

RESPUESTA EN CLIMA Y AMBIENTE PARA LA SALUD EN LAS AMÉRICAS

Doing Transdisciplinary Tesearch

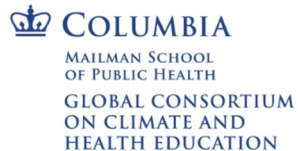
Case Study:

Climate resilience in a Latin American city, Duran, Ecuador.

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Cities in LAC: Challenge areas and opportunities

Duran 2019, Foto: Alina Van D. & Lotte V.

- The socio-ecological context of urban areas are vitally important for the **health and wellbeing** of their inhabitants.
- **Climate change may exacerbate existing challenges** in urban life, including social inequality, urban stress, epidemics, demand for safe housing, deteriorating infrastructure and ecosystem degradation.
- **Mayors and municipalities need to make informed decisions** to reduce the impact of the pandemic and recover better than before. **Competencies:** in land use, disaster risk management, provision of basic services, health and food subsystems, and care for vulnerable groups.



Duran 2020, CIP RRD

Collaborative process for the formulation of the RESCLIMA DURAN project

Gad Municipal Duran

- Interest
- Urban GIS Workshop for Municipalities
- 2016

ESPOL Team & GAD Risks

- Problem formulation
- Methodological development
- Products
- 2016-2017

Legal Institutions Arrangements

- Signing of Specific Agreement January 2018
- Contribution \$ from both parties



Start of Project
RESCLIMA
Marzo 2018



The Pacific International Center for Disaster Risk Reduction (ESPOL) and the Municipality of Duran, develop projects:

1. **Duran Resclima Duran, 01/06/2018 - 01/30/20.**
2. SAT floods, 2019 - 2021
3. **SAT COVID-19 Input, 2019-2022**
4. SAT Implementation, 2022 - 2024

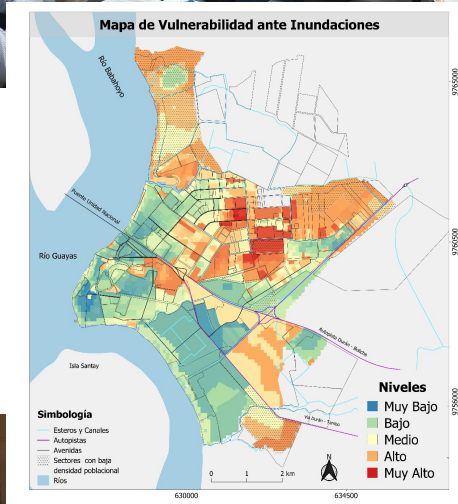
300.000 inhabitants located in the Gulf of Guayaquil



Hydro-climate conditions: rainfall, tides, run off, streamflows, low terrain, infiltration capacity, mangroves and wetlands degraded and occupied.

Factors: lack of infrastructure, education level, poverty, precarious housing

Doing Transdiscipline (TD) work in a Latin American city.



**Co-
production**

Interaction with
Stakeholders

**Iterative
Process**

Actionable
Science

Interdisciplinary

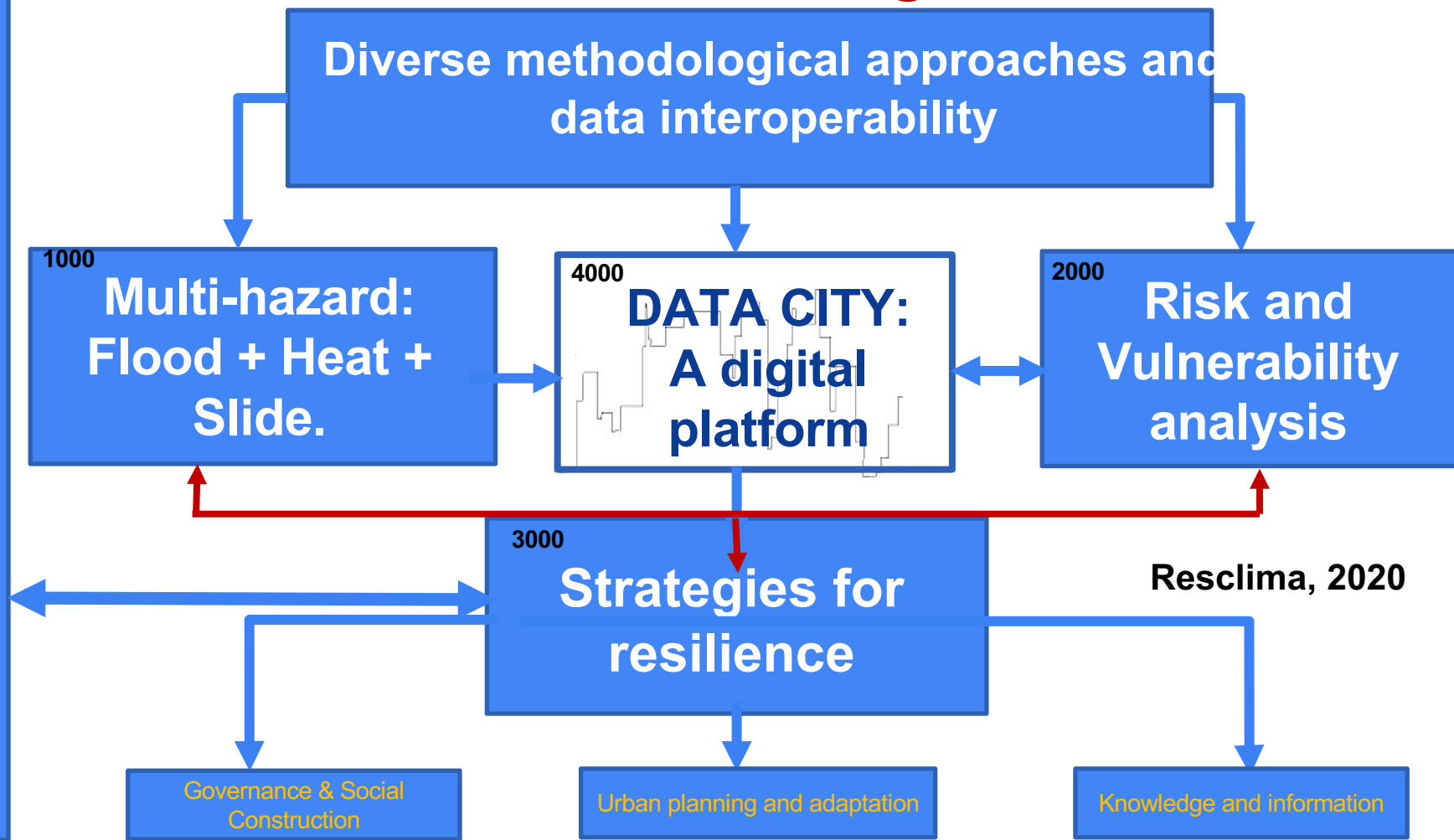


What factors are relevant to an approach of researchers and local governments:

1. Trust
2. Common interests and benefits
3. Institutional Arrangements
4. Leadership and Proactivity
(Champion)
5. Regulatory and policy framework

RESCLIMA Methodological Framework :

Interactive dialogue with stakeholders



HOLISTIC APPROACH TO CLIMATE RISK

Hazard



Vulnerability



Risk



EXPOSURE



SENSITIVITY



ADAPTIVE CAPACITY



Duran, Diario EL Universo

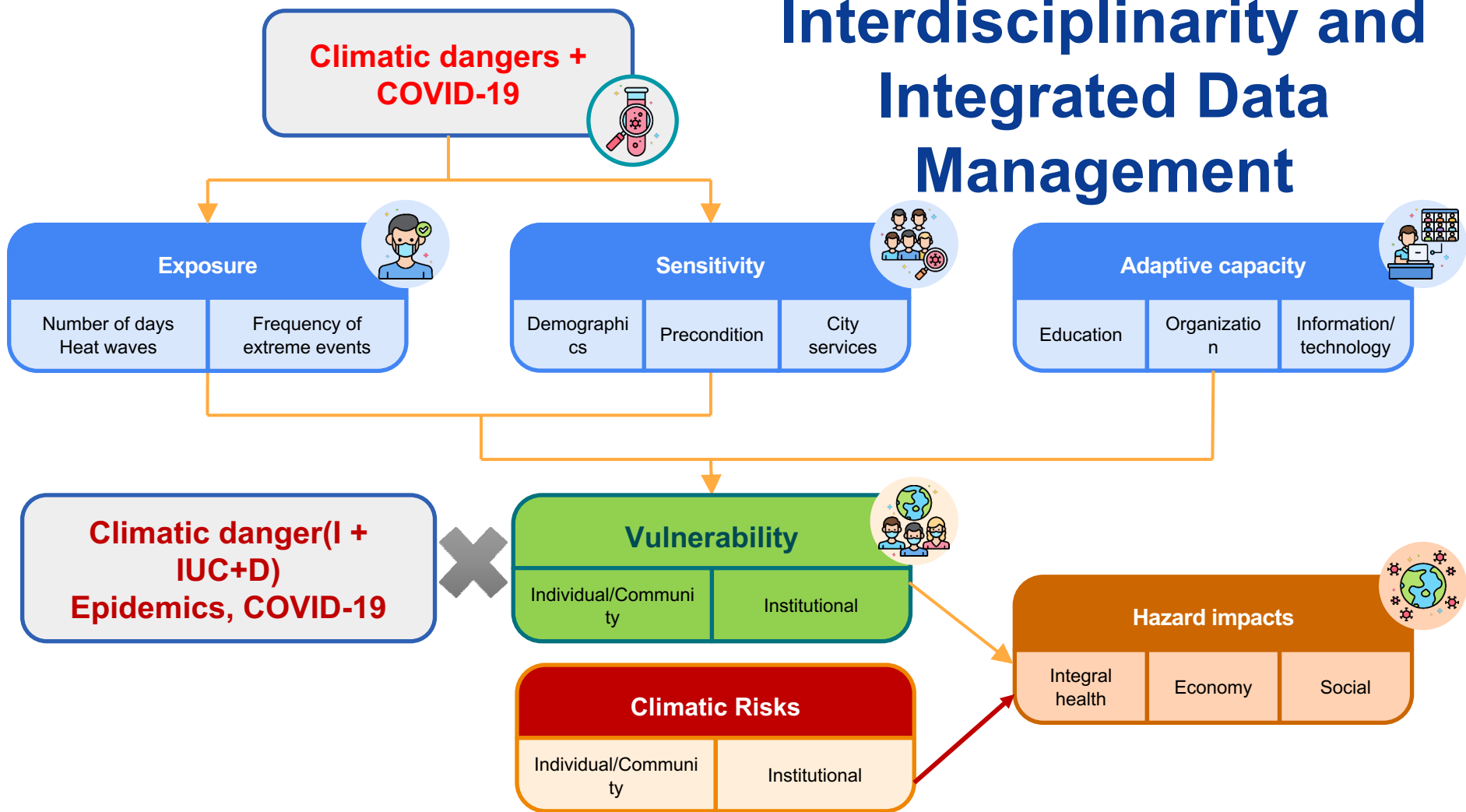


Duran, Diario EL Universo



RESCLIMA, 2020

Interdisciplinarity and Integrated Data Management



Identifying the Determinants of Urban Vulnerability & Health

Physical

Exposure



- Local meteorology
- Geomorphology
- Elevation/topography
- Distance to flood zones
- Extreme events: ENSO

Population

Sensitivity



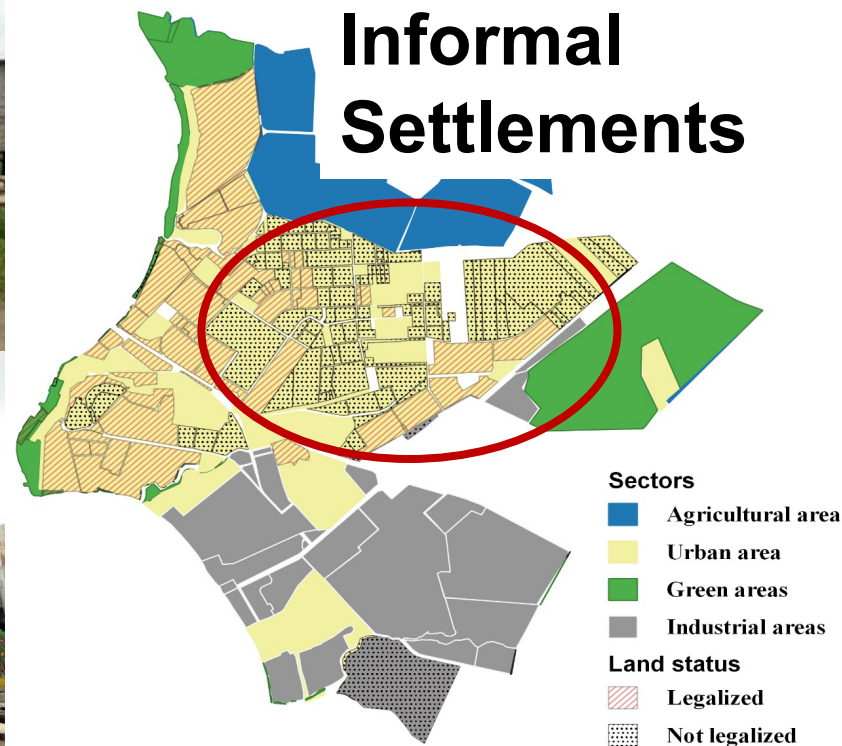
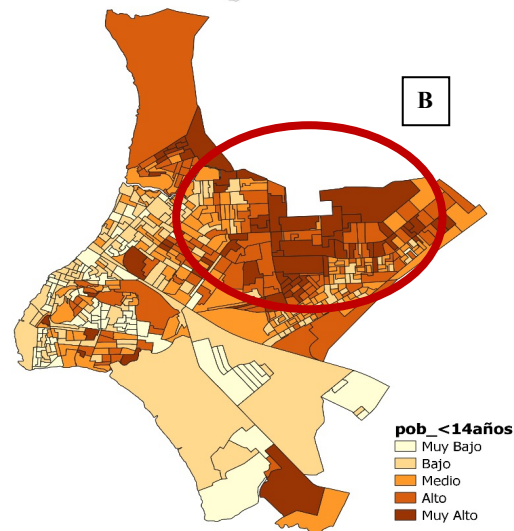
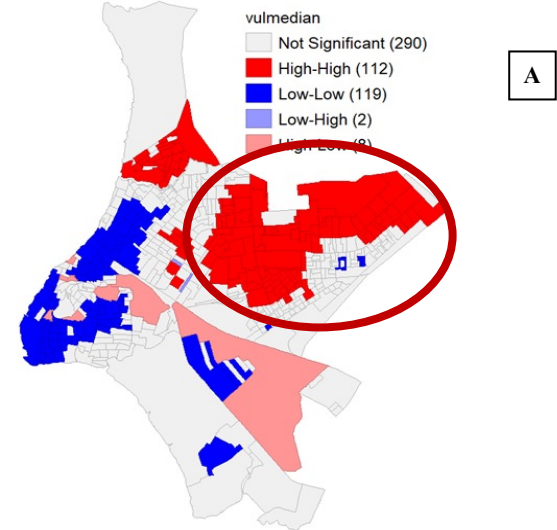
- Demographics
- Housing conditions
- Local urban infrastructure
- Population age
- Economic conditions

Resources

Adaptive Capacity



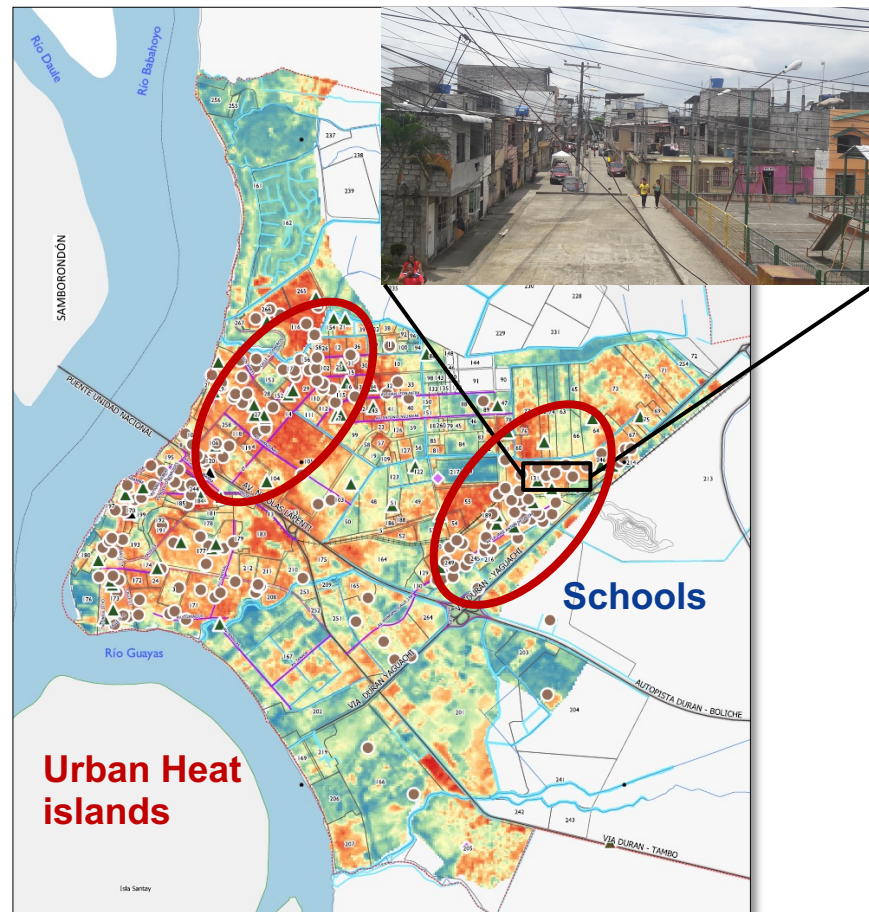
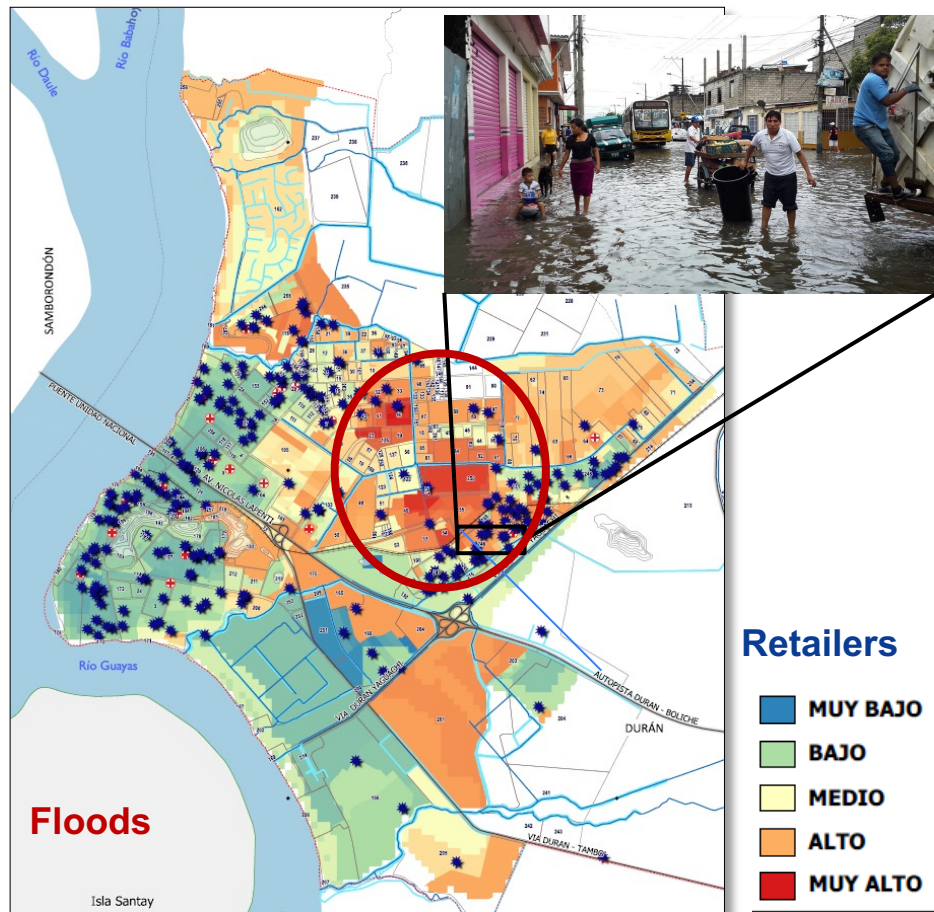
- City resources (DRR, health)
- Community organization
- Education
- Livelihoods
- Community organization



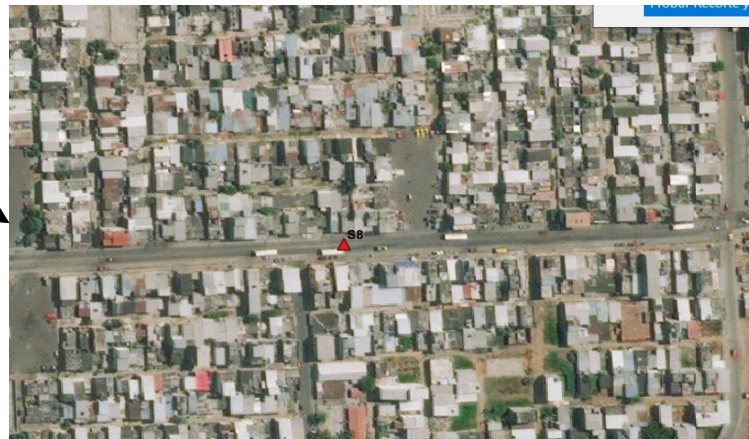
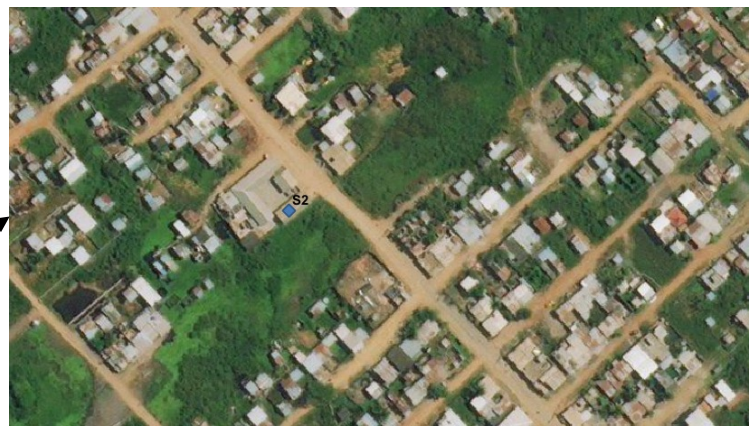
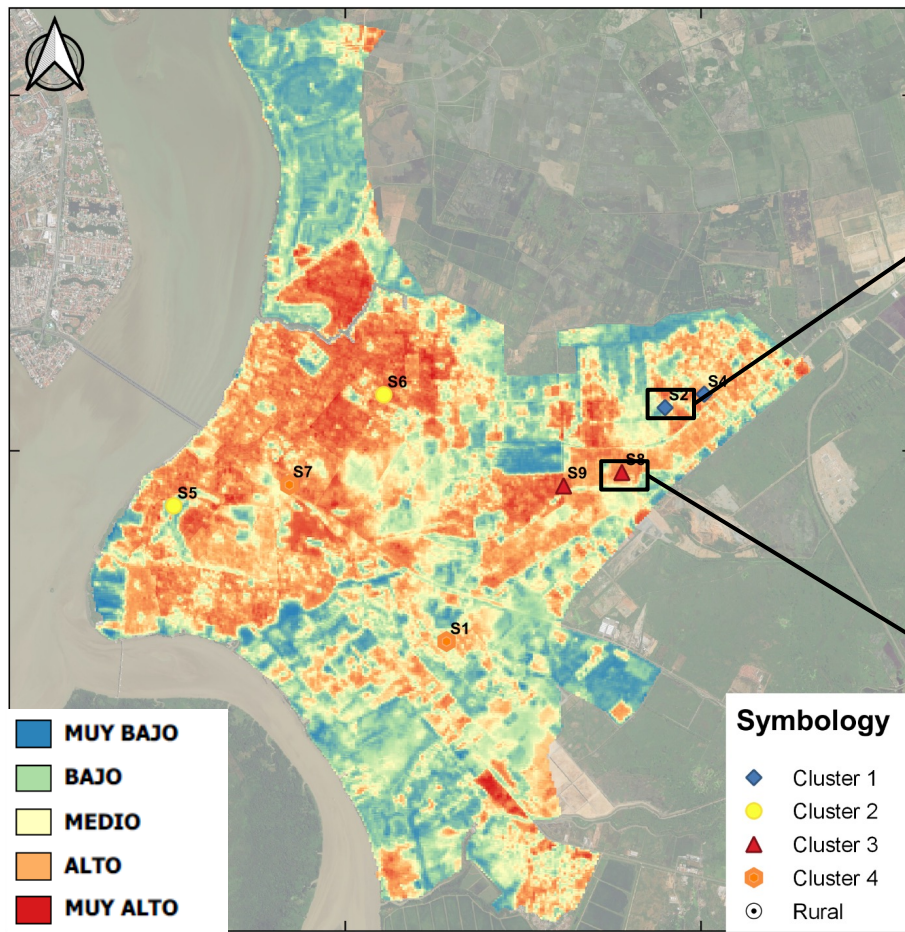
Maps with 2010 census data for the canton of Durán a) Population under 14 years of age, b) Informal areas c) High vulnerability areas

Source: RESCLIMA 2020, Borbor-Cordova et al., 2020, Sustainability

Flood Risk Maps and ICU - Educational Sectors

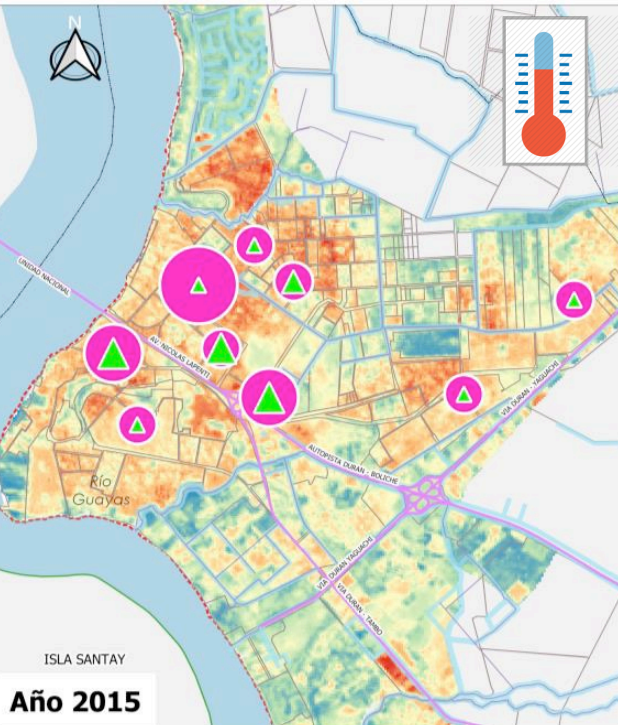
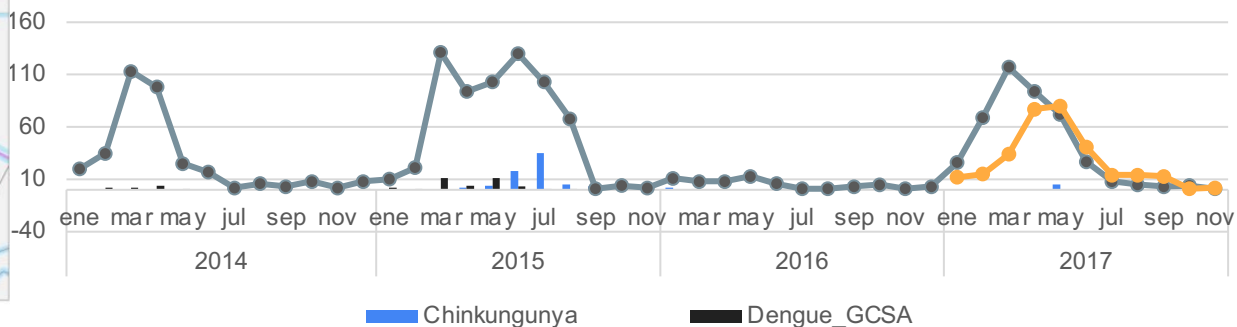
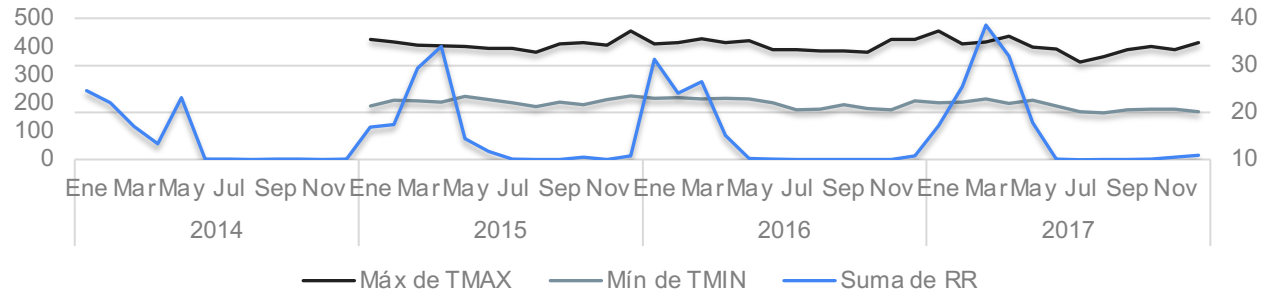


Urban Heat Island Risk Maps - Cluster



Climate-sensitive diseases during extreme events

Max and Min Precipitation and Temperature



RIESGO ISLAS DE CALOR

- MUY BAJO
- BAJO
- MEDIO
- ALTO
- MUY ALTO

BAJO
MEDIO
ALTO

MUY ALTO

NÚMERO CASOS ETV_2015

- 2 - 16
- 16 - 29
- 29 - 43

NÚMERO CASOS IRA_2015

- 93 - 317
- 317 - 540
- 540 - 764

Relationship between vector-borne diseases and meteorological variables

Dengue cases related to minimum Temp. ($r: 0.61$) $p < 0.01$

Zika related to precipitation ($r: 0.87$), Tmin ($r: 0.65$) $p < 0.01$

Vector, cardiovascular and respiratory diseases increased in extreme years El Nino (2015).

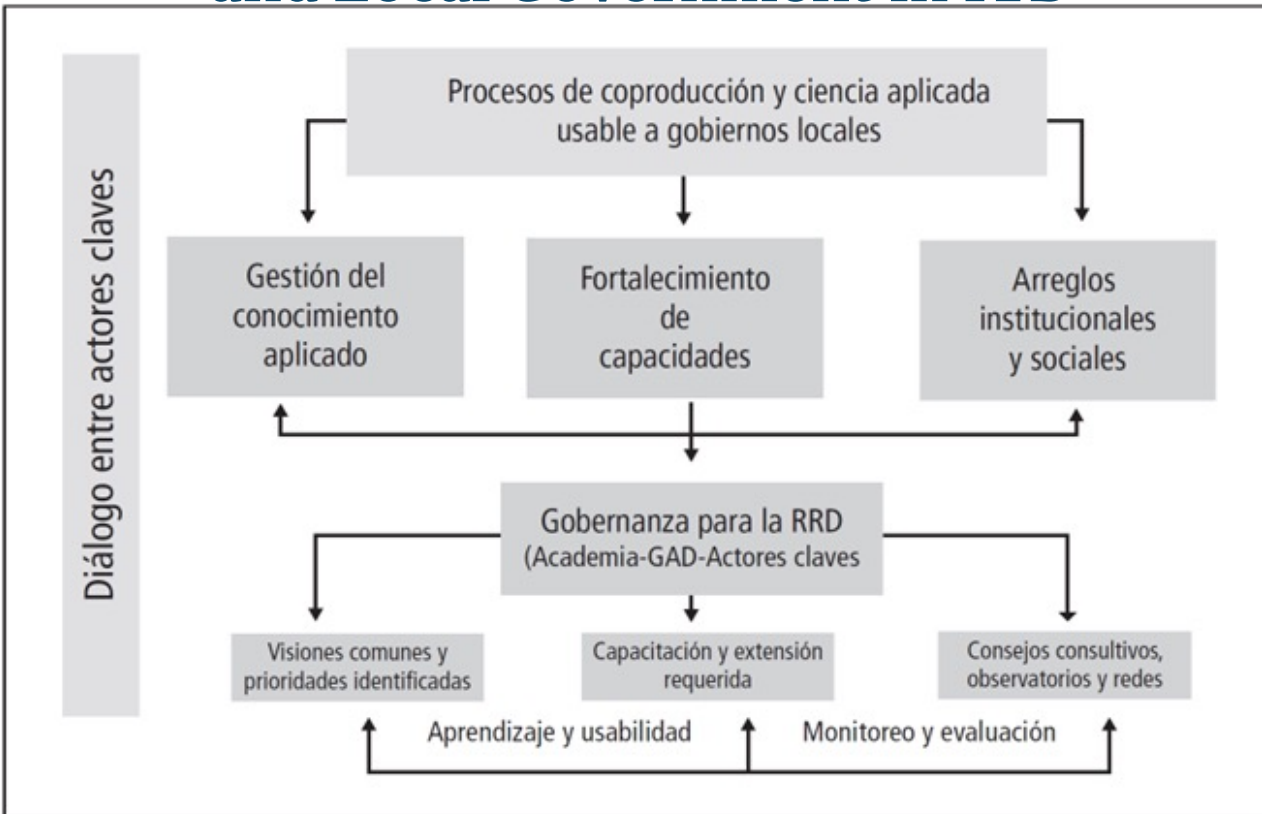
Relevance of social factors (inequity, health systems, others).

PARTICIPATORY PROCESS TO IDENTIFY STRATEGIES AND ACTIONS WITH STAKEHOLDERS AND COMMUNITY

- Design thinking: identification of the problem, vulnerability factors and priorities.
- Co-production process with different stakeholders and validation of maps.
- Results: officials and researchers prefer technical solutions.
- Community priority is social empowerment and (urban) health.



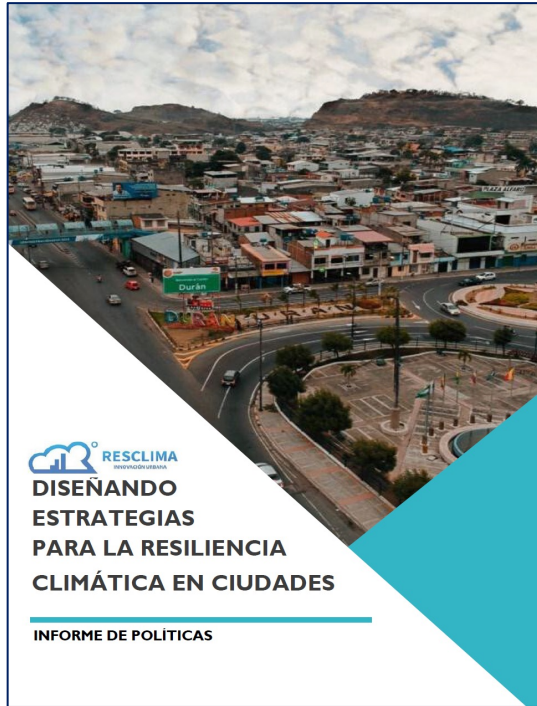
Co-production Process between Academia and Local Government in ITD



Borbor-Cordova et al., 2021. Good collaboration practices, ,



Policy-relevant action research and science-policy translation in Climate, Environment and Health.

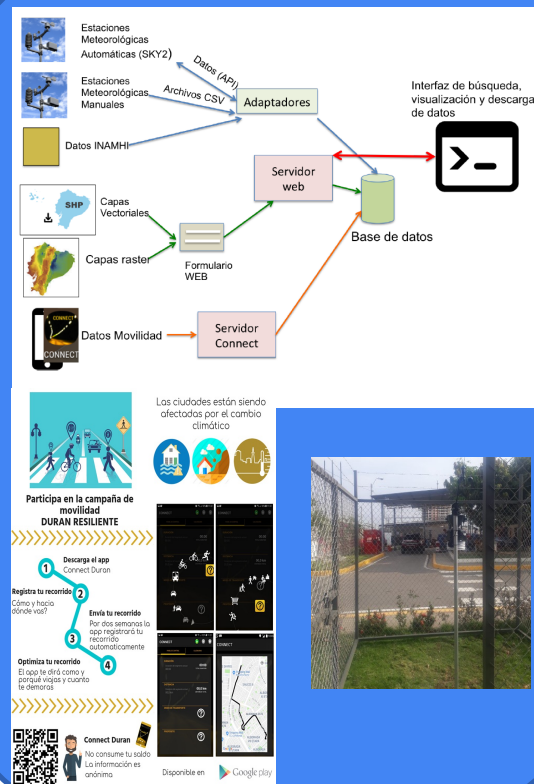


- Strategic Objective 1: Generate ordinances that adopt the principles of the Sendai Framework for Action and Adaptation to Climate Change in their Land Use Planning and Resilience Plans (PDOT).
- Strategic Objective 2: Strengthen institutional governance and social capacity of communities for resilience.
- Strategic Objective 3: Incorporate knowledge management and urban innovation.
- Strategic Objective 4: Incorporate Urban Landscape Design and ecosystems for resilience (Nature Based Solutions) into city planning.

Intersectoral articulation: relevant data communication



URBAN PLANNING: Green Infrastructure, restoration of ecosystem services, urban forests.

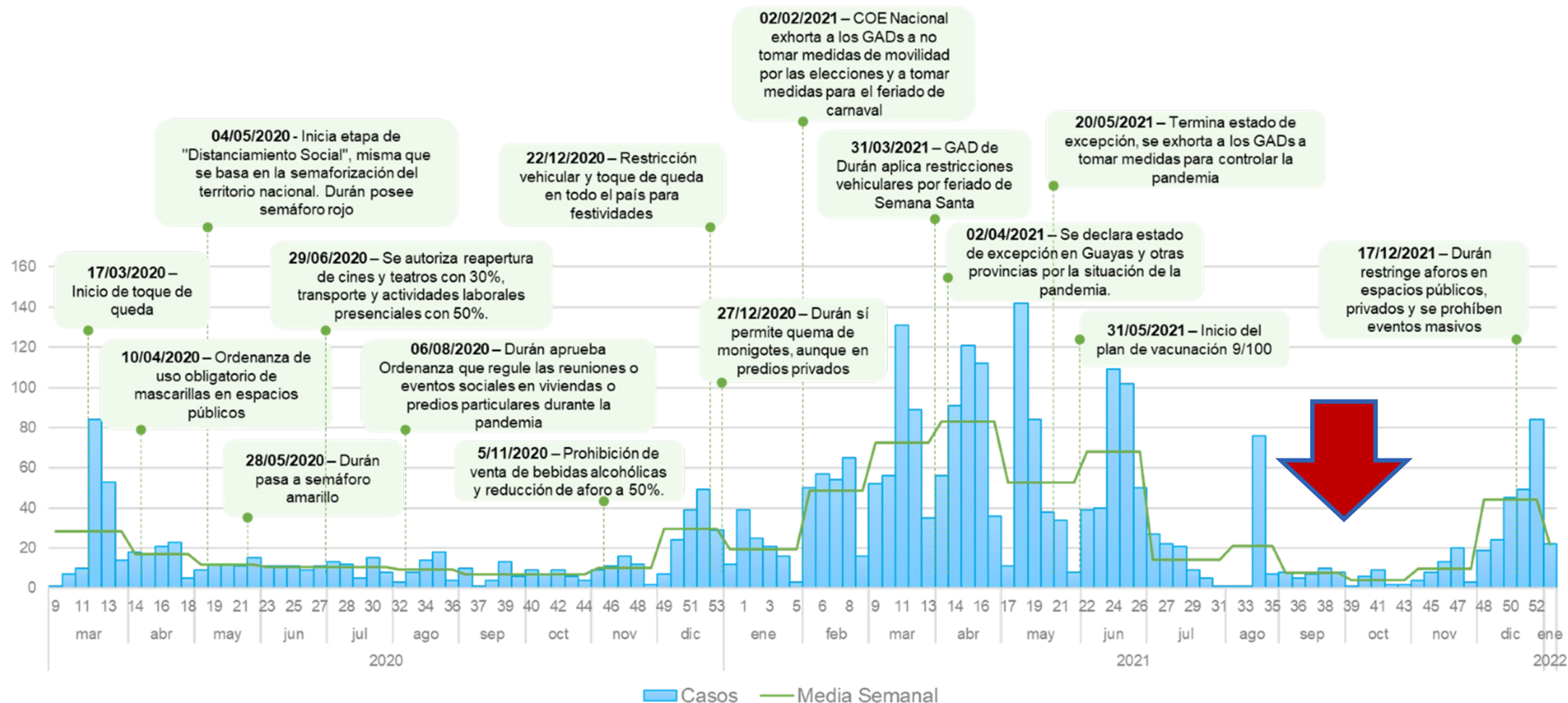


DATA & SAT: Sensors, GIS risk maps, AUTOSALUD APP, community environmental monitors



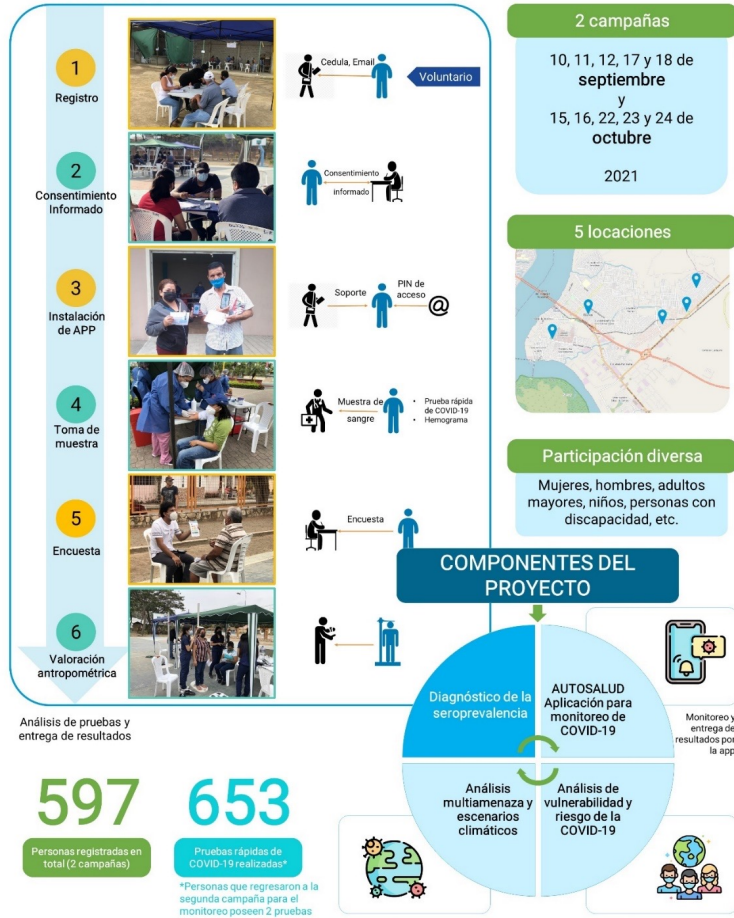
INTER INSTITUTIONAL PARTNERSHIPS: Municipality, Risks, Health

COVID-19 PANDEMIC: Timeline of Local Actions and Number of Cases



INPUTS FOR AN EARLY WARNING SYSTEM FOR EPIDEMICS

PROCESO REALIZADO



Health determinants

Serology samples

App AutoSalud

Epidemiological Survey

Perception

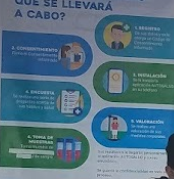
Mental Health

Evaluation

Anthropometric



REGISTERING



APP INSTALLATION



SURVEY



BLOOD SAMPLE



ANTHROPOMETRIC EVALUATION



Best Practices in Transdisciplinarity

- **Institutional arrangements** in the form of framework agreements for the medium term (five years) and specific agreements (short term) allocating funds, and collaboration in kind and funds from both parties.
- **Work and interaction of knowledge networks (interdisciplinary)** and innovation hubs to complement specialties and experiences in the territory. Increase capacities in cross disciplines: epidemiology, geographic information systems, biostatistics, climate impacts on health, environmental determinants and well-being.
- **Communication:** Translation into simple and applicable language so that academic products can be understood by municipal and public health technicians. Continuous training and outreach.
- **Inputs for public policy instruments :** Policy Brief for Epidemic Alert Systems, Nature-Based Solutions, DATACITY.

References:

- Borbor-Córdova M.J., Cornejo-Rodríguez M.P., Andrade G., Ochoa E. Gobiernos autónomos descentralizados y la academia: buenas prácticas de colaboración para la resiliencia climática y la COVID-19. Ed. Andrea Carrión, Cambio climático, desarrollo territorial y gobiernos locales: lecciones de la crisis sanitaria. Serie Territorios en Debate - Segunda Etapa - N° 12, pág. 81-110
- Cornejo-Rodriguez, M.P., Borbor-Cordova, M., Arias-Hidalgo, M., Matamoros-Camposano, D., Sanclemente, E., Soriano-Idrovo, G., Macias-Zambrano, J., Ochoa-Donoso, D., Dominguez-Bonini, F., Nolivos-Alvarez, I., Villafuerte-Arias, R., Menoscal-Aldas, L., Valdiviezo-Ajila, A., 2021. *Diseñando Estrategias para la Resiliencia Climática en Ciudades: Informe de Políticas*. CIP-RRD, Guayaquil, Ecuador. 22 págs. ISBN: 987-9942-36-967-3.
- Borbor-Cordova, M.J.; Ger, G.; Valdiviezo-Ajila, A.A.; Arias-Hidalgo, M.; Matamoros, D.; Nolivos, I.; Menoscal-Aldas, G.; Valle, F.; Pezzoli, A.; Cornejo-Rodriguez, M.d.P. An Operational Framework for Urban Vulnerability to Floods in the Guayas Estuary Region: The Duran Case Study. Sustainability 2020, 12, 10292.
<https://doi.org/10.3390/>

Gracias!

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