Cities' COVID Mitigation Mapping (C2M2) Program:
Second-order impacts of a global pandemic

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Erika Nunez, Humanitarian Information Unit

Outline

- Program Support
- Overview of C2M2
- Metrics and Data
- What are COVID-19 Second-order Impacts?
- Supporting Activities
- C2M2 Program Projects

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AAG
American Association of Geographers

Colorado State University

https://mapgive.state.gov/

Overview of Cities' COVID Mitigation Mapping (C2M2) program

Build	Share	Produce
Build **partnerships** for **open participatory mapping models** to address COVID-19 second-order impacts.	Share geospatial **data analysis techniques** to **identify needs** for infrastructure critical to COVID-19 second-order impacts.	Produce **digital maps and other datasets** to support **data-driven decision making** that mitigates COVID-19 second-order effects.

C2M2 Fundamental Concepts

- Geography matters: Think Spatially
- Rapid response → Long-term Impacts
- Intersectionality is Central
  - Distributional impacts; Pandemics don't recognize boundaries; Transdisciplinary approach
- Linkages to Sustainable Development Goals
- Geospatial Data + Decisions = Measurable Outcomes
- Monitoring
- Access to Information: Share Information, Collect Feedback, Promote Ethics

In our response to pandemics, we are not just exposing the weaknesses in the system, we're highlighting solutions that need to transcend the period.
Michael Seltzer, Former Executive Director,
Funders Concerned about Aids, 2020

What is a C2M2 project?

- 1-year project
- Middle/low-income countries: urban areas, vulnerable populations
- *Geospatial analysis on COVID-19 second-order impacts*

Thematic area: What is the question?

Data assessment →

Data gaps/limitations →

Data surrogates →

Data analysis → Analysis of impacts

Outcomes →

Decision making →

Mitigation strategies

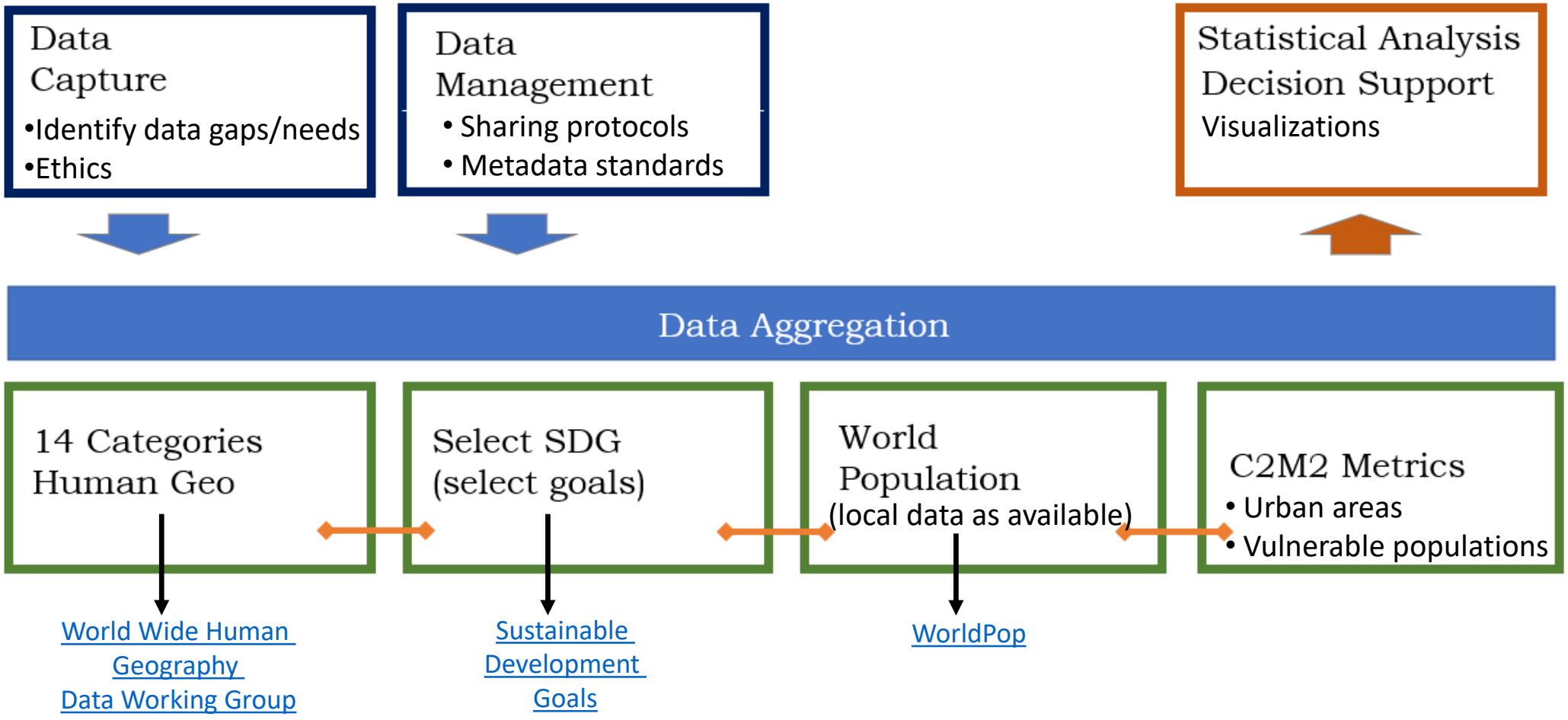
Monitoring and Evaluation

Virtual methods for remote community mapping using online conference and mapping tools

C2M2 Indicator Metrics

- People:
  - Number of training or capacity building activities that are designed to promote geospatial awareness and capacity.
- Data
  - Number of geospatial products created to support data-driven decision making by key stakeholders
  - Tools and technology for data generation
- Results
  - Analysis and modeling
  - Mitigation Strategies

Data Analytics Framework

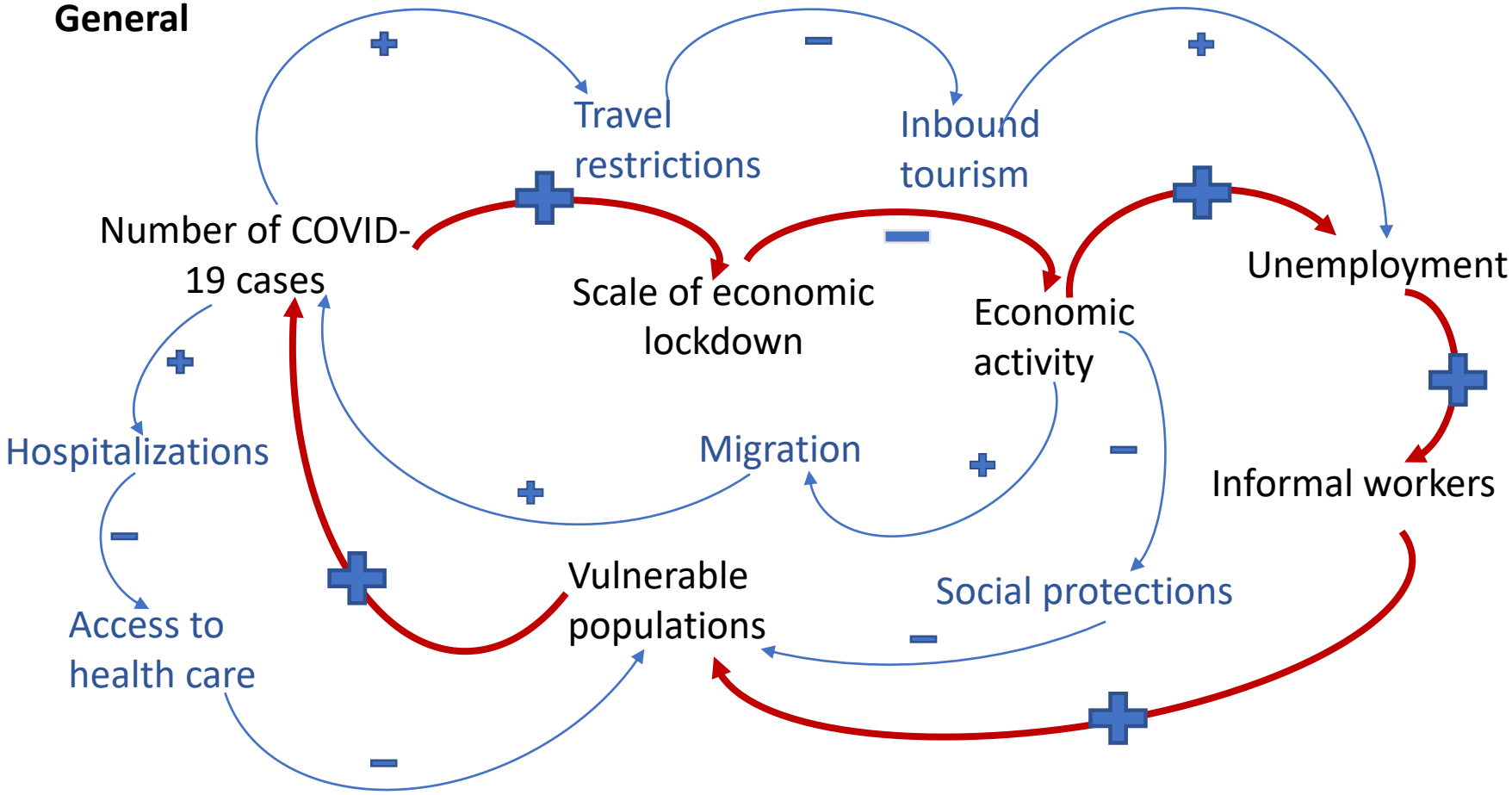


What are COVID-19 second-order impacts?

- Extreme poverty
- Livelihoods compromised
- Inequality
- Forced migration and mobility
- Food insecurity
- Lack of access to education
- Emergence of Violence and Illegal Activities
- Others

Conceptual Model – using a Causal Loop Diagram –
Considering potential trends for COVID-19 second order impacts

General



Resources:
https://www.hrw.org/news/2020/08/26/impact-covid-19-childrens-education-africa#
https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/08/sg_policy_brief_covid-19_and_education_august_2020.pdf

CLD source: R. Richardson, 2020

C2M2: Emphasis on second-order impacts

Who:
- Vulnerable populations

Where:
- Urban areas in developing countries
- Informal settlements

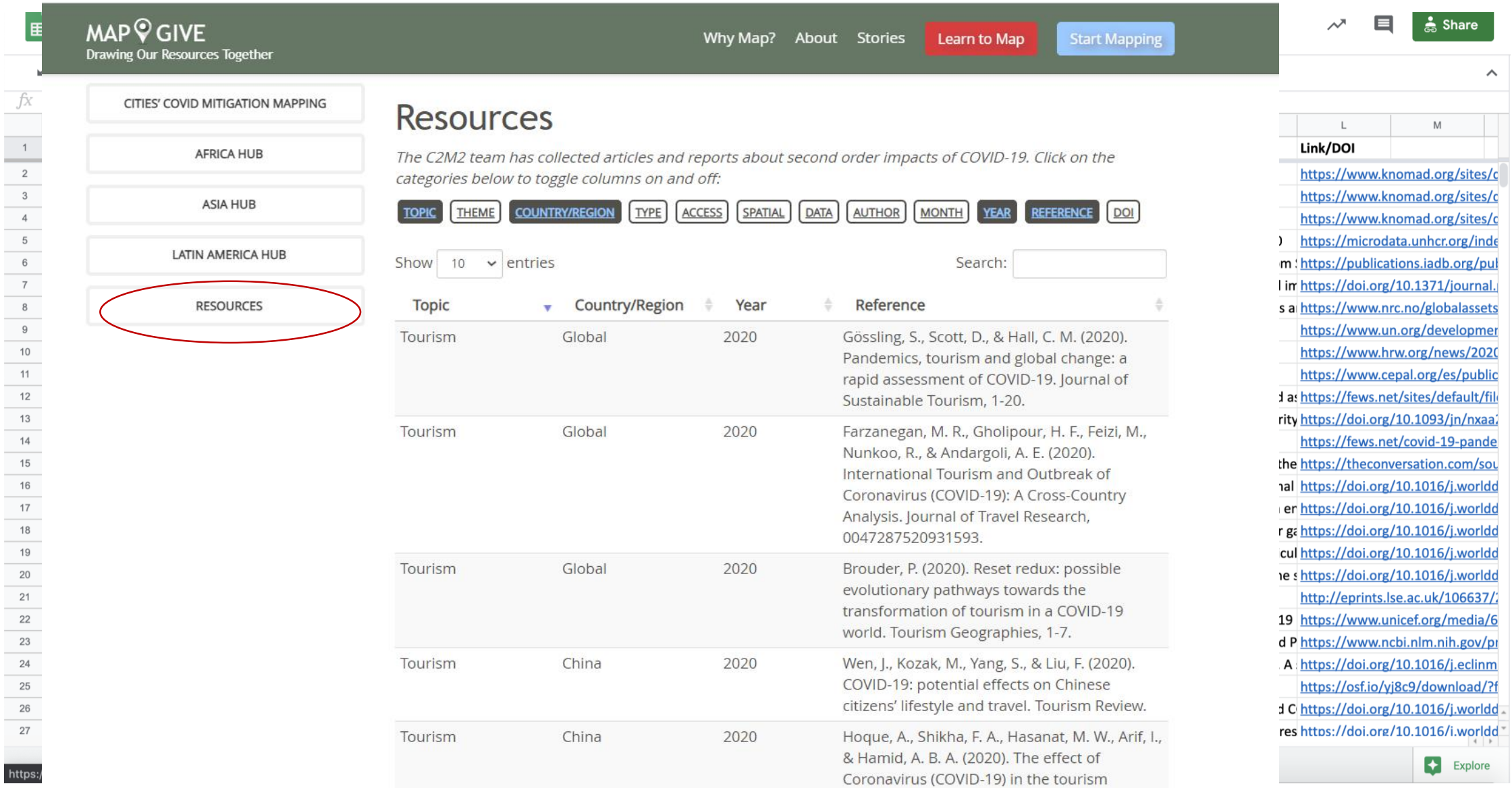
What are second-order impacts:
- Social services (health, water, education)
- Economic development
- Food security
- Mobility/migration

- *Baseline assessment*
- *Data assessment*
- *Geospatial technologies*

Examples:
- *Adequate access to health services*
- *Impacts on specific economic sectors: tourism*
- *Changes in movement patterns: return to villages*

- Analysis on geospatial data to support data-driven decisions and policy development
- Monitoring and evaluation
- Mitigation strategies
- Research results

C2M2 Literature Review spreadsheet



MAP GIVE
Drawing Our Resources Together

Why Map? About Stories Learn to Map Start Mapping

CITIES' COVID MITIGATION MAPPING

AFRICA HUB

ASIA HUB

LATIN AMERICA HUB

RESOURCES

Resources

The C2M2 team has collected articles and reports about second order impacts of COVID-19. Click on the categories below to toggle columns on and off:

TOPIC THEME COUNTRY/REGION TYPE ACCESS SPATIAL DATA AUTHOR MONTH YEAR REFERENCE DOI

Show 10 entries Search:

Topic	Country/Region	Year	Reference
Tourism	Global	2020	Gössling, S., Scott, D., & Hall, C. M. (2020). Pandemics, tourism and global change: a rapid assessment of COVID-19. Journal of Sustainable Tourism, 1-20.
Tourism	Global	2020	Farzanegan, M. R., Gholipour, H. F., Feizi, M., Nunkoo, R., & Andargoli, A. E. (2020). International Tourism and Outbreak of Coronavirus (COVID-19): A Cross-Country Analysis. Journal of Travel Research, 0047287520931593.
Tourism	Global	2020	Brouder, P. (2020). Reset redux: possible evolutionary pathways towards the transformation of tourism in a COVID-19 world. Tourism Geographies, 1-7.
Tourism	China	2020	Wen, J., Kozak, M., Yang, S., & Liu, F. (2020). COVID-19: potential effects on Chinese citizens' lifestyle and travel. Tourism Review.
Tourism	China	2020	Hoque, A., Shikha, F. A., Hasanat, M. W., Arif, I., & Hamid, A. B. A. (2020). The effect of Coronavirus (COVID-19) in the tourism industry in China. Asian Journal of Multidisciplinary Studies, 3(1), 52-58.

Share

Explore

Table 1: Literature review (97 articles accessed; August to December 2020)

- Articles by region address multiple topics; refer to MapGive C2M2 Resource tab.
- *NOTE:* All articles define a second-order impact; 38 articles across multiple topics specifically apply geospatial approaches to a second-order impact.

Paper submitted:
Annals of GIS – Special Issue on GIS and COVID-19
COVID-19's Second-Order Impacts on Global Vulnerable Urban Areas
M. Laituri, R.B. Richardson, L.V. Cline, S. Viscuso, L. Schwartz

Theme	Topic (# of articles)	Type (# of articles)	Region (# of articles)
Economy **Environment** **Society**	Economic Impacts (10) Tourism (12) Environmental Impacts (15) Social Protection (8) Education (9) Food Security (13) Health (6) Information (6) Migration (16)	Commentary (17) Dataset (7) Journal Article (47) Policy Brief (9) News Article (2) Research Report (10) Technical Note (5)	Global (39) Africa (10) Asia (27) Latin America (13) Europe (3) United States (5)

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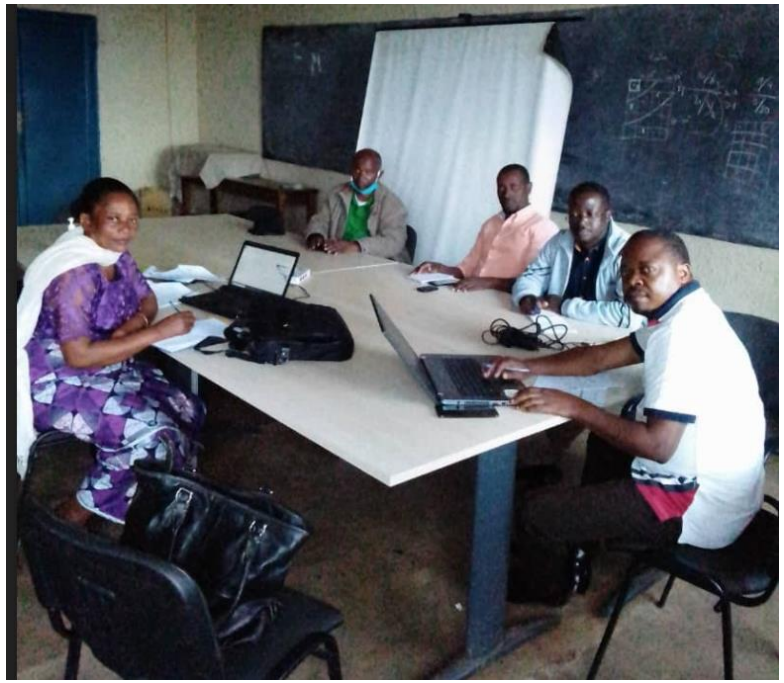
CGA Student Volunteer Teams

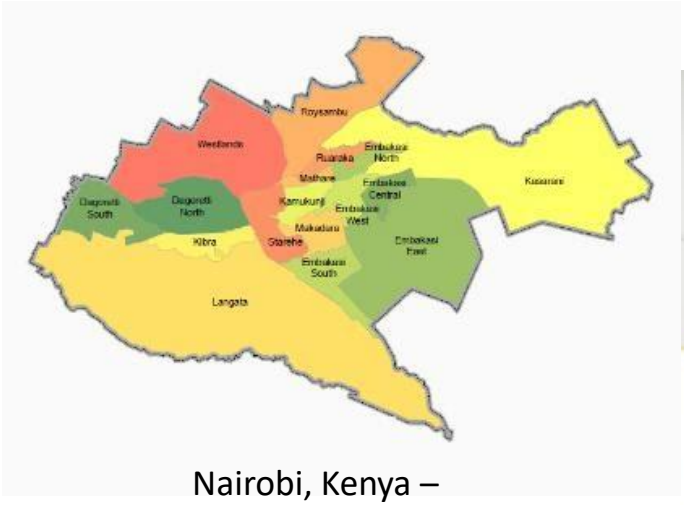
9 teams working on C2M2-related projects

- Conduct a **literature review** of COVID-19 second-order impacts
- **Review** and assess **data dashboards** for C2M2 countries
- **Compare** countries/study sites of C2M2 projects
- **Identify data and data gaps** related to COVID-19 second-order impacts
- **Assess** the state of geospatial analysis – **methods and approaches** of COVID-19 second-order impacts
- **Analyze** COVID-19 second-order impacts data using **existing data**
- **Create infographics** of C2M2 project countries/study sites
- **Define** specific pandemic-related **ethics and privacy** issues related to geospatial data
- Develop **training activity** to access and use geospatial data related to COVID-19 second-order impacts

C2M2 Cities and Regional Hubs



C2M2 Bukavu Team –
Democratic Republic of Congo



Nairobi, Kenya –
C2M2 City Project

2. Cities' COVID Mitigation Mapping (C2M2)' project – Pemba's staff presentation Mozambique

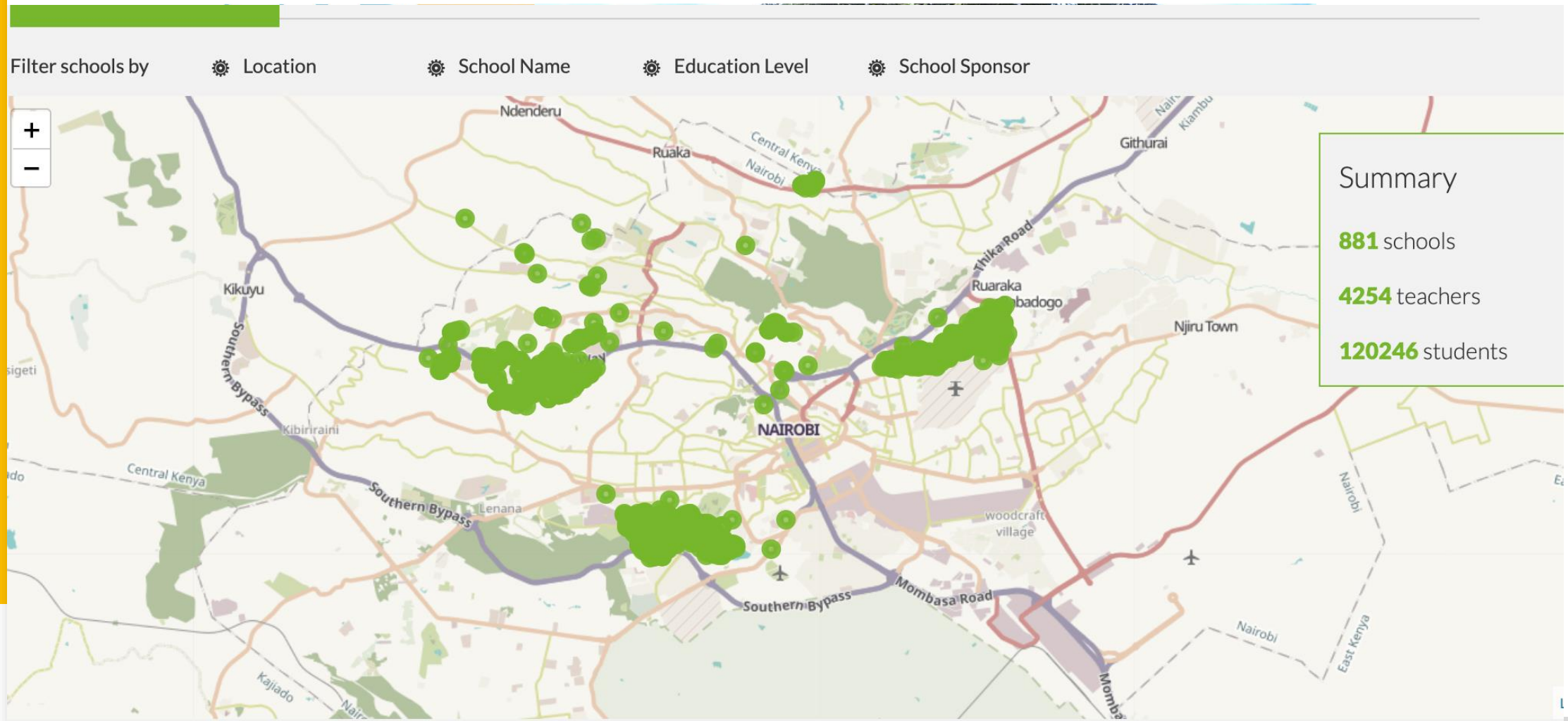
C2M2 Africa Hub

Regional Hubs – Africa

Gaston Mbonglou, UASG Advisors, Philadelphia, PA

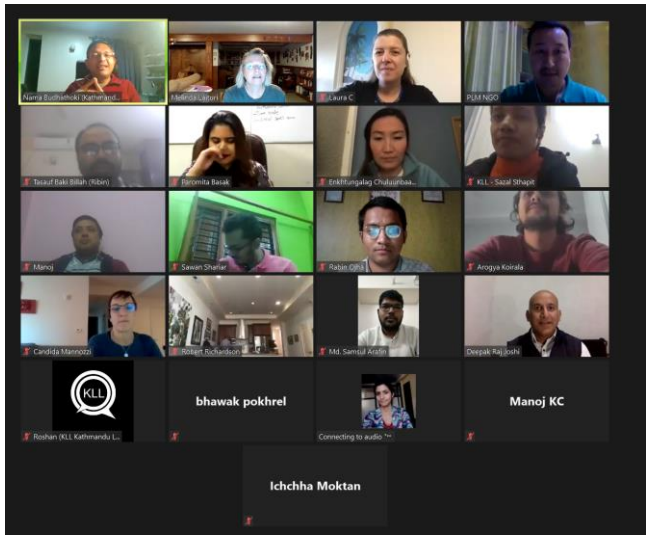
Projects-	Partner	Topic
Bukavu, Democratic Republic of Congo (DRC)	University of Bukavu	• Access to health services • Tracking schools and student adaptations to COVID-driven strategies
Kenya	GroundTruth Initiative	• Assess the impact on the education sector • Assess the economic impact especially on the vulnerable groups and use geospatial data to document key community resources that are important to mitigate second order impacts
Pemba, Mozambique	Universidad Catolica de Mozambique	• Impacts on informal economy; impacts on port activity • Assess status of available resources: identify subsistence needs and track availability
Africa Hub project: mini-technical exchanges	Network of West African universities	• Open-source geospatial tools for data generation • Collaborate with Secondary Cities alumni • Facilitate network of geospatial users in West Africa
Hub Support Resources	Youth Mappers (Ghana), Open City (Guinee) and University Houphouet Boigny (Ivory Coast)	• Outreach, communication and best practice sharing with Ghana, Ivory Coast and Guinee.

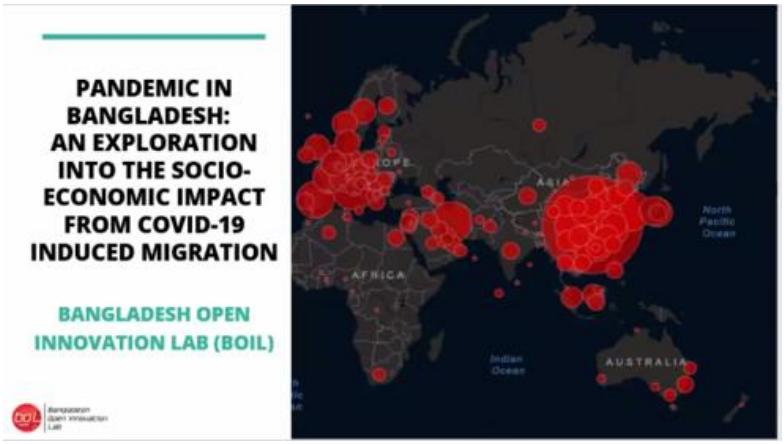
C2M2 Nairobi – School closures

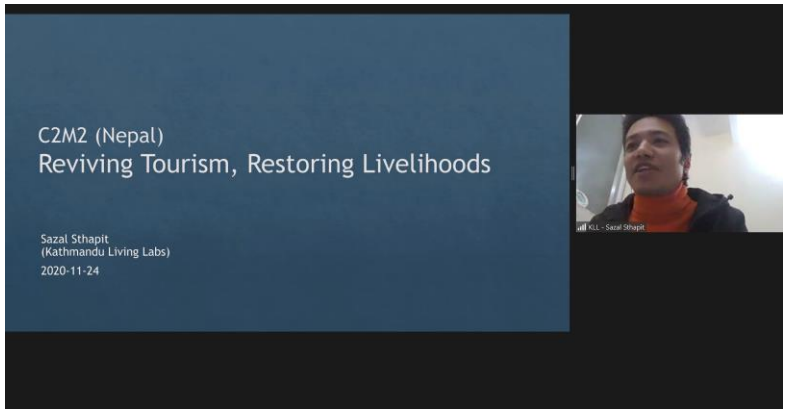


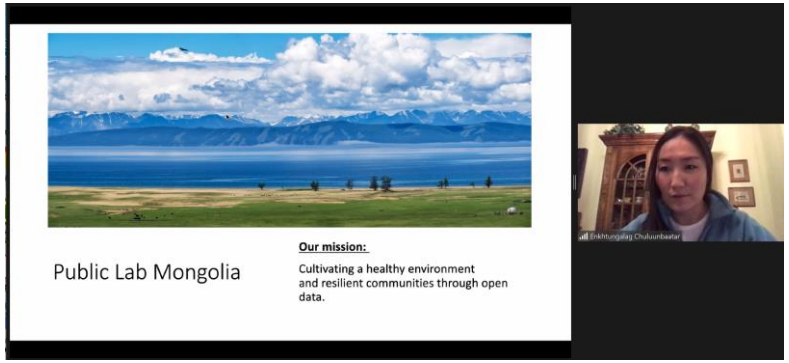
Kickoff Workshop with all Stakeholders

C2M2 Asia Hub







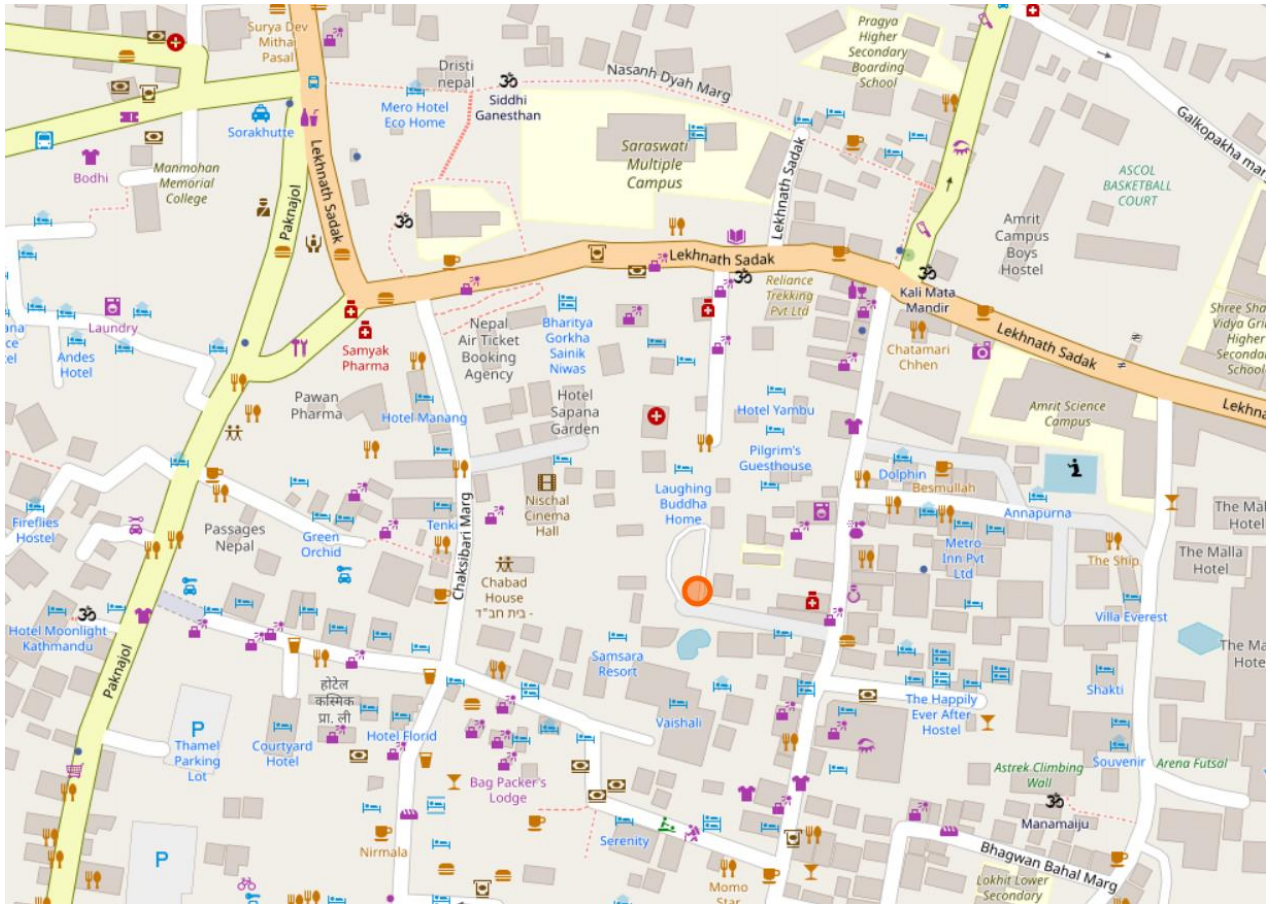


Regional Hubs – Asia

Nama Budhathoki, Kathmandu Living Labs, Kathmandu, Nepal

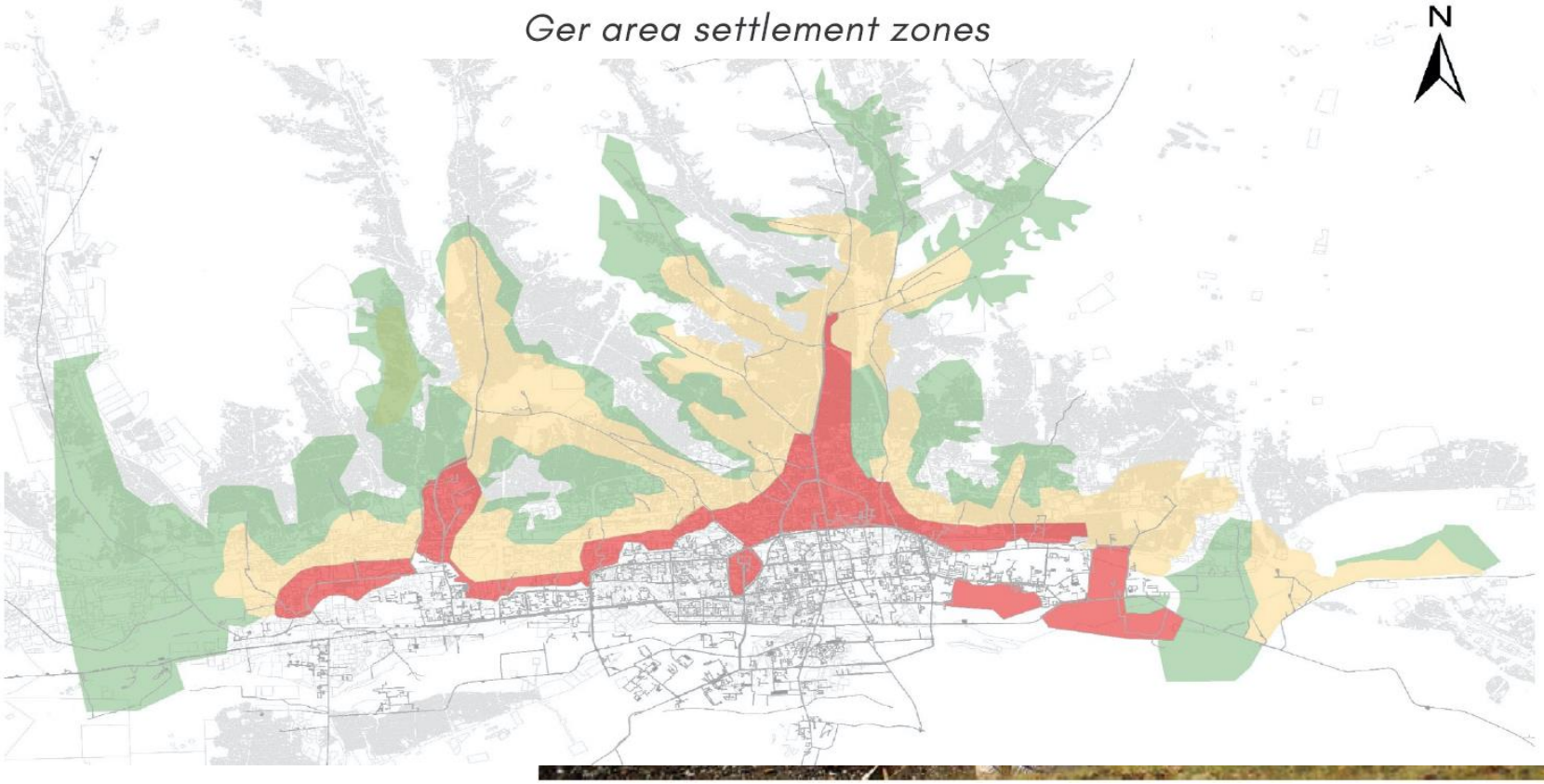
Projects	Partner	Topic
Asia Hub project (subproject: Kathmandu, Nepal)	Nepal Tourism Board	• Economic impacts of tourism due to government shutdown • Mapping hotels: Opening/closing; resources; create online tool to share information with tourists
	Oversee city projects, provide technical exchanges	
Dhaka, Bangladesh	Open Innovation Lab	• Internal mobility: push-pull factors Push: loss of economic opportunity Pull: return to villages • Compounding factors: susceptibility to flooding, Monsoon season • Infrastructure: availability in "pull" locations • Vulnerable populations: Dhaka neighborhoods
Ulaanbaatar, Mongolia	Public Lab Mongolia	• Informal communities: map vulnerable neighborhoods (ger communities) and access to health services • Develop online tool for open, publicly available data on health access

C2M2 Kathmandu - Tourism: Tracking hotels and cascading impacts due to COVID-19



Thamel, Kathmandu, OpenStreetMap

C2M2 Ulanbaatar –
Informal settlements and access to health services



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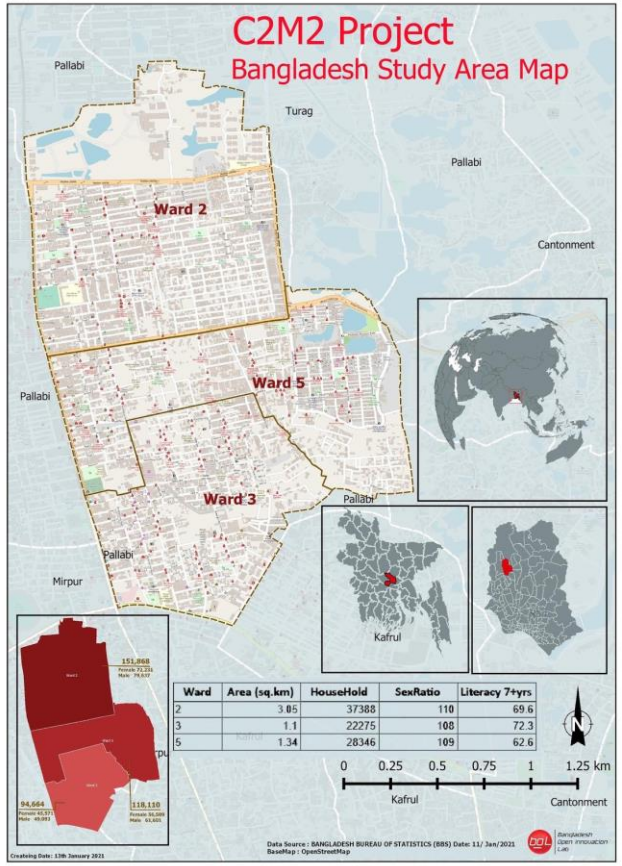
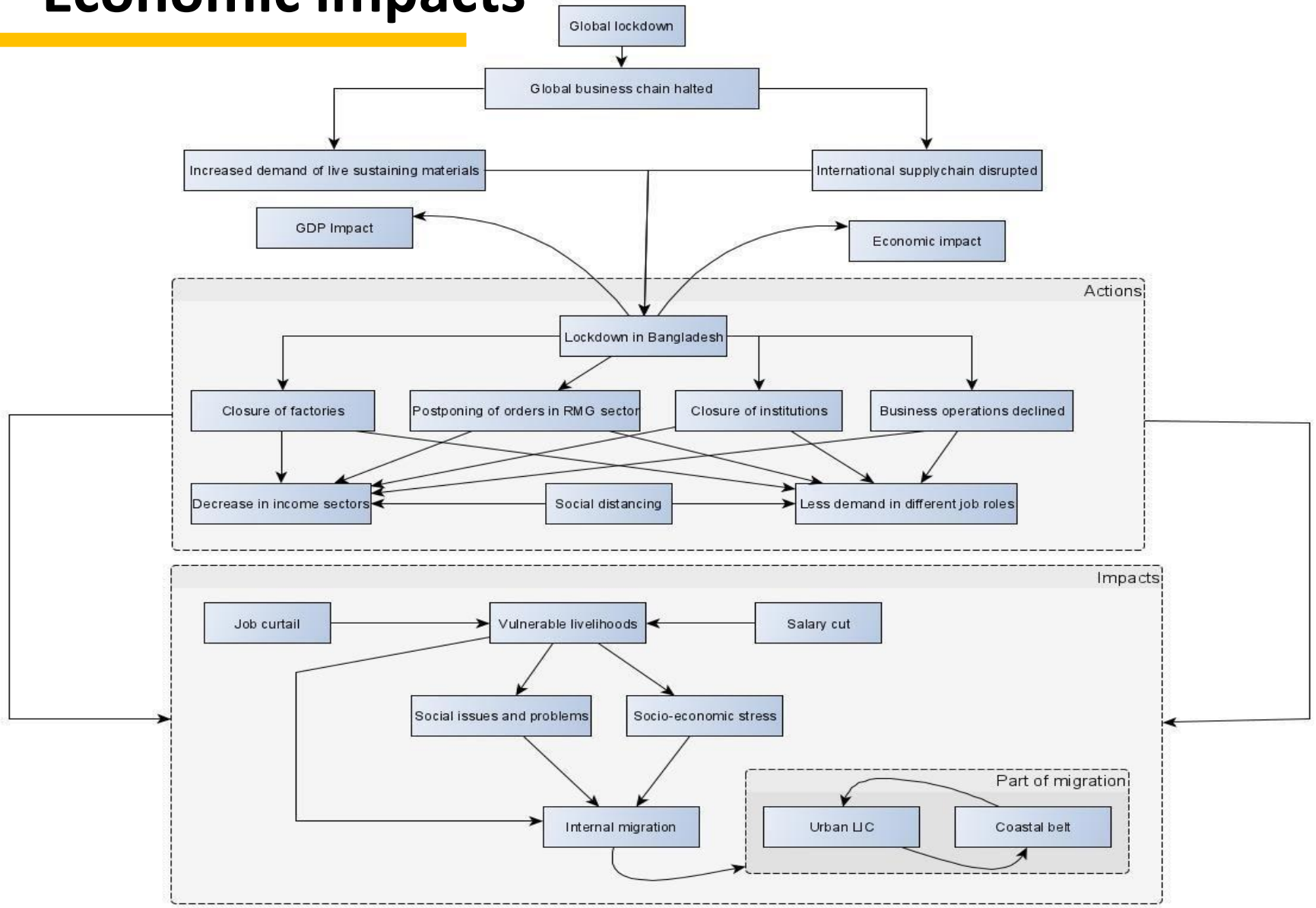
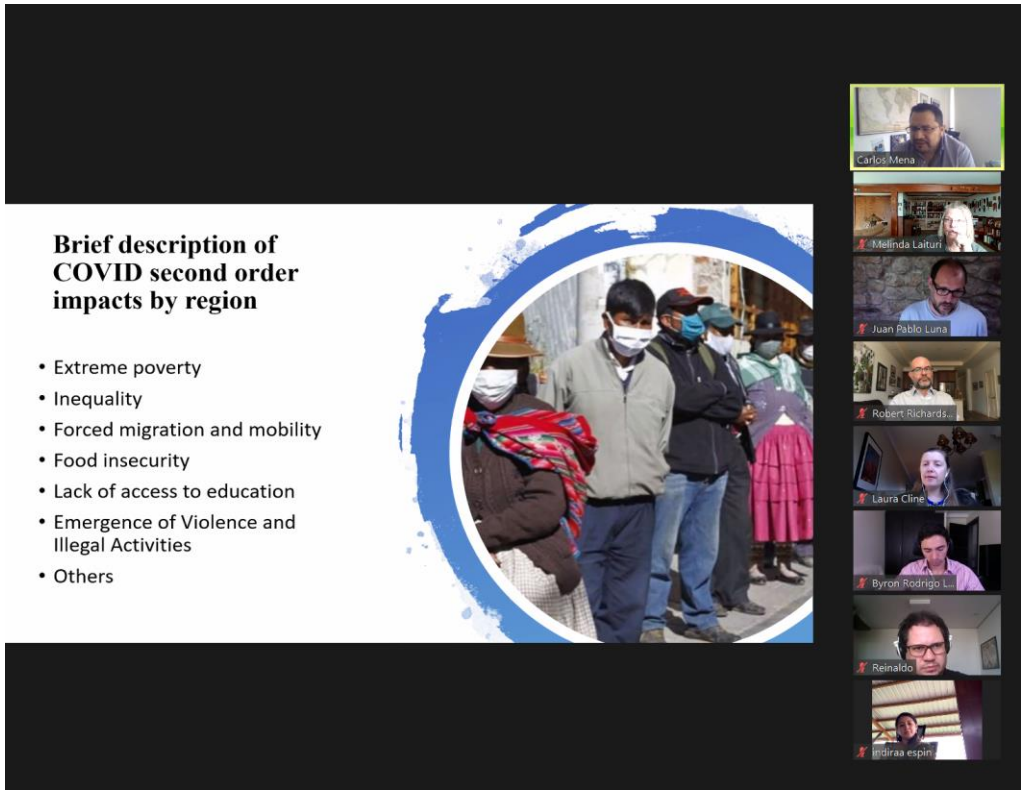
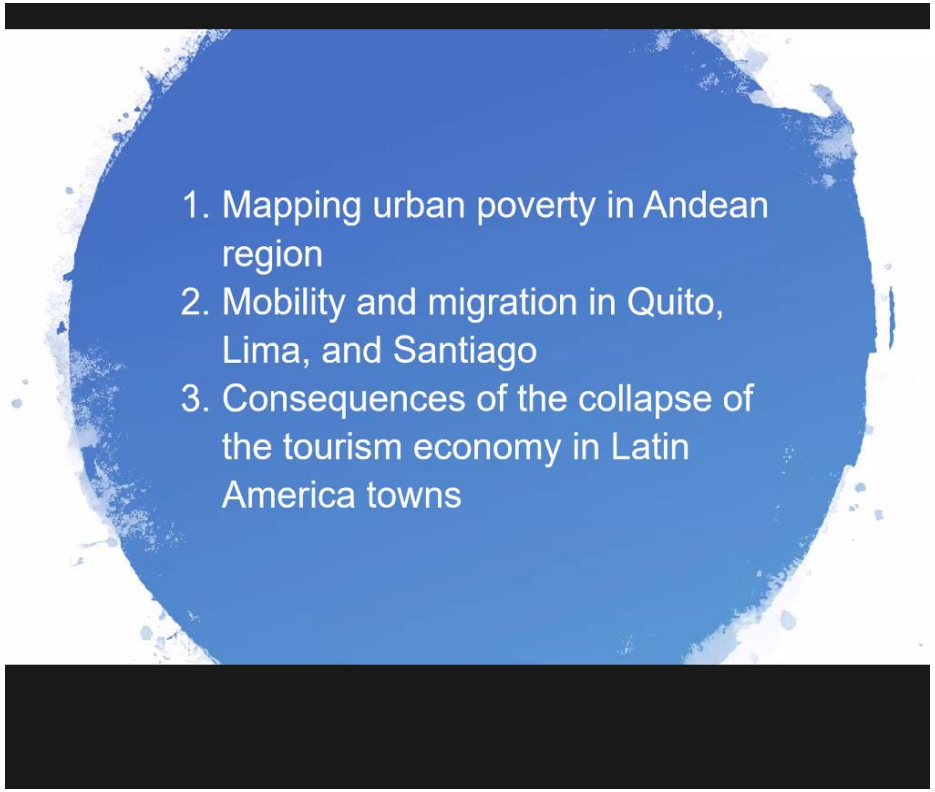
C2M2 Bangladesh – Economic impacts









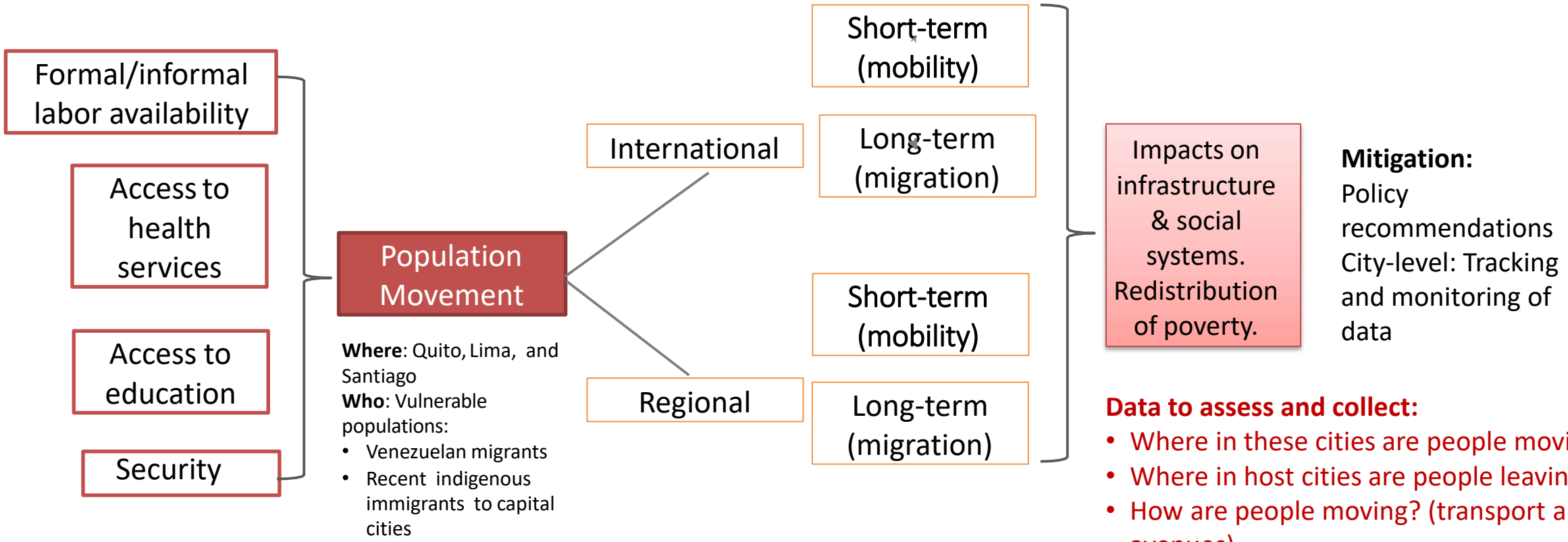
C2M2 Latin America Hub

Regional Hubs – Latin America

Carlos Mena, Universidad San Francisco de Quito, Quito, Ecuador

Projects	Partner	Topic
Latin America Hub project	Universidad San Francisco de Quito; regional partners	Mapping urban poverty in Andean region
Quito, Ecuador; Lima, Peru; Santiago, Chile	Universidad Cayetano Heredia (Peru) Universidad Catolica de Chile Local governments	Mobility and migration in Quito, Lima, and Santiago
Santa Cruz, Galapagos, Ecuador; Cuzco, Peru; Ouro Preto, Brazil	Universidad Federal de Minais Gerais (Brazil) EcoCity Builders (Peru) Local governments	Consequences of the collapse of the tourism economy in Latin America towns

Latin America Hub - Mobility



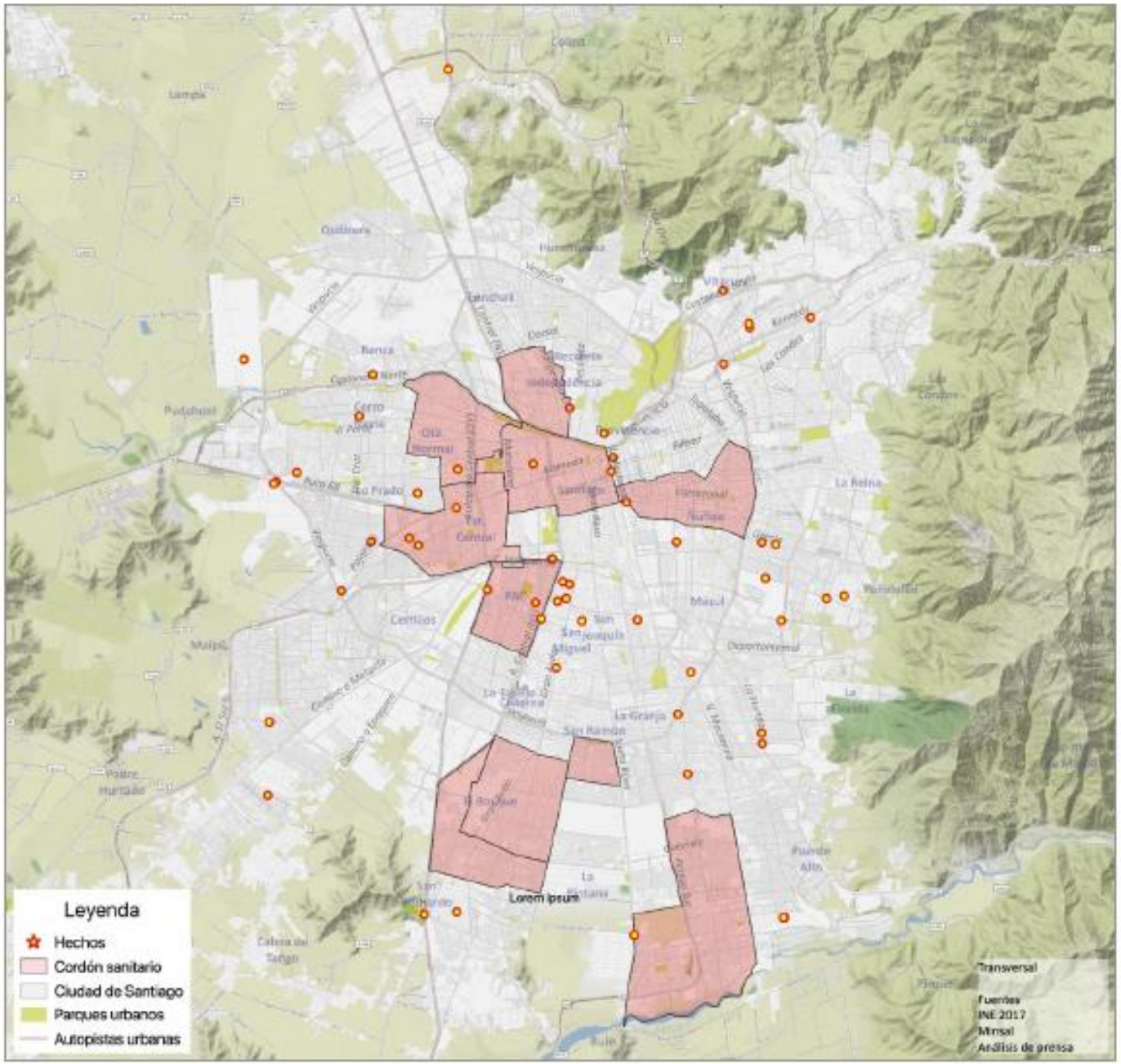
Data to assess and collect:

- Where in these cities are people moving to?
- Where in host cities are people leaving?
- How are people moving? (transport and avenues)
- Demographics on vulnerable populations
- Access to services
- Changes in labor market, employment
- School closures
- Incidence of violence

Project: Redistribution of Poverty: Mobility and Migration

C2M2
Santiago, Chile

Mapa de Tensión Social en Pandemia Santiago 2020



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Data Ethics

1 SAFE PEOPLE

2 SAFE PROJECTS

3 SAFE SETTINGS

4 SAFE DATA

5 SAFE OUTPUT

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Questions

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