Linking the wealth of people and places

Survey data and OpenStreetMap

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CERL

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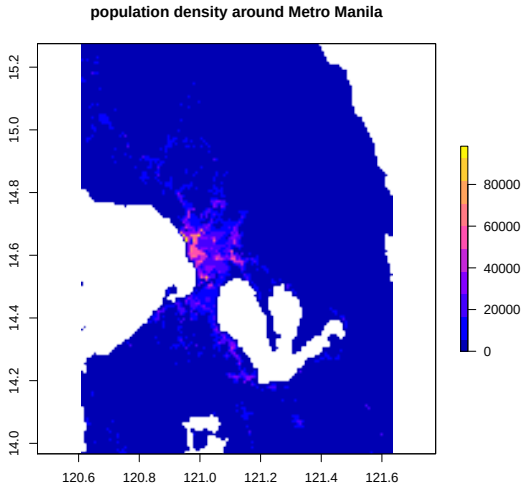
Agenda

- The wealth of people & places
- Benefits
- Challenges & problems

Mapping wealth



- people-based (economic, human, & social capital)
  - social networks
  - education
  - bank account
- place-based (natural, ecological, & community capital)
  - infrastructure (a dam, roads)
  - natural resources (forest, wetlands)
  - social services (banks, theatre, retail)

Case: disaster-driven migration

people-based propensity to migrate

place-based food & water availability following a disaster

Grocery stores are a critical source of lifesaving supplies during and after a disaster, however supply chains are often disrupted and unable to deliver the surge of supplies required by the population (Palin, 2017). Following a disaster, certain types of non-perishable goods may remain sparsely available and out-of-stock for many months (Cavallo, Cavallo, & Rigobon, 2014).

Food & water availability

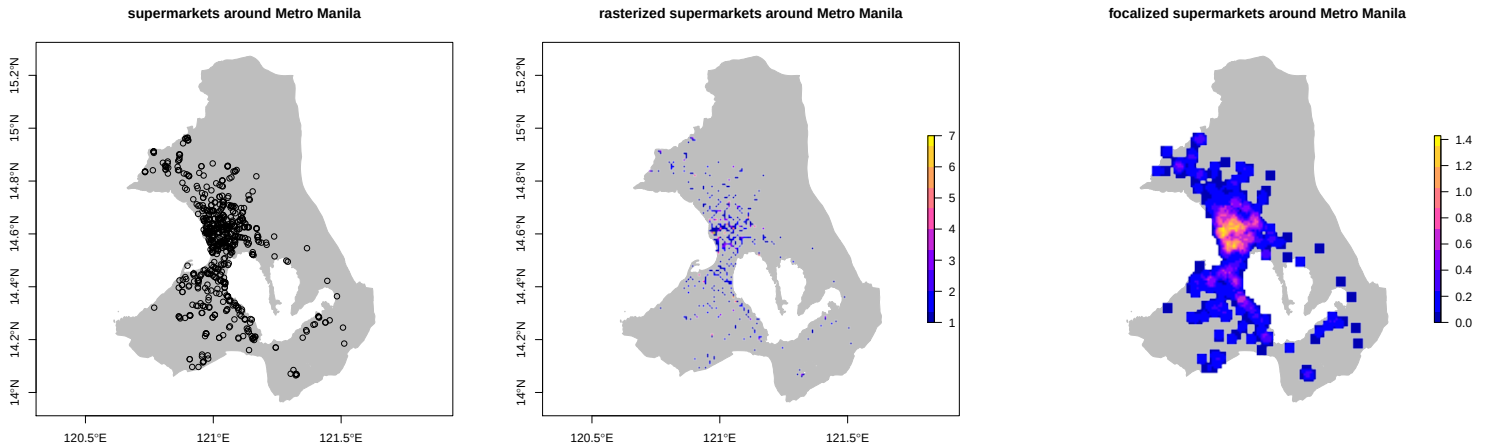


Figure 1: (OpenStreetMap contributors, 2018)

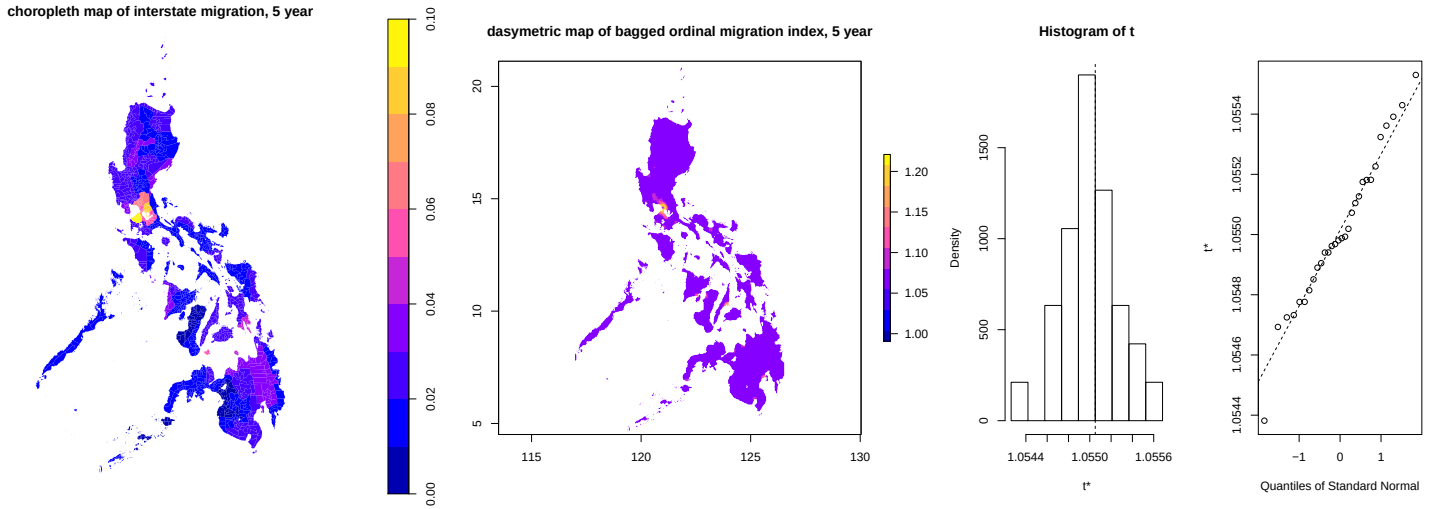
Propensity to migrate

- past migration
- resources to migrate
- distance to potential immigration site

variable(1=‘yes’)	mean(standard deviation)	n missing
migration, 5-year	0.031(0.03)	1353467
migration, 10-year	0.04(0.038)	2280714
native	0.98(0.02)	251850

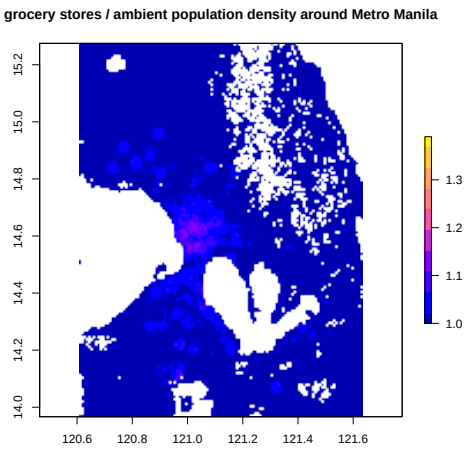
Table 1: (Minnesota Population Center, 2018)

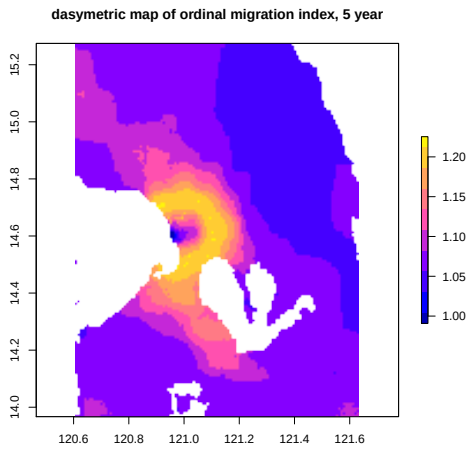
Dasymetric mapping & population characterization

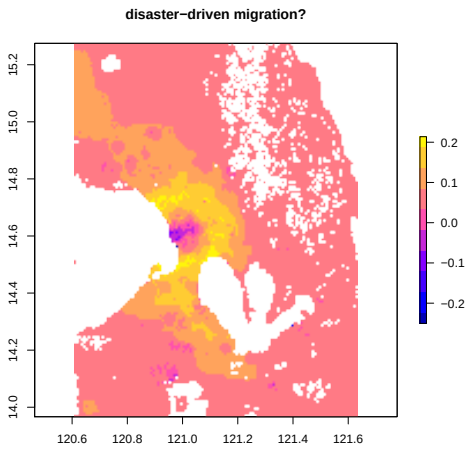


- administrative population data
- landcover
- roads
- points

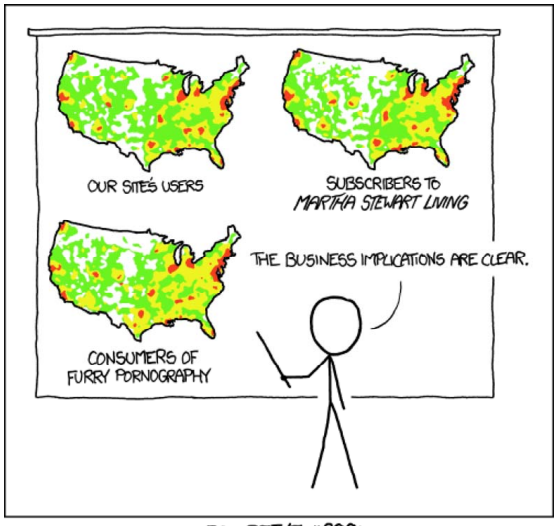
Linking the wealth of people & places







Challenges & Problems



PET PEEVE #208:
GEOGRAPHIC PROFILE MAPS WHICH ARE BASICALLY JUST POPULATION MAPS

- Population dominates
- Modifiable areal unit problem
- Embarrasingly parallel, but high space complexity
- Largely deductive, with little to no inductive validation

Benefits

- Re-expresses all data into a common format and resolution: easy analysis
- Simple to add new data to analysis: resampling & aggregation
- Nonparametric: fast, fewer assumptions, analyze bias, skew, & uncertainty
- Mapped demographics permit geospatial operations: distances, intersections, buffers, etc.
- Many applications: disaster preparedness & mitigation, response, rehabilitation & reconstruction

Cavallo, A., Cavallo, E., & Rigobon, R. (2014). Prices and supply disruption during natural disasters. *The Review of Income and Wealth*.

Minnesota Population Center. (2018). *Integrated public use microdata series, international: Version 7.0.* Minneapolis, MN. doi: http://doi.org/10.18128/D020.V70

OpenStreetMap contributors. (2018). *Planet dump retrieved from https://planet.osm.org.* "`https://www.openstreetmap.org`".

Palin, P. J. (2017). *The role of groceries in response to catastrophes* (Tech. Rep.). CNA.

POC

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