Urban Climate Policies and Practices in Latin America and Korea

Hyejung Kim

Managing Director at SusIF

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Contents

I.

Integration of Mitigation and Adaptation in Urban Climate Action Plans in Latin America

(Kim, H. and Grafakos, S., 2019)

- Integration of Mitigation and Adaptation (M+A)
  - Level of integration M+A
- 44 Latin American Cities
  - Factors potentially influencing the level of the integration of M+A

II.

Climate Adaptation Technologies in Korean Cities

(Kim, H., 2021)

- Korean Policies related to Climate Adaptation Technologies
- Adaptation Technologies Applied in the 3 Major Cities in Korea

I.

Integration of Mitigation and Adaptation in Urban Climate Action Plans in Latin America

(Kim, H. and Grafakos, S., 2019)

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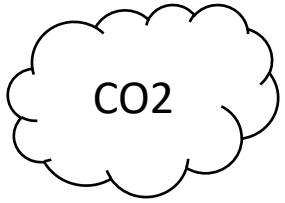
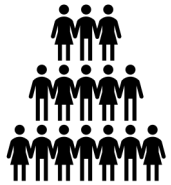
Background



75 to 80% contribution

City

(Satterthwaite, 2008)



Urban population rate 81%

LAC region

(UN DESA, 2018)

By 2030,
additional 5% extreme poverty rate in the LAC

Climate change
+
Climate-related disasters

(Hallegatte, et al., 2016)

City-level actions to mitigate and adapt to climate change

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Interrelationships between Mitigation and Adaptation -> Integration of M+A

"A portfolio of adaptation and mitigation measures can diminish the risks associated with climate change … Analysis of the interrelationships between adaptation and mitigation may reveal ways to promote the effective implementation of adaptation and mitigation actions." (IPCC WGII, 2007. pp70-73)

"**Integration of adaptation and mitigation into planning and decision-making can create synergies with sustainable development (high confidence)**… Significant co-benefits, synergies, and trade-offs exist between mitigation and adaptation and among different adaptation responses; interactions occur both within and across regions" (IPCC WGII Part A, 2014. p184)

Synergies and trade-offs of adaptation and mitigation will be included in AR6 (IPCC, 2017)

Examples of interrelationships between M+A

Table 2 Illustrative examples of climate adaptation and mitigation interrelationships

Type of interrelationship	Action/measure	Primary objective	Interrelationship explained
Co-benefit	District heating and cooling system	Mitigation	District cooling can be used also in warm months to adapt to high temperatures
Synergy	Construction of green walls and rooftops	Adaptation and mitigation	Green walls and rooftops increase energy efficiency of buildings and decrease water run off
Conflict	Densification of urban structure	Mitigation	Dense urban structure reduces green areas suitable for natural flood protection measures
Trade-off	Urban zoning	Adaptation or mitigation	Challenges to set priorities in urban planning due to space limitations in cities

(Source: Grafakos et al. 2019)

Level of Integration of M+A

Analytical Framework (Grafakos et al. 2019)

Table A3. Evaluation framework for the level of integration of mitigation and adaptation in CCAPs (IMA Index). Reproduced from Grafakos *et al* CC BY 4.0 ©The Author(s) 2019.

Stage of planning	Component	Indicators (22)	Scale	Explanation
Identifying and understanding	Scientific knowledge and information	GHG emissions profile	0–1	Identified (1) or not identified (0) in the plan
		GHG emissions forecast	0–2	Forecast beyond 2020 (2), up to 2020 (1) or not included in the plan (0)
		Vulnerability profile	0–2	Supported by quantitative data (2), identified in the plan but w/o quantitative data (1) or not identified (0)
		Future climate projections	0–2	Projection beyond 2030 (2), up to 2030 (1) or not included in the plan (0)
		Uncertainty of climate impacts	0–1	Addressed (1) or not addressed (0) in the plan
		Cost estimates of damages of climate impacts	0–1	Included (1) or not included (0) in the plan
		Climate hazards (detailed)	0–1	Included (1) or not included (0) in the plan
Envisioning and planning	Target setting	GHG emissions reduction targets (overall)	0–2	Target by 2050 (2), by 2020 (1) or not included in the plan (0)
		GHG emissions reduction targets (by sector)	0–1	Included (1) or not included (0) in the plan
		Adaptation objectives	0–2	Long term (2), short term (1) or not included in the plan (0)
	Prioritization	Cost estimates of actions	0–2	Both M+A (2), either M or A (1) or not included in the plan (0)
		Benefit estimates of actions	0–2	Both M+A (2), either M or A (1) or not included in the plan (0)
		Consideration of M+A interrelationships	0-2	Both synergies and conflicts (2), either synergies or conflicts (1) or not included in the plan (0)
		Sustainability benefits	0–1	Included (1) or not included (0) in the plan
	Communication	Common public education and outreach	0–1	Included (1) or not included (0) in the plan
Implementation and monitoring	Financing	Common public funding body or budget (national/city level)	0–1	Included (1) or not included (0) in the plan
		Public or private financing commitment	0–1	Included (1) or not included (0) in the plan
	Implementation	Mainstreaming potential of both M+A	0–2	Both M+A (2), either M or A (1) or not included in the plan (0)
		Common policy or regulatory framework	0–2	Both M+A (2), either M or A (1) or not included in the plan (0)
		Common coordination/ implementation body	0–1	Included (1) or not included (0) in the plan
		Partnerships	0–2	Both M+A (2), either M or A (1) or not included in the plan (0)
	Monitoring	Common monitoring procedure/framework	0–2	Both M+A (2), either M or A (1) or not included in the plan (0)
Total score (IMA index)				**Maximum 34**

Source: adopted from Grafakos *et al* (2019).

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Target Cities: 44 cities in LAC

Selection Criteria

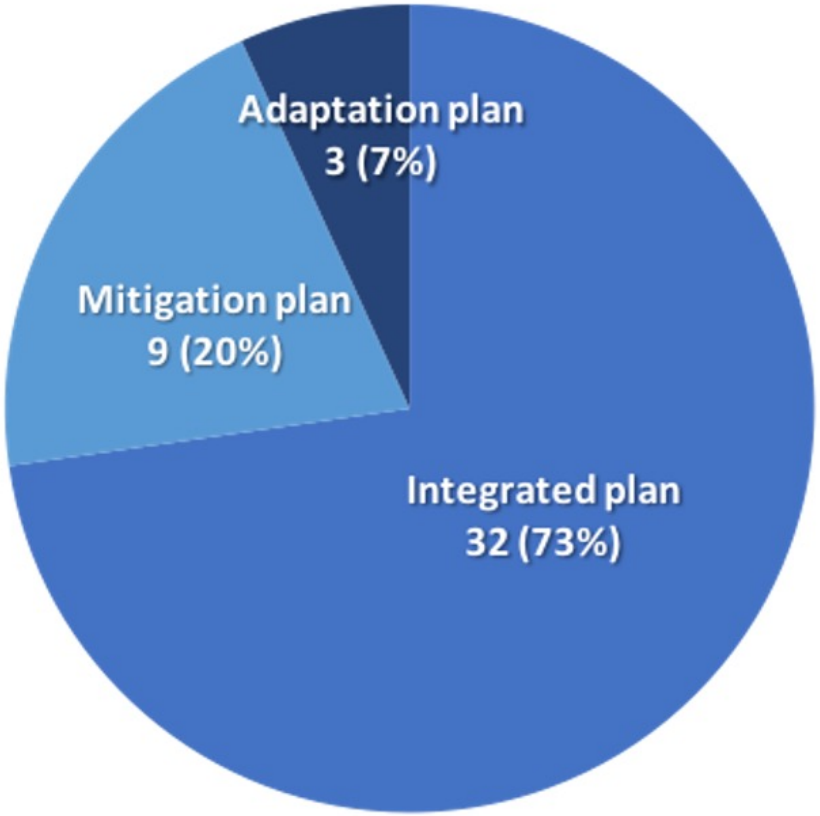
- More than one million inhabitants.
- Have already developed policies that include separated mitigation or adaptation, or integrated (combined) action plans, as of July 2018.

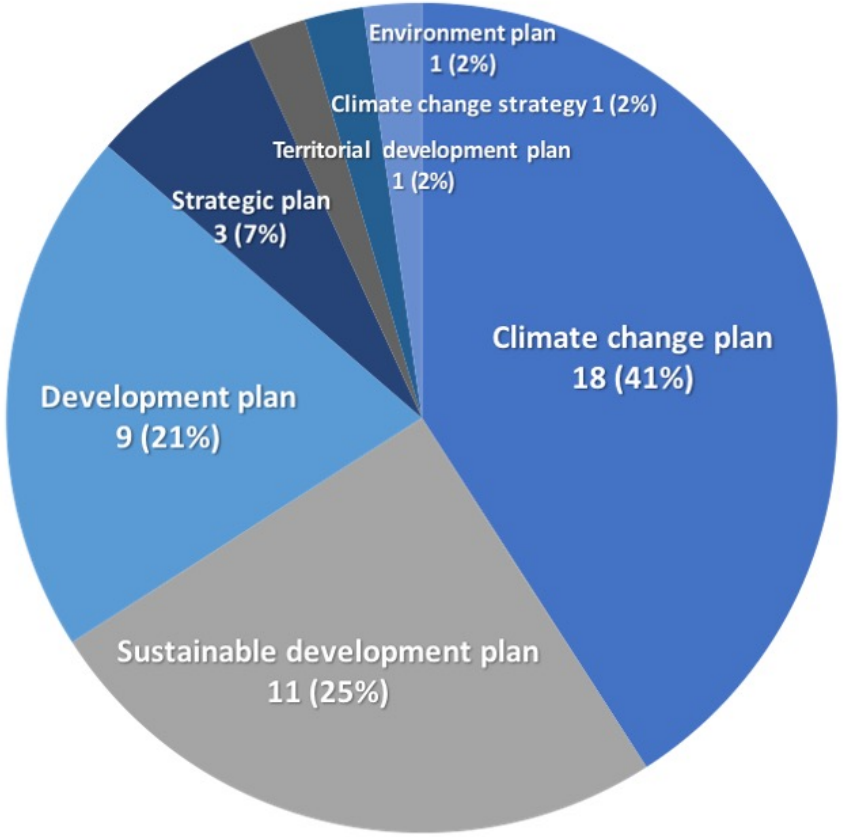
➢ 44 cities in the LAC region which populations account for around 28 percent of the total population of the entire area.

44 cities

REGION	COUNTRY (16)	CITY (44)
CARIBBEAN	Cuba	Havana
	Dominican Republic	Santo Domingo
CENTRAL AMERICA	Costa Rica	San Jose
	Honduras	Tegucigalpa
	Mexico	Aguascalientes, Mexico City, Cuernavaca, Guadalajara, Leon de los Aldamas, Merida, Puebla, Queretaro, Tijuana, Toluca de Lerdo, Torreon
	Panama	Panama City
SOUTH AMERICA	Argentina	Buenos Aires, Mendoza, Rosario
	Bolivia	Cochabamba, La Paz, Santa Cruz de la Sierra
	Brazil	Belo Horizonte, Brasilia, Curitiba, Florianopolis, Fortaleza, Goiania, Vitoria, Joao Pessoa, Rio de Janeiro, Salvador, Sao Paulo
	Chile	Santiago
	Colombia	Bogota, Bucaramanga, Cali, Cartagena, Medellin
	Ecuador	Quito
	Paraguay	Asuncion
	Peru	Lima
	Uruguay	Montevideo
	Venezuela	Caracas

Integration of M+A





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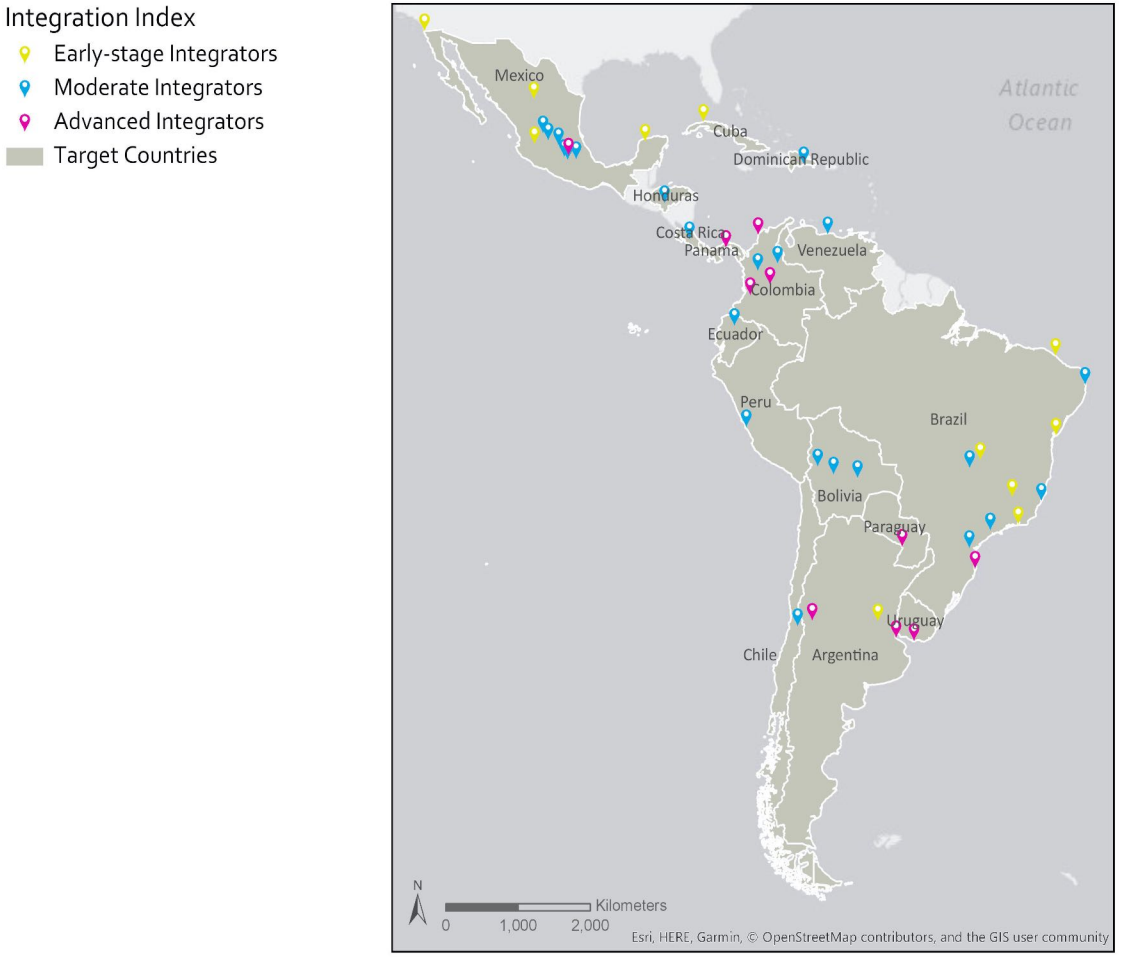
LAC cities: Level of Integration of M+A

Top 10 cities

Table 3. Ten highest ranking cities based on IMA index.

Rank	City	Country	IMA index
1	Bogota	Colombia	28
2–4	Asuncion	Paraguay	25
	Mendoza	Argentina	
	Mexico City	Mexico	
5–8	Cali	Colombia	24
	Florianopolis	Brazil	
	Montevideo	Uruguay	
	Panama City	Panama	
9	Buenos Aires	Argentina	23
10	Cartagena	Colombia	22



Source: Kim & Grafakos 2019

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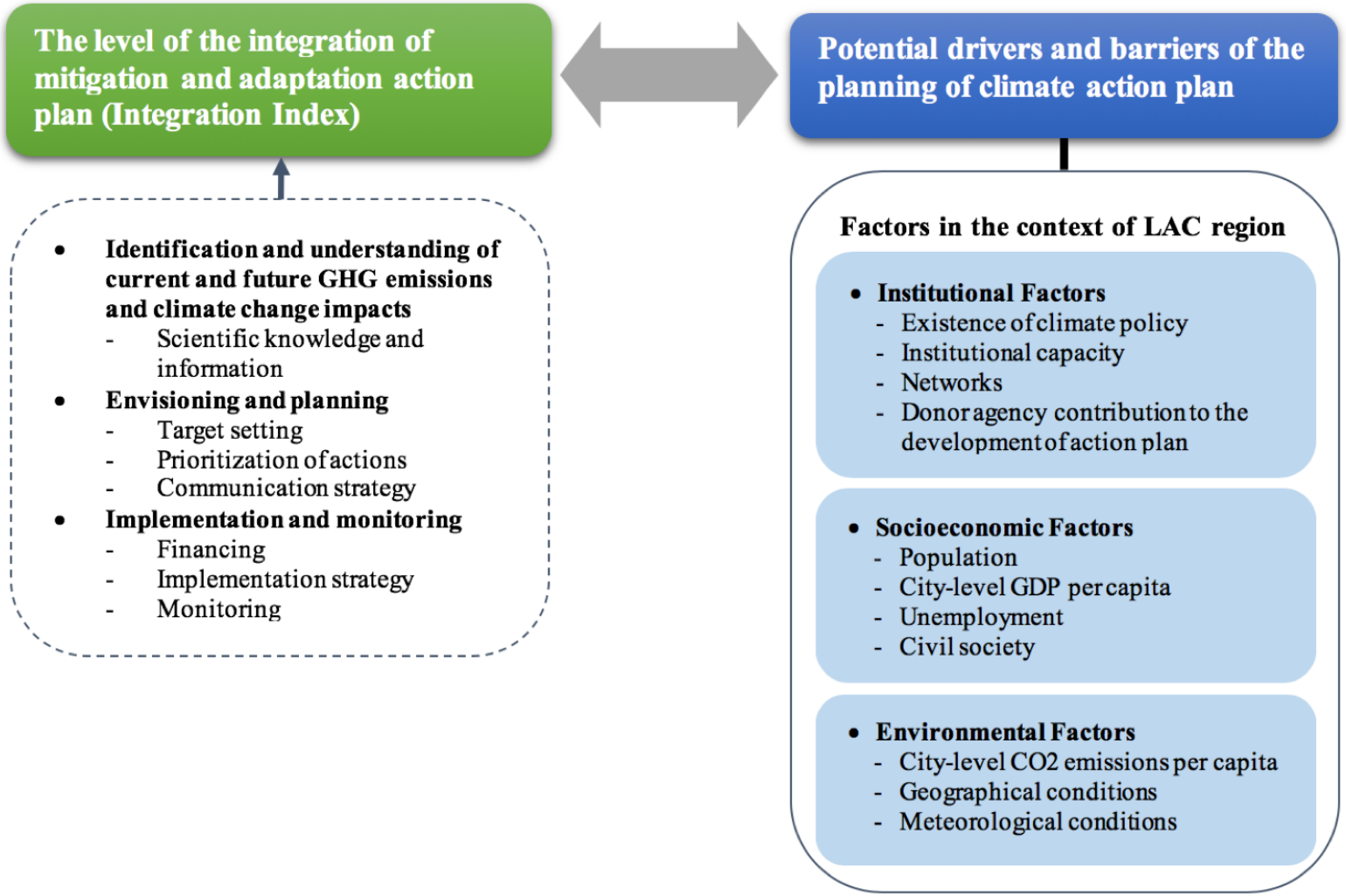
Question.

To what extent do institutional, socioeconomic, and environmental factors potentially influence the level of the integration of mitigation and adaptation in urban action plans of Latin American and Caribbean cities?

Conceptual Framework

The level of Integration of Mitigation and Adaptation (IMA Index) of 44 LAC cities



42 institutional, socioeconomic, and environmental factors

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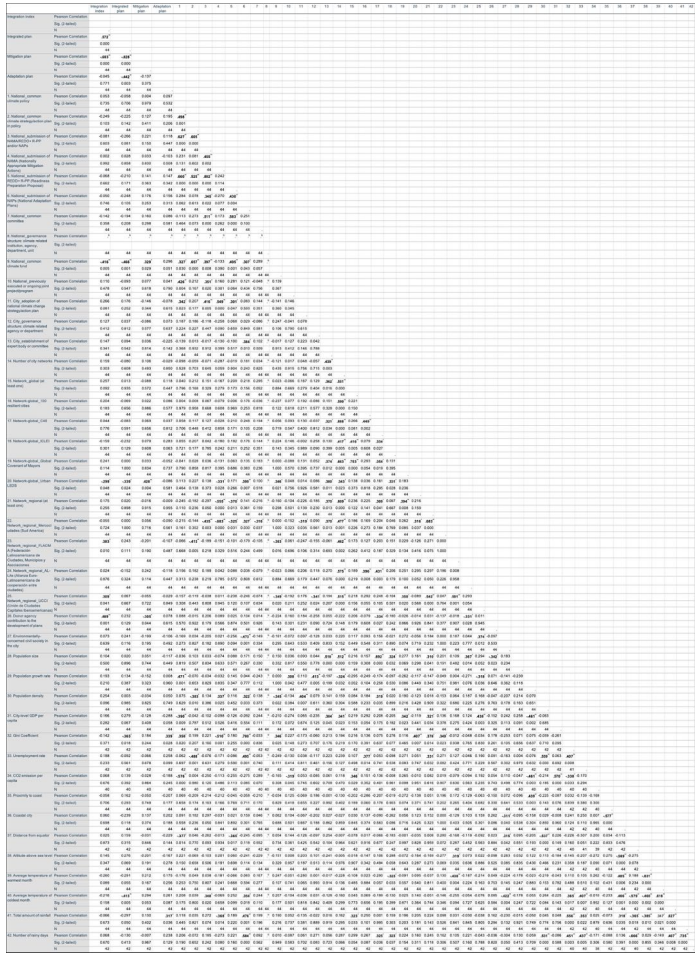
Result: Factors Potentially Influencing the Level of Integration of M+A

Multiple regression analysis



Results

Table 5. Factors with a significant level of correlation with IMA index.

Factors with significant level of correlation ($p < 0.05, r > +0.30$ or < -0.30)	
Positive correlation (Driving factors)	• Institutional factors (3) - Regional network 'FLACMA' - Regional network 'UCCI' - Donor agencies' contribution to the development of CCAPs*
Negative correlation (Constraining factors)	• Institutional factors (2) - National common climate fund* - Global network 'Urban LEDS'

*$p < 0.01$.

- Potential drivers
  - Participation in regional networks
  - Donor agencies' intervention in developing urban climate policies: IDB, UNDP, etc.
- Potential barriers
  - National Climate Fund
  - Global network Urban LEDS Phase I

Source: Kim & Grafakos 2019

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- Still unbalanced focus between mitigation and adaptation

  ⇒ Need to put more efforts to adapt to climate change

  ⇒ One way is to promote RD&D of adaptation technologies in order to attract both public and private sectors.

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Adaptation Technologies in Korean Cities

(Kim, H., 2021)

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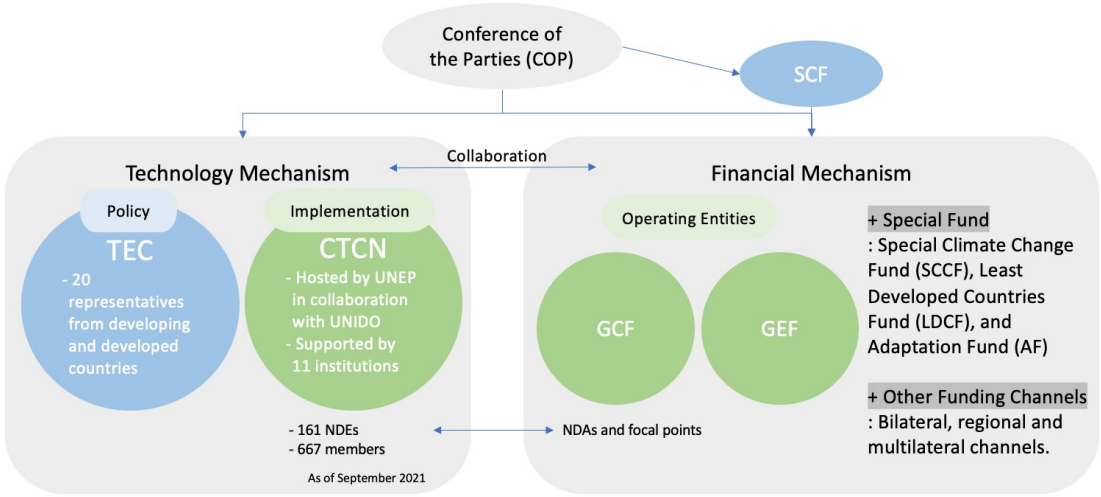
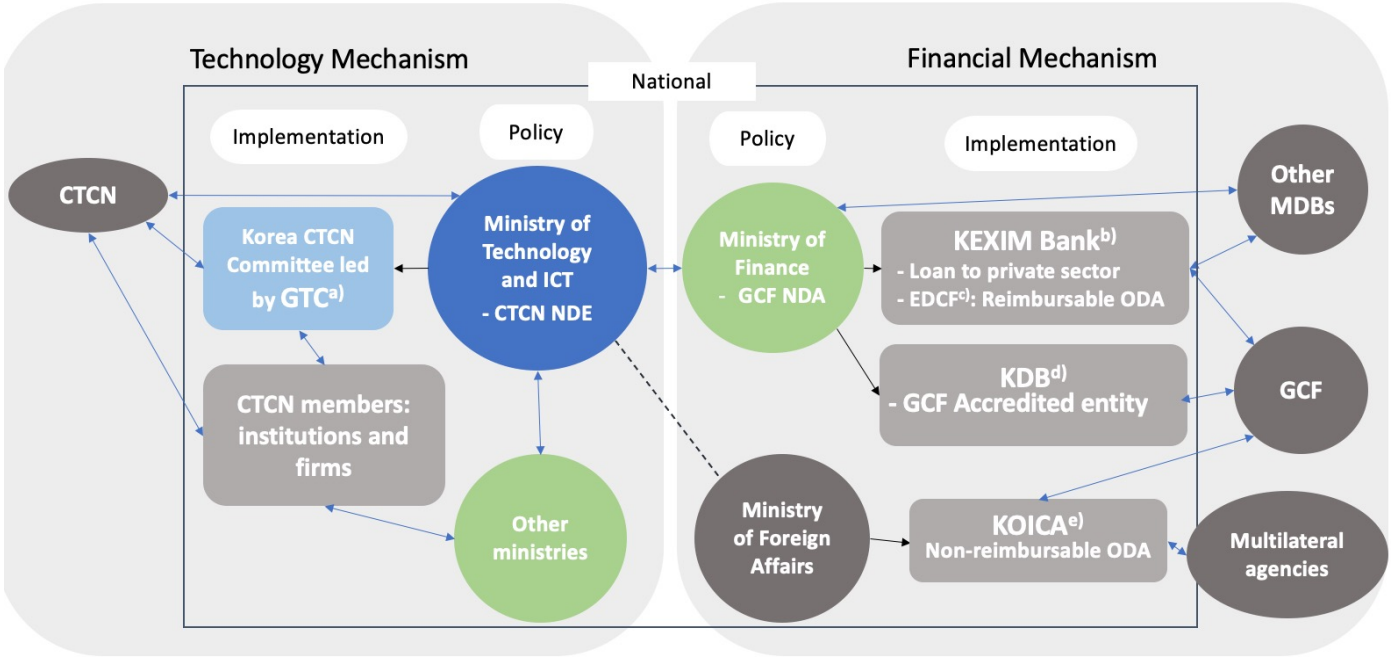
Technology Mechanism

UNFCCC



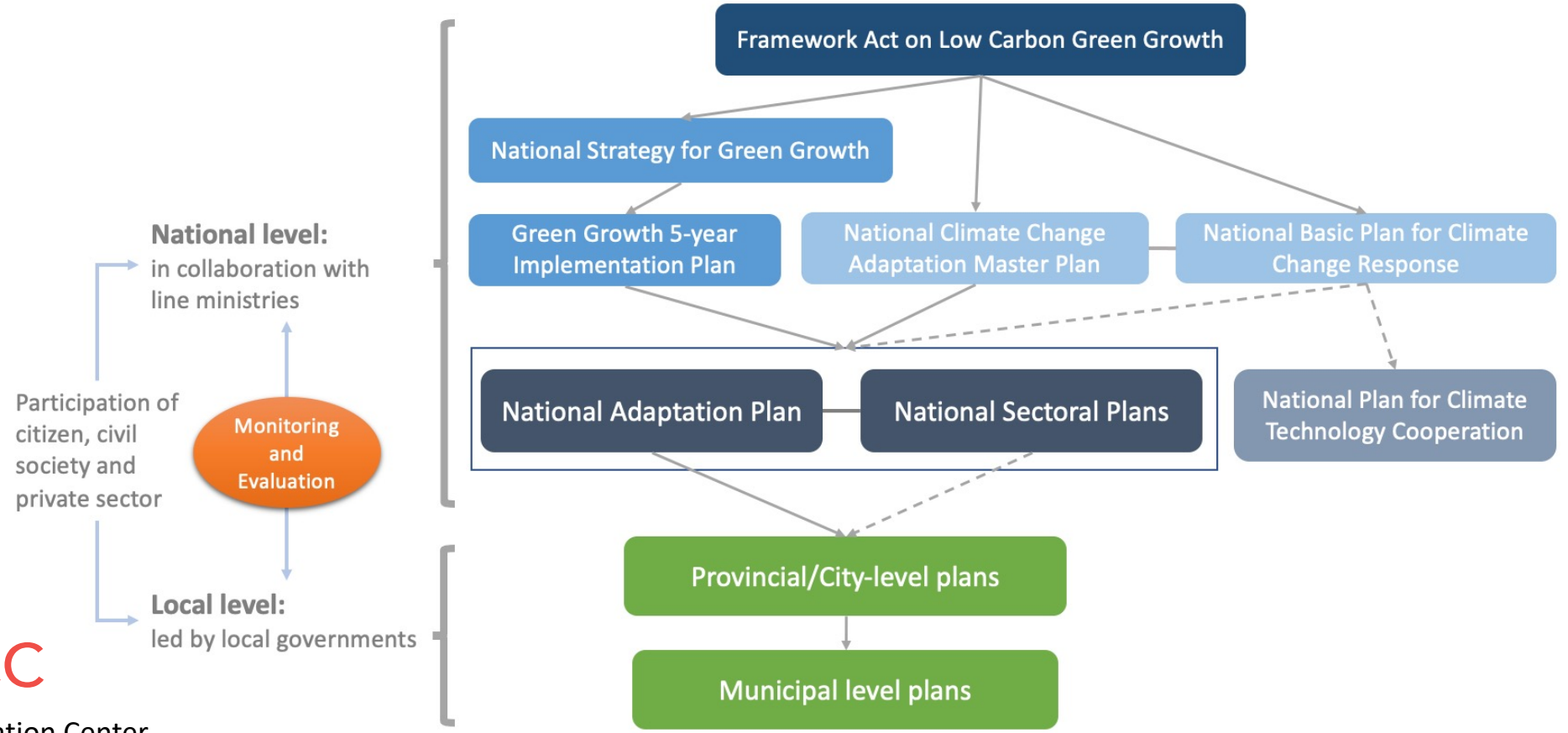
(Source: Kim and Grafakos, Under Review)

Korea



(Source: Kim, 2021)

Korean National and Local Policies Related to Adaptation Technologies



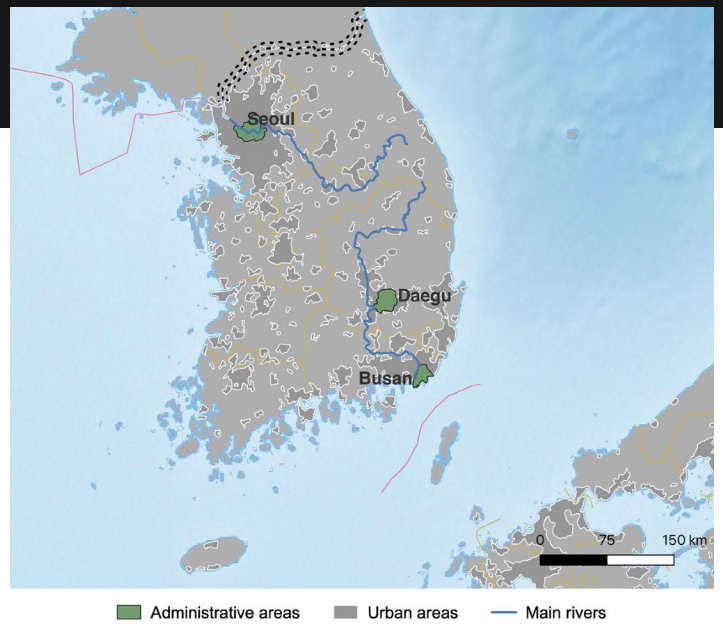
Support from

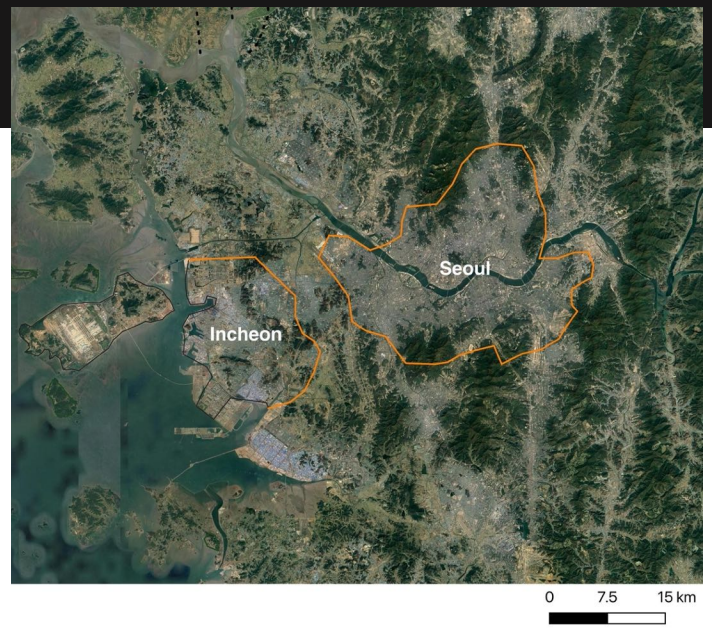
KACCC

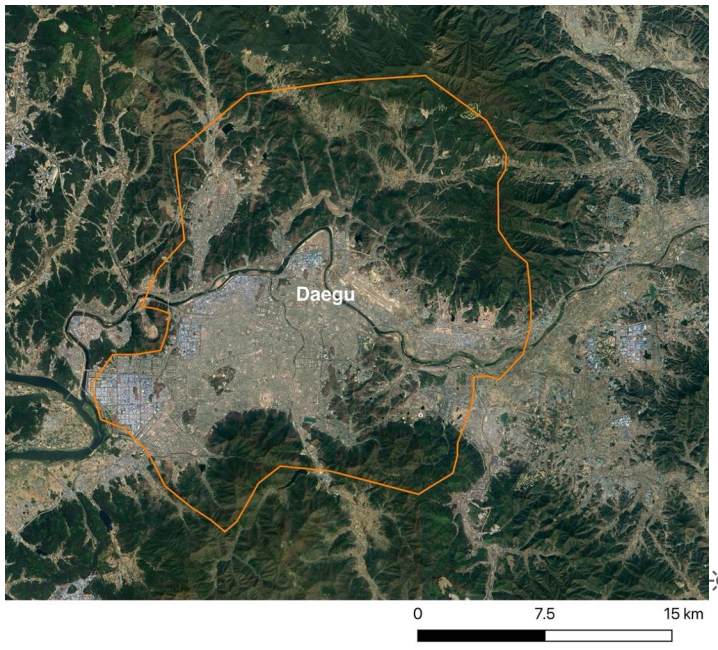
Korea Adaptation Center for Climate Change

(Source: Kim, 2021. p 28)

Challenges in Major Korean Cities







- Seoul – inland megacity (10 million inhab.)
  : PM concentration (positive correlation with temperature (Yang, 2019))
  : Extreme Hot and Cold Weather (incl. Heatwave)
- Daegu – intermontane city (2.4 million inhab.)
  : Extreme Hot Weather and Heatwave
- Busan – coastal city (3.4 million inhab.)
  : Heavy Rainfall and Flood

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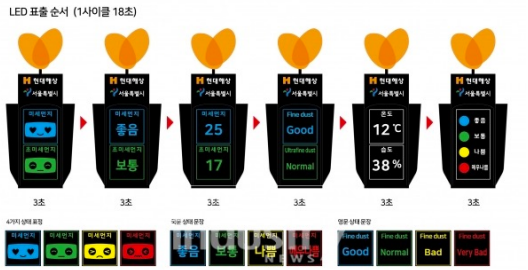
Adaptation Technologies in Korean Cities : Seoul

PM 2.5 concentrations

Temperature rise -> higher PM concentrations in the air

Negative impacts on public health: respiratory diseases, etc.

- Ban on old vehicles (diesel before 2009, gasoline before 2000)
- EWS: send notification to citizens via mobile services
- Operation of PM signal lights in public parks



Heatwaves and PMs

: Cooling fog and green energy vehicle

Climate resilient and low carbon urban agriculture

: Urban plant factory (Smart Metro Farm)

Metro farms in Seoul

Dapsimni Station

Sangdo Station

Metro Farm Academy in Sangdo Station

Source: Adapted from the Farm 8 official website. http://www.farm8.co.kr/. Accessed on July 8, 2020.

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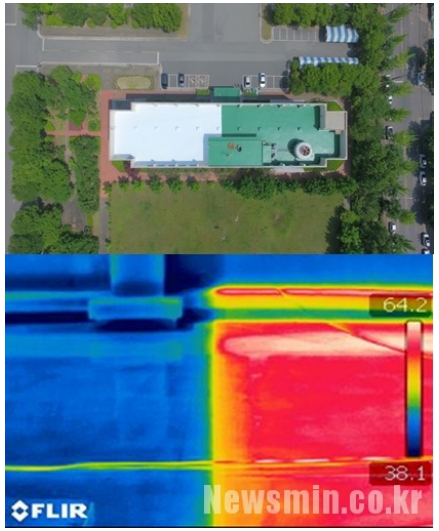
Adaptation Technologies in Korean Cities : Daegu (experiments of technologies against heatwave)

Cool roof



Cool pavement

Cool and clean road

Cooling fog

Smart shade-open

Smart shade-closed

Smart bus shelter

Source: (a,) http://www.newsmin.co.kr/news/22905/; (b, e, f, g) Photographed by author; and (c, d) adapted from Daegu Environment Story Blog (http://blog.naver.com/PostView.nhn?blogId=ecocitydaegu&logNo=221564859820&parentCategoryNo=&categoryNo=6&viewDate=&isShowPopularPosts=false&from=postList)

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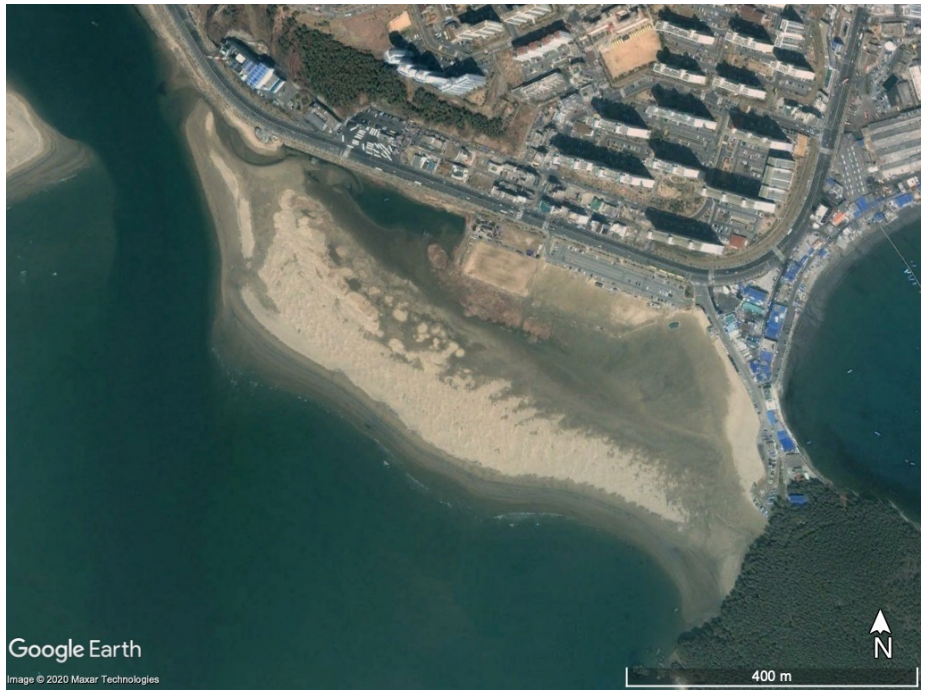
Adaptation Technologies in Korean Cities : Busan

Coastal disaster prevention forest in Dadaepo, Busan



2006

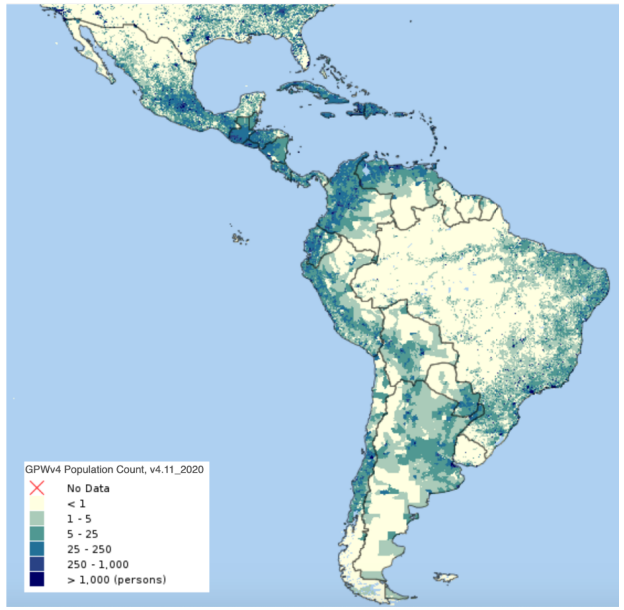
2020

Adaptation Technologies in Korean Cities : Busan

Adaptation in hillside villages

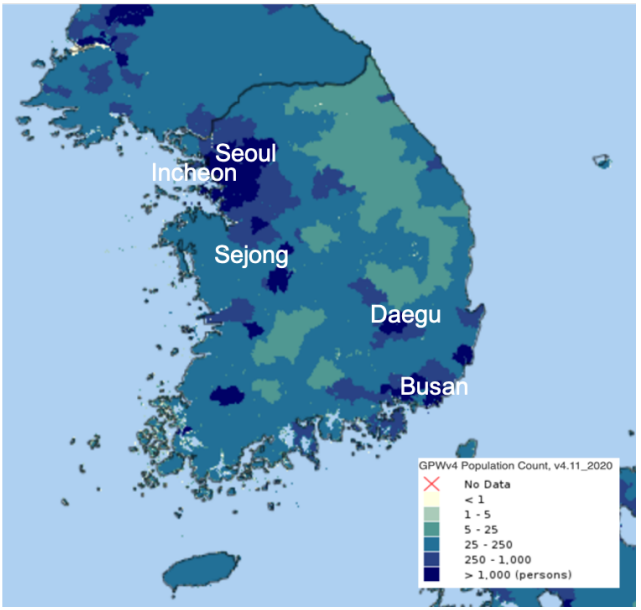
- Several villages were informally built during the Korean War in 1950s.
- The proportion of older dwellers is still high, accounting for over 20%. They are vulnerable to heatwaves.
- Hocheon village, selected as the 1st cool roof village
- Prone to flooding due to the inadequate drainage system
- Urban regeneration projects are in process.

Maps of LAC region and Korea



Source: GWP v4 Population Count, v4.11_2020. https://sedac.ciesin.columbia.edu/data/collection/gpw-v4.

- Diversity of geographic conditions: coasts, mountains and islands
- Population concentrated in coastal cities

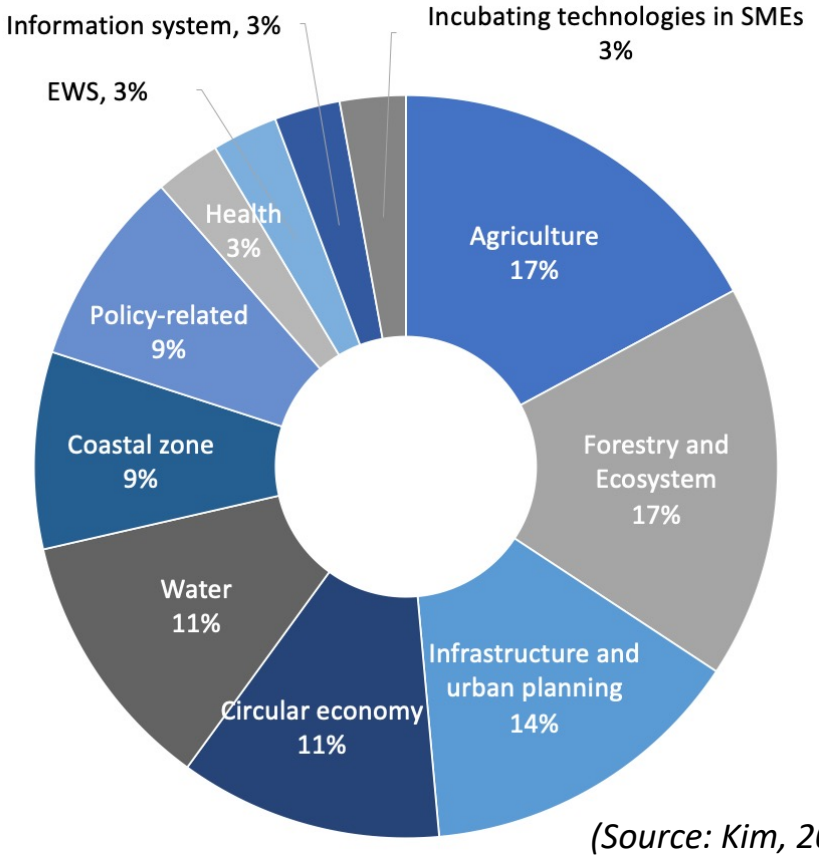


(Source: Kim, 2021, p 31)

Potential Areas for Cooperation between Cities in Latin America and Korea

TA requests from LAC to CTCN for adaptation technologies by sector

(from 2014 to September 15, 2020)



(Source: Kim, 2021. p 64)

Possible cooperation areas between cities in Latin America and Korea

Sector	Adaptation challenges	Technologies
Agriculture	Extreme/unpredictable weather	Agro-weather information system Smart farm (e.g., metro farm)
Disaster	Flooding	EWS Retention facilities Urban greening
Water	Freshwater shortage	Desalination (coastal area) Rainwater collecting Underground dam (coastal area) Water reuse
Health	Heatwave	Cool roof Cool and clean road system EWS Urban greening Water sprays in recreational area
	PMs	Cool and clean road system EWS Urban greening
Infrastructure	Heatwave	Green buildings (e.g., green wall, green roof)
Fishery	Water temperature rise	Diversifying aquaculture
Coastal zone	Beach erosion Coastal flooding	Coastal forest EWS

(Source: Kim, 2021, p66)

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Start-up for Sustainable Cities and Communities

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- Since 2021
- Headquarters in Seoul, South Korea
- Regional focal points
  - Manila, the Philippines
  - Quito, Ecuador
  - Eindhoven, the Netherlands

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- Areas
  - Urban climate policy, governance, and technology analysis
  - Strategy development for sustainable cities projects
  - Development projects for the ESG-related activities of private sector
  - Project review and Monitoring & Evaluation (M&E)

- Topics for further research
  - Drivers of deforestation and reforestation / Ecosystem services in Amazon (South America)
  - Comparitive analysis of urban climate policies and technologies
  - Climate change and gender
  - Contribution of ESG-related activities to achieving the SDGs

Seeking Opportunities for Projects Collaborating with other Start-up Partners

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Collaboration

HUASIPICHANGA
URBAN CONSULTING

Research and policy analysis,
feasibility study,
strategy development,
implementation planning,
project coordination, and
project review

Headquarters in the Netherlands
A brother company in Ecuador

Child-friendly urban planning

11 SUSTAINABLE CITIES AND COMMUNITIES

3 GOOD HEALTH AND WELL-BEING

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

ESG

- Main literature

✓Part I: Kim H. and Grafakos S. (2019). Which are the factors influencing the integration of mitigation and adaptation in climate change plans in Latin American cities?. *Environmental Research Letters*, Vol. 14, No. 10. Focus on Systematizing and Upscaling Urban Solutions for Climate Change Mitigation. https://iopscience.iop.org/article/10.1088/1748-9326/ab2f4c

✓Part II: Kim H. (2021). Technologies for adapting to climate change: A case study of Korean cities and implications for Latin American cities. UN ECLAC. Project Document LC/TS.2021/54. https://www.cepal.org/es/node/54171

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