8.677						
		BTN	12.221			GBM		33.801	38.089

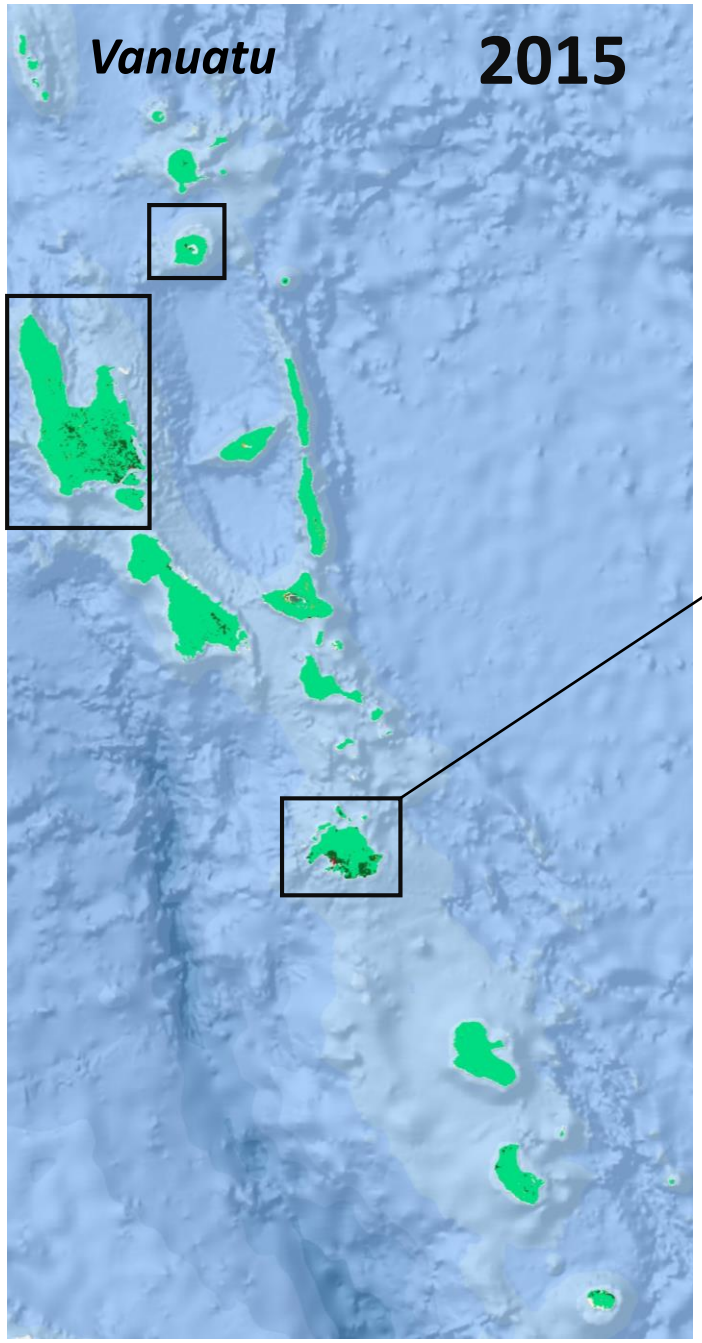


Ref.: Methodology for Hazard Exposure and Vulnerability Assessment in the Ganges-Brahmaputra (GBM) River Basin
http://communities.unescap.org/system/files/methodology8_17july.pdf

Dispersed populations

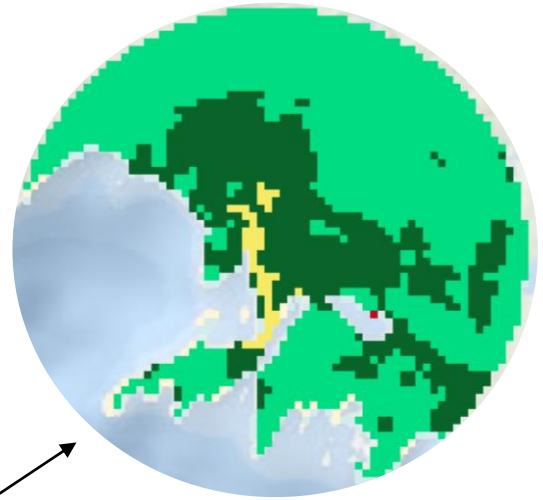
- ~def.: groups of populations with poor (or potentially poor) coverage from remote sensing images or from population census and surveys, or both.
- Aim should be to include such groups better in statistical analysis





2005

2015



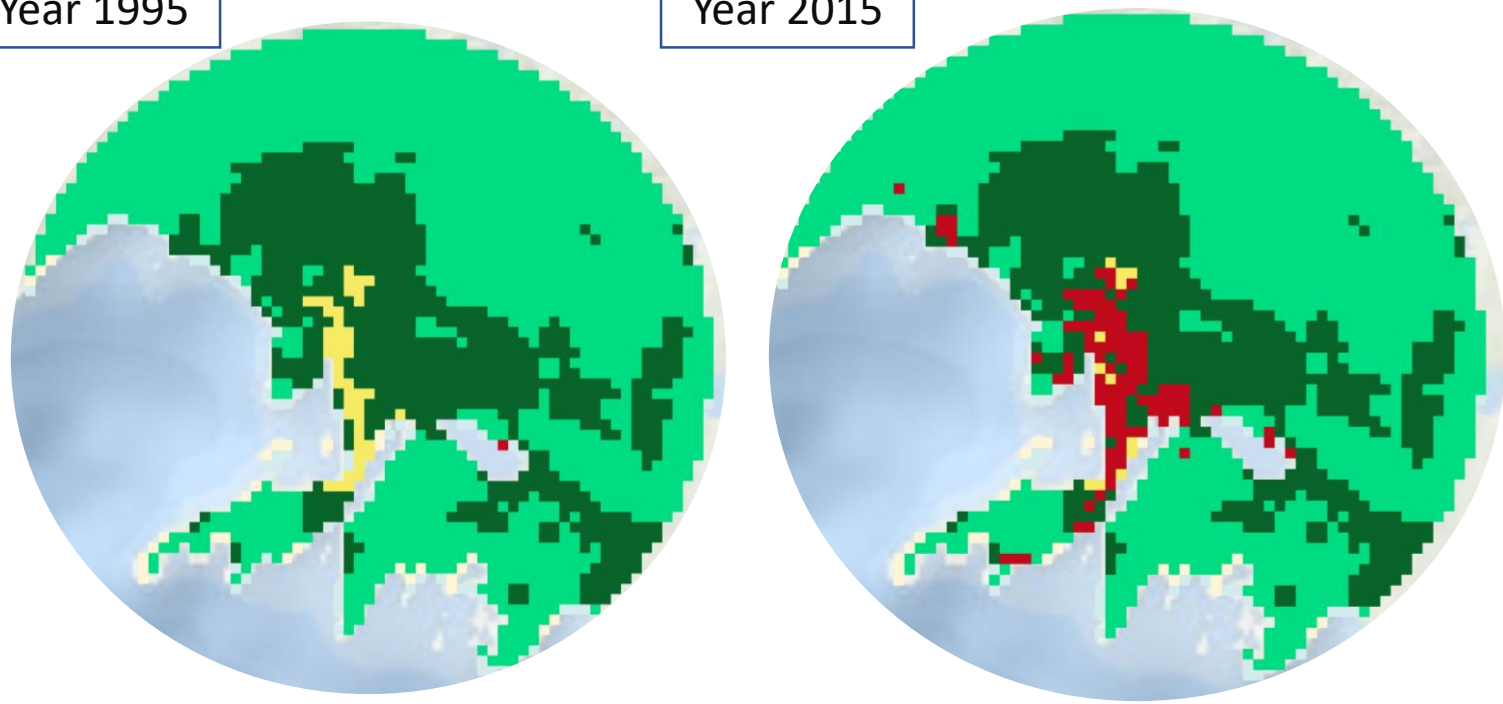
0 1 2 4 6 8 Kilometers

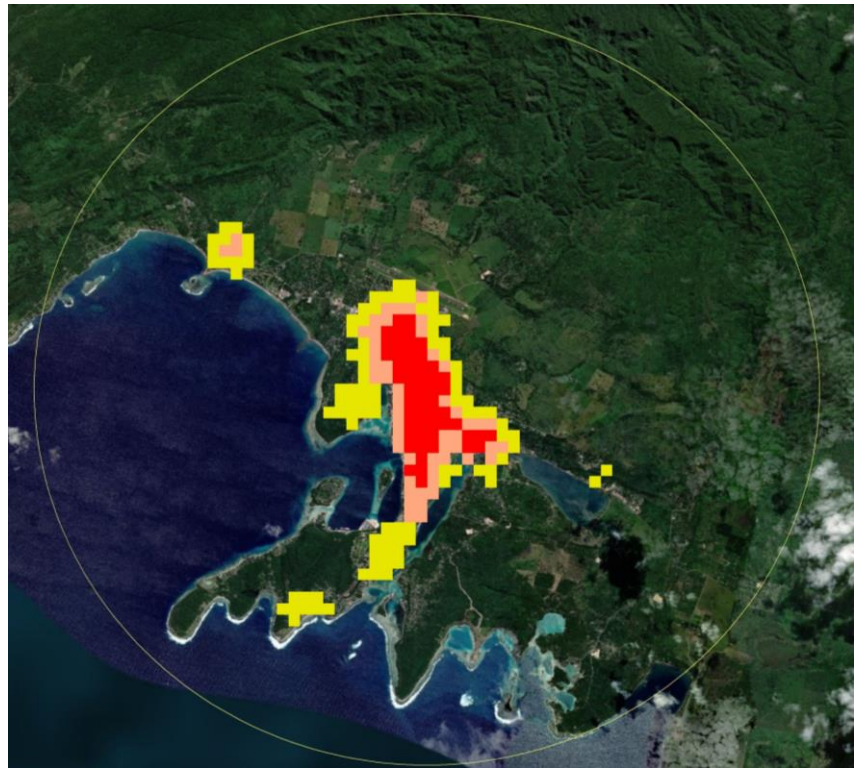
- Artificial surfaces
- Herbaceous crops
- Woody crops
- Multiple or layered crops
- Graslands
- tree-covered areas
- Shrubs and/or herbaceous vegetation, aquatic or regularly floodec
- Sparsely natural vegetated areas
- Terrestrial barren land
- Inland water bodies

N
W E
S

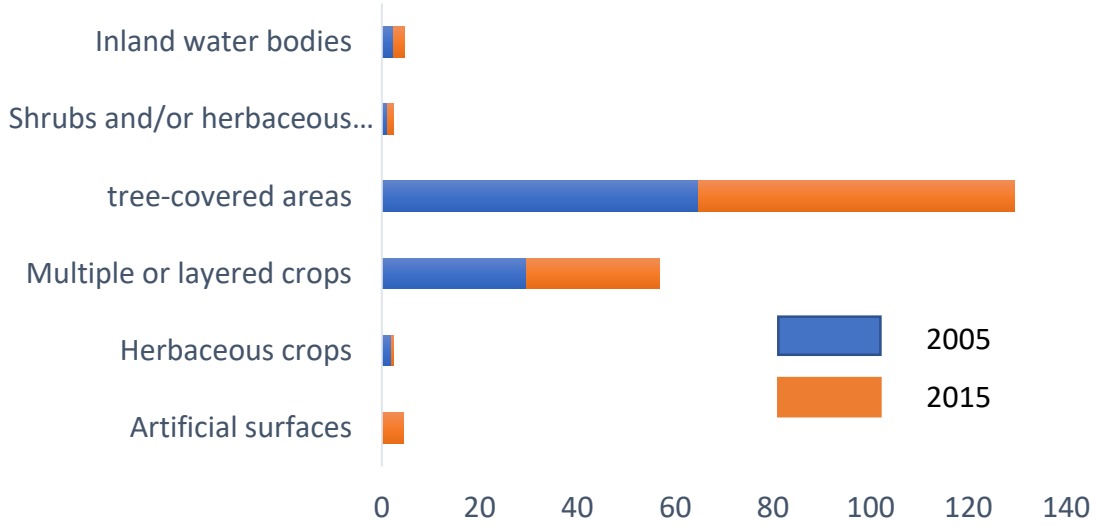
Year 1995

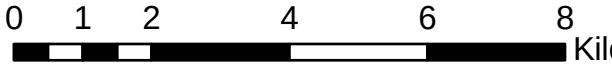
Year 2015

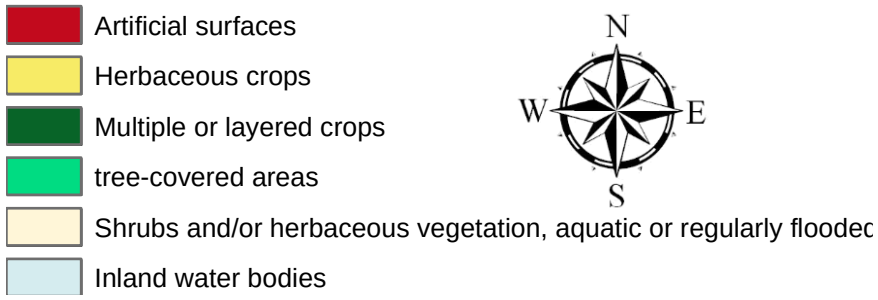


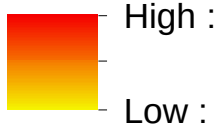


Port Vila



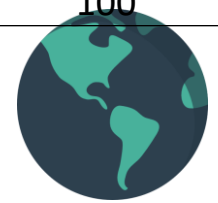


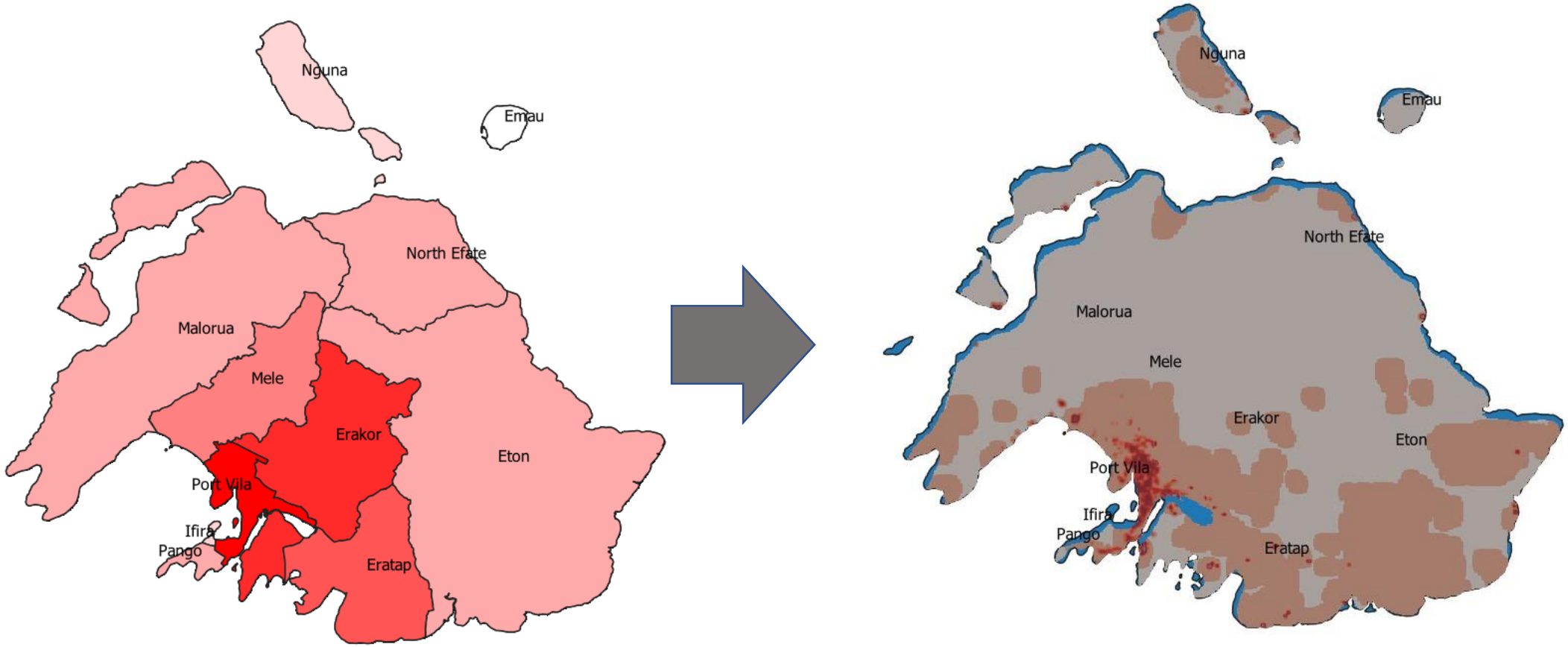




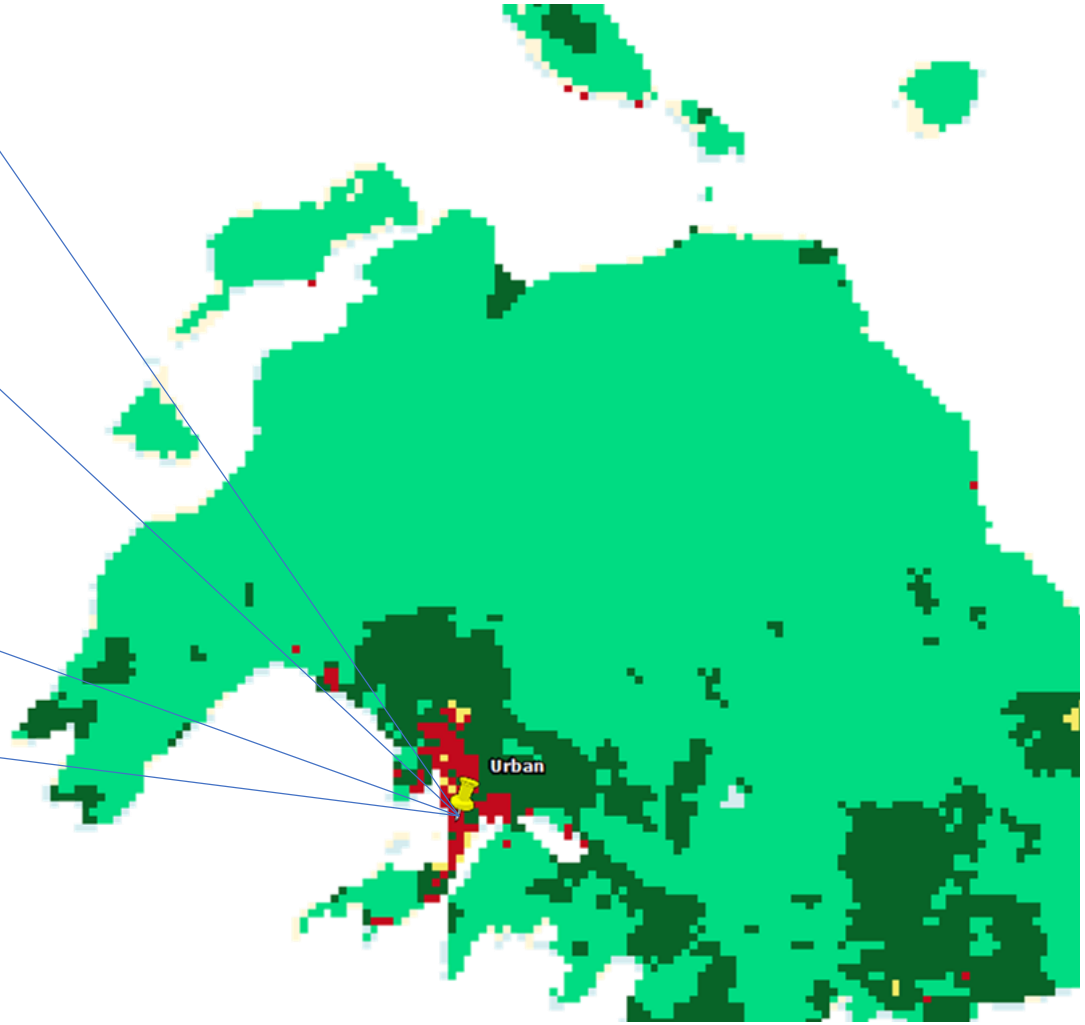
Sample of land cover change statistics

land Cover Type	Year 2005	Year 2015	land Cover Change	Percent Change	Percentage of land Cover 2005	Percentage of land Cover 2015
Artificial surfaces	4.67	18.31	13.64	292.0770878	0.036577533	0.143415048
Herbaceous crops	35.28	18.78	-16.5	-46.76870748	0.276328775	0.147096374
Woody crops	39.29	32.99	-6.3	-16.03461441	0.307736892	0.25839773
Multiple or layered crops	898.47	603.82	-294.65	-32.79463978	7.037219794	4.729485225
Graslands	0.19	0.19	0	0	0.001488165	0.001488195
tree-covered areas	11299.85	11608.34	308.49	2.730036239	88.50549055	90.92357411
Shrubs and/or herbaceous vegetation, aquatic or regularly flooded	221.8	222.94	1.14	0.513976555	1.737237026	1.746201577
Sparsely natural vegetated areas	7.06	7.06	0	0	0.055297085	0.055298211
Terrestrial barren land	24.13	24.13	0	0	0.188996977	0.189000826
Inland water bodies	236.4	230.58	-5.82	-2.461928934	1.85159077	1.8060427
Total	12767.14	12767.14			100	100




Nguna
Emau
North Efate
Malorua
Mele
Erakor
Eton
Port Vila
Ifira
Pango
Eratap
Nguna
Emau
North Efate
Malorua
Mele
Erakor
Eton
Port Vila
Ifira
Pango
Eratap

Year 2015



Year 2015

Layer List

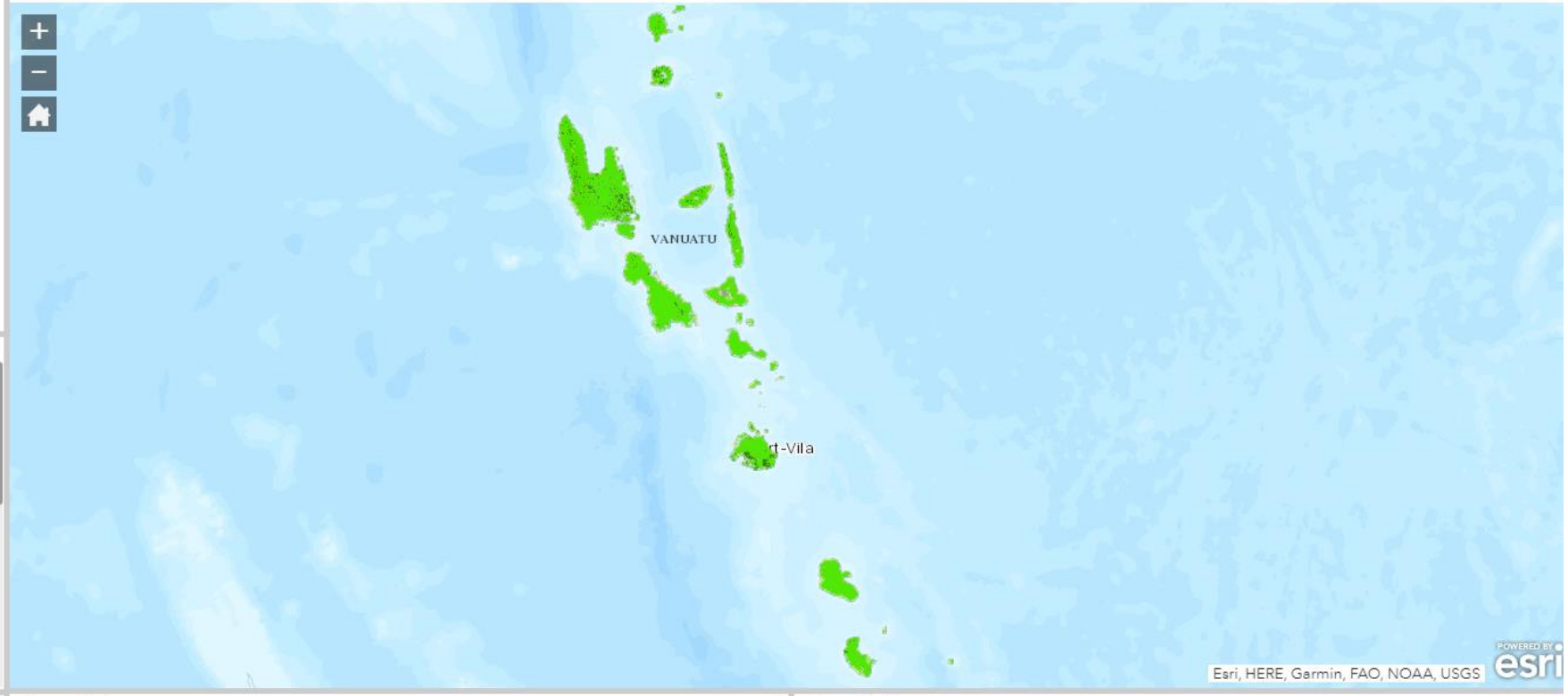
Layers

- Land Cover 2005
- Land Cover 2015
- Hot_Spt_maps
- Admin boundaries

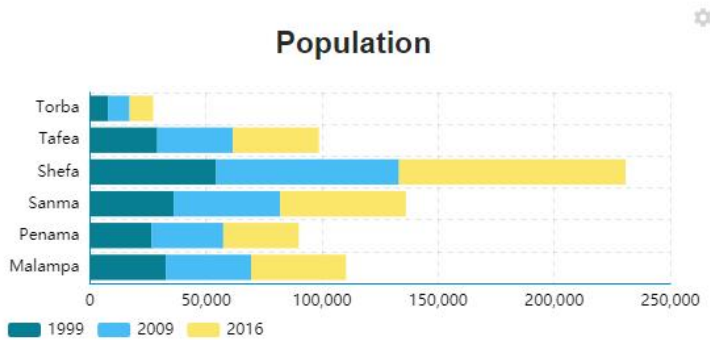
Legend

Land Cover 2015

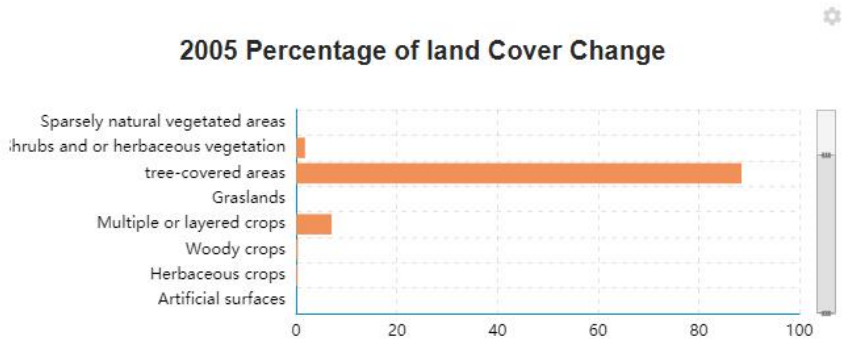
- Artificial surfaces
- Graslands
- Herbaceous crops
- Inland water bodies
- Multiple or layered crops
- Shrubs and or herbaceous vegetation
- Sparsely natural vegetated areas
- Terrestrial barren land



Infographic



Infographic_2



Infographic_3