AGENDA – MORNING

10:45 – 11:45 **The pilot cities & the City Profiles**

Dr. Marius Mohr, Fraunhofer IGB; Trinidad Fernandez, Fraunhofer IAO; Catalina Diaz, University of Stuttgart – City Lab leaders

11:45 – 12:00 **Findings on the climate and risk assessments**

Sophie Mok, Fraunhofer IAO – Climate and expertise building leader

12:00 – 13:00 Lunch & networking

CITY LAB KOCHI

Dr Marius Mohr

Fraunhofer IGB

The pilot cities & the City Profiles

Kochi

MGI Final Conference 2023

9.5.2023, Dr. Marius Mohr

University of Stuttgart
Institute for Human Factors and Technology Management IAT

Fraunhofer

Supported by:

Federal Ministry for Economic Affairs and Climate Action

IKI INTERNATIONAL CLIMATE INITIATIVE

on the basis of a decision by the German Bundestag

Kochi / Cochin

- City: 600,000 inh.
- Agglomeration: 2.1 million inh.
- State of Kerala
- Good education system, not much industry
- Many people work abroad
- Tropical climate, two monsoon seasons
- Popular tourist location (Backwaters)
- Colonial heritage, peaceful co-existance of different religions
- Part of Indian 100 Smart Cities Mission

City Lab Kochi - Overview

- December 2018: „political“ Kick-Off
- May 2019: Workshop, selection of sectors: energy, housing, water
- January 2020: On-site assessment (2 weeks)
- Partners:
  - FhI‘s IGB, ISE, IBP, IAO
  - Fraunhofer India
  - NIUA
  - CSML Kochi / C-HED
  - Frankfurt School of Finance
- Delays due to signature of local partner, Covid 19

Kochi – close to the sea

Housing and built environment

Energy

Water

On-site: Interviews and site visits

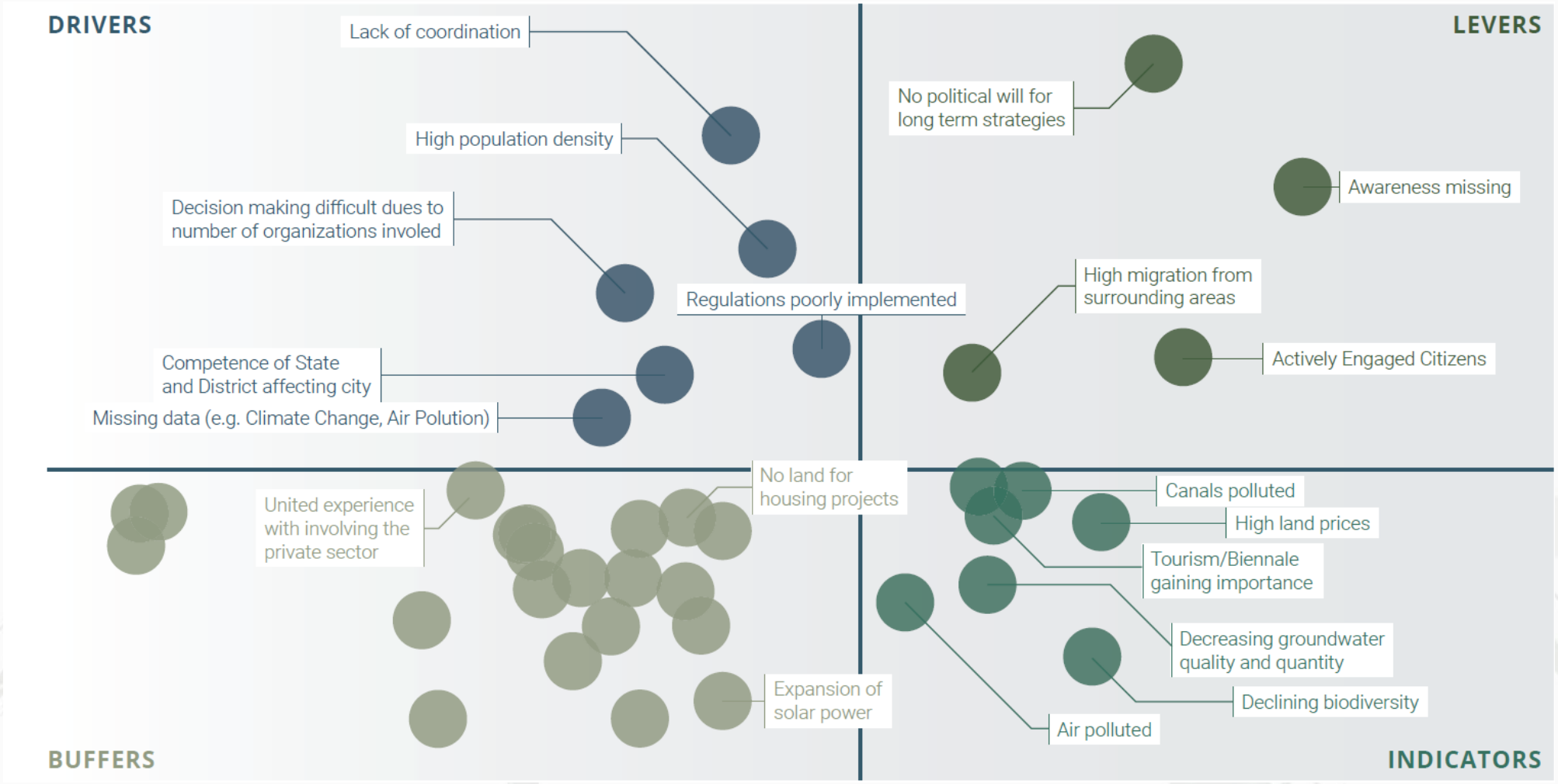
- Interviews with
- Administration (12)
- Private sector (4)
- Academia (2)
- NGO‘s (2)
- Sites visited:
- Brahmapuram landfill
- STP Elankulam
- CANALPY (Alappuzha)
- Slum Fort Kochi
- Marina One

Workshop on January 22nd, 2020

Indicators - water

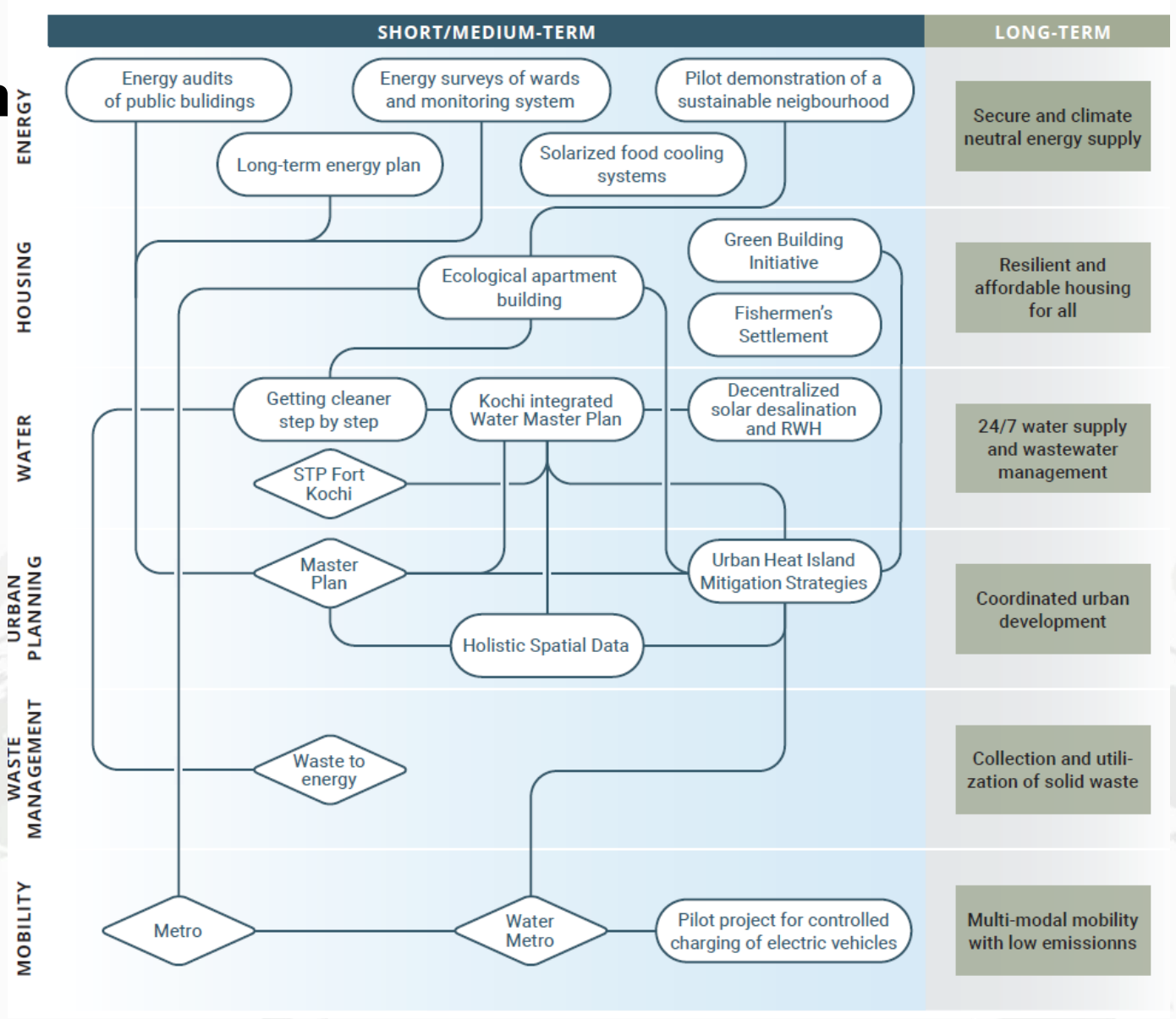
Indicator	Value	Unit	Source
% of water samples/ year that comply with national potable water quality standards	100	%	SAAP 2016-17, Government of Kerala
Annual consumption of water/capita of homes connected to the city water supply	145	Liters/capita /day	SAAP 2016-17, Government of Kerala
Water supply coverage	85	%	SAAP 2015-16, Government of Kerala
Water supplied from reuse of treated wastewater	0	%	KWA
Non-revenue water	ca. 60	%	KWA, C-HED
Share of households within the city that are connected to a sewer system	3	%	SAAP 2015-16, Government of Kerala
Coverage with toilets	95	%	SAAP 2016-17, Government of Kerala
Coverage of storm water drainage network	43	%	SAAP 2015-16, Government of Kerala

Impact Factors – cross-impact analysis

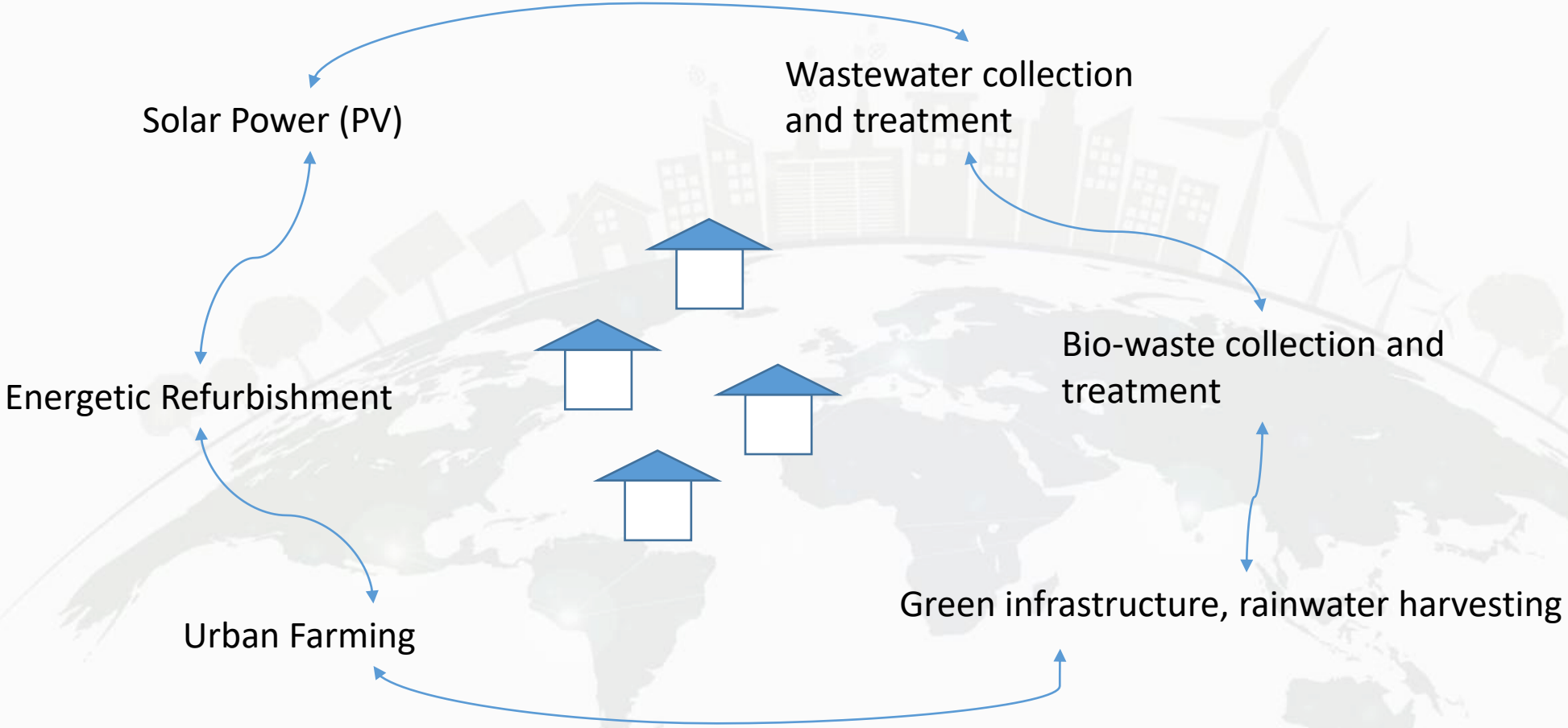


15 Project ideas

Strategy roadm



Sustainable Neighborhood Kochi – integrated infrastructure development



CONTACT

MORGENSTADT GLOBAL SMART CITIES INITIATIVE
GLOBAL APPROACH – LOCAL SOLUTIONS

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GLOBAL APPROACH – LOCAL SOLUTIONS

Thank you for your attention!

http://www.mgi-iki.com/

9.5.2023, Marius Mohr

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CITY LAB PIURA

Trinidad Fernández

Fraunhofer IAO

City Lab Piura

City Profile

MGI – Morgenstadt Global Smart City Initiative

MGI Final Conference, 09.05.2023 – Trinidad Fernandez

Universität Stuttgart

Fraunhofer

Universidad de Piura

Piura Municipalidad Provincial

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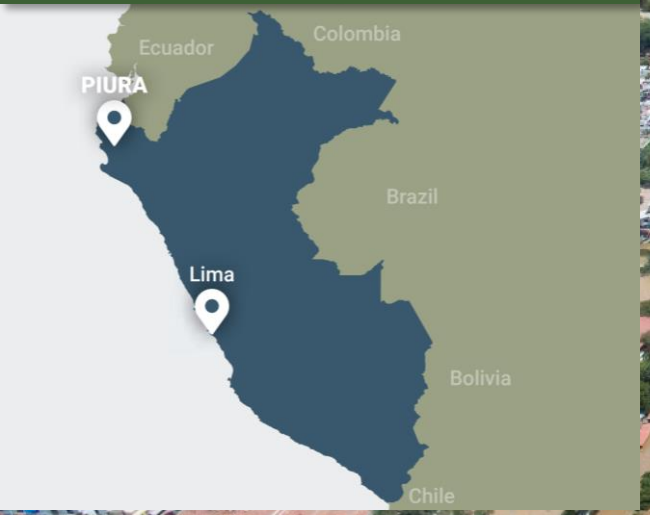
PIURA
(Peru)

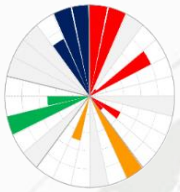


- Capital of the northwestern region called also Piura, located in the Sechura desert.
- Fifth most populated city (894,847 inhabitants) and the eight highest urban growth in Peru
- Hot desert-like climate, with a climatic variability of extraordinary rainfall and droughts due to El NiñoSouthern Oscillation events.
- Agriculture as a strong economic sector
- 1/3 of the population has at least one unmet basic such as access to housing, sanitation, etc.

CITY LAB PIURA: PROJECT STAGES

- **Objective of MGI:** Assessing, co-creating and implementing a long-term sustainable and innovation-based urban developing strategy

1 Definition of analysis sectors



2 Quantitative analysis

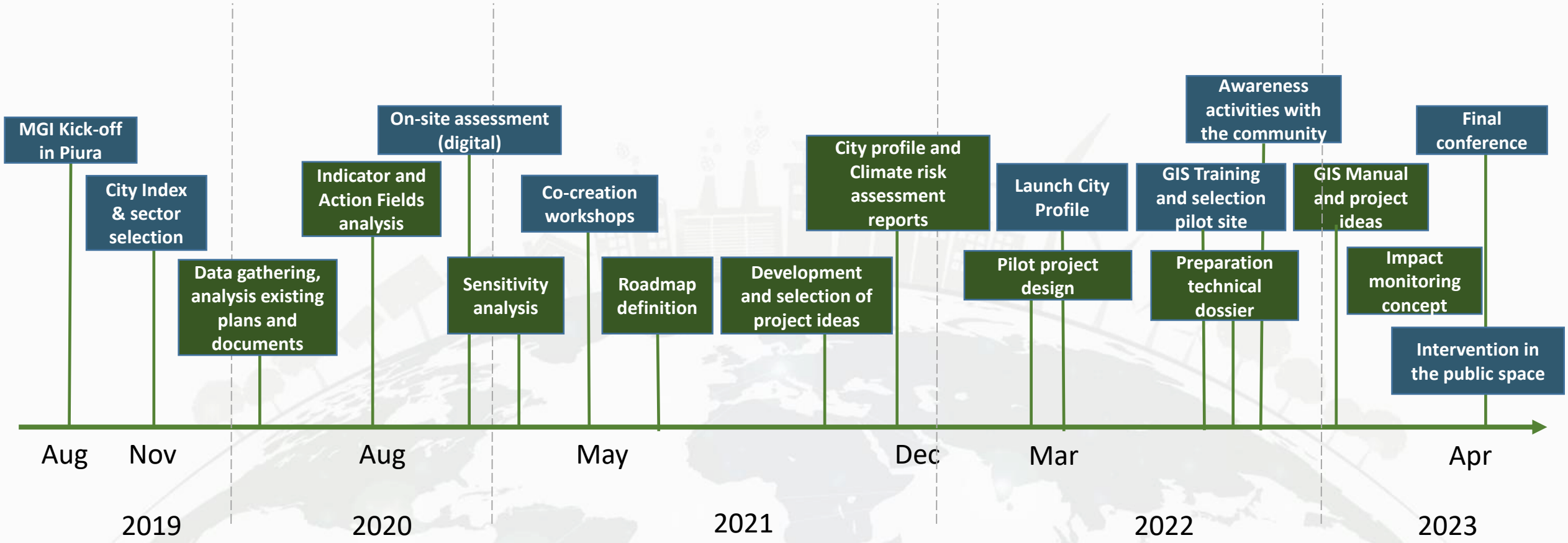
3 Stakeholder interviews and workshops

4 Development of project ideas

5 Roadmap

6 Implementation and capacity building

TIMELINE CITY LAB PIURA



Socios City Lab Piura

Fraunhofer

Universität Stuttgart

Frankfurt School of Finance & Management

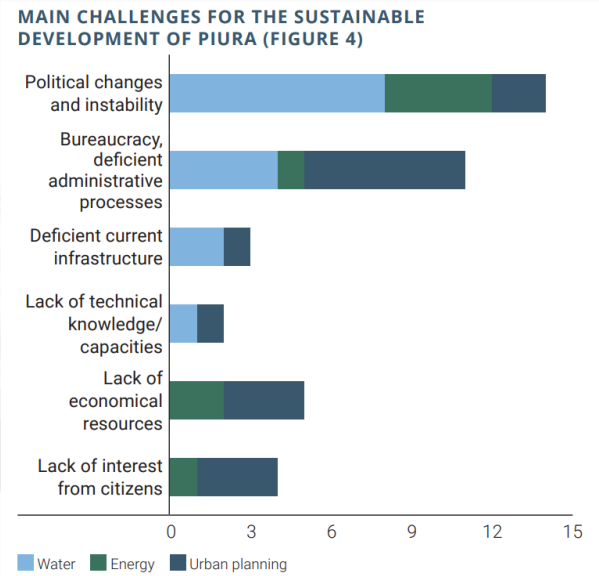
Universidad de Piura

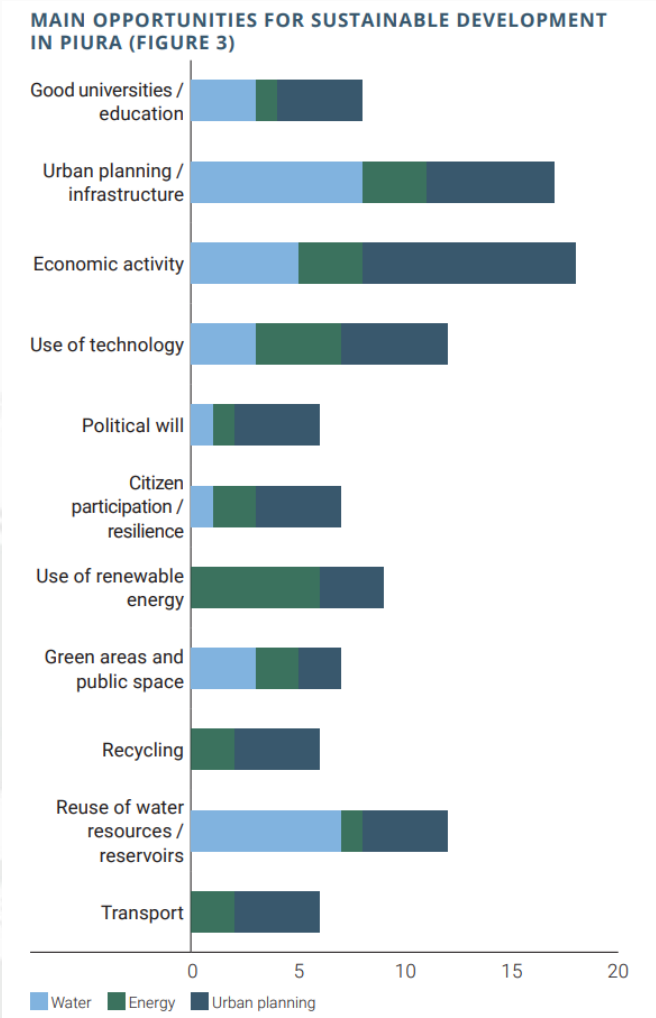
Piura Municipalidad Provincial

PROJECT KICK-OFF 2019

- MCI Index → 3 sectors identified: water, energy, urban planning

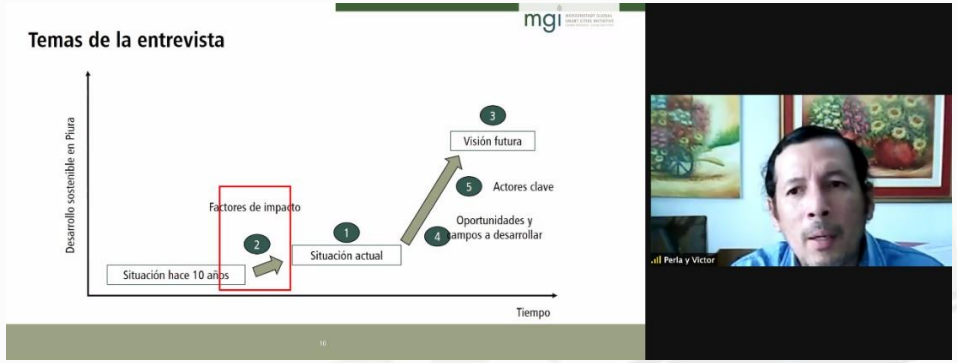
CHALLENGES AND OPPORTUNITIES

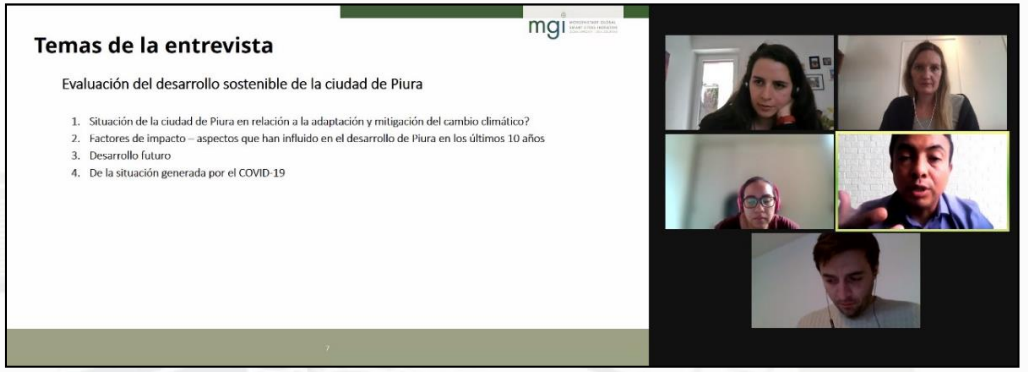


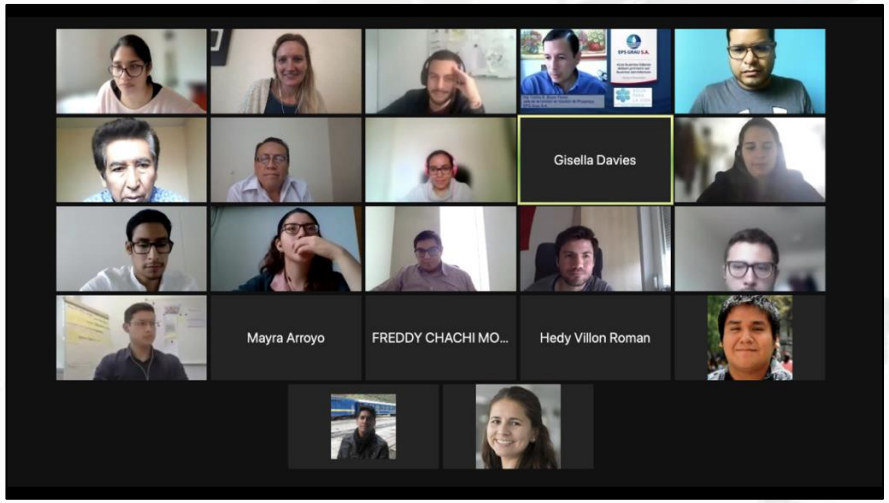


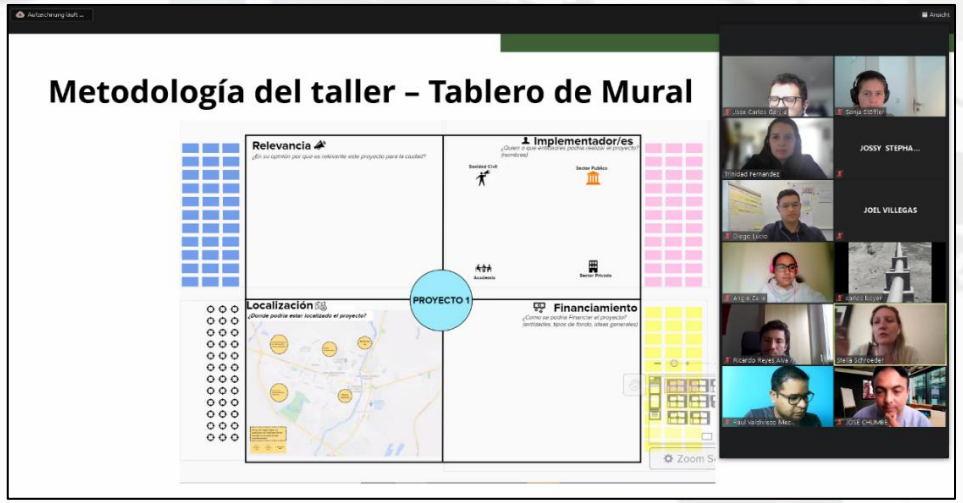
STAKEHOLDERS INTERVIEWS AND WORKSHOPS

- 27 interviews with local stakeholders, 3 co-creation workshops and virtual exchange activities









INDICATOR ANALYSIS AND VISION FOR EACH SECTOR

Urban planning

A model city of ecological, economical, and social sustainability with accessible public spaces, native vegetation, and adequately designed urban infrastructure for its inhabitants

CHALLENGES:

- Continuous urban sprawl and a population without access to essential services.
- Informal construction on and occupation of urban land.
- Poor access and high maintenance costs for green areas and recreation.
- Areas in the city are uninhabitable due to being in risk zones (underground basins, flooding).
- Lack of awareness and disinterested citizenry regarding the impact of climate change and sustainability.

INDICATOR	VALUE FOR PIURA	CHALLENGES AND SOLUTIONS
Population in households with two or more NBI (MPP, 2015)	23.2% AT THE DISTRICT LEVEL ~ 10% WITHIN THE URBAN AREA	In the case of Piura, in the districts that make up the metropolitan area, the most significant percentage of the population resides in inadequate physical housing and has at least one NBI, highlighting the vulnerability of its resident population.
Average annual population growth rate (INEI, 2019)	1.8%	This value reflects urban growth over the last ten years, which is increasing exponentially and predicted to continue with this trend. This growth is in line with the annual growth of the Piura economy (6.4%) and higher than the national average (4%) in 2018.
Green areas per capita (INEI, 2014)	1.75 m²	Compared to the WHO recommendation, which has established a minimum green area of between 10 m² to 15 m² per inhabitant distributed proportionally in terms of population density, the city has insufficient green areas. In Peru, only Lima, Arequipa and Tacna exceed 3 m² per inhabitant.

INDICATOR ANALYSIS AND VISION FOR EACH SECTOR

Water

A resilient city with an integrated approach to wáter Management under efficient articulation between the different governmental, private, academic and social levels

CHALLENGES:

- Inefficient water resource management.
- Low quality of water for human consumption.
- Resilience to atmospheric phenomena and climate change.
- Flood control and lack of efficient urban storm drainage systems.
- Poor articulation between the different sector levels of government, private, academic, and social.

INDICATOR	VALUE FOR PIURA	CHALLENGES AND SOLUTIONS
Water consumption (EPS Grau, 2018)	**130** L/D/CAPITA WATER CONSUMPTION OF PEOPLE WHOSE HOUSEHOLDS ARE CONNECTED TO THE CITY'S WATER NETWORK	One of the best-categorized indicators is "Water consumption," which is within the range recommended by the Inter-American Development Bank (120-200 L/d/capita).
Storm drainage coverage (Consorcio de Inundaciones, 2019)	**40%** OF THE CITY THAT HAS A STORMWATER DRAINAGE SYSTEM	The current stormwater drainage system only covers 40% of the rainwater runoff from the districts of metropolitan Piura, which generates underground basins in large parts of the city, making the population vulnerable. An articulated storm drainage master plan for the city is required, taking green and grey infrastructure into account.
Water samples meet national drinking water quality standards. (MVCS, 2015)	**80%** OF THE TOTAL NUMBER OF WATER SAMPLES COMPLYING WITH THE ADMISSIBLE VALUES	Although the IDB considers critical values, the MVCS plans to comply with 100% by 2036. This implies significant investments by the government in the long term.
Operating margin of drinking water supply (EPS Grau, 2018)	**– 43%** DIFFERENCE BETWEEN THE COST OF WATER SUPPLY AND THE TARIFFS COLLECTED	The negative value implies that the operating costs are higher than the required investment in operation and maintenance on the drinking water supply system. This necessitates the implementation of system optimization projects.
Non-revenue water (EPS Grau, 2018)	**50.31%** THE RATIO OF NON-REVENUE WATER TO TOTAL WATER SUPPLY	Non-revenue water refers to supplied water that is "lost" in the network before reaching the customer due to the age of the system, theft, or illegal use, which results in poor service from the water utility due to a lack of revenue.

INDICATOR ANALYSIS AND VISION FOR EACH SECTOR

Energy

A city with a reliable, sustainable, and equitable energy supply.

CHALLENGES:

- Improving electricity supply and modern energy access particularly in rural areas, is necessary for meeting basic needs and reducing poverty and inequality in the region.
- A lack of regulations for the implementation and use of renewable energy impedes the use of these technologies.
- A lack of awareness and sensitization regarding energy consumption and savings

INDICATOR	VALUE FOR PIURA	CHALLENGES AND SOLUTIONS
Total energy demand per capita (Own calculation)	**3,400** KWH/A/CAP IN 2018	Although these values are low compared to other countries internationally, and reflect the moderate socio-economic level in Piura, economic growth will cause these values to increase substantially in the future. In particular, based on the developed energy model, we estimate an increase of total energy demand per capita to close to 20,000 kWh by 2040, while CO_2 emissions are projected to be close to 15 tCO_2 per capita. The implementation of energy efficiency measures as well as the supply of energy utilizing renewable technologies are two key strategies to reduce energy consumption and CO_2 emissions. This could bring many benefits beyond energy savings and CO_2 emissions. Together, they could reduce electricity costs for households, industries, commerce, and the public sector; they could generate local jobs; they could reduce local pollution and improve air quality; and they could create activities that drive economic growth in the region, among many other things.
CO_2 emissions per capita (MINAM, n.d.)	**2.8** T CO_2EQ/A/CAP IN 2018	
Electricity demand in the residential sector per capita (Own calculation)	**340** IN 2018	
Households using firewood (MINAM, n.d.)	**30%** FOR COOKING **6%** FOR HEATING WATER	The high use of firewood represents a severe risk for the low socio-economic population. Household air pollution is a cause of diseases such as strokes, ischemic heart disease, chronic obstructive pulmonary disease (COPD), and lung cancer. Also, about half of all pneumonia deaths among children under five years of age are due to particles inhaled from household air pollution (WHO, 2021).

ACTION FIELD ANALYSIS

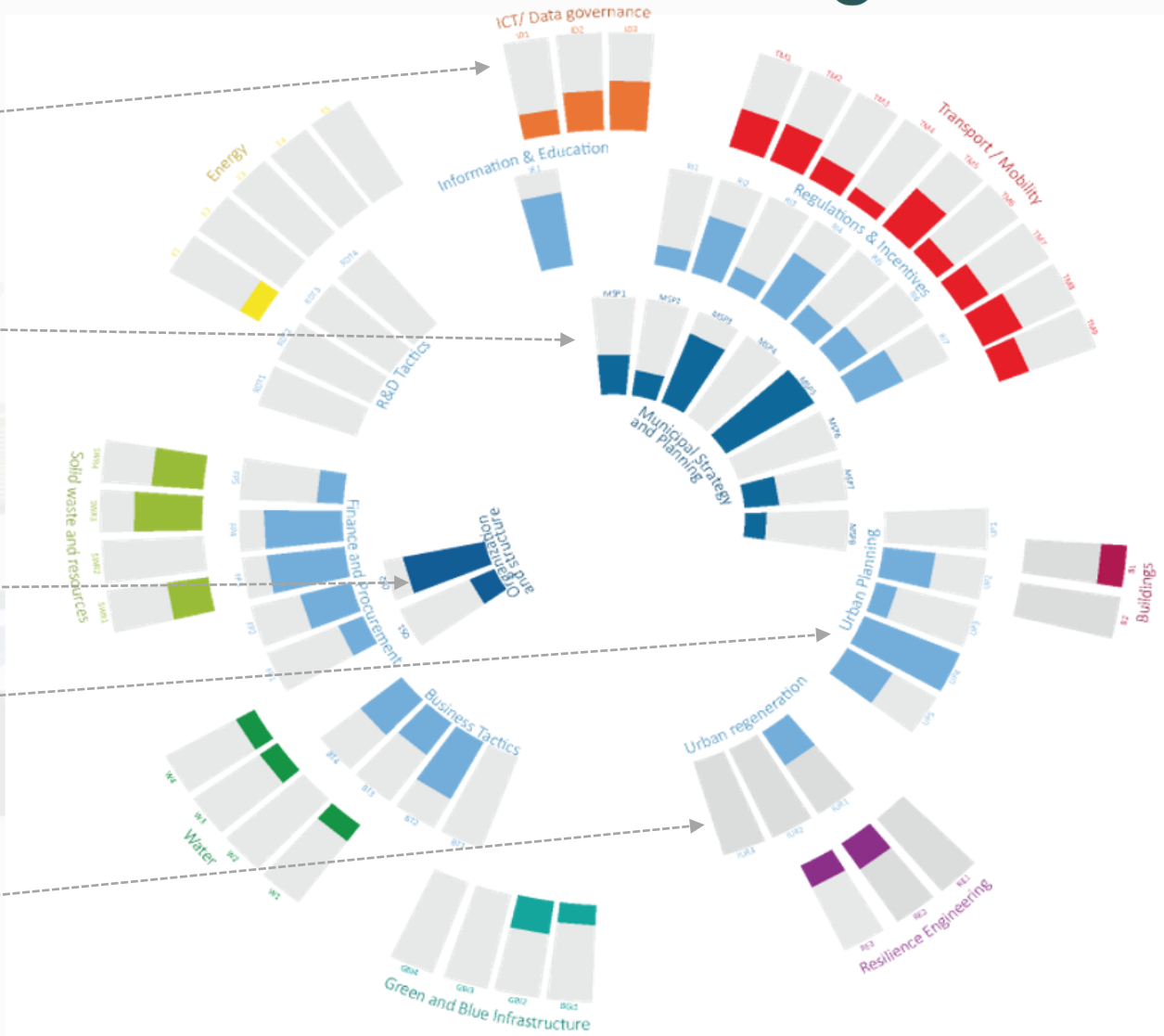
ICT / DATA GOVERNANCE
Work on efficient data management, as well as promote the implementation of information systems that facilitate interdisciplinarity, accuracy and transparency.

MUNICIPAL STRATEGY AND PLANNING
Pursue city-region collaboration for environmental protection and sustainability. Develop a municipal innovation strategy that addresses resilience and planning. Work on projects and strategies that transcend political periods as long-term plans despite electoral periods. Define a municipal climate change management and action plan for climate change mitigation. Lack of long-term sustainability objectives.

ORGANIZATION AND STRUCTURE
Creation of interdepartmental administrative structures for the coordination of cross-cutting issues such as those related to urban planning and climate change.

URBAN PLANNING
Incorporate development objectives and guidelines for sustainable district development, considering small scale and mixed uses. Encourage active participation of citizens. Lack of urban planning and management tools. Work on sustainability solutions in long-term planning.

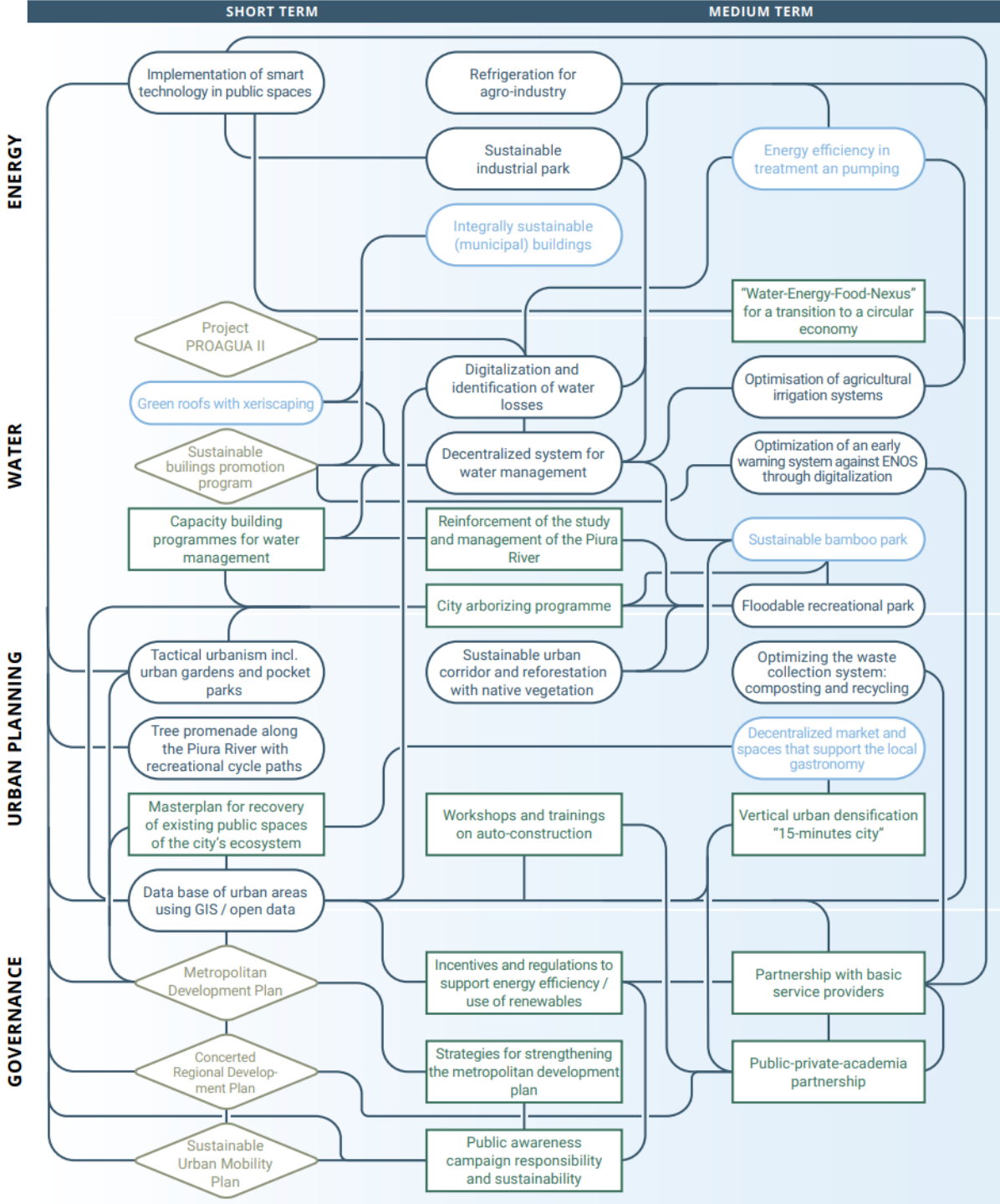
URBAN REGENERATION
Potential for green approaches to urban regeneration.



SENSITIVITY ANALYSIS: IMPACT FACTORS

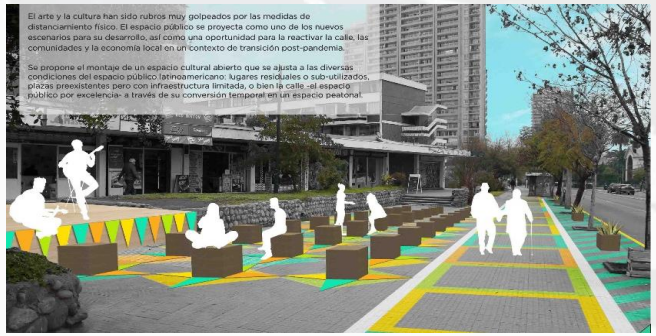
- **Drivers:** have the potential to drive change and remain stable for longer, however, they are often resistant to change:
- **Levels:** have a high impact on many factors and are also influenced by many others. These include the crucial factors that need to be addressed to transform the system in the desired direction.
- **Indicators:** have little influence but are strongly influenced by others.
- **Buffers:** are relatively inactive in both directions.

CITY LAB PIURA ROADMAP



Tangible projects, 12 pre-selected projects.
Plans or measures that were part of the project ideas but are not tangible projects.
Current Projects or plans that the city is developing and are relevant for the projects in the Roadmap.
Tangible projects, not further detailed.

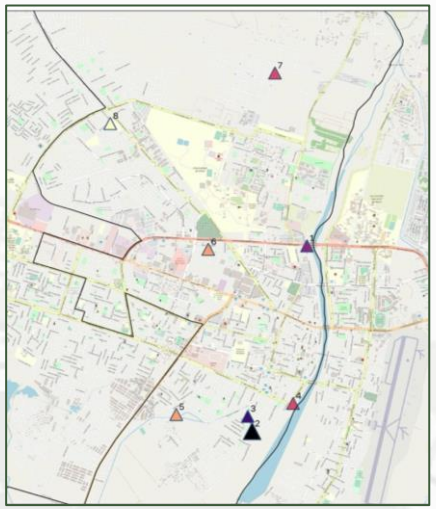
CITY LAB PIURA ROADMAP

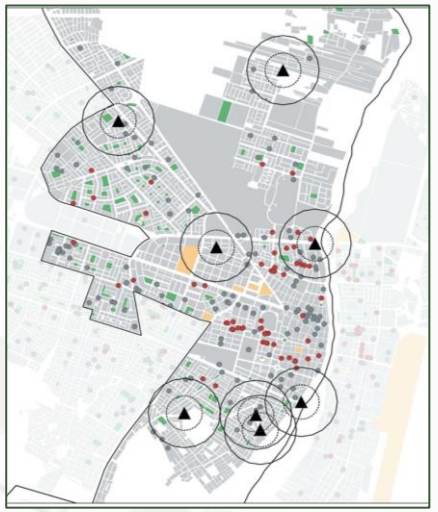


PRESENTATION OF RESULTS IN PIURA

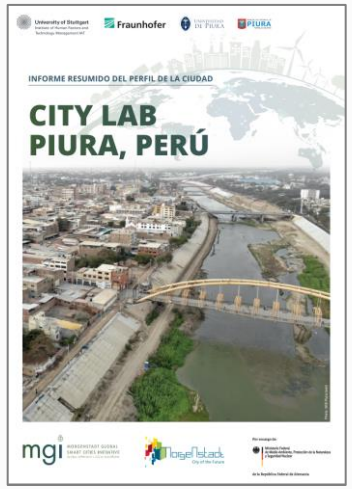
PILOT PROJECT SELECTED FOR IMPLEMENTATION

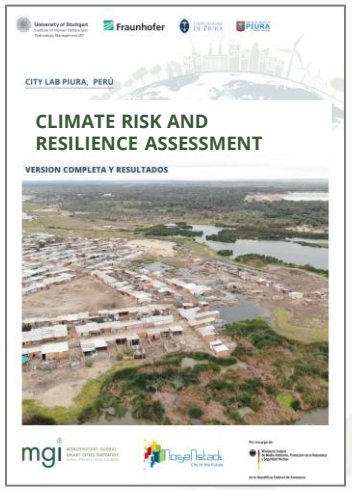
Reconverting a small illegal dump site into a new public space

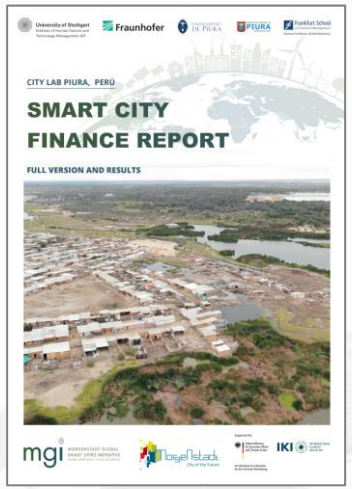


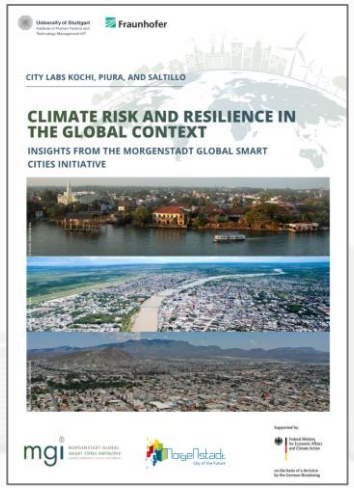


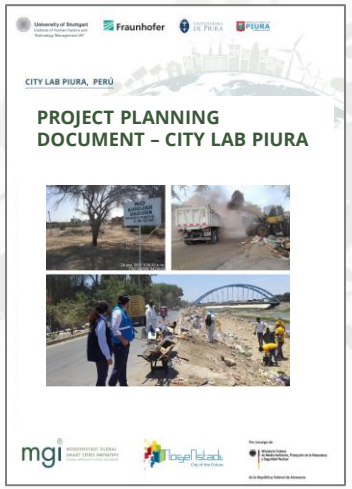
RESULTS: *REPORTS AND DOCUMENTS*

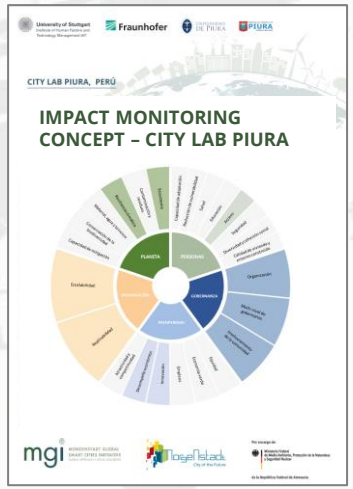


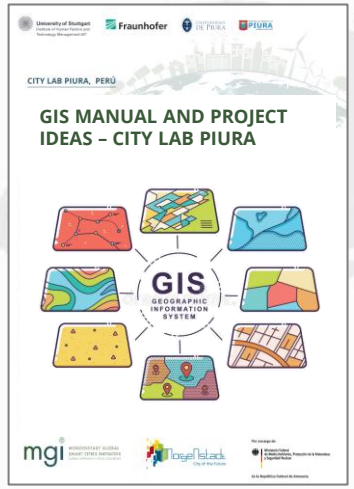






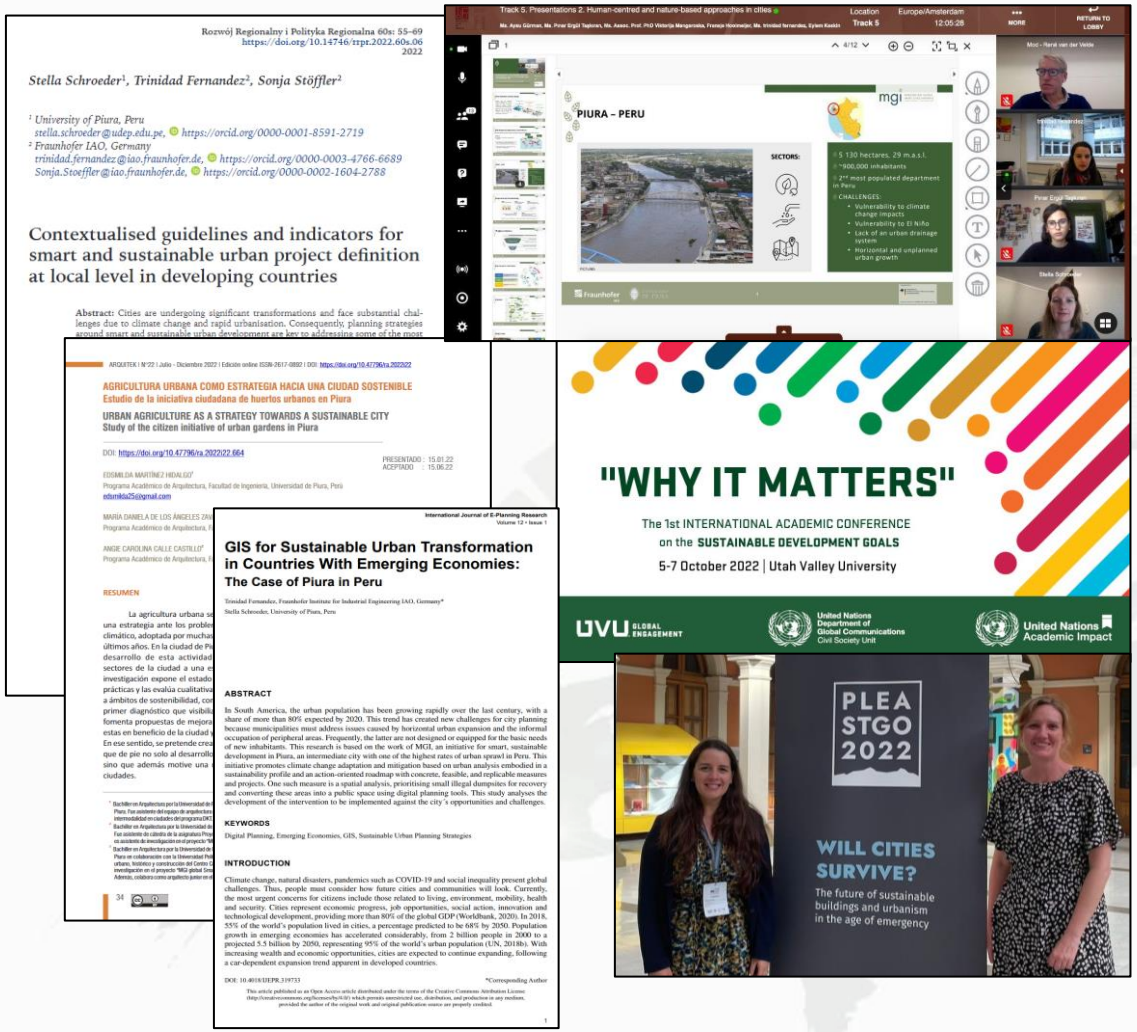






- **City Lab Piura Summary Report.** *Available en:* https://doi.org/10.24406/h-418573
- **City Lab Piura Complete Report.** *Available at:* https://s.fhg.de/L5S
- **Climate Risk and Resilience Assessment of Piura.** *Available at:* https://doi.org/10.24406/publica-116
- **Smart City Financing Report for Piura.** *Available at:* https://s.fhg.de/ri6
- **Climate Risk and Resilience in the Global Context: City Labs of Kochi (India), Piura (Peru) and Saltillo (Mexico).** *Available at:* https://s.fhg.de/d6F
- **Practical Guide to support the implementation of climate change projects through public investment in Peru.** *Available at:* https://doi.org/10.24406/publica-985
- **Project Planning Document.** *Internal document.*
- **Impact Monitoring Concept for the Pilot Project in Piura.** *Internal document.*
- **GIS Manual and Project ideas in Piura.** *Internal document.*

RESULTS: *SCIENTIFIC PUBLICATIONS*



- Fernandez, T., Schroeder, S. (2021): **Global approach - local solutions. Sectorial planning approaches for a sustainable urban future in Piura, Peru.** *Available at: https://doi.org/10.24404/6151bea604e942000831d6f0*
- Schroeder, S., Fernandez, T., Stoeffler, S. (2022): **Contextualised guidelines and indicators for smart and sustainable urban project definition at local level in developing countries.** *Available at: https://doi.org/10.14746/rrpr.2022.60s.06*
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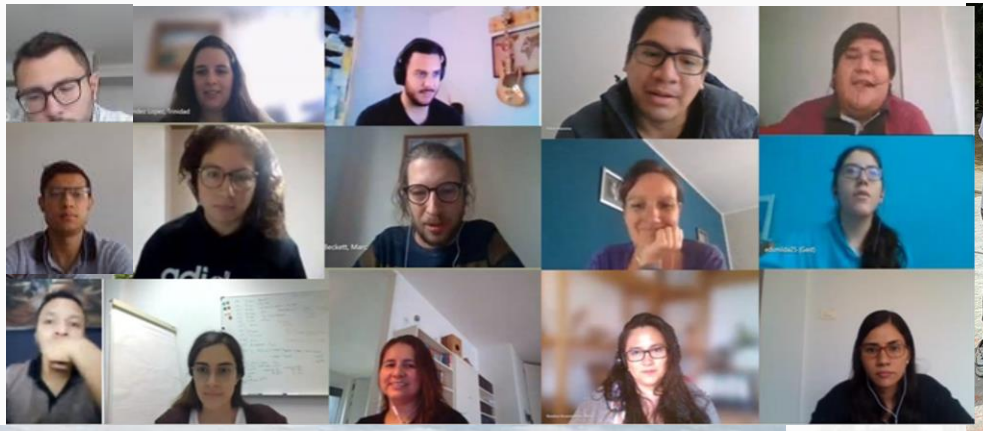
- Martínez, E., Zavala, D., Calle, A. (2022): **Agricultura urbana como estrategia hacia una ciudad sostenible. Estudio de la iniciativa ciudadana de huertos urbanos en Piura.** *Available at: https://revistas.upt.edu.pe/ojs/index.php/arquitek/article/view/664/710*
- Fernandez, T., Schroeder, S. (2023): **Impact-Based Project Ideas for Sustainable Cities: The Case Of Digital Planning Tools In Piura, Peru.** *Available at: https://plea2022.org/wp-content/uploads/2023/03/PROCEEDINGS-ONSITE-FINAL-MARZO.pdf*
- Schroeder, S. (2023): **Understanding Informal Production Of Public Spaces For A New, Sustainable Urban Planning Strategy. Case Study Of Community Gardens In Piura, Peru.** *Available at: https://plea2022.org/wp-content/uploads/2023/03/PROCEEDINGS-ONSITE-FINAL-MARZO.pdf*
- Fernandez, T., Schroeder, S. (2023): **GIS for Sustainable Urban Transformation in Countries With Emerging Economies: The Case of Piura in Peru.** *Available at: https://www.igi-global.com/gateway/article/319733*

THE MGI CITY LAB PIURA COMMUNITY















THANK YOU FOR YOUR ATTENTION!

mgi MORGENSTADT GLOBAL SMART CITIES INITIATIVE
GLOBAL APPROACH – LOCAL SOLUTIONS

Visit our project website:
www.mgi-iki.com/en/

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CITY LAB SALTILLO

Catalina Diaz

University of Stuttgart IAT

City Lab Saltillo, Mexico

City Profile

MGI - Global Smart Cities Initiative - Morgenstadt

09.05.2023 - Catalina Diaz

University of Stuttgart
Institute for Human Factors and Technology Management IAT

IMPLAN
INSTITUTO MUNICIPAL DE PLANEACIÓN SALTILLO

Fraunhofer

Tecnológico de Monterrey

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on the basis of a decision by the German Bundestag

SALTILLO
(Mexico)

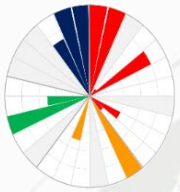
- Capital of the northeastern state of Coahuila de Zaragoza.
- Located in the desert of Coahuila.
- Semi-arid and dry climate, high solar radiation
- High population growth, adding more than 25,000 inhabitants each year
- One of the most industrialized areas in Mexico
- Economy based on industrial activities (automobiles, machinery, steel)

PROJECT KICK-OFF 2019

CITY LAB SALTILLO: PROJECT STAGES

- **Objective of MGI:** Assessing, co-creating and implementing a long-term sustainable and innovation-based urban development strategy

1 Definition of analysis sectors



2 Quantitative analysis

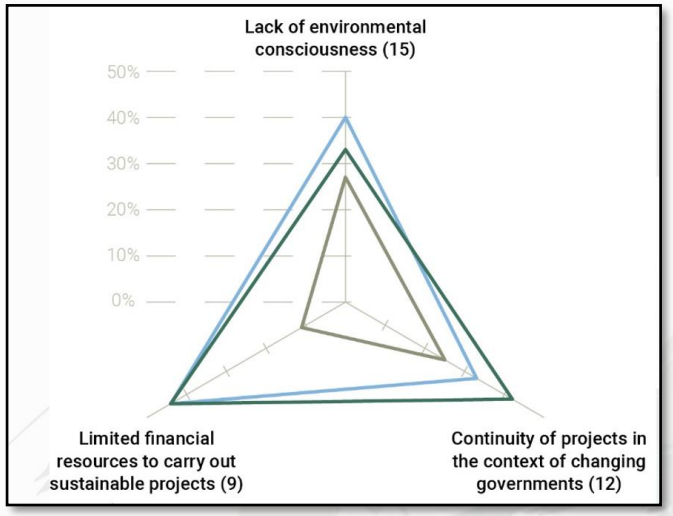
3 Stakeholder interviews and workshops

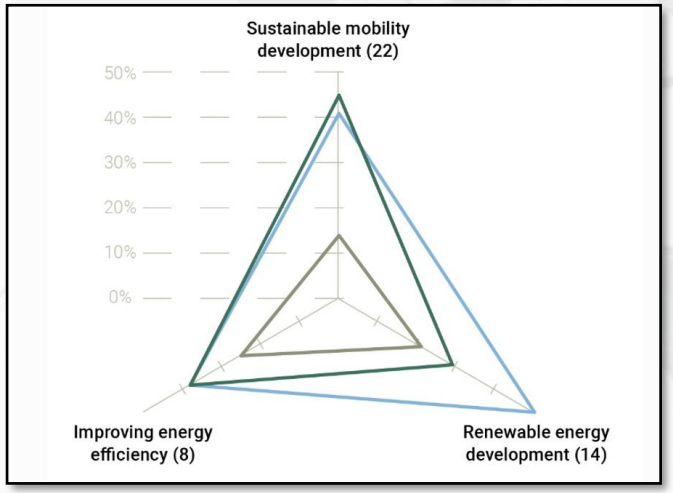
4 Development of project ideas

5 Roadmap

6 Implementation and capacity building

CHALLENGES AND OPPORTUNITIES





Challenges

- Challenge of reducing individual mobility and shifting to cleaner transportation technologies
- Challenge of applying long-term incentives, lack of environmental awareness and limited financial resources

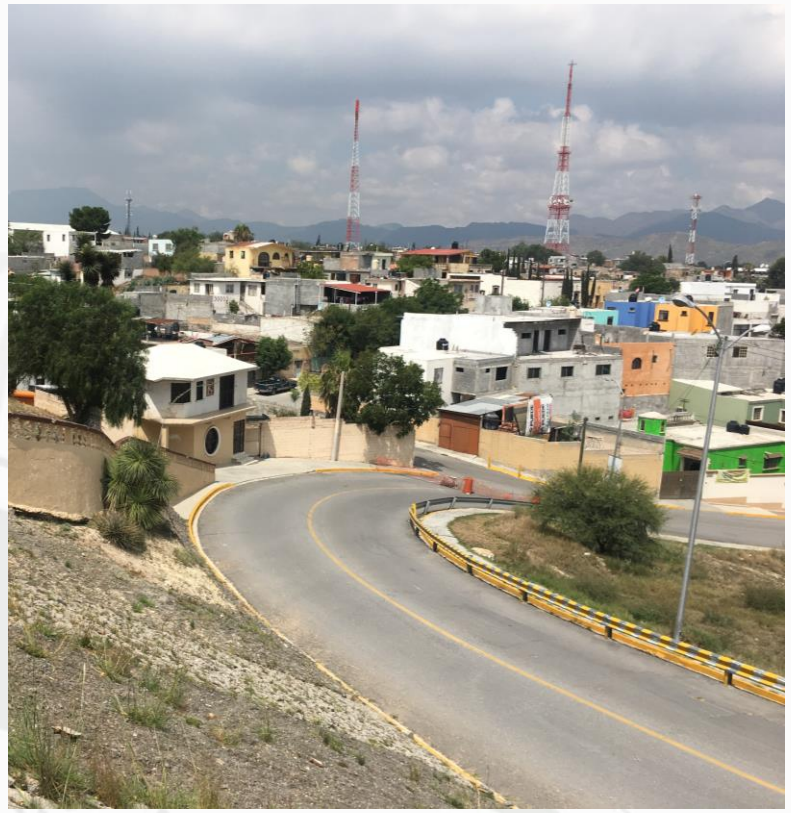
Opportunities

- Opportunity to improve resilience in the face of worsening water shortages
- Potential to improve energy efficiency and increase renewable energies

Sector público Sector académico Sector privado

ENERGY SECTOR

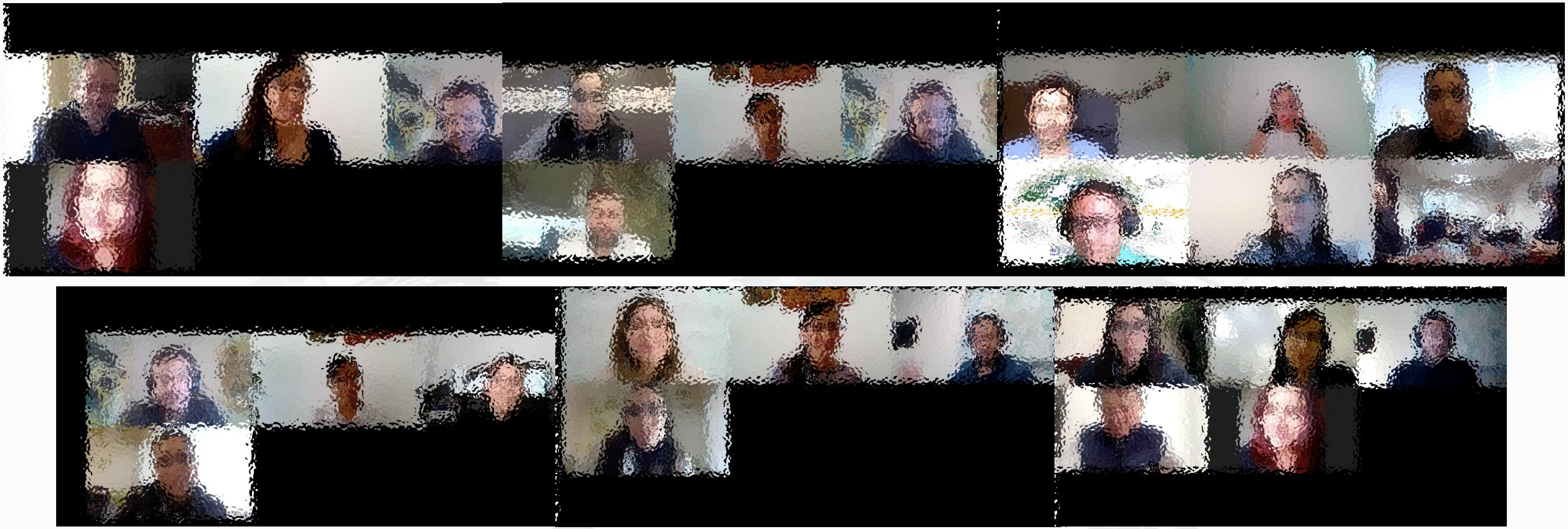
WATER SECTOR



MOBILITY SECTOR

STAKEHOLDERS INTERVIEWS AND WORKSHOPS

City Lab Methodology (On-site phase) applied for the first time in a virtual format



ENERGY SECTOR

VISION

WORLD-LEADING INDUSTRY AND BUSINESS IN ENERGY EFFICIENCY, SOLAR ELECTRICITY SELF-SUFFICIENCY BY TAKING ADVANTAGE OF UNIQUE SOLAR POTENTIAL

CHALLENGES
- Improve energy efficiency
- Use renewable electricity
- Promote public mobility
- Promote electric mobility

SOLUTIONS
- World leaders in sustainable industrial parks, harvesting potentials in energy efficiency and photovoltaic self-supply
- Awareness events
- Universities as solution providers
- Streetcars to industrial parks, electric busses

INDICATOR	VALUE FOR SALTILLO	CHALLENGES AND SOLUTIONS
Total energy use per capita	>12,000 kWh PER PERSON PER YEAR	High energy demand in the city due to its industrial parks and transportation system. Implementation of efficiency measures in the industrial sector and alternative mobility solutions.
Share of renewable energies in the power mix	< 20% GRID ELECTRICITY < 0.1% SELF-SUPPLY	The municipal landfill for electricity generation currently generates only 0.1 to 0.5% of the demand. Large solar potential to improve self-sufficiency in renewable energy.
CO_2 emissions per capita	3.7 TONS OF CO_2 PER PERSON PER YEAR EXCLUDING ELECTRICITY EMISSIONS, OR 4.7 TONS INCLUDING ELECTRICITY	To meet the objectives of the Paris agreement, this value must be reduced to zero. This implies the abandonment of fossil fuels in favor of renewable energy.

WATER SECTOR

VISION

SPONGE CITY WITH GREEN AND BLUE INFRASTRUCTURE INTEGRATED INTO THE URBAN FABRIC AND EXCELLENT WATER EFFICIENCY

CHALLENGES
- Absolute water shortage
- Dependence on overexploited aquifiers
- Flooding and lack of rainwater drainage
- Rivers in bad condition

SOLUTIONS
- Water resource master plan
- Reduce overexploitation of aquifiers
- Restoration of surface water bodies
- Urban green space strategy
- Sustainable buildings with green roofs
- Promotion of wastewater reuse for irrigation and industrial uses

INDICATOR	VALUE FOR SALTILLO	CHALLENGES AND SOLUTIONS
Water sustainability (CCRB 2019)	**–16,100,000.00** m^3/YEAR	This value should always be ≥ 0 for sustainable resource management. Water extracted for economic activities should not exceed the water resources infiltrating the exploited aquifers.
Water security (CONAGUA 2020a, 2020c, 2020b)	**1,119.32** m^3/CAP/YEAR	This value falls into the category of absolute water scarcity according to the Falkenmark index. A limiting factor is the annual rainfall in the region.
Water Metering (AGSAL 2020)	**100%**	Unalterable but relevant factor in understanding the struggle associated with water management in Saltillo. Water is unevenly available in the region and over time.
Percentage of reused treated wastewater (Saltillo Gobierno Municipal 2020)	**7%**	Opportunity for Saltillo to develop its capacity to use alternative water resources. By increasing the reuse of treated water, pressure on aquifers can be reduced.

MOBILITY SECTOR

VISION

EXCELLENT PUBLIC MOBILITY, USE OF NON-MOTORIZED TRANSPORTATION, A CITY WHERE EVERYTHING IS ALWAYS WITHIN FIFTEEN MINUTES' REACH

CHALLENGES

- Reduce individual mobility
  - Public mobility and intermodality
  - Non-motorized mobility
- Transport-oriented urban development
- Vehicle verification

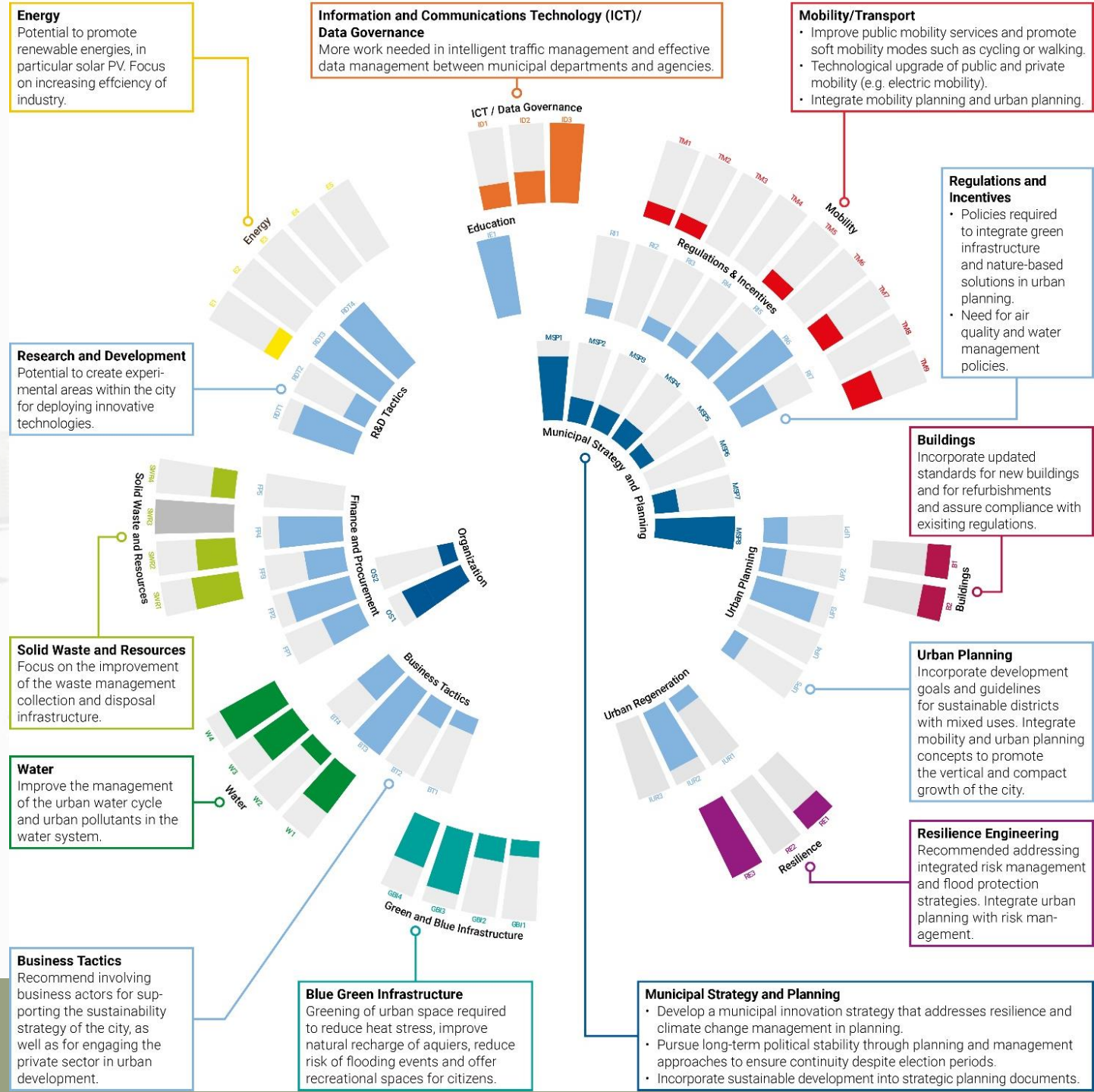
SOLUTIONS

- Comprehensive Mobility Master Plan
- Pedestrian areas (e.g. historic center)
- Mobility as a (public) service
- Technological updating of public transports
- Vehicle verification program
- Strategic Alliances: business, government, academia

INDICATOR	VALUE FOR SALTILLO	CHALLENGES AND SOLUTIONS
Road density (IMPLAN 2015)	**411.9 km** PER 100,000 INHABITANTS; **21 km** PER 100 km²	Saltillo has considerably better road coverage compared to other Latin American countries.
Annual growth rate of total private vehicles (IMPLAN 2015)	**3.78%**	The private vehicle fleet in Saltillo is increasing. Traveling by car is still more efficient than traveling by public transportation.
Percentage of traffic light intersections with total pedestrian crossings in relation to total traffic light intersections (IMPLAN 2015)	**5%**	Need to work on alternative city concepts, such as the fifteen-minute city, supported by city revitalization and densification strategies.

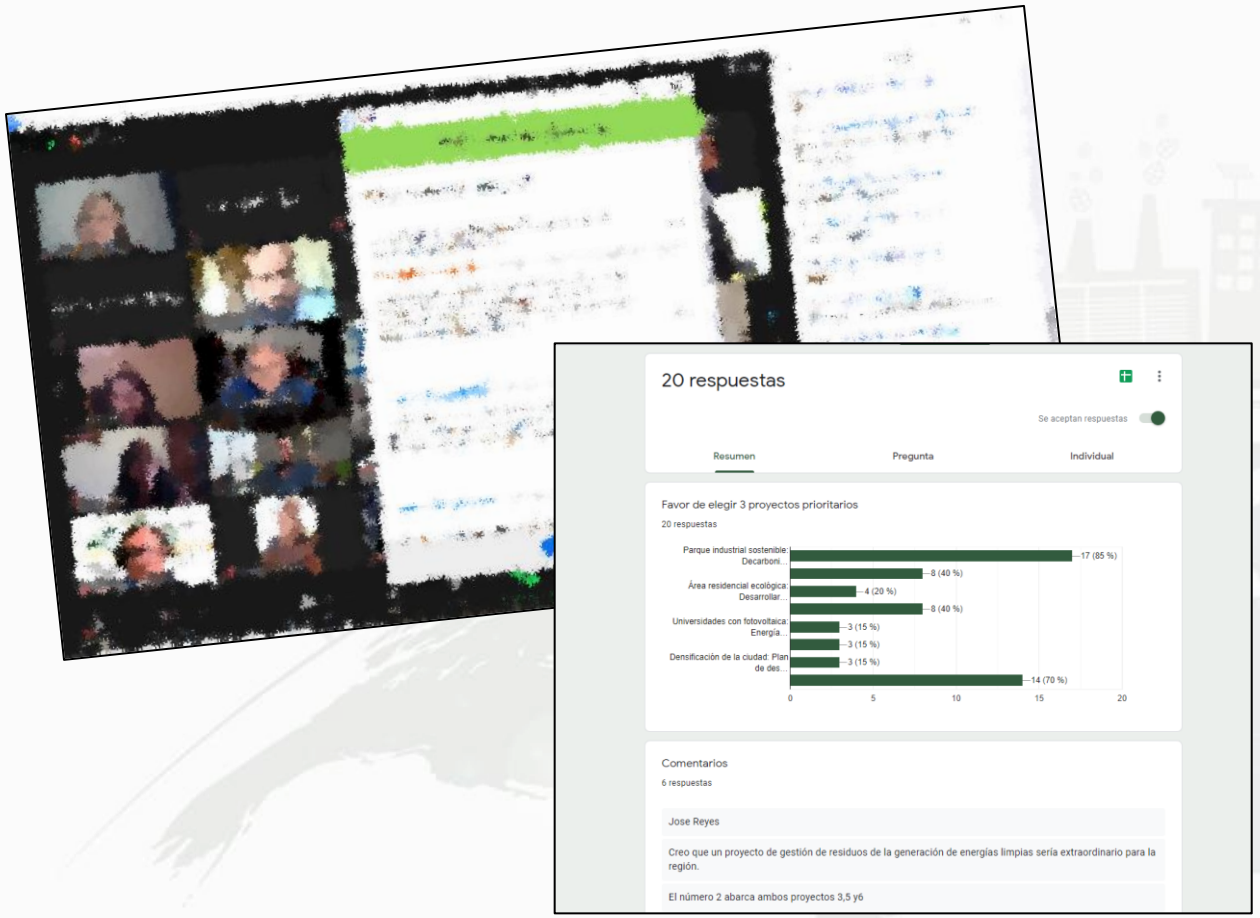
ACTION FIELD ANALYSIS

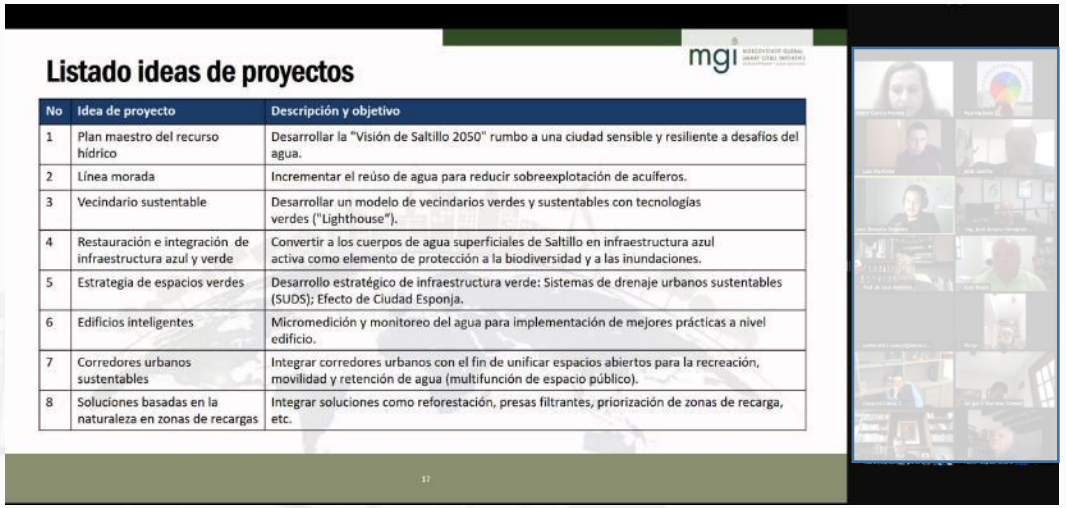
- Shows a wide variety of areas that need to be worked on
- Emphasizes the importance of projects that address
  - Green and blue infrastructure
  - Promotion and intermodality of public transport systems
  - High energy efficiency



MORGENSTADT GLOBAL SMART CITIES INITIATIVE
GLOBAL APPROACH – LOCAL SOLUTIONS

CO-CREATION SESSIONS



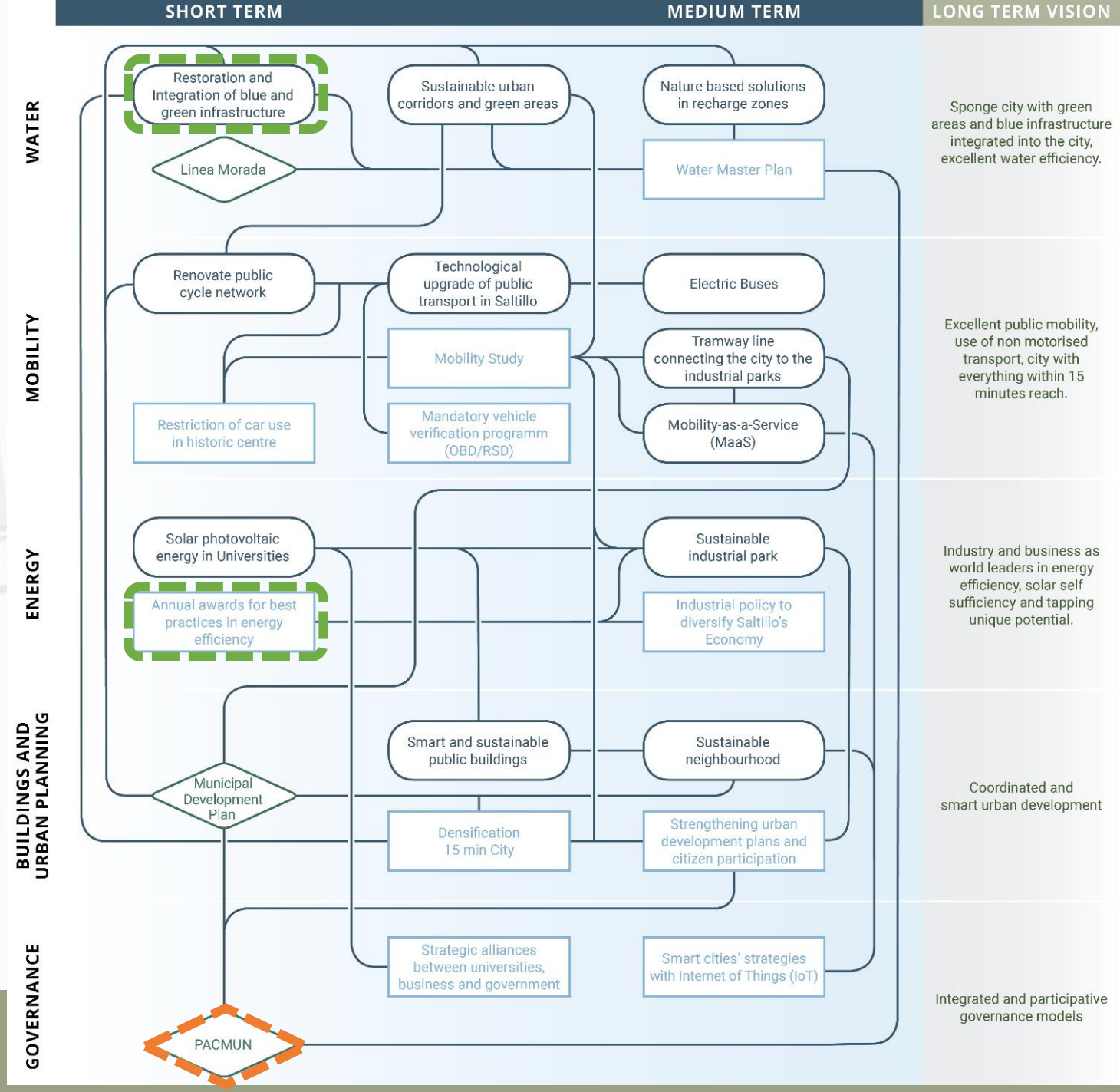


No	Idea de proyecto	Descripción y objetivo
1	Plan maestro del recurso hídrico	Desarrollar la "Visión de Saltillo 2050" rumbo a una ciudad sensible y resiliente a desafíos del agua.
2	Línea morada	Incrementar el reúso de agua para reducir sobreexplotación de acuíferos.
3	Vecindario sustentable	Desarrollar un modelo de vecindarios verdes y sustentables con tecnologías verdes ("Lighthouse").
4	Restauración e integración de infraestructura azul y verde	Convertir a los cuerpos de agua superficiales de Saltillo en infraestructura azul activa como elemento de protección a la biodiversidad y a las inundaciones.
5	Estrategia de espacios verdes	Desarrollo estratégico de infraestructura verde: Sistemas de drenaje urbanos sustentables (SUDS); Efecto de Ciudad Esponja.
6	Edificios inteligentes	Micromedición y monitoreo del agua para implementación de mejores prácticas a nivel edificio.
7	Corredores urbanos sustentables	Integrar corredores urbanos con el fin de unificar espacios abiertos para la recreación, movilidad y retención de agua (multifunción de espacio público).
8	Soluciones basadas en la naturaleza en zonas de recargas	Integrar soluciones como reforestación, presas filtrantes, priorización de zonas de recarga, etc.

CITY LAB SALTILLO ROADMAP

SYMBOLOGY

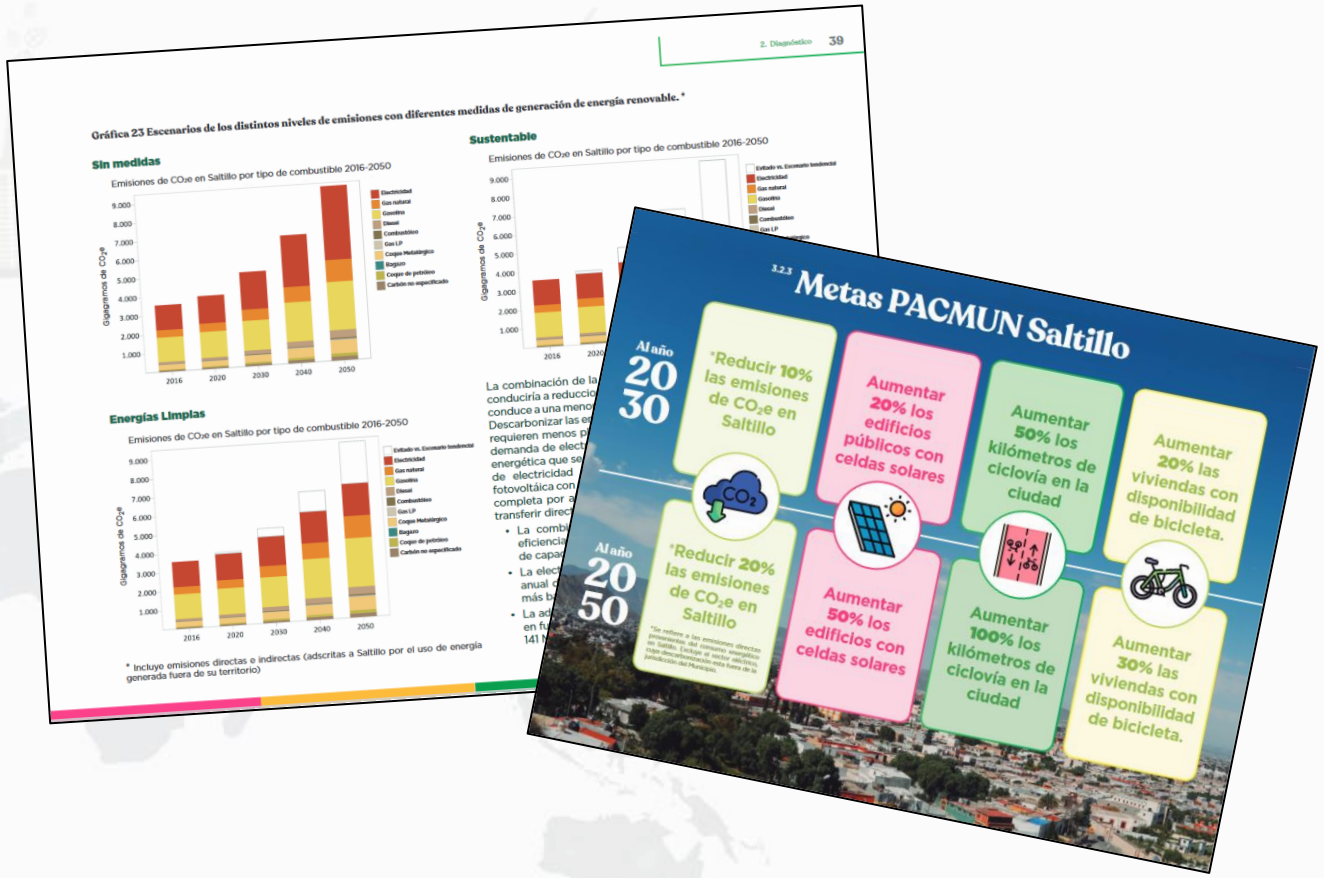
- Tangible physical interventions
- Regulatory projects
- Projects or plans that exist already in the city



PRESENTATION OF RESULTS IN SALTILLO

MORGENSTADT GLOBAL SMART CITIES INITIATIVE
GLOBAL APPROACH – LOCAL SOLUTIONS

CITY LAB RESULTS KEY TO FINALISING THE MUNICIPAL CLIMATE ACTION PLAN - PACMUN



PILOT PROJECTS SELECTED FOR IMPLEMENTATION

RESTAURATION AND INTEGRATION OF BLUE AND GREEN INFRASTRUCTURE

Climate adaptation project

Funded within the MGI Project

ANNUAL AWARDS FOR BEST PRACTICES IN ENERGY EFFICIENCY

Climate mitigation project

Funded outside the MGI Project

THANK YOU FOR YOUR ATTENTION

mgi
MORGENSTADT GLOBAL SMART CITIES INITIATIVE
GLOBAL APPROACH – LOCAL SOLUTIONS

M.Sc. Catalina Diaz
City Lab leader

M.Sc. Gabriela de Valle
City Lab local leader

M.Sc. Carmina Villarreal
Support local leader

Dr. Eduardo Santillán
Local academic expert

University of Stuttgart
Institute for Human Factors and Technology Management IAT

IMPLAN
INSTITUTO MUNICIPAL DE PLANEACIÓN SALTILLO

Fraunhofer

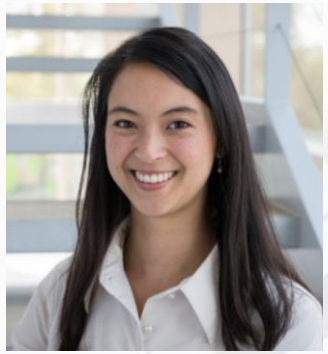
Tecnológico de Monterrey

Supported by:

Federal Ministry for Economic Affairs and Climate Action

IKI INTERNATIONAL CLIMATE INITIATIVE

on the basis of a decision by the German Bundestag



RISK AND RESILIENCE ASSESSMENT

Sophie Mok

Fraunhofer IAO

Climate Risk and Resilience in the Global Context

University of Stuttgart
Institute for Human Factors and Technology Management IAT

Fraunhofer

Overall insights from Morgenstadt Smart Cities Global Initiative

Tuesday, 9th of May 2023, Sophie Mok, Fraunhofer IAO

Supported by:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

based on a decision of the German Bundestag

LOSSES DUE TO WEATHER RELATED DISASTERS WORLDWIDE (1970-2019)[1]

11,072
REPORTED DISASTERS

577K
DEATHS FROM STORMS

650K
DEATHS FROM DROUGHTS

2.06
MILLION
DEATHS

58K
DEATHS FROM FLOODS

55K
DEATHS EXTREME TEMERATURES

3.6
TRILLION US$
ECONOMIC LOSSES

DEVELOPMENT OF RISKS

5×
THE NUMBER OF WEATHER DISASTERS HAS INCREASED BY A FACTOR OF FIVE OVER THE LAST 50 YEARS[2]

SINCE
1990
THE UN IPCC HAS PROVIDED EVIDENCE OF THE LINK BETWEEN INCREASED CLIMATE RISKS AND ANTHROPOGENIC CLIMATE CHANGE[3]

9 / 10
HOTTEST YEARS EVER RECORDED GLOBALLY AND IN EUROPE HAVE OCCURRED SINCE 2000[4]

EXPECTED IMPACTS

130+
MILLION
PEOPLE COULD BE PUSHED INTO POVERTY BY 2030 DUE TO CLIMATE CHANGE[5]

216
MILLION
PEOPLE COULD BE DRIVEN TO MIGRATE WITHIN THEIR OWN COUNTRIES BY 2050 DUE TO CLIMATE CHANGE[6]

UP TO **20%**
OF GDP COULD BE LOST DUE TO CLIMATE CHANGE IF NEITHER ADAPTATION NOR MITIGATION STRATEGIES ARE PURSUED. CLIMATE CHANGE CAN HAVE SIGNIFICANT IMPACTS ON THE ECONOMIES OF MOST MIDDLE- AND LOW-INCOME COUNTRIES [7,8]

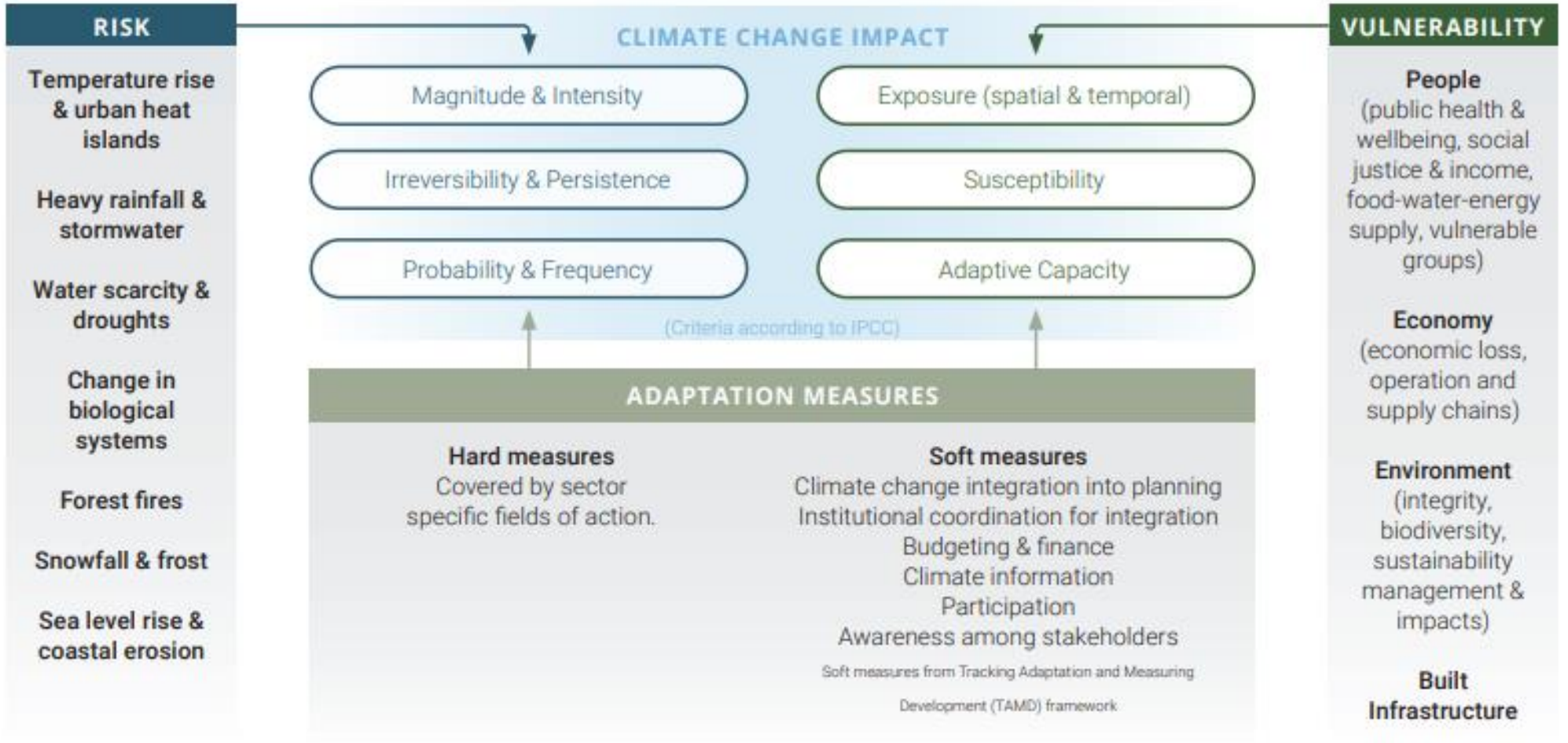
CAUSES & CONTRIBUTORS

60% – 80%
OF ENERGY PRODUCTION WORLDWIDE
IS CURRENTLY CONSUMED BY URBAN ACTIVITIES AND ACCOUNT FOR ROUGHLY AN EQUAL SHARE OF GLOBAL CO_2 EMISSIONS[9]

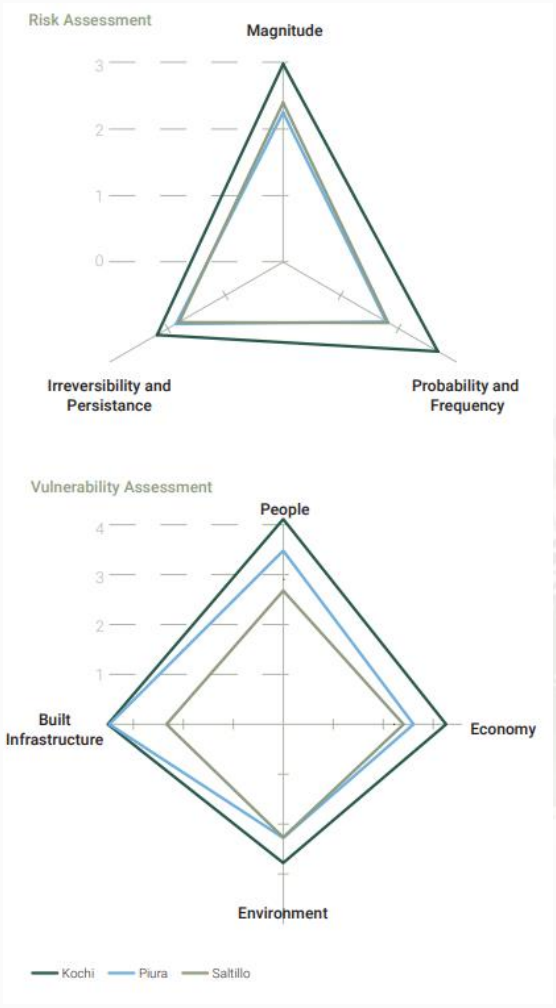
0.3
METRIC TONS
OF CO_2 PER CAPITA WERE EMITTED BY LOW-INCOME COUNTRIES IN 2019[10]

9.8
METRIC TONS
OF CO_2 PER CAPITA WERE EMITTED BY HIGH-INCOME COUNTRIES IN 2019[11]

MGI Risk and Resilience Assessment Framework



Risk Cluster Analysis (IPCC framework)



KOCHI	PIURA	SALTILLO
3140 mm Average annual rainfall (Indian Meteorological Department)	**302 mm** Average annual rainfall (climate-data.org)	**484 mm** Average annual rainfall (IMPLAN 2021)
EXTREME RAINFALL EVENTS and a reduction in the frequency of light rainfall are future projections of Indian summer monsoon rainfall (Mohr et al. 2020)	**EXTREME PRECIPITATION** values are expeded to increase between 5 – 20 % in the River Piura basin by 2040 ("Climate Change Risk Index in Piura" (CAF); Development Bank of Latin America, 2020)	**HEAVY STORMS AND CYCLONES** intensity is expected to increase due to climate change (INECC 2019a)
1.4 MILLION PEOPLE had to be housed in relief camps during the floods of 2018 in Kerala (GlobalMedic, 2023)	**9.2 MILLION PEOPLE** were affected by intense rainfall and floods in 2014 in Peru (SGRD 2014)	**80 THOUSAND PEOPLE** people were affected by the floodings of 2010 in Cohauila, the state to which Saltillo belongs (Zocalo, 2010)

FIGURE 12: INFOBOX

EL NIÑO AND EL NIÑO COSTERO

THE EL NIÑO PHENOMENON IS AN EVENT WHICH REFERS TO A WARM OCEAN CURRENT IN THE TROPICAL PACIFIC THAT NORMALLY HAPPENS DURING THE SUMMER MONTHS IN THE SOUTHERN HEMISPHERE.

Example: Heavy rainfall and stormwater amongst the biggest risks in all 3 cities…

Climate Adaptation Measures (TAMD framework)

Example: use of climate information

The cities' progress in the implementation of soft climate change adaptation and governance measures

INDICATORS OF THE TAMD FRAMEWORK	KOCHI	SALTILLO	PIURA
Availability of observational data	☑	☑	☑
Accessibility of climate information	☐	☑	☑
Accessibility of climate inf. generated by international orgs.	☑	☑	☑
Capacity to interpret and use climate information	☐	☑	☑
Complementing information with indigenous knowledge	☐	☑	☑

☑ Yes ☑ Partially ☐ No

MAIN CHALLENGES	ENABLERS
Developing regular climate-related risk assessments and monitoring schemes **requires regular investment**.	There is often **free information available** on upcoming weather events to inform the population.
Generating disaggregated data at the local level and not only at the state level.	Recordings of hydrological and meteorological data and climate related risks are also **available from international sources**.
Bridging data gaps and interpreting data related to, for example, water quality and pollution sources and local level emissions.	Using information **generated by partnerships** with universities or international research projects.
It costs time and money to **research and integrate local experience** dealing with environmental issues and bottom-up adaptation measures.	**Established disaster emergency response protocols** is a way to organize important information on climate risk response.

Climate risks are manifold and vary from city to city.

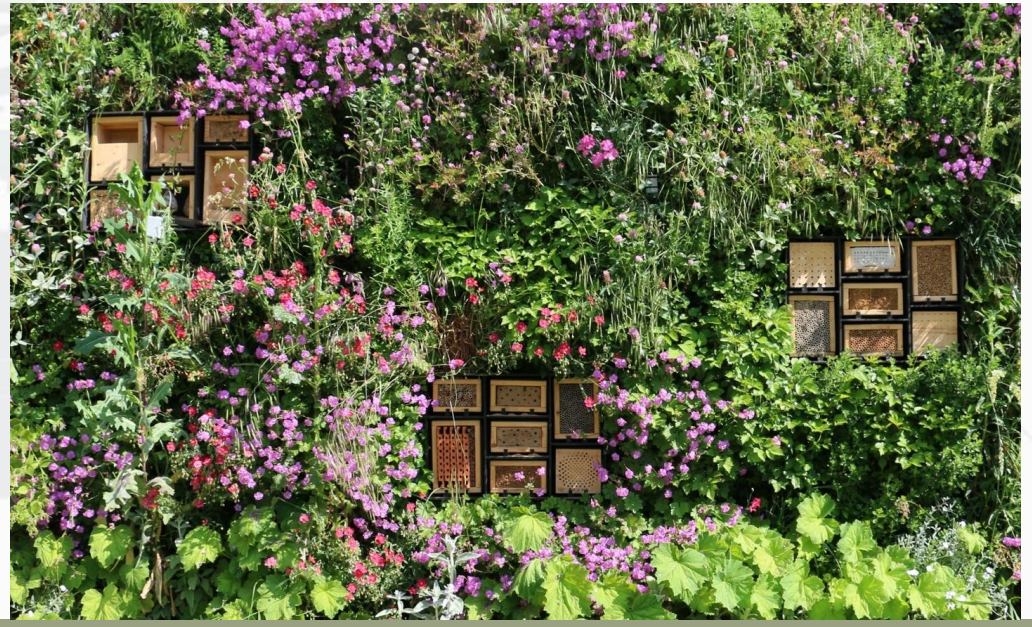
Risk and resilience are determined by climate zone, geographical particularities, as well as the social, political, and economic context.

People are perceived as the most vulnerable to climate change impacts (in comparison to economy, environment, and built infrastructure)

Agriculture, fisheries and tourism are amongst the most often named industries at risk.

Change in Biological Systems is the risk cluster which is the most difficult to predict.

Nature-based solutions, impermeabilization of surfaces, sustainable urban drainage, as well as rainwater harvesting are amongst the most often suggested hard adaptation measures.



Soft adaptation measures include

a) targeted uptake of climate change adaptation in **formal planning processes** and municipal strategies

b) cross-sectoral and multilevel coordination and organization

c) the creation of **special budgets and financing vehicles** for climate response

d) the generation and availability of **up-to-date information** and **relevant data**

e) participative structures and **increasing awareness** to improve personal preparedness and adaptive capacity.

Involving the right experts (both locally and internationally) is key to help include various perspectives. For future implementation and planning processes, especially vulnerable groups and indigenous knowledge need to be better integrated.

International projects and initiatives provide an opportunity for exchanges on challenges and best practices, to better understand and evaluate the extent of climate impacts, as well as to form new alliances.

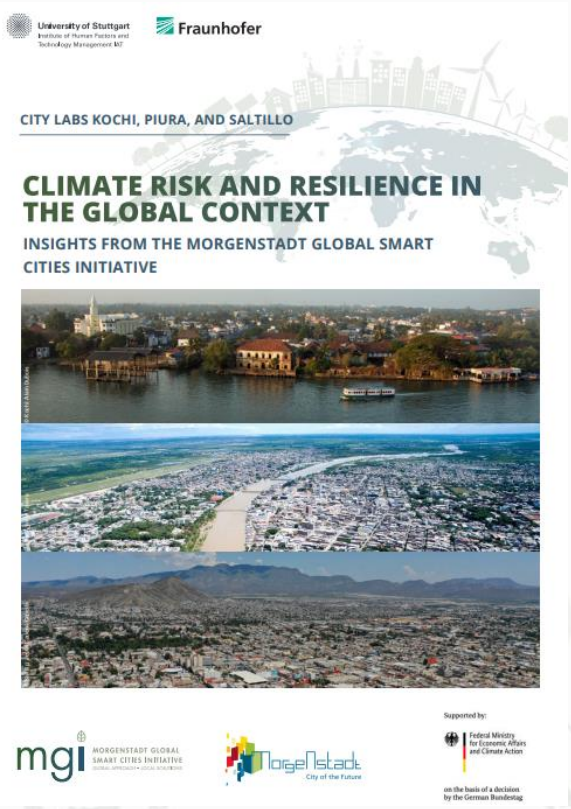
Ultimately, it is important to put the gained knowledge into practice and develop local solutions and strategies to be prepared for the global challenges to come.

A joint effort from the Morgenstadt Smart Cities Global Initiative...





Mok, Sophie; Díaz, Catalina; Fernández, Trinidad; Jayawant Amruta; Millán Julio (2023): Climate Risk and Resilience in the Global Context: Insights from the Morgenstadt Global Smart Cities Initiative. DOI: http://dx.doi.org/10.24406/publica-589



Find the full publication here:

AGENDA – MORNING

10:45 – 11:45 **The pilot cities & the City Profiles**

Dr. Marius Mohr, Fraunhofer IGB; Trinidad Fernandez, Fraunhofer IAO; Catalina Diaz, University of Stuttgart – City Lab leaders

11:45 – 12:00 **Findings on the climate and risk assessments**

Sophie Mok, Fraunhofer IAO – Climate and expertise building leader

12:00 – 13:00 Lunch & networking

AGENDA – AFTERNOON

13:00 – 14:00 Pilot project implementations
Local partners & experts

14:00 – 14:20 Smart city financing
Maria Baez, Frankfurt School of Finance – City financing advisor

14:20 – 14:35 **Coffee break**

14:35 – 14:55 Prague's perspective: How cities learn and transform through experimentation
Tomáš Vácha, OICT Smart Prague – Head of International Department

14:55 – 15:00 Acknowledgements and end of online program

15:00 – 16:00 Site visits for audience on site

16:00 – 17:00 Closure