*META*VALLEY

Explorations of an *adapted* geodesign framework
to integrate a regenerative approach and planning
in the Metropolitan Area of the Valley of Mexico

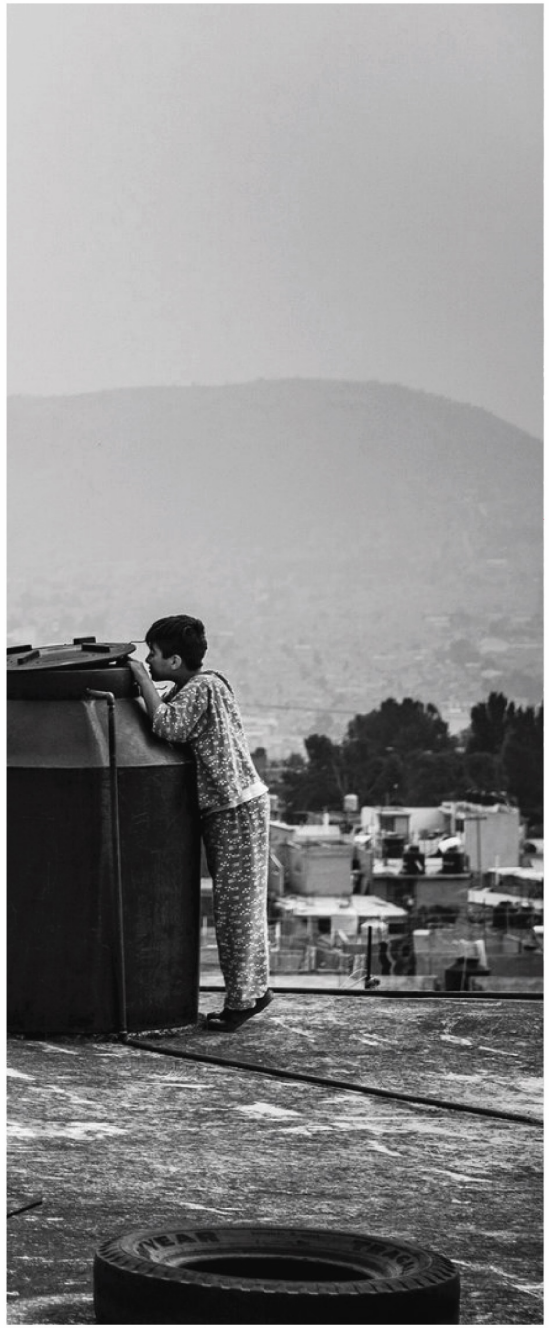
P5 Presentation by

Emma Paola Flores Herrera

Faculty of Architecture and the Built Environment
Delft University of Technology

First mentor: Dipl.- Ing. Alexander Wandl
Second mentor: Dr. Diego Andrés Sepulveda

External examiner: Dr. André Mulder



Index

Theory

Regenerative Development and Design

-A system of technologies and strategies

-Generation the whole system understanding of a place

-Development of strategic systemic thinking capacities

-Engagement of the stakeholders required to ensure regenerative design

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Picket et al. (2003)
Scott et al. (2013)
Aalto et al. (2018)
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Metropolitan Area of the Valley of Mexico

Image: Kimmelman, 2017

Why the MAVM as a case study?

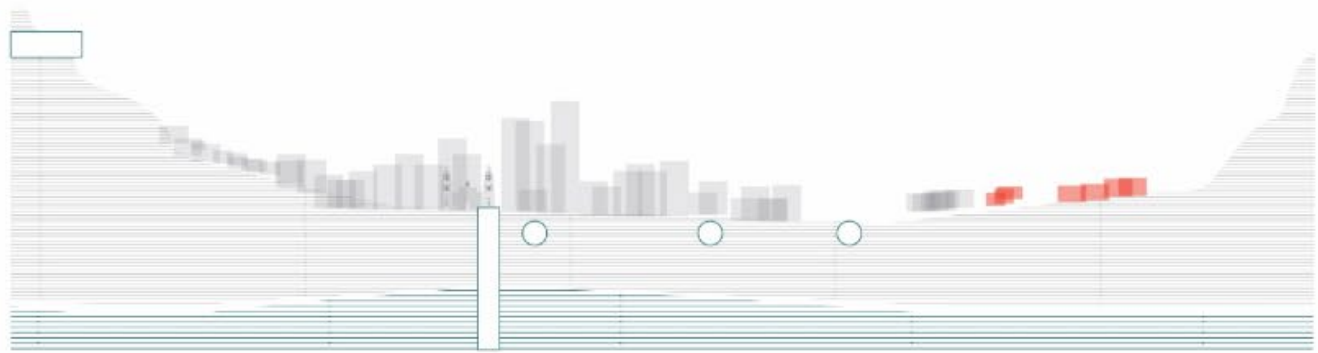
Urbanisation

Water management

Image: Kimmelman, 2017

1500 1600-1800 1800-1950 1950-1990 1990-2018

Urbanisation



Urbanisation

Image: Googlemaps, 2018

Image: Googlemaps, 2018

Marginalisation- Social housing development

Image: Marosi, 2017

Image: Marosi, 2017

Urbanisation

Social and informal h
Informal housing
Social housing

Image: Googlemaps, 2018

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Marginalisation- Informal housing development

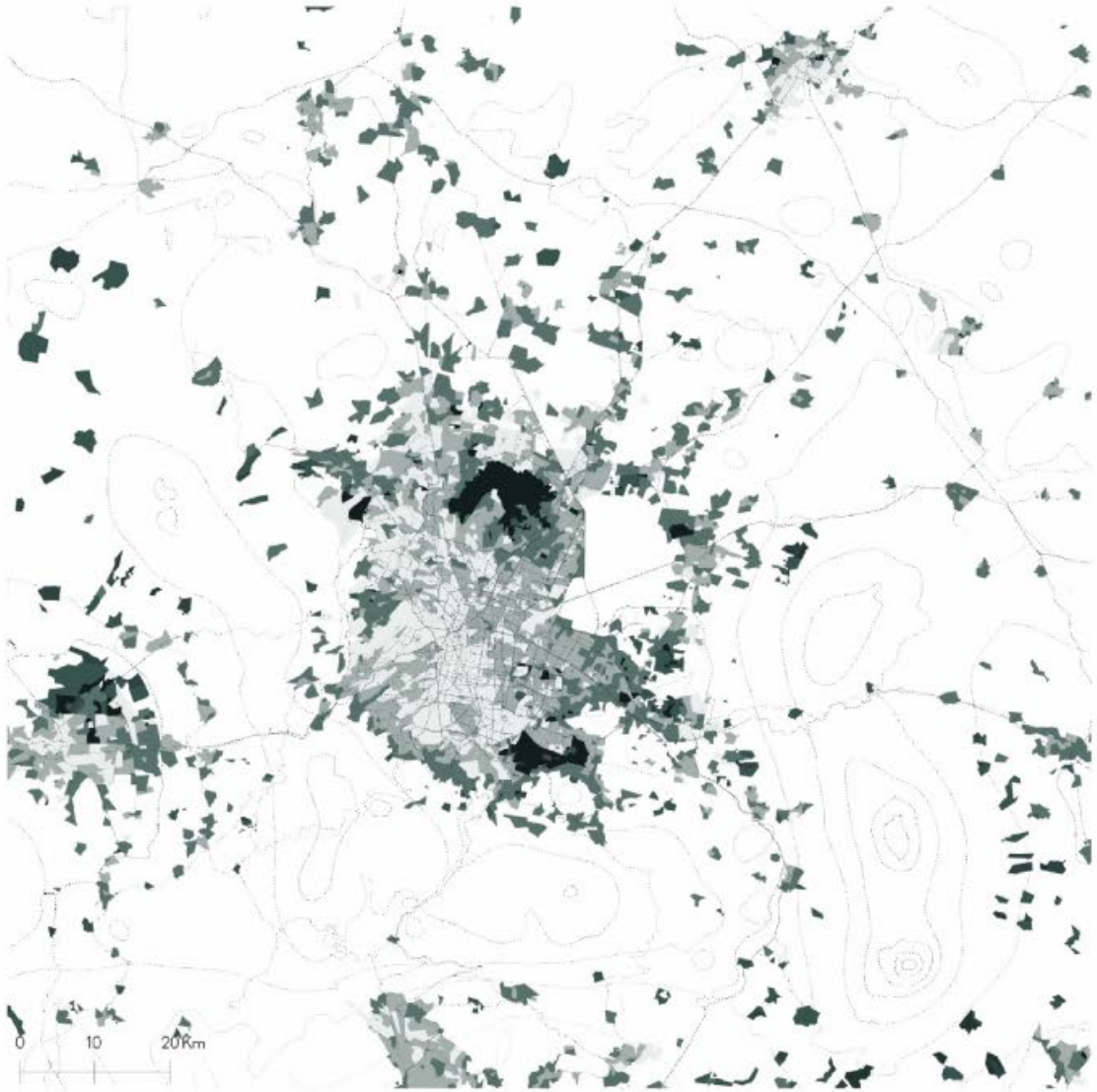

Image: De Jong, 2017

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Marginalisation-Central city

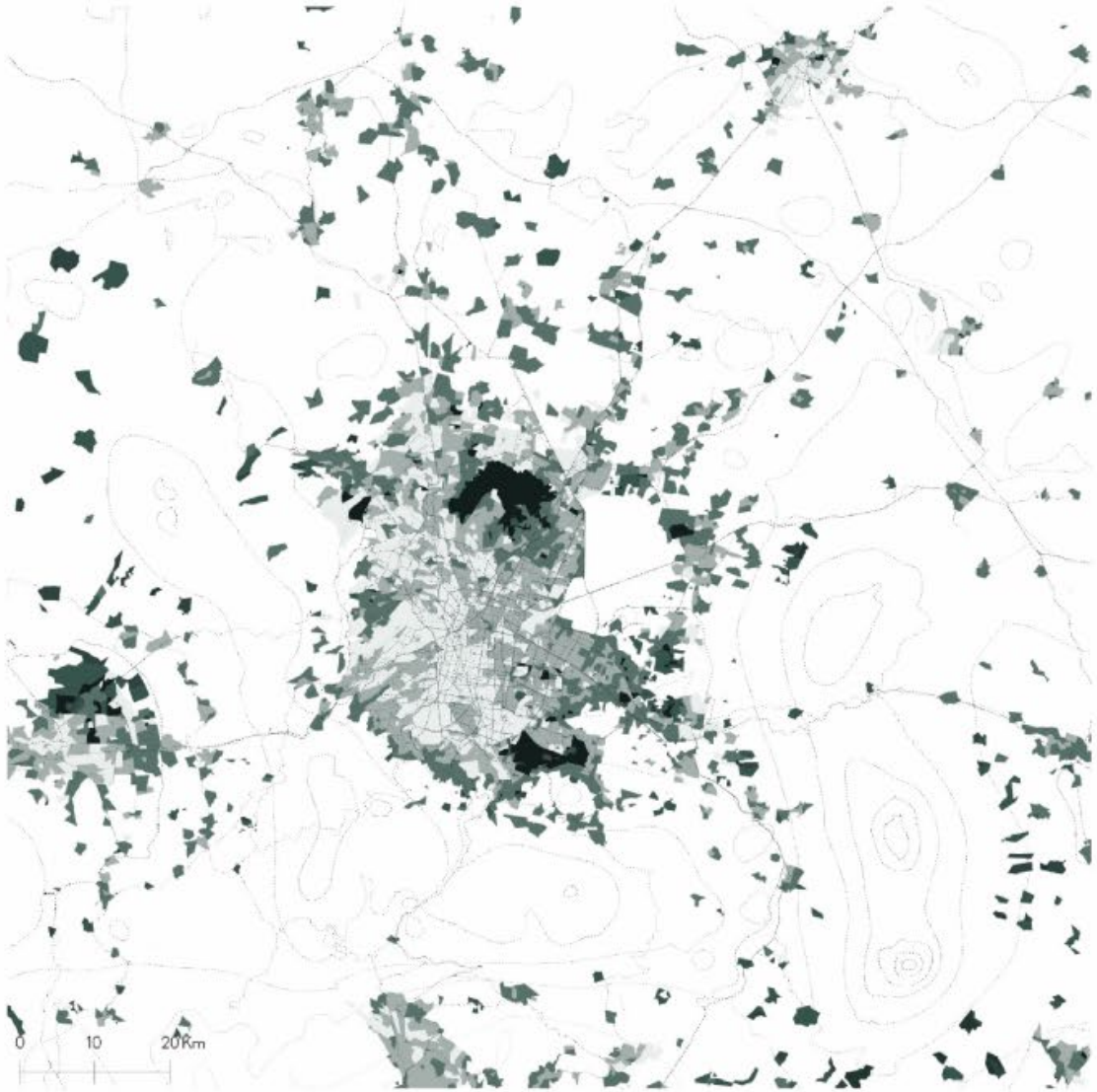
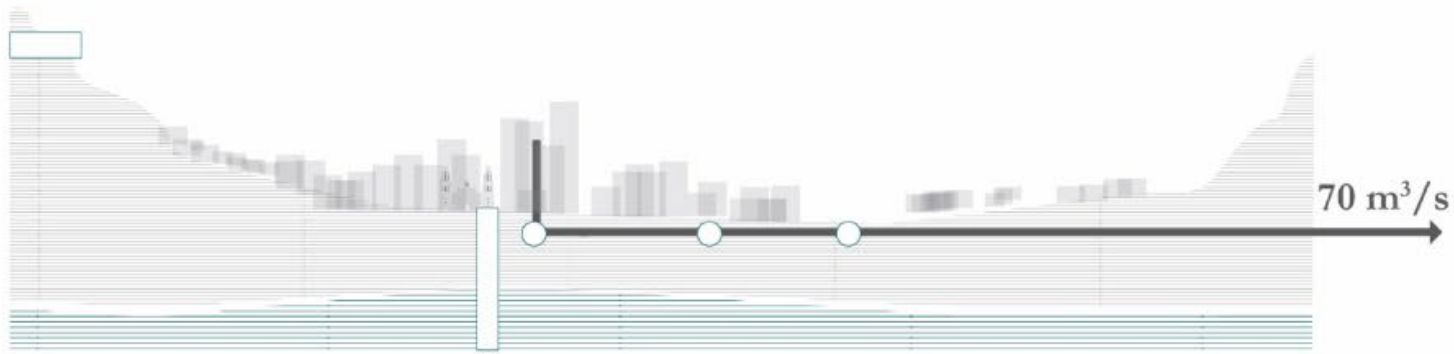


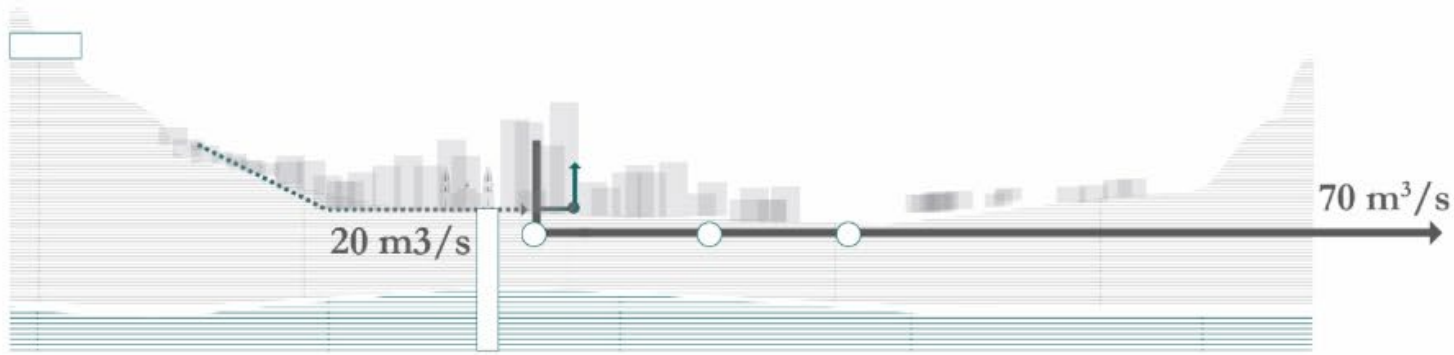
Image: Farlom, 2018

Image: Farlom, 2018

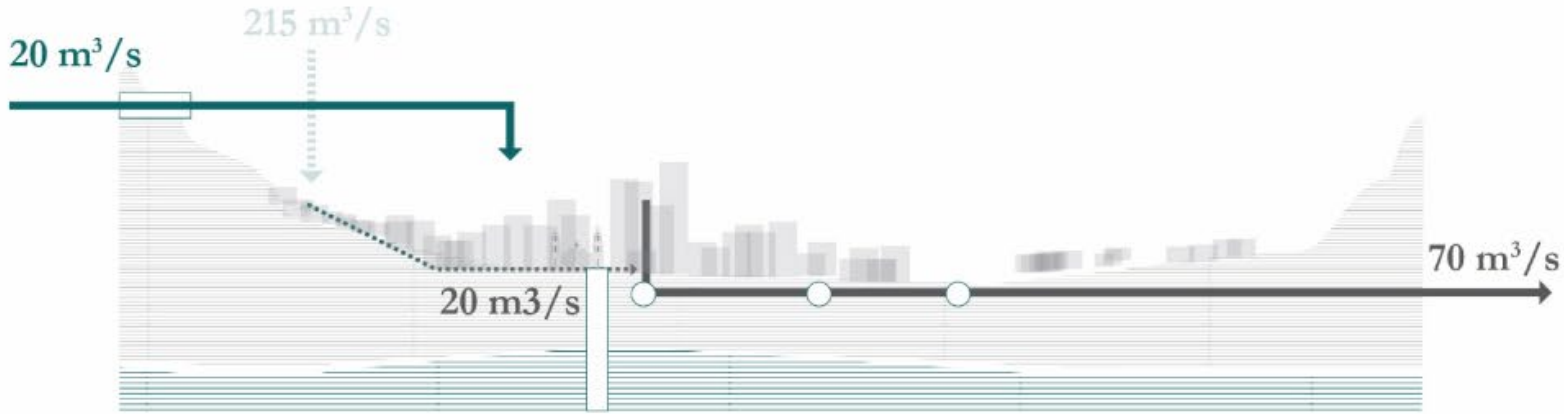
Water management



Water management



Water management



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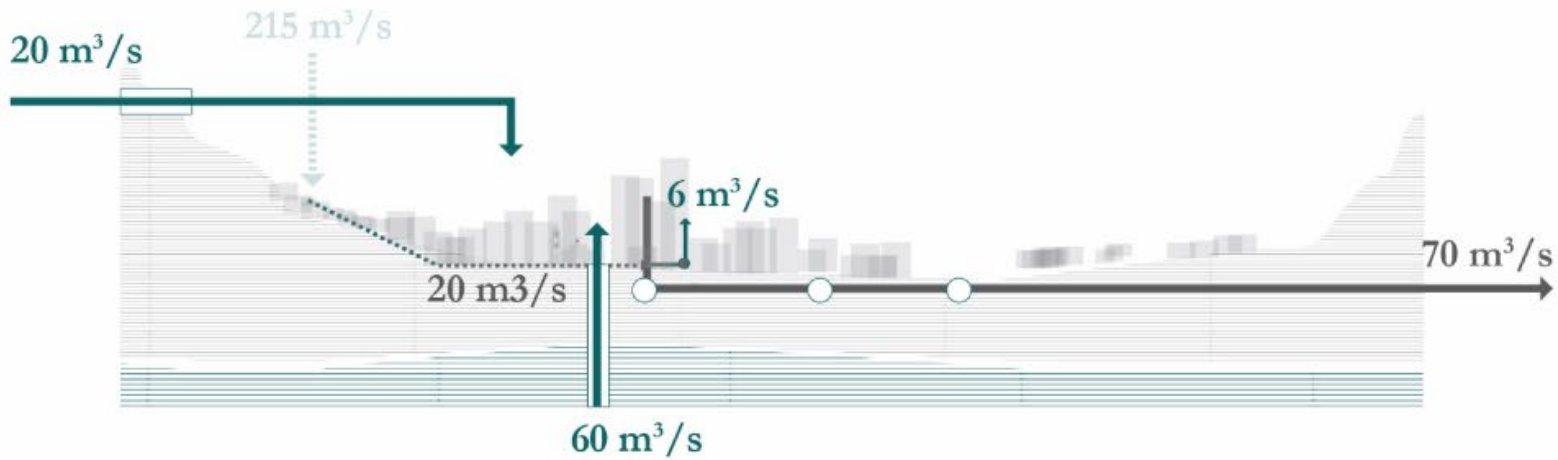
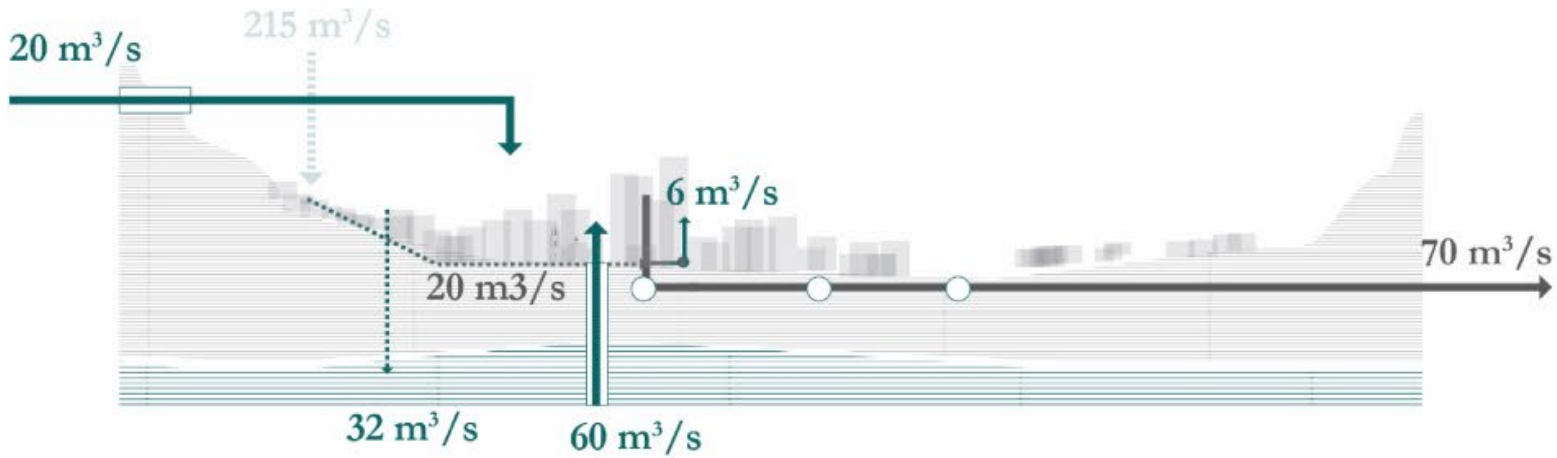


Water management



Water scarcity- subsidence

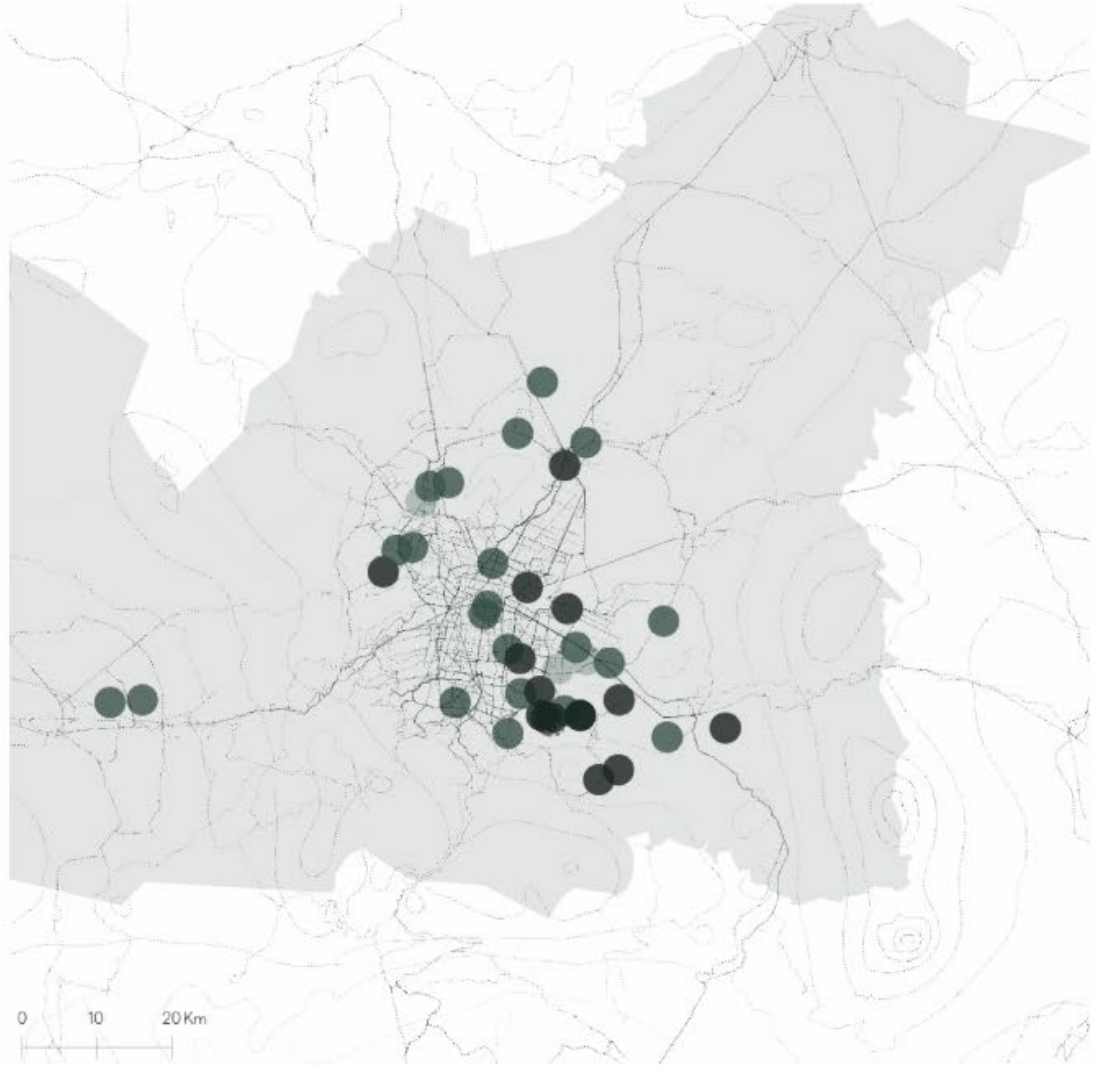


Image: Alef, 2017

Image: Salazar, 2017

Water scarcity- floodings

Image: Pontaza, 2018

Image: Televisa, 2017

Water scarcity- draughts

Image: Olvra, 2017

Image: Corona, 2018

How can regenerative development and planning practices be integrated in the case study of the MAVM in order to circumvent the current deteriorating social-ecological system?

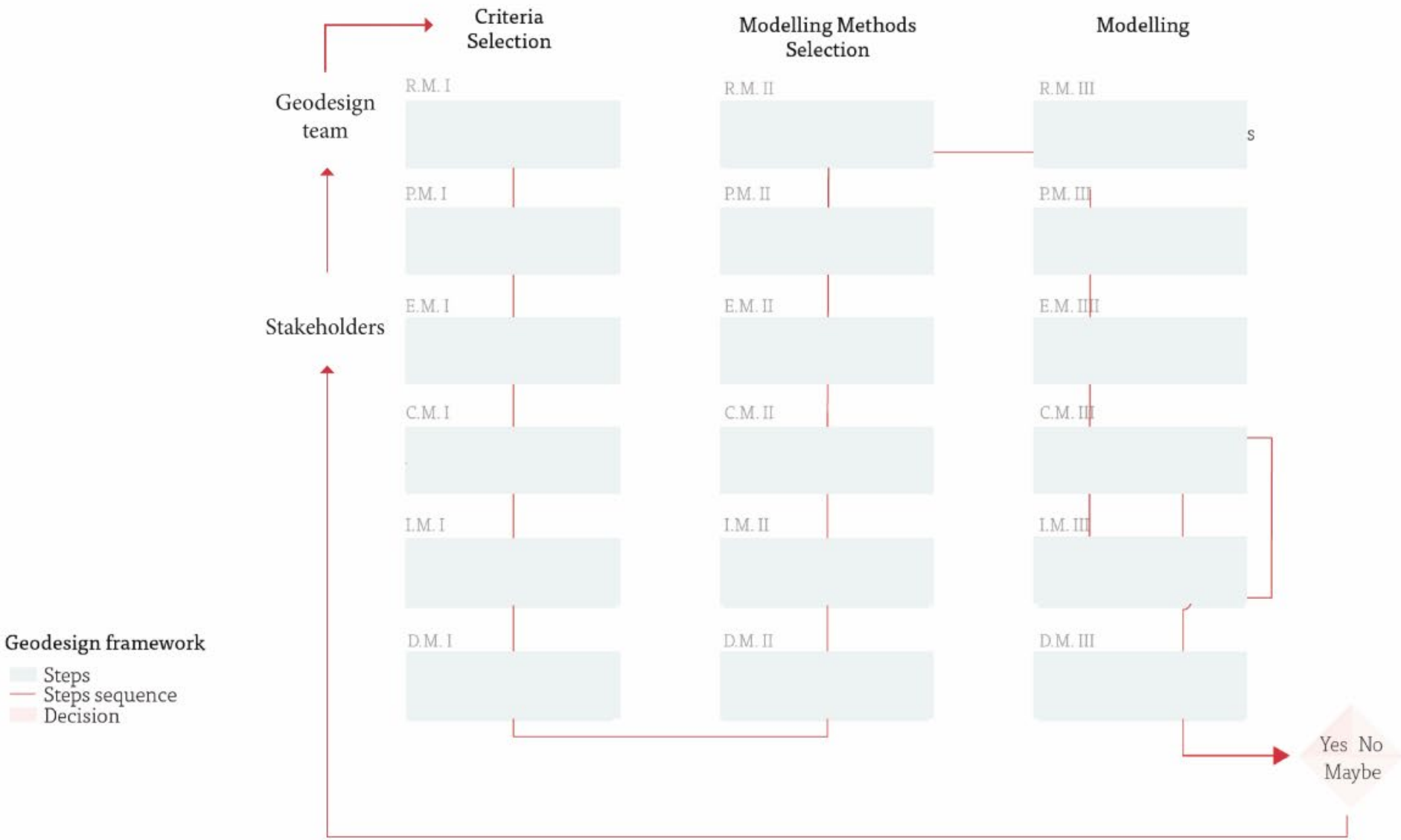
Picket et al. (2003)
Scott et al. (2013)
Aalto et al. (2018)
van der Leer et al. (2018)

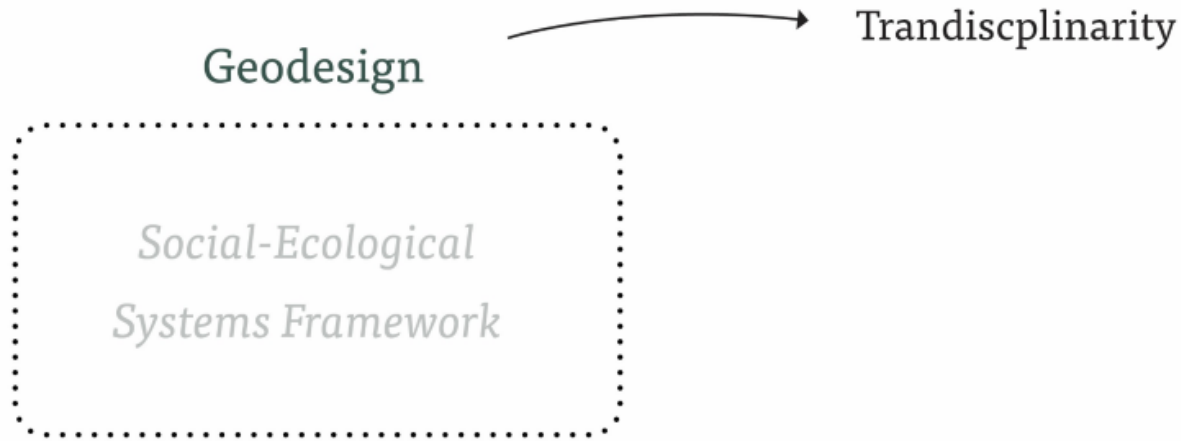

Theory
Regenerative Development and Design
Geodesign
Social-Ecological
Systems Framework
Practice
Planning

Geodesign

Social-Ecological

Systems Framework


Criteria Selection
Modelling Methods Selection
Modelling
Geodesign team
Stakeholders
R.M. I
R.M. II
R.M. III
P.M. I
P.M. II
P.M. III
E.M. I
E.M. II
E.M. III
C.M. I
C.M. II
C.M. III
I.M. I
I.M. II
I.M. III
D.M. I
D.M. II
D.M. III
Yes No
Maybe
Geodesign framework
Steps
Steps sequence
Decision

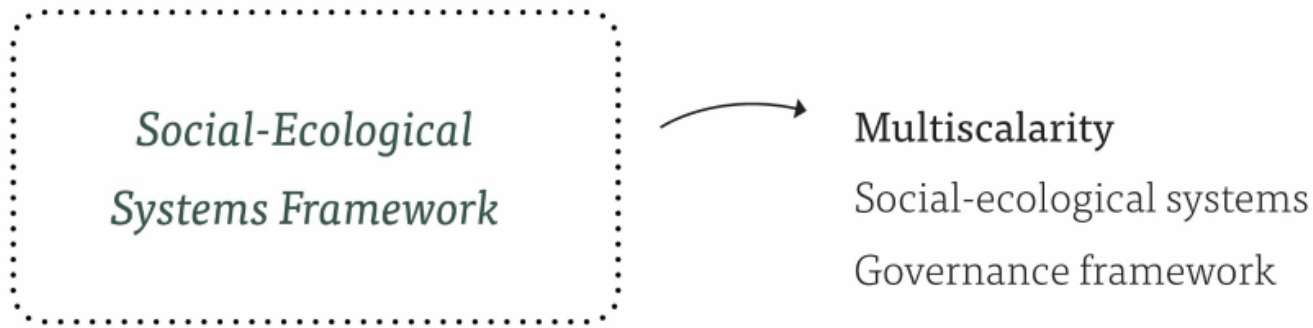

Geodesign
Trandiscplinarity
Social-Ecological
Systems Framework

Geodesign

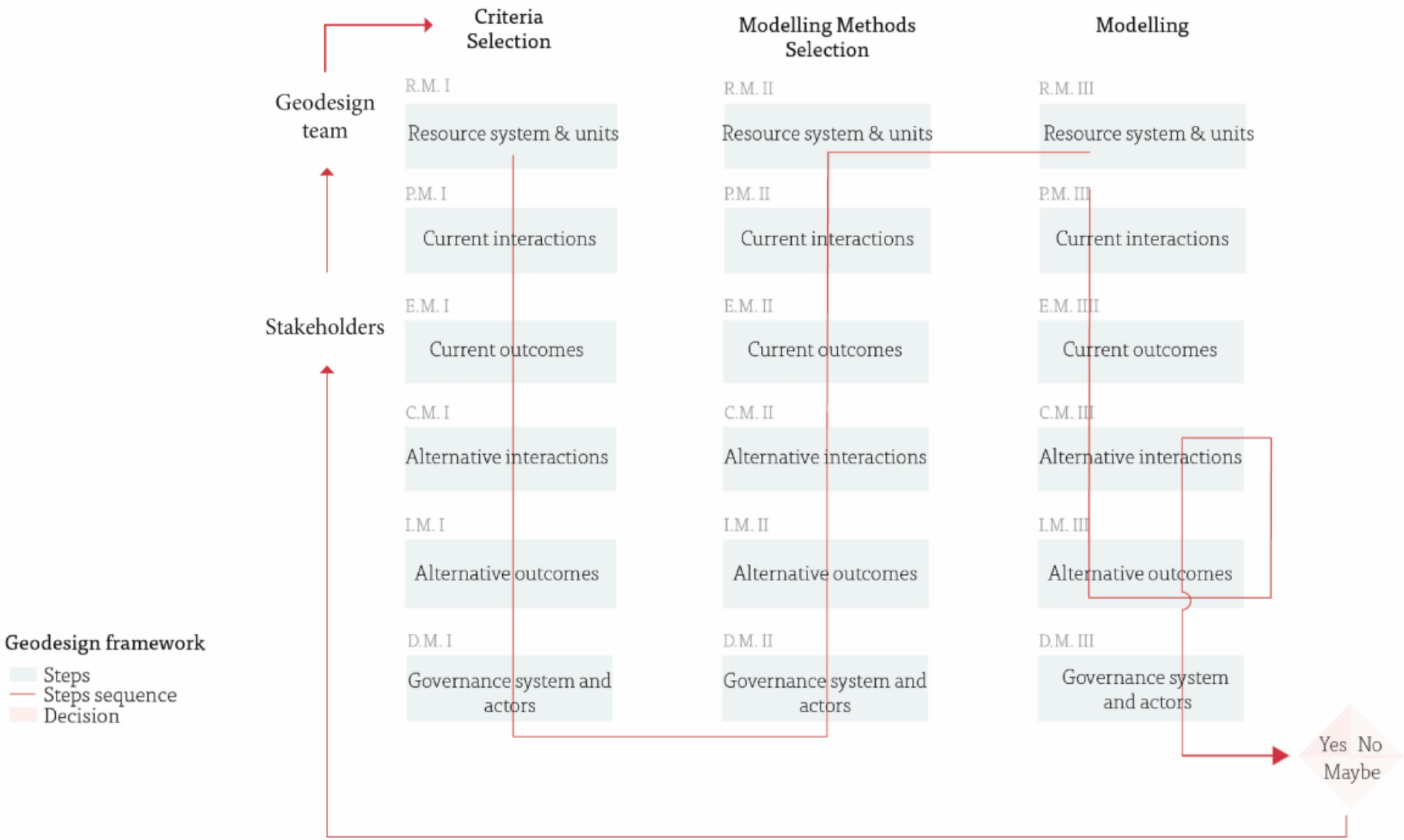
Social-Ecological

Systems Framework

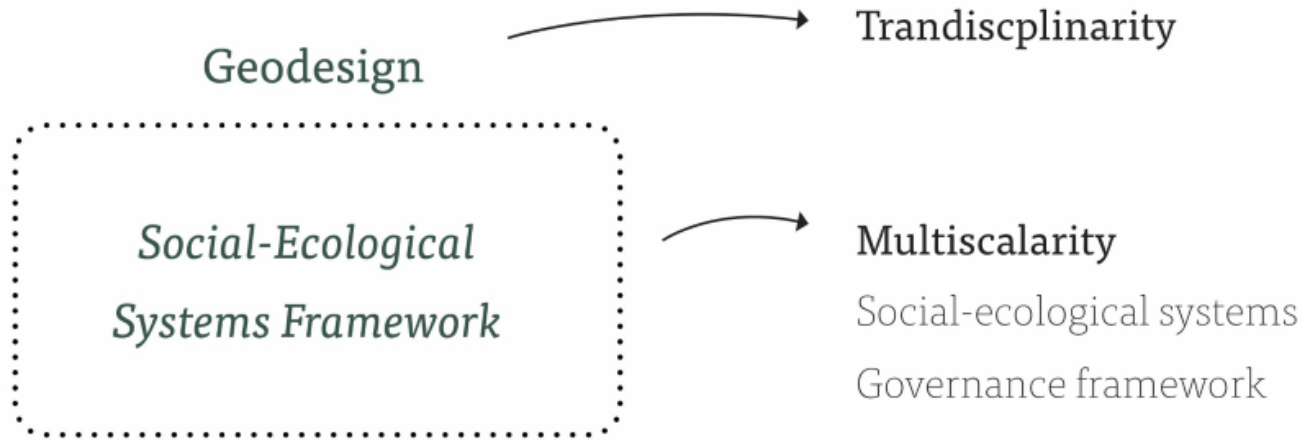
Geodesign


Social-Ecological
Systems Framework
Multiscalarity
Social-ecological systems
Governance framework

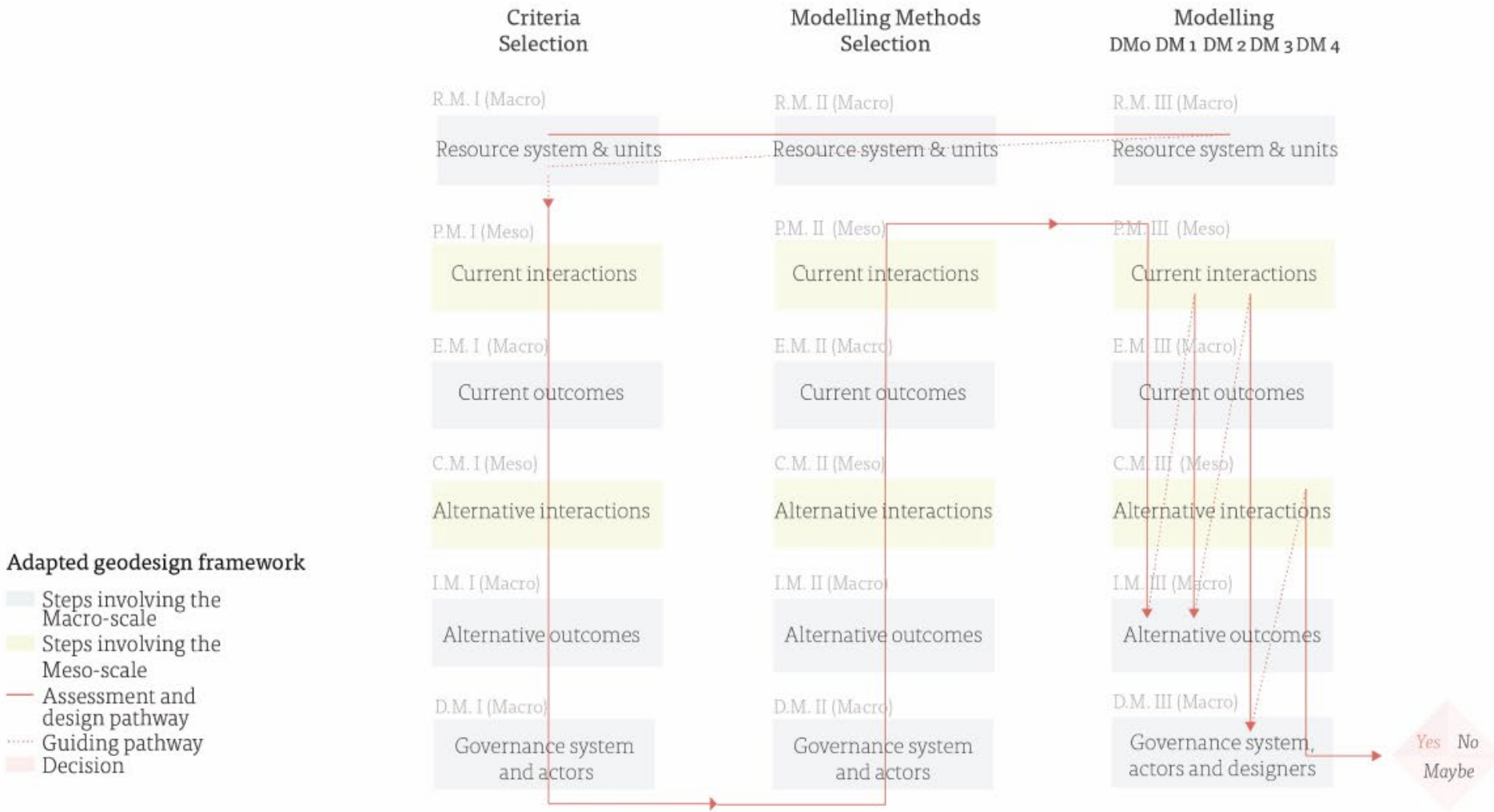
Adapted geodesign model



Adapted geodesign model



Adapted geodesign model



Iteration 0

Macro-scale

Meso-scale

Iteration 0

Macro-scale

Resource systems and subsystems

Meso-scale

Resource systems and subsystems

Iteration 0

Macro-scale

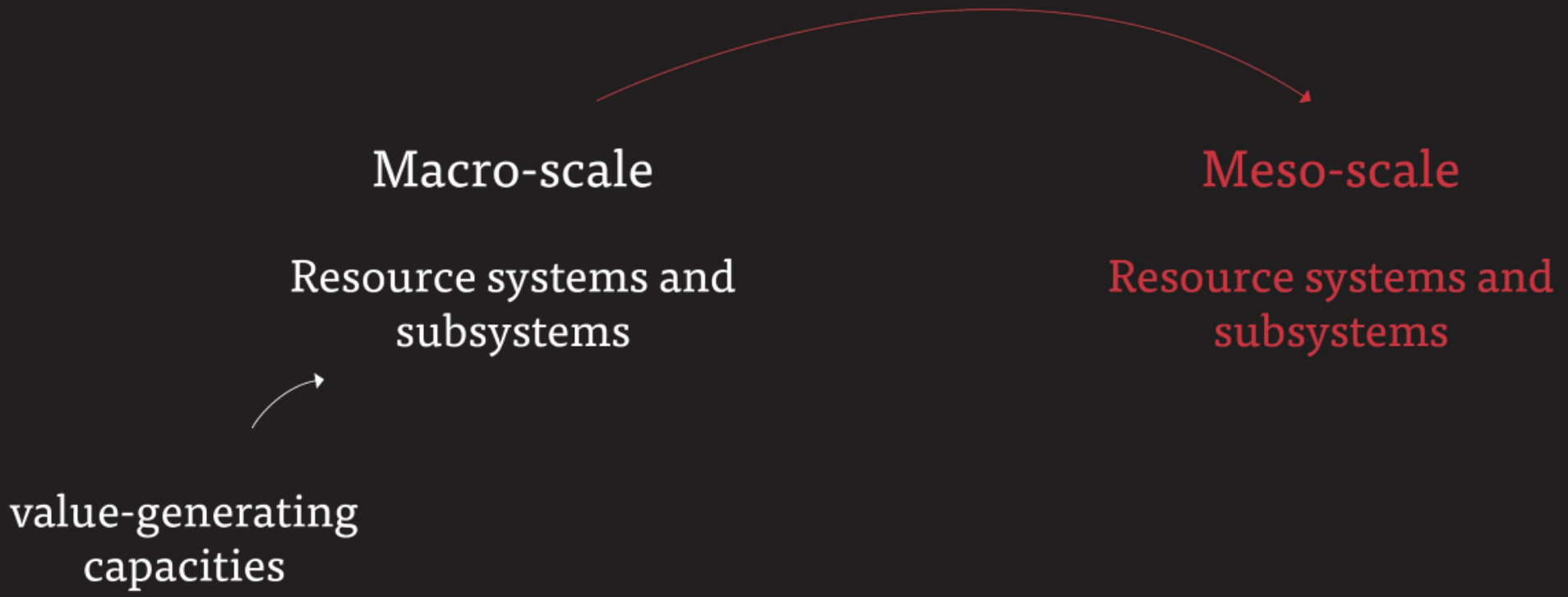
Resource systems and subsystems

value-generating capacities

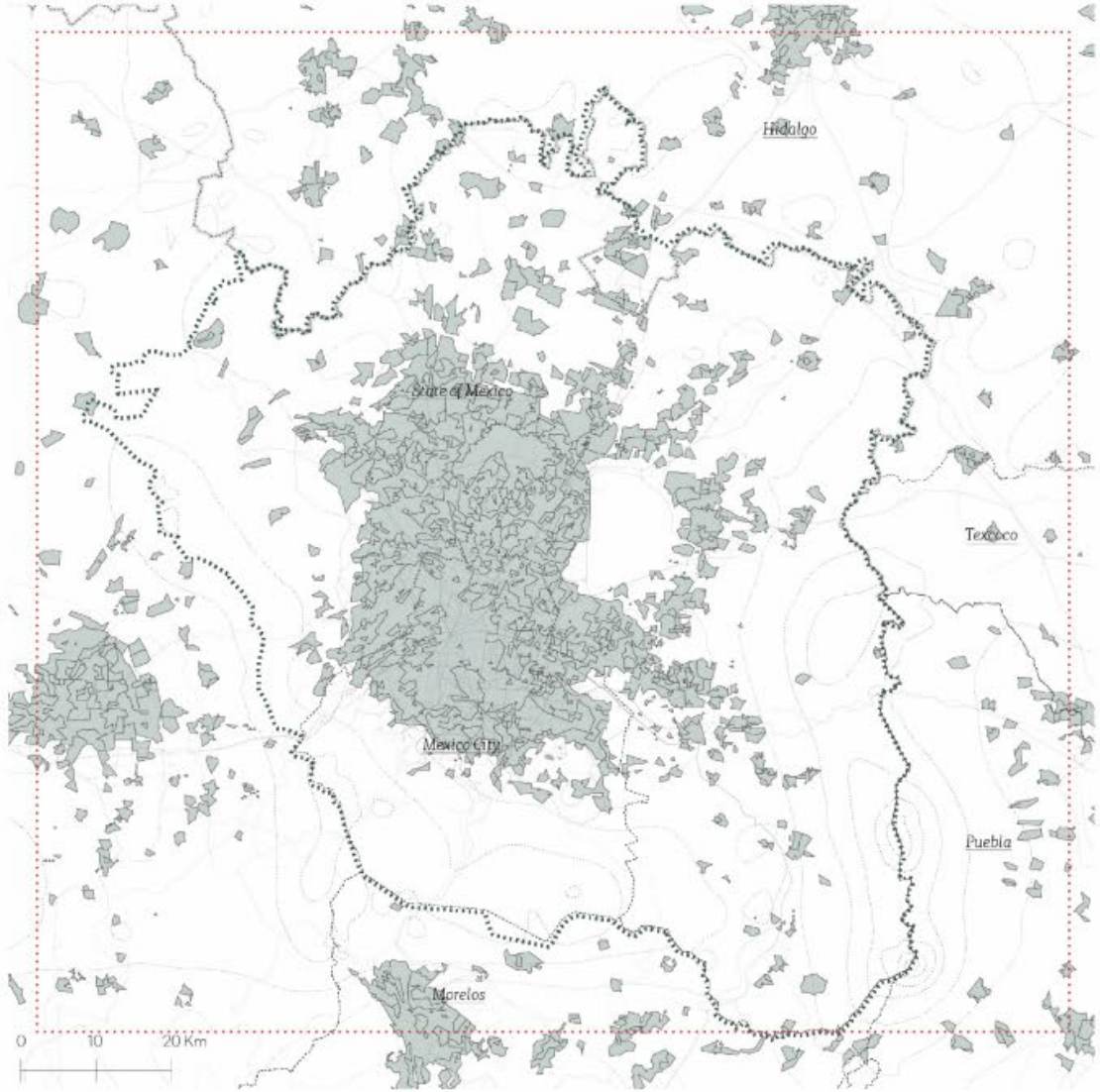
Meso-scale

Resource systems and subsystems

Iteration 0

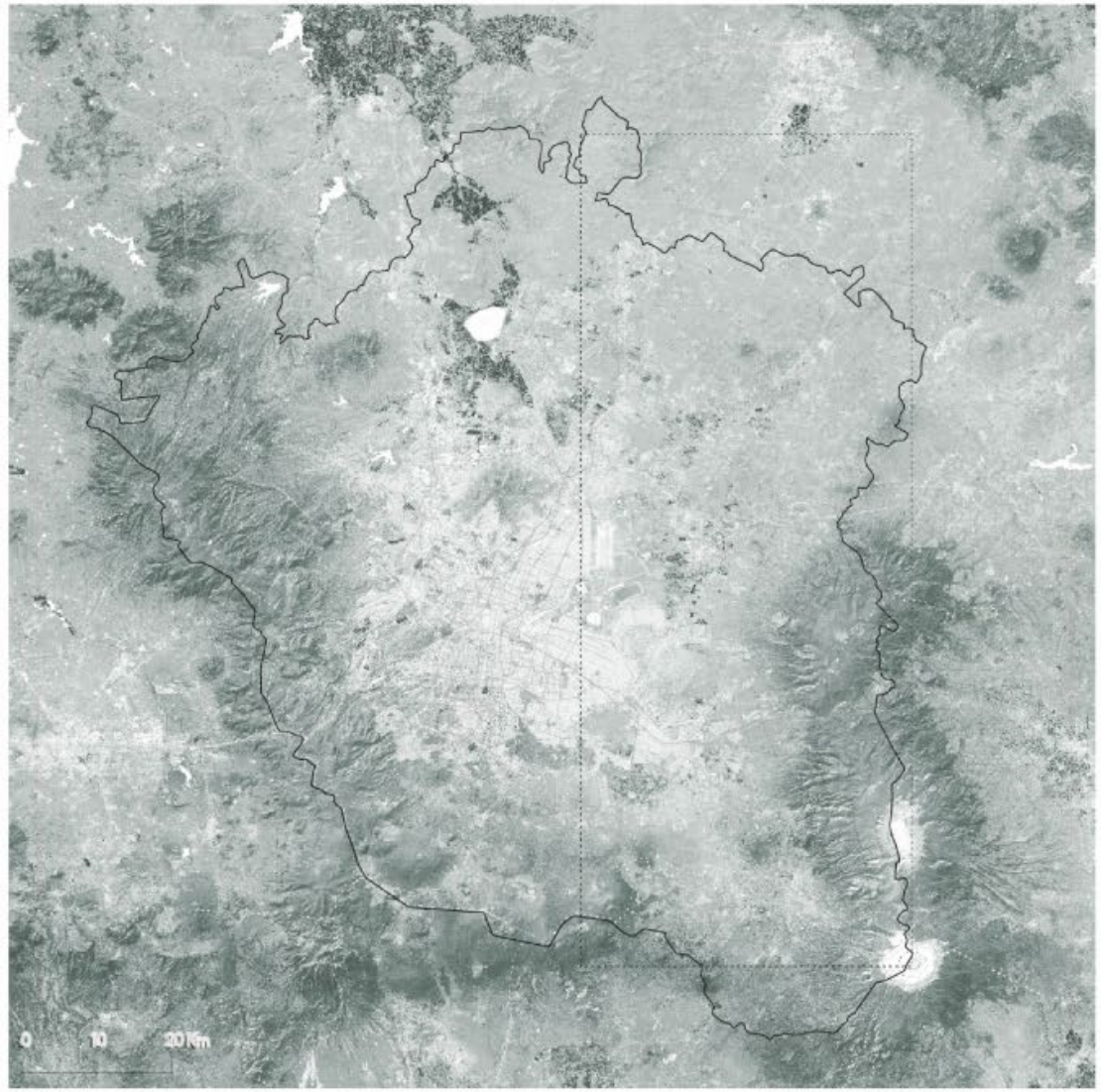

Macro-scale
Resource systems and subsystems
Meso-scale
Resource systems and subsystems
value-generating capacities

Social system and subsystems



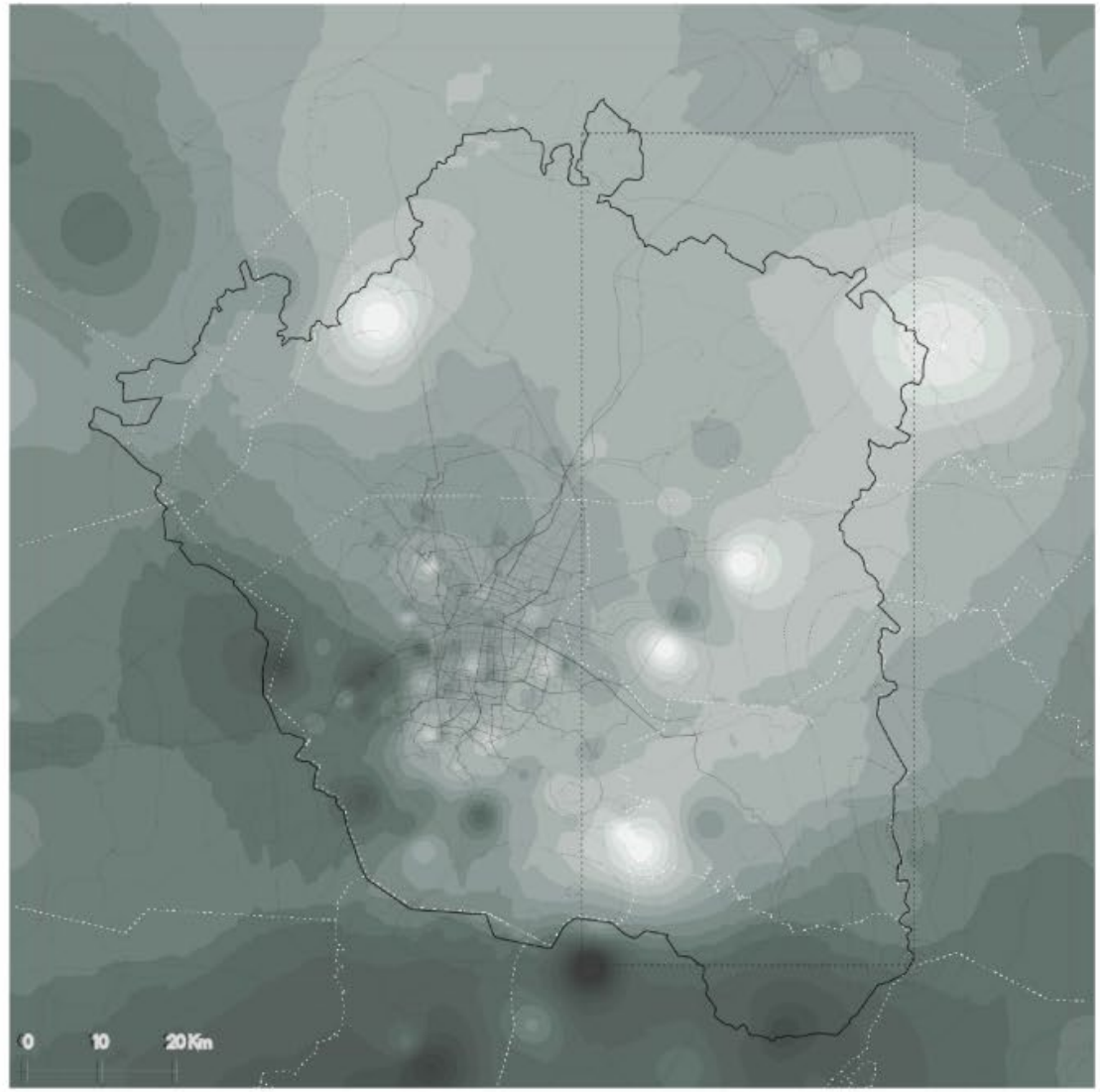
Ecological system and subsytems

Soil permeability



NDVI

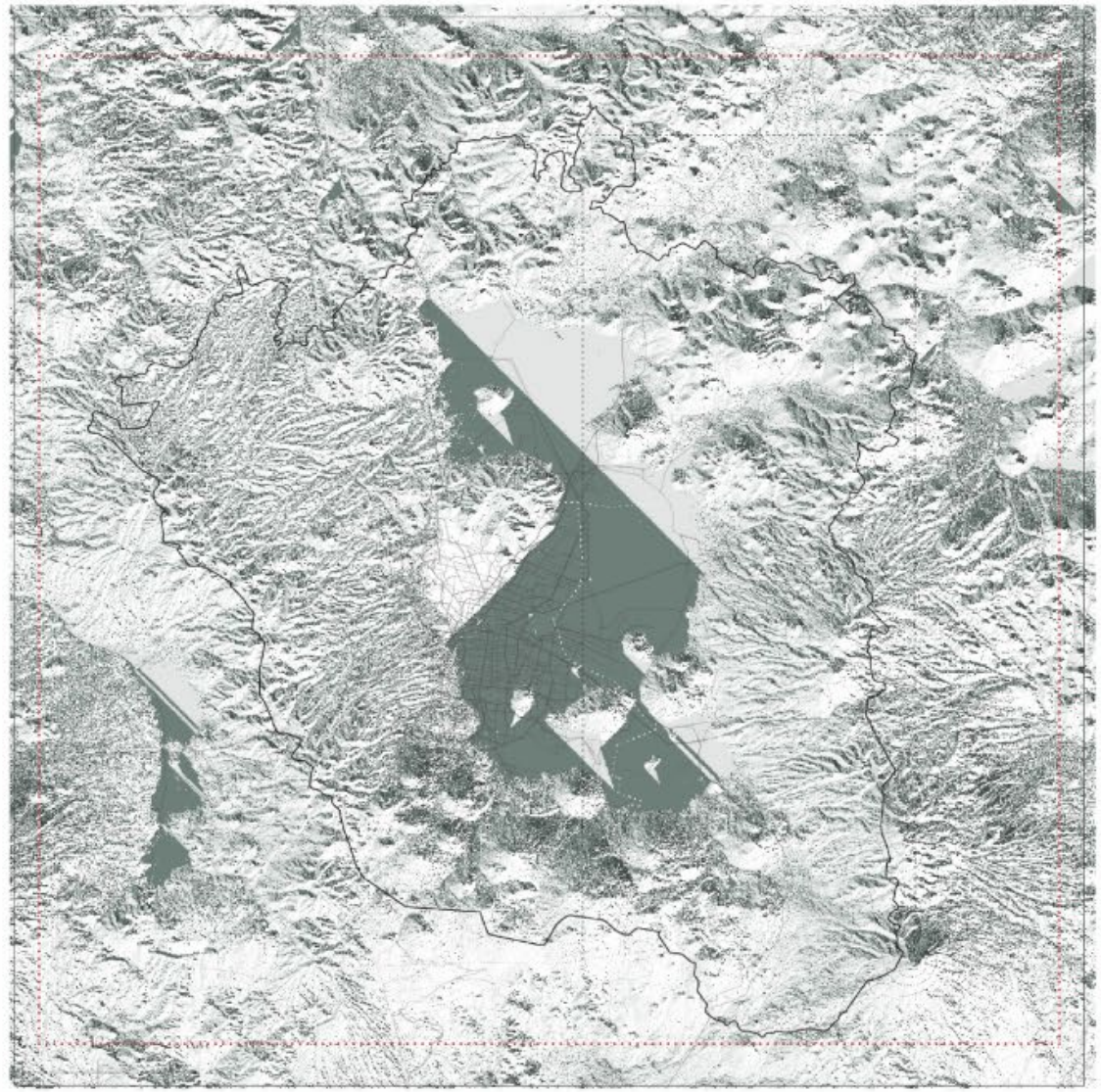
Rainfall



Precipitation

- 0-125 mm
- 125-400 mm
- 400-600 mm
- 600-800 mm
- 800-1200 mm
- 1200-1500 mm
- 1500-2000 mm
- 2000-2500 mm
- 2500-4000 mm

Runoff

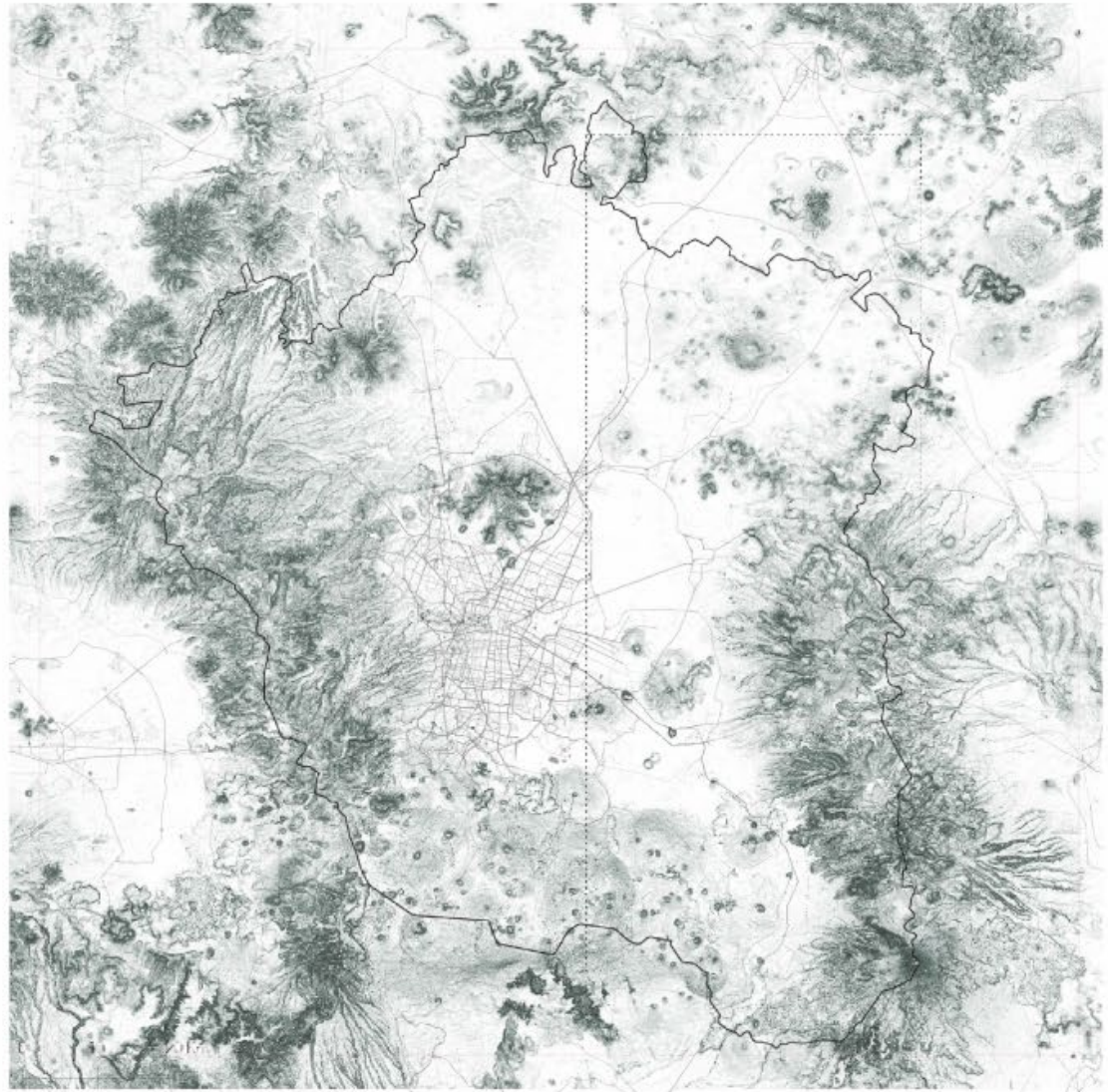


Runoff accumulation

1

128

Slope

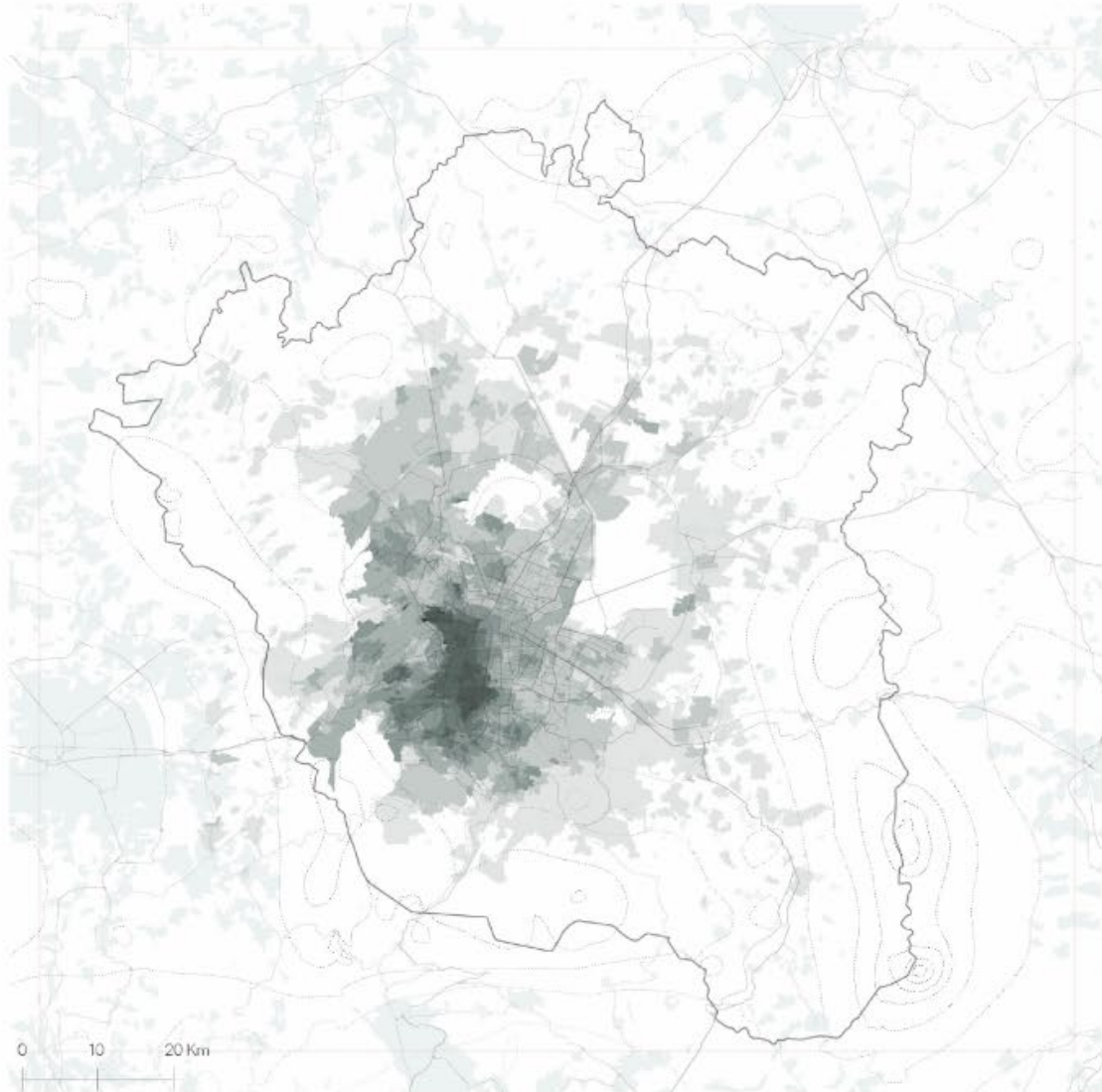


Slope

0°

78°

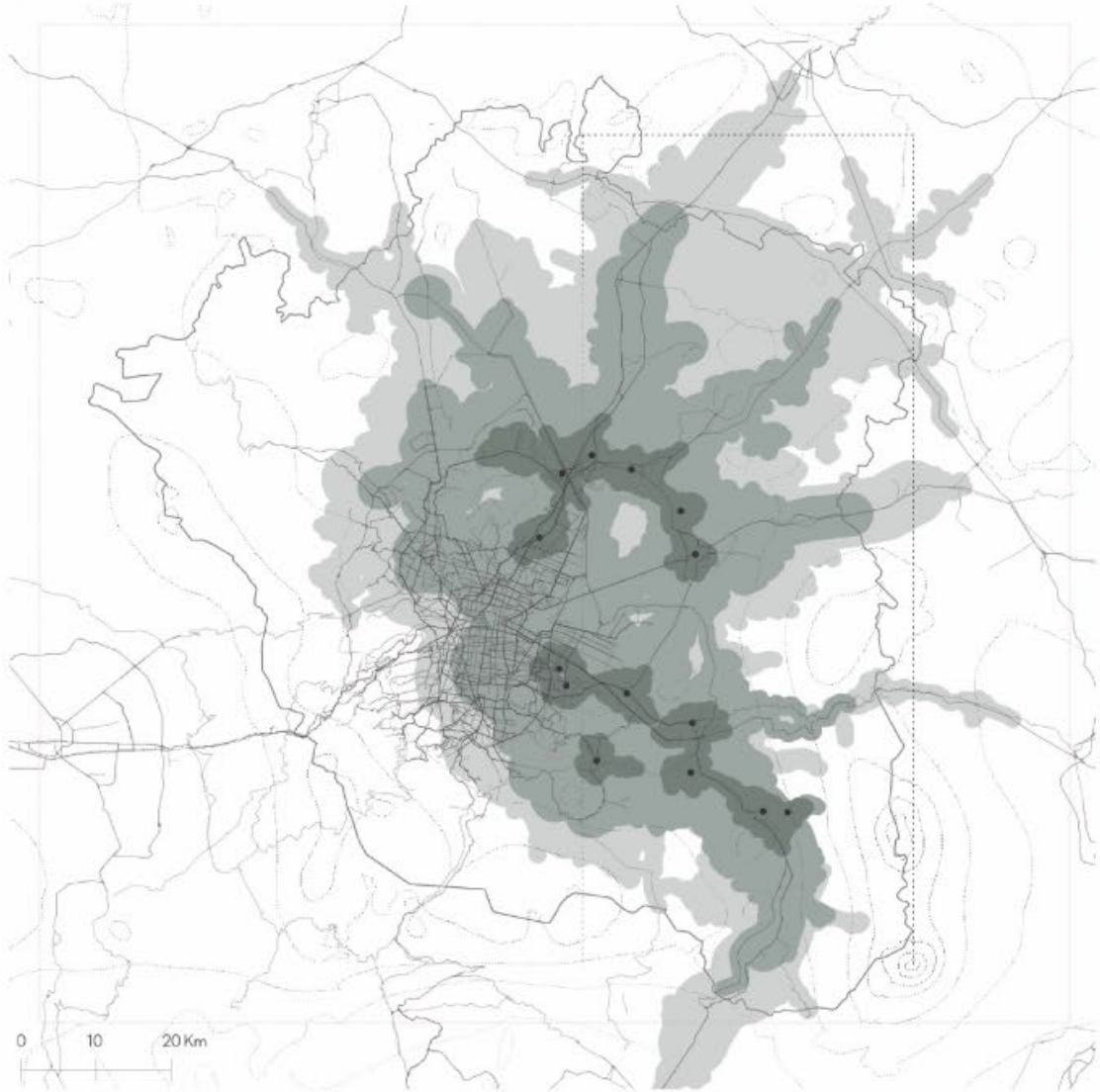
Landprice



Landprice

- <6,320 MXN
- 6,320- 12,639 MXN
- 12,639- 18,959 MXN
- 18,959- 25,278 MXN
- 25,278- 31,598 MXN
- 31,598- 37,918 MXN
- 37,918- 44,237 MXN
- 44,237-50,557 MXN
- 50,557-56,876 MXN
- 56,876-63,196 MXN

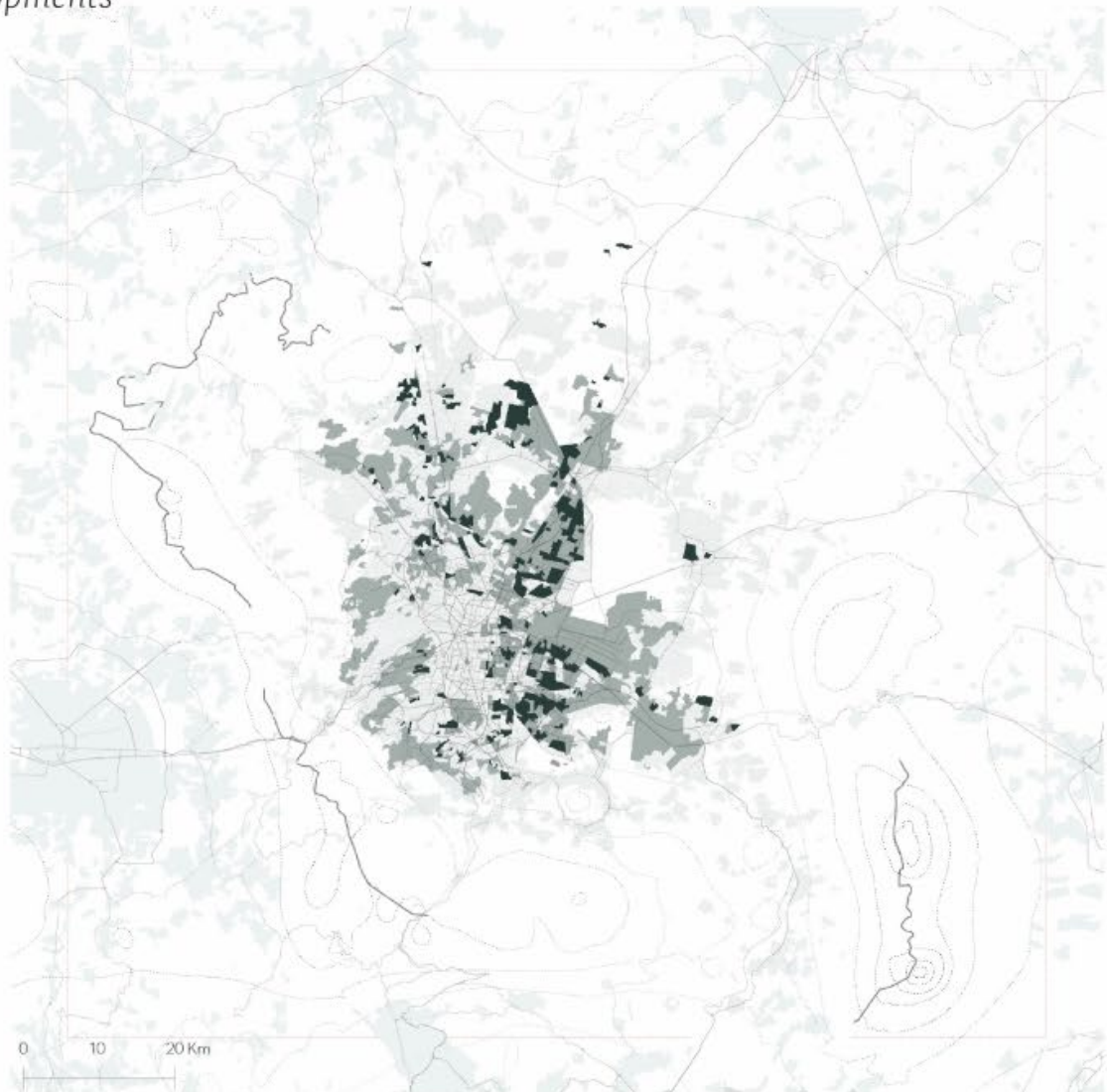
Accesibility to employment centers



Public transport and pedestrian accesibility

- <20 min
- < 40 min
- > 40 min

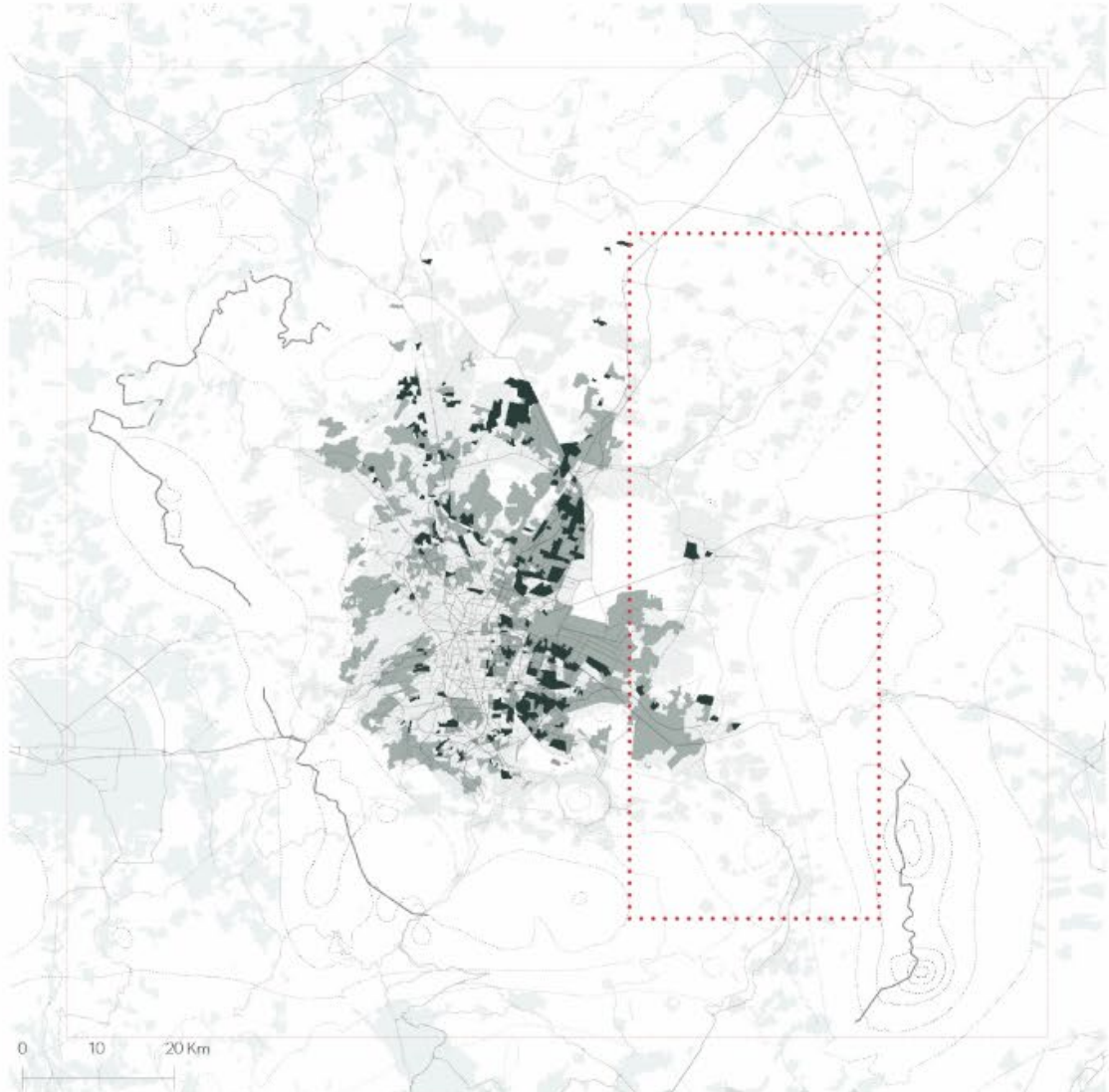
Existing social and informal housing developments



Social and informal housing

Informal housing
Social housing

Meso-scale



Iteration 1

interactions

Macro-scale

Resource systems and subsystems

Meso-scale

Resource systems and subsystems

Iteration 1

governance system and actors

interactions

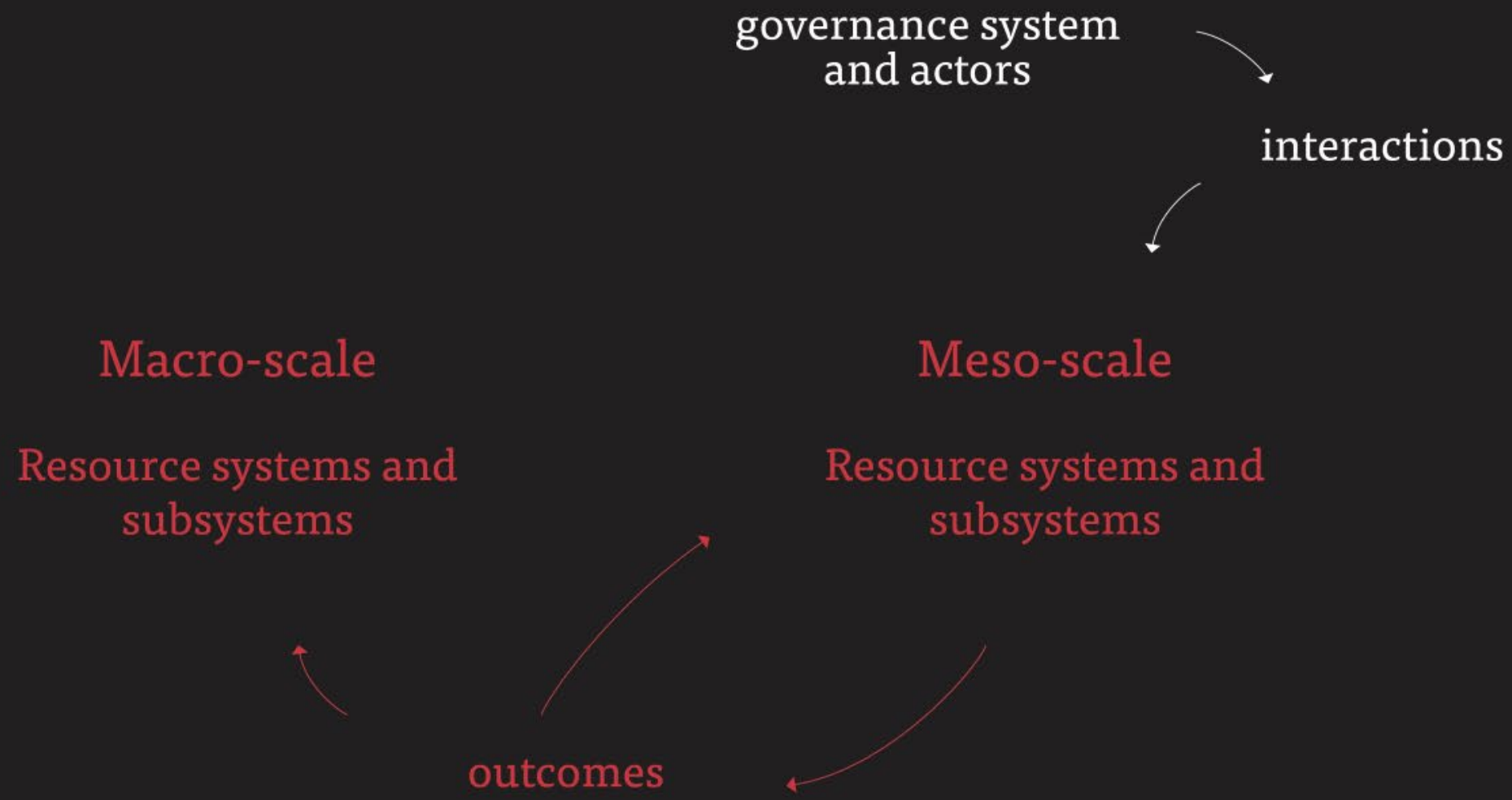
Macro-scale

Resource systems and subsystems

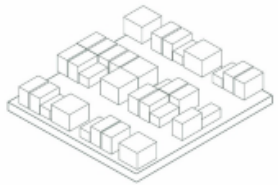
Meso-scale

Resource systems and subsystems

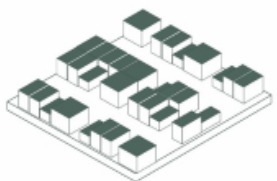
Iteration 1


governance system and actors
interactions
Macro-scale
Resource systems and subsystems
Meso-scale
Resource systems and subsystems
outcomes

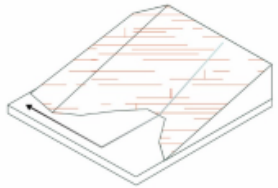
Current interactions



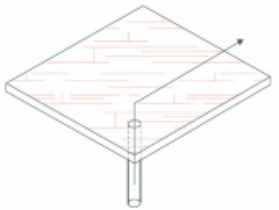
Developments of social housing far from employment centers



Rainfall catchment

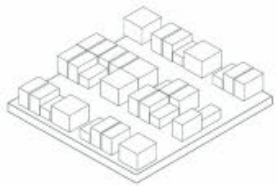


Runoff to discharge



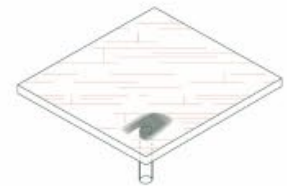
Groundwater extraction

Alternative interactions

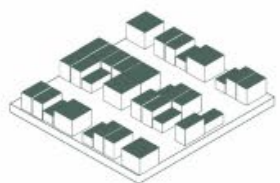


Developments of social housing near to employment centers

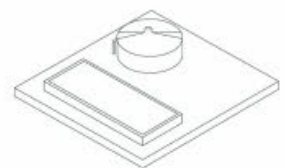
Runoff delayment



Runoff infilitration

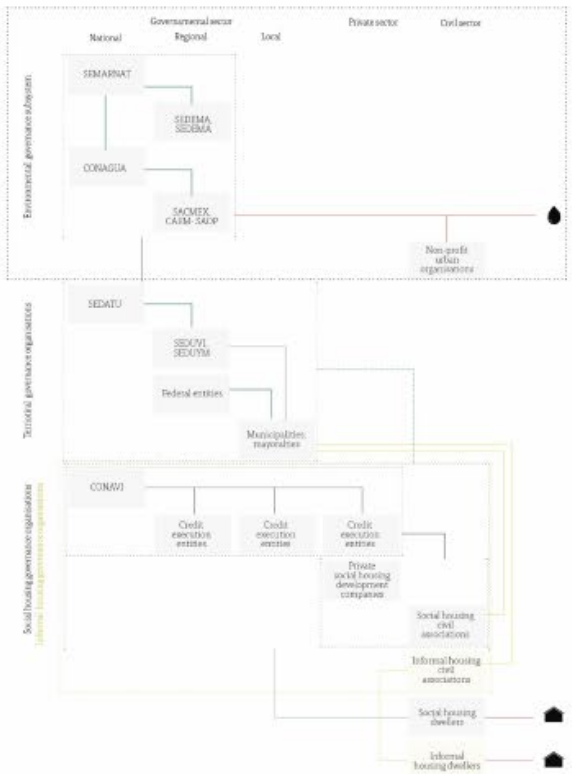


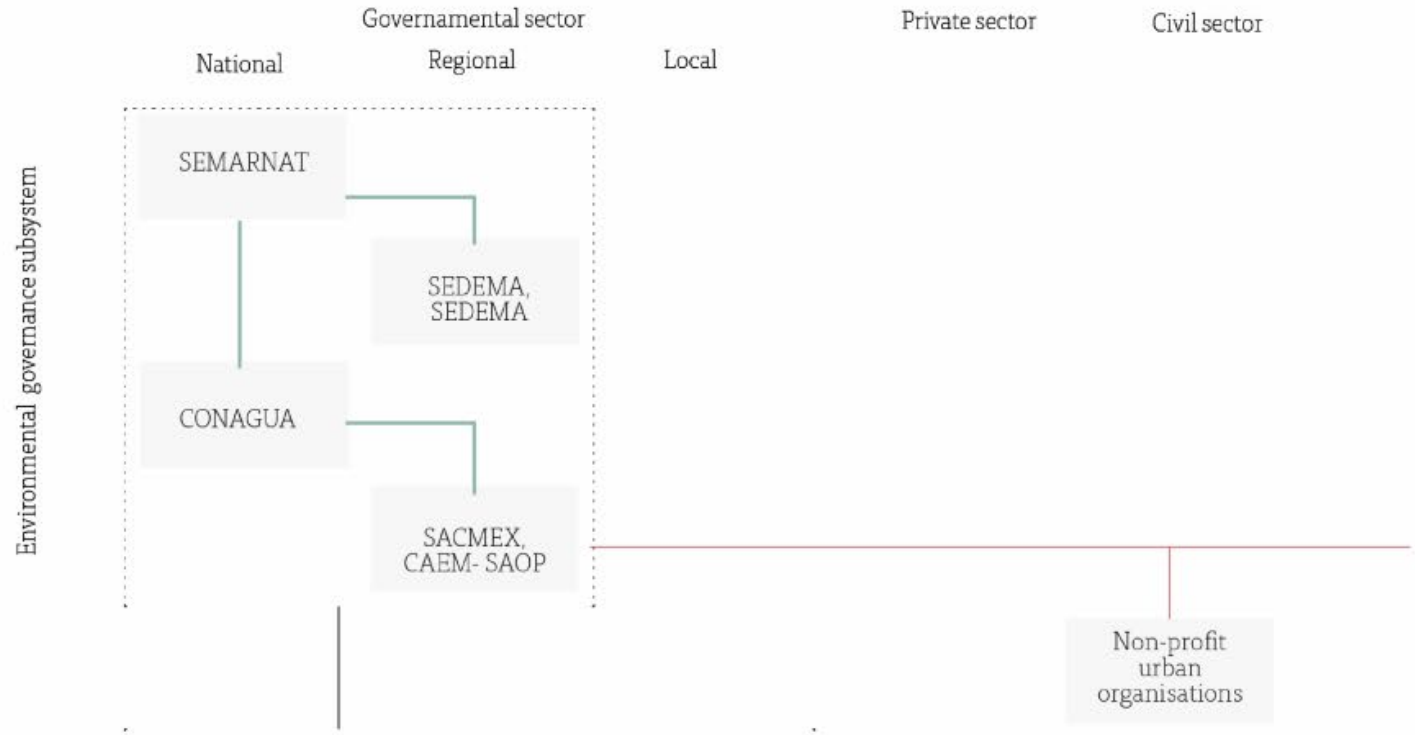
Rainfall catchment



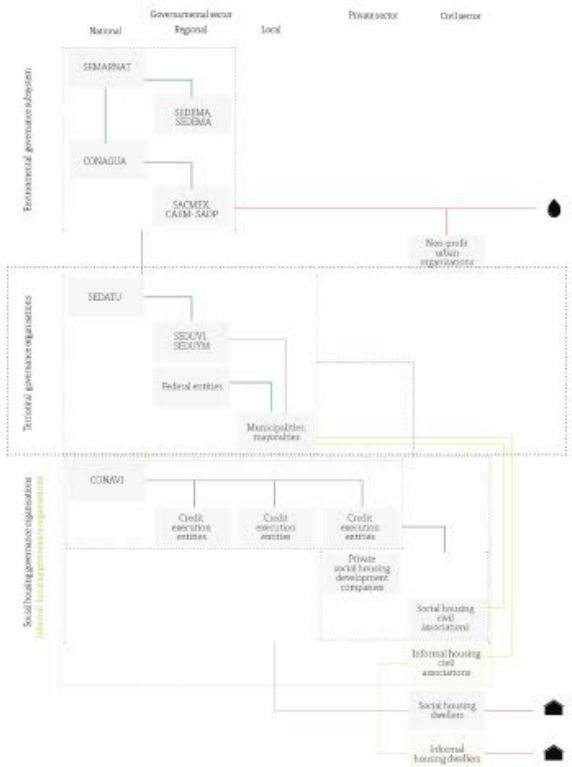
Wasterwater treatment

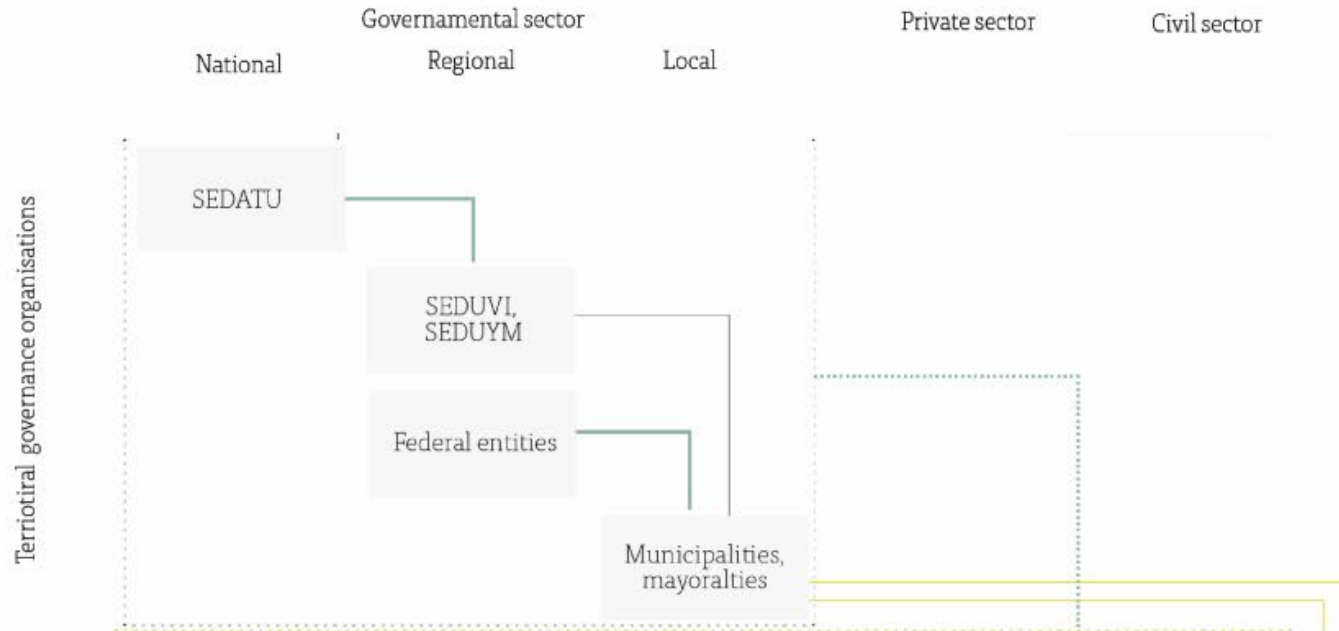
Governance system and actors



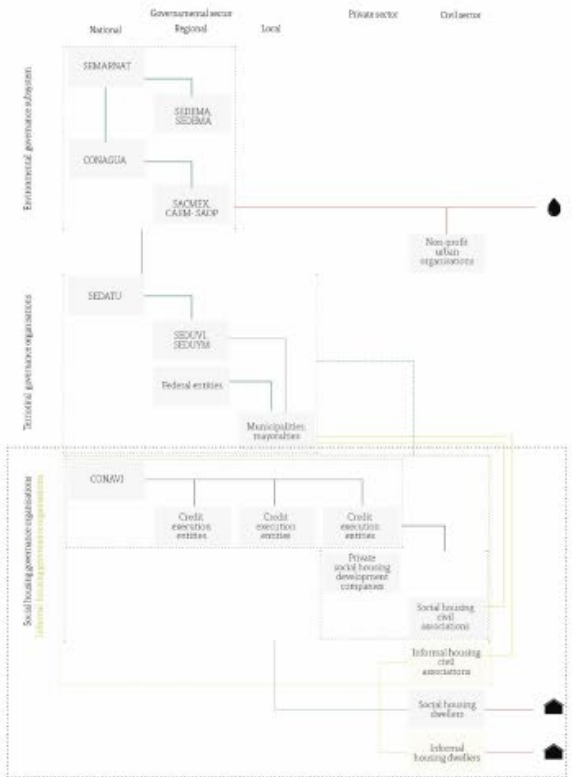


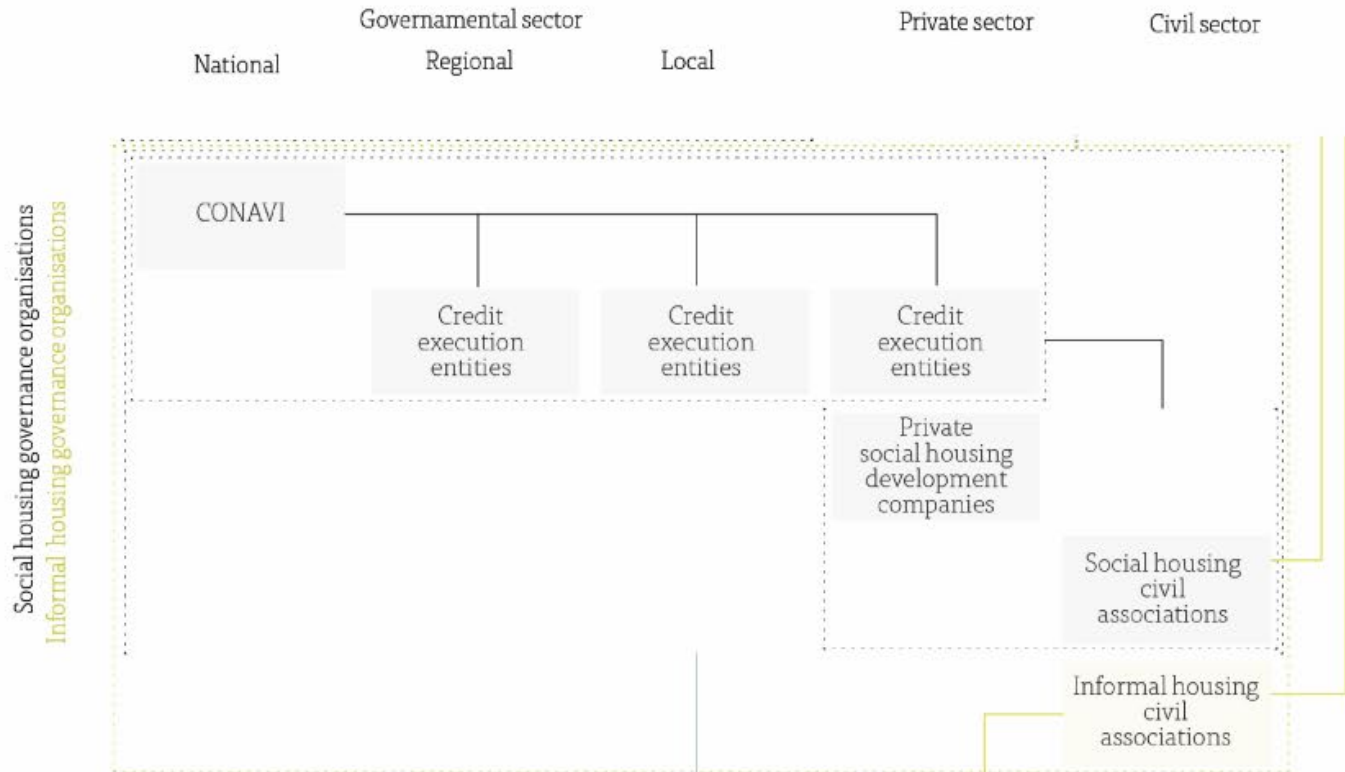
Governance system and actors





Governance system and actors





Outcomes

Social performance

- Accesibility to services
- Accesibility to infrastructure

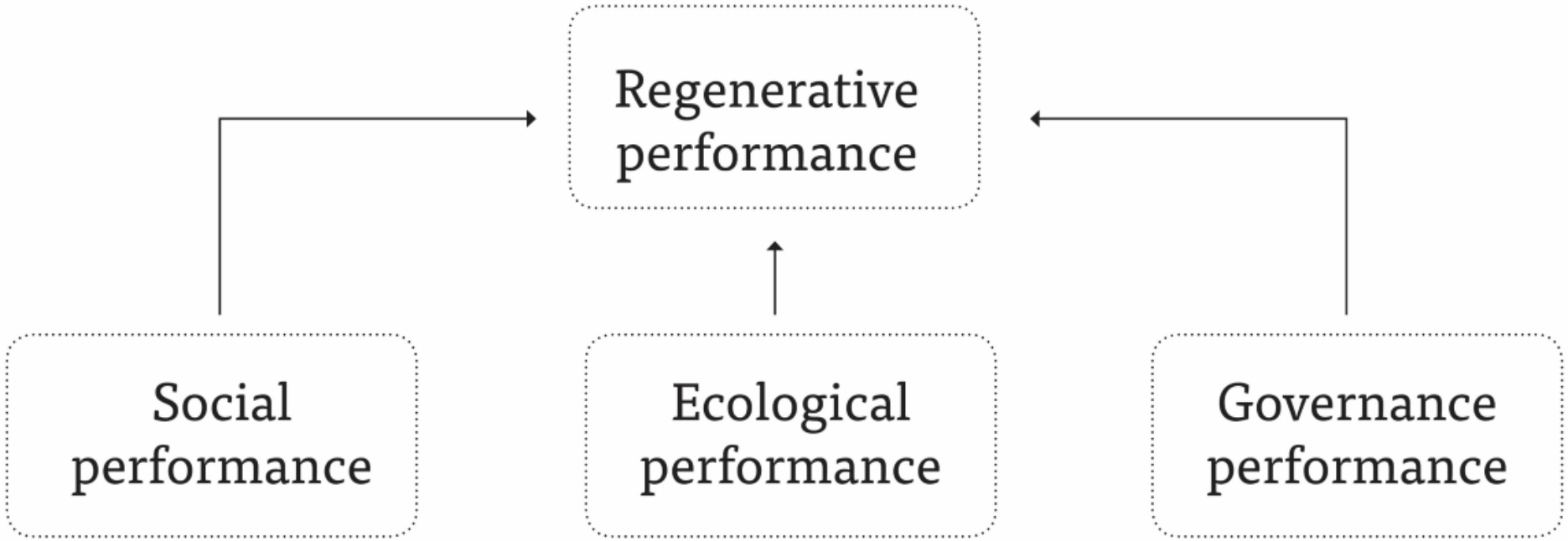
Ecological performance

- Infilitration and extraction rates balance

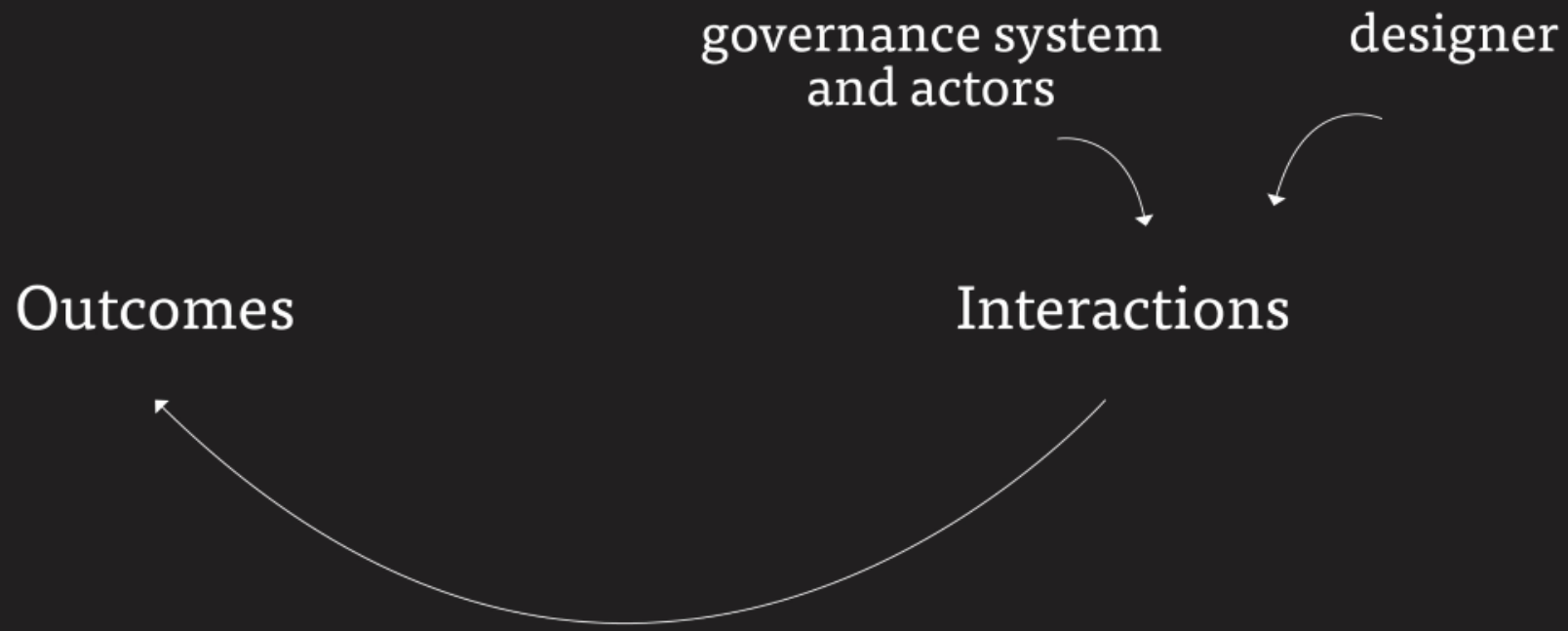
Governance performance

- Knowledge on regeneration
- Engagement in regeneration
- Strength of the actors network

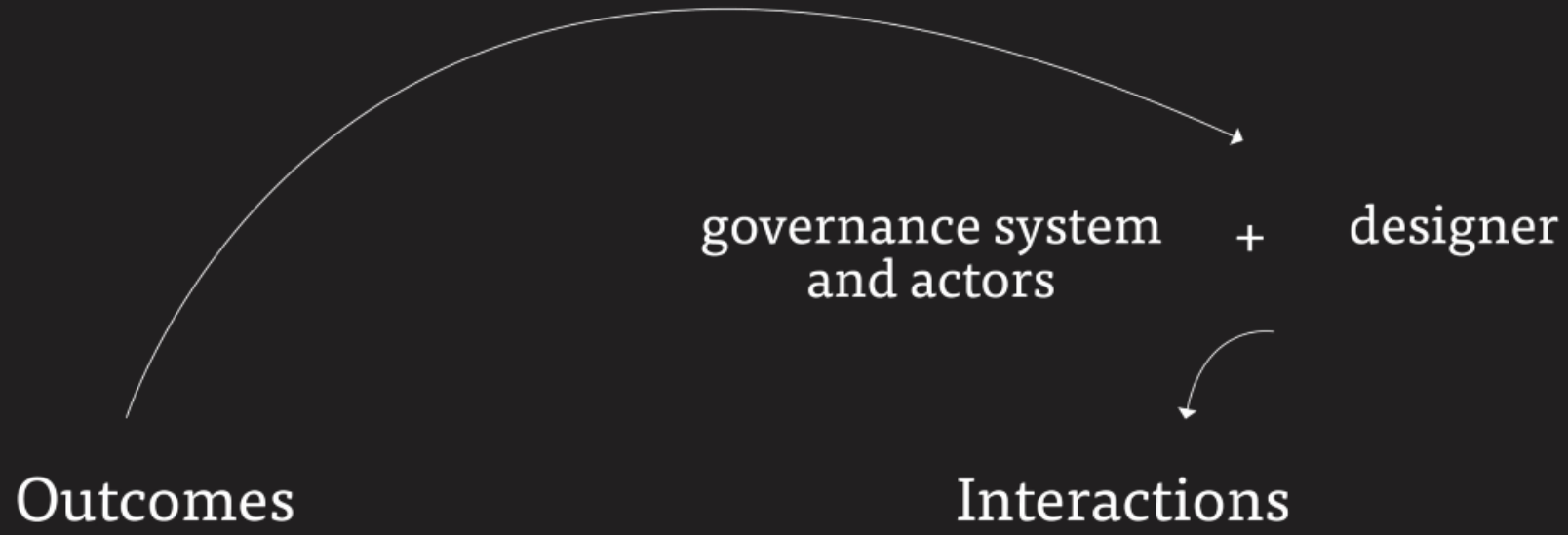
Outcomes


Regenerative performance
Social performance
Ecological performance
Governance performance

Iteration 3


governance system
and actors
designer
Outcomes
Interactions

Iteration 3


governance system
and actors
+
designer
Outcomes
Interactions

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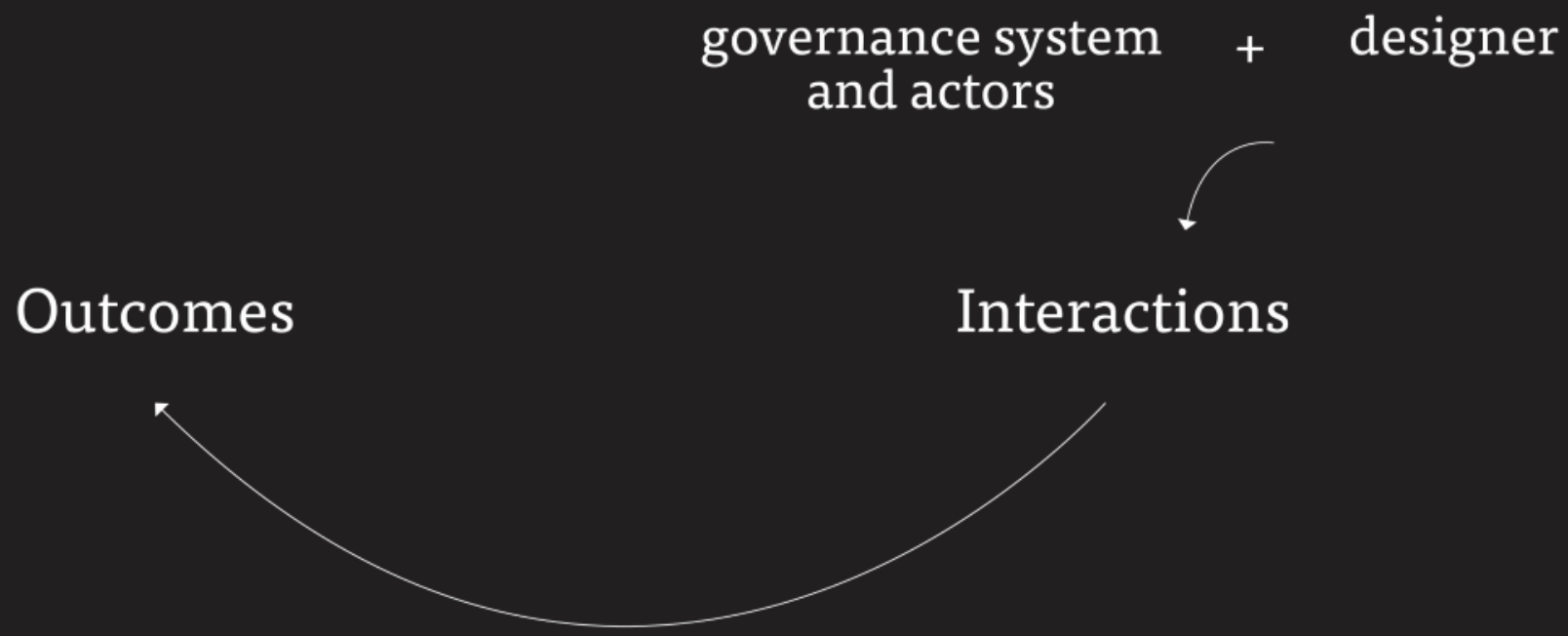
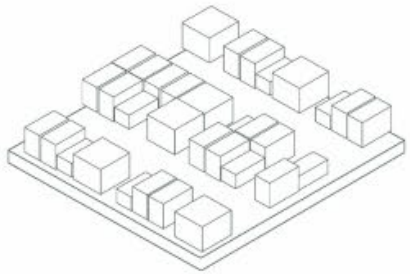

governance system
and actors
+
designer
Outcomes
Interactions

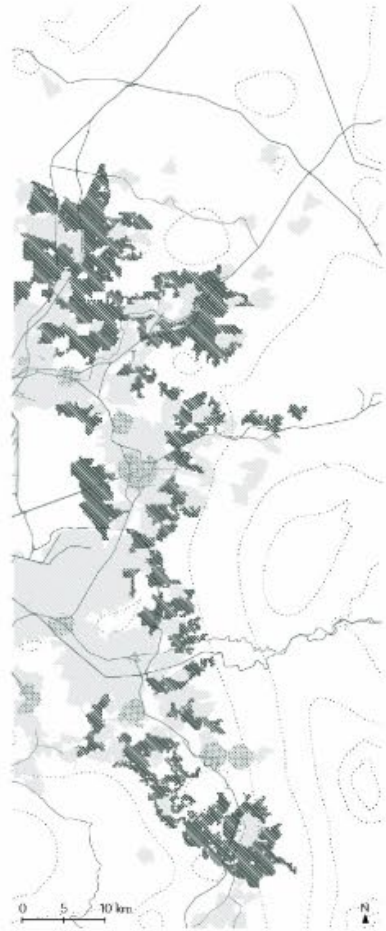
Agent-based modelling tool

Catalogue



Development of social housing

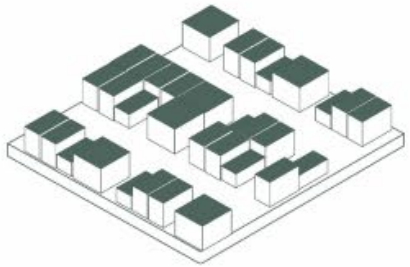
Zone 1



Zone 2

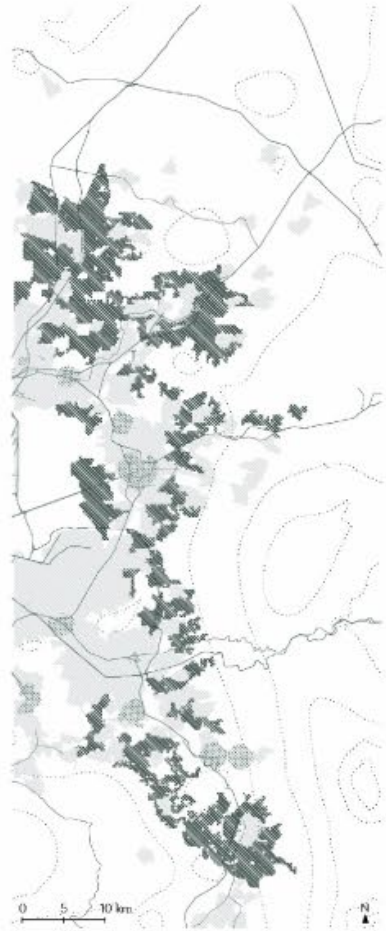
Zone 3

Catalogue



Catchment of rainwater

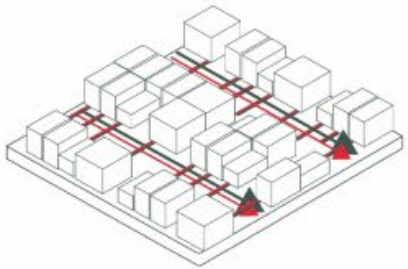
Zone 1



Zone 2

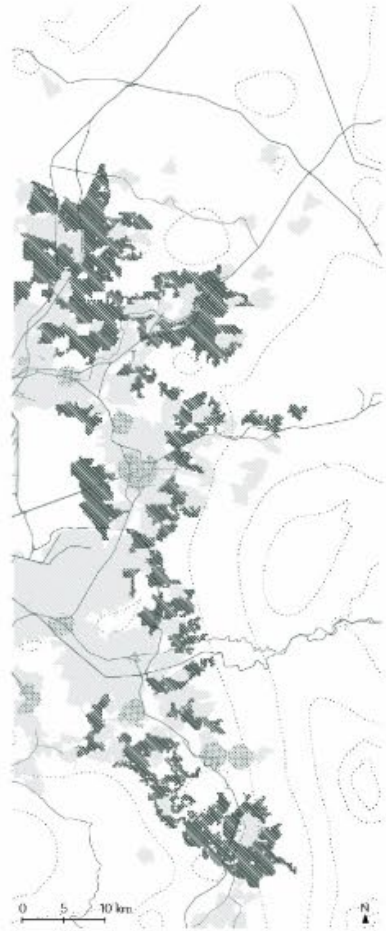
Zone 3

Catalogue



Separation of wastewater

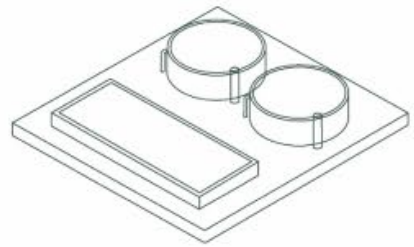
Zone 1



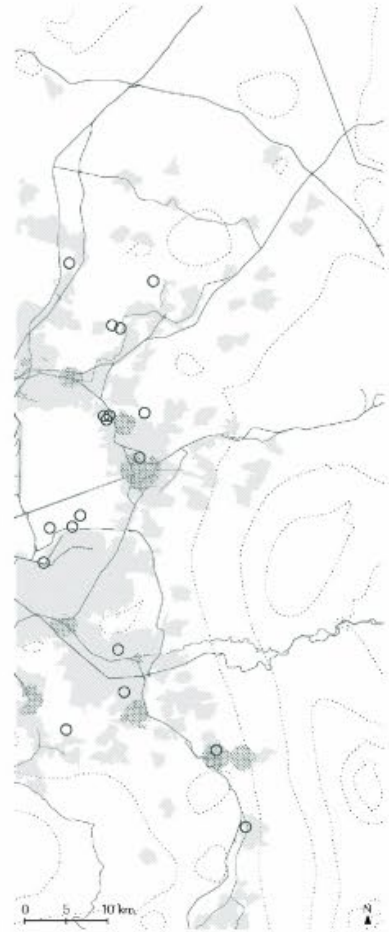
Zone 2

Zone 3

Catalogue

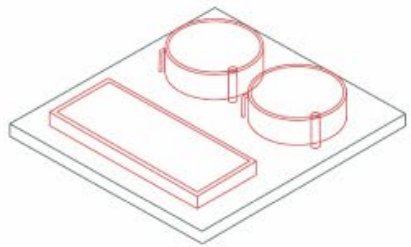


Treatment of wastewater in existing WTP

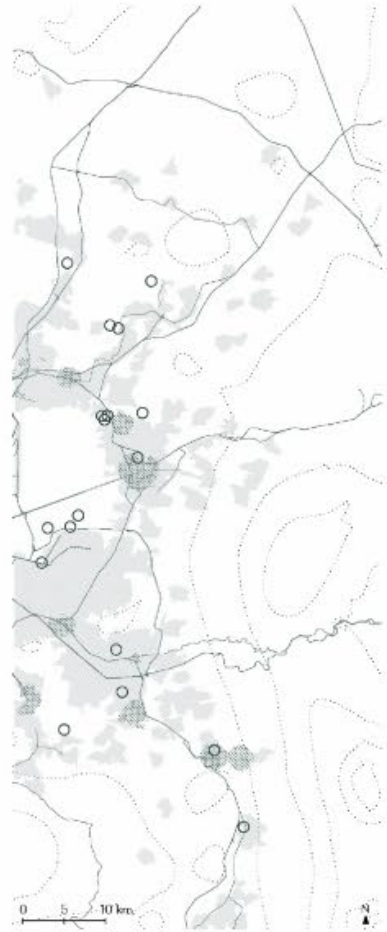


Existing WTP

Catalogue

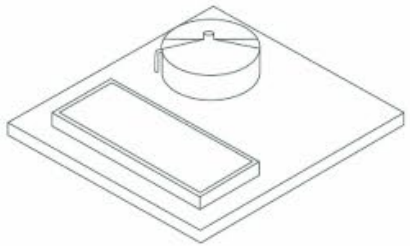


Treatment of
wastewater in improved WTP

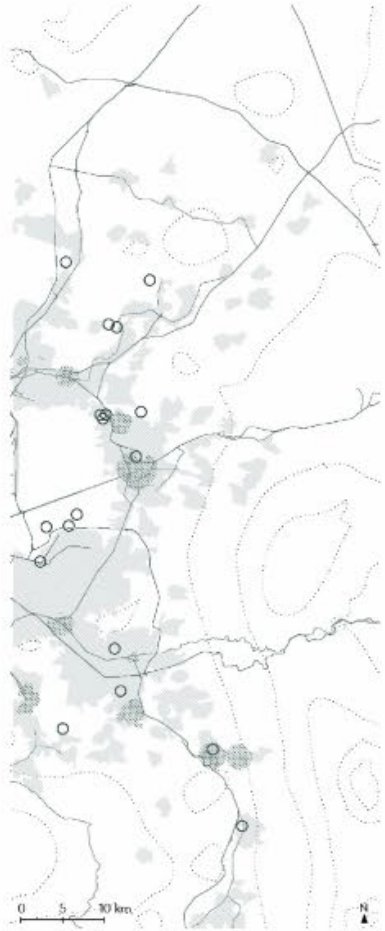


Existing WTP

Catalogue



Treatment of wastewater in WTP turned to anaerobic

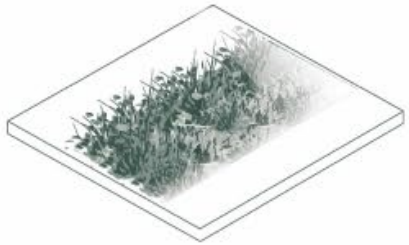


Existing WTP

New WTP

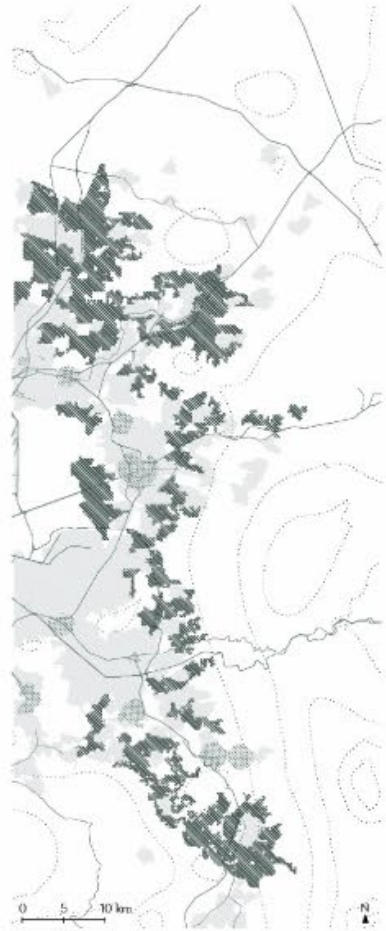
New WTP

Catalogue



Treatment of greywater in wetlands

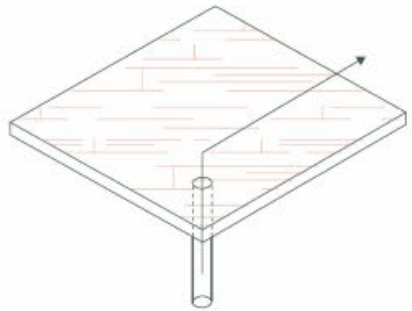
Zone 1



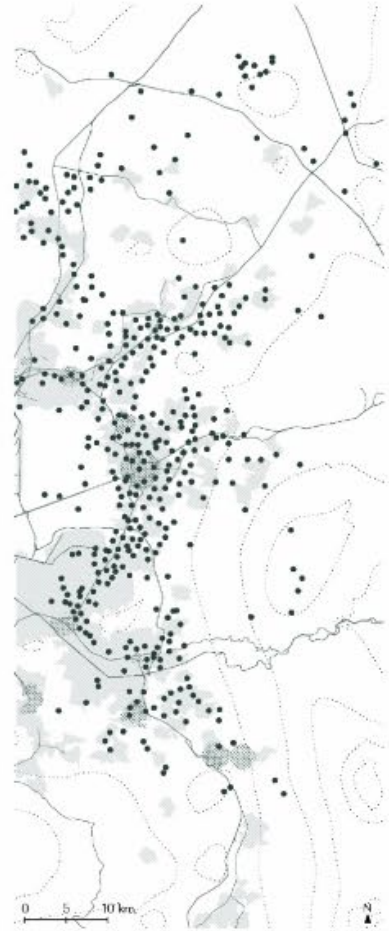
Zone 2

Zone 3

Catalogue

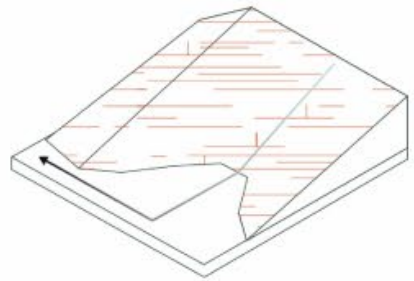


Groundwater extraction



Extraction wells

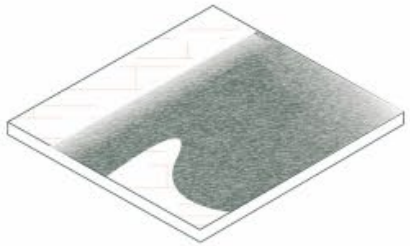
Catalogue



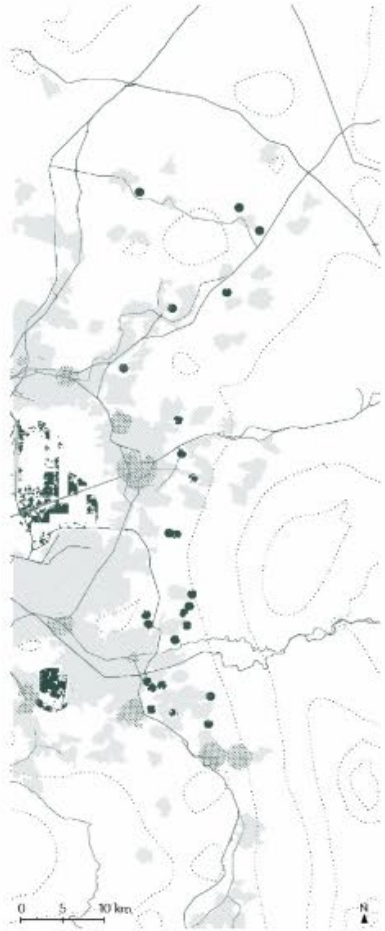
Runoff to discharge

Sewage network

Catalogue



Infiltration of water in lagoons

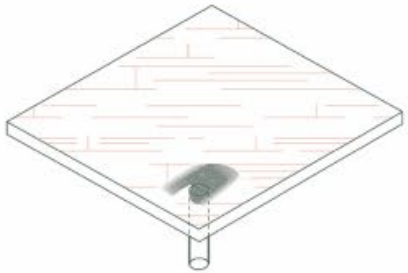


New lagoons

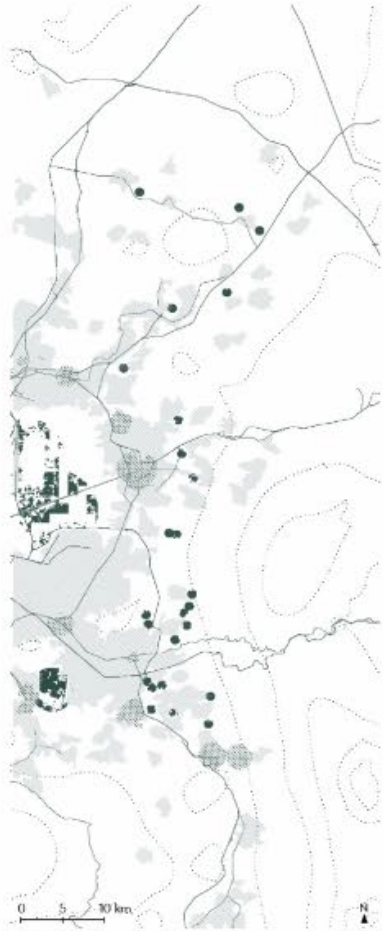
New lagoons (minus Z2)

New lagoons (minus Z3)

Catalogue



Infiltration of water in wells

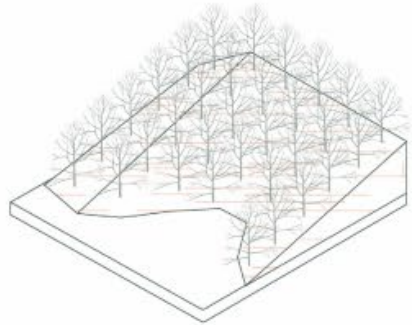


New wells

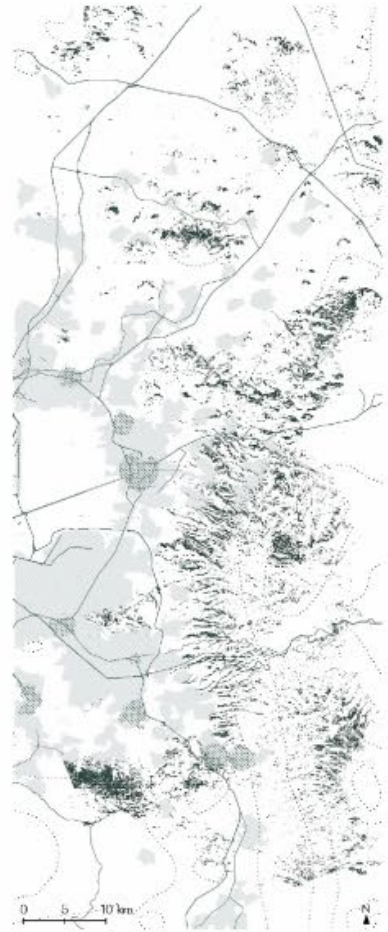
New wels (minus Z2)

New wells (minus Z3)

Catalogue



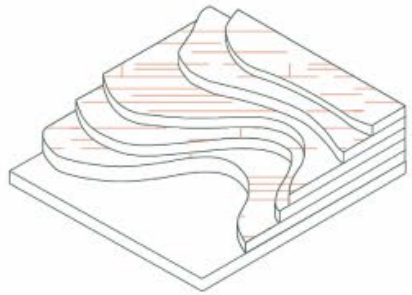
Delayment and infilitration of runoff with vegetation



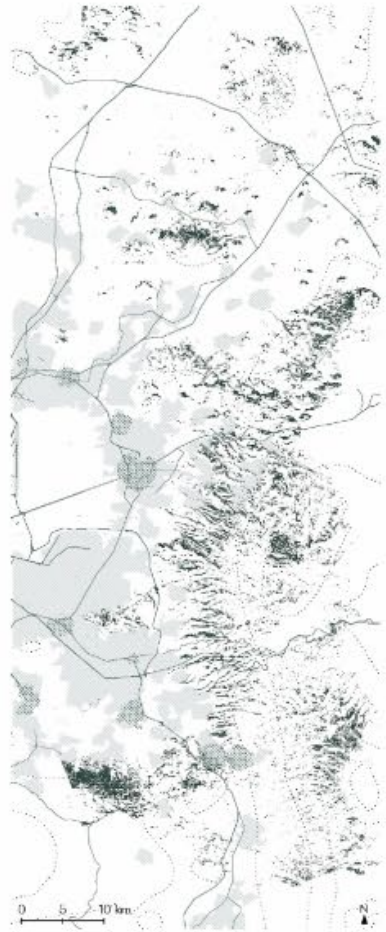
Low slopes

High slopes

Catalogue



Delayment and infilitration of runoff with terraces

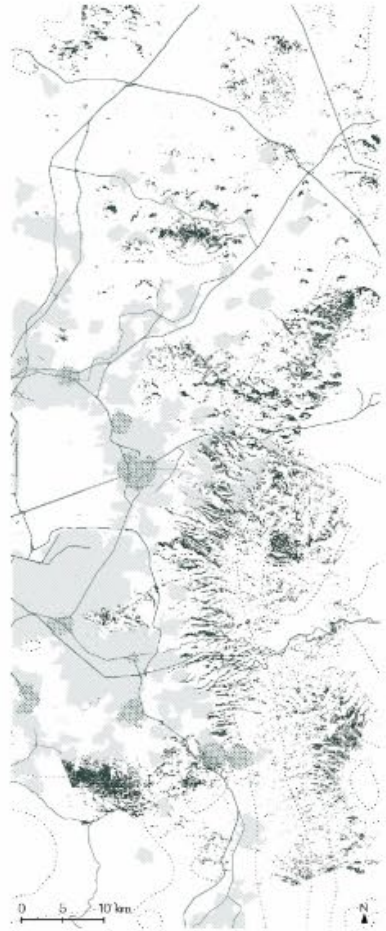


Low slopes

High slopes

Catalogue

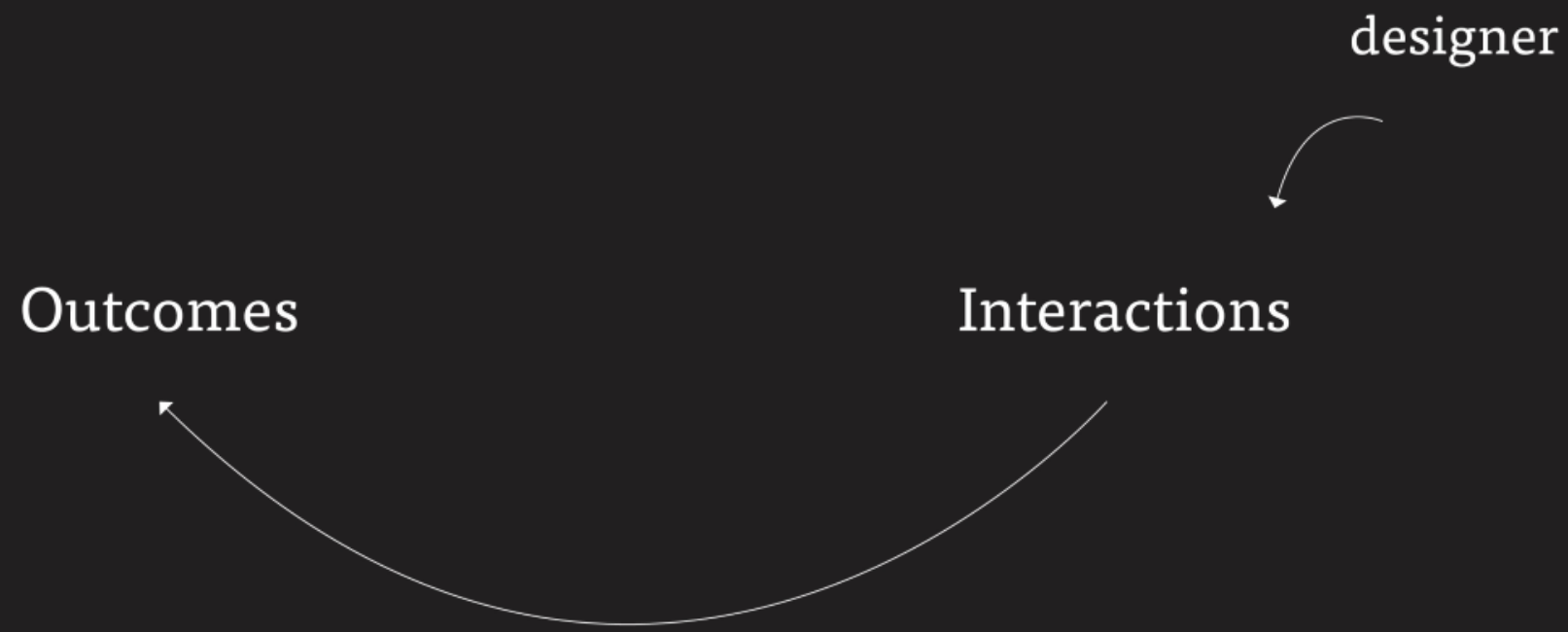
Delayment and infilitration of runoff with vegetation and terraces



Low slopes

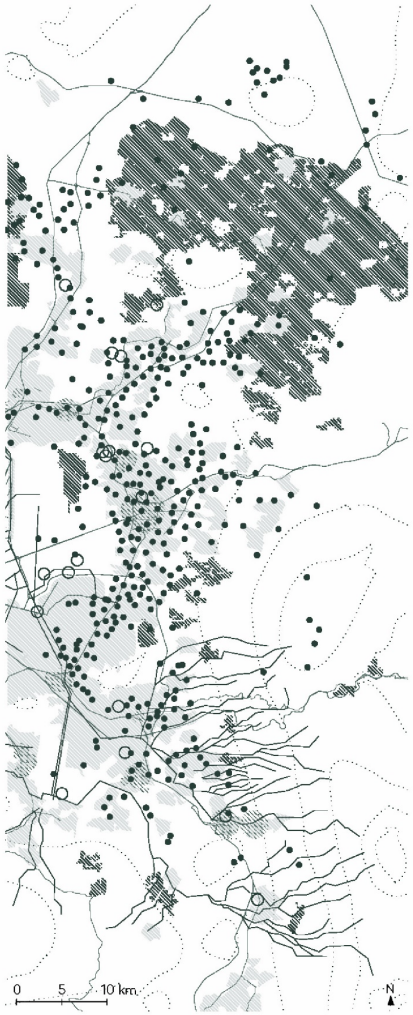
High slopes

Iteration 3-sub-iteration 2



Designer's Business-As-Usual Scenario (Process Model)

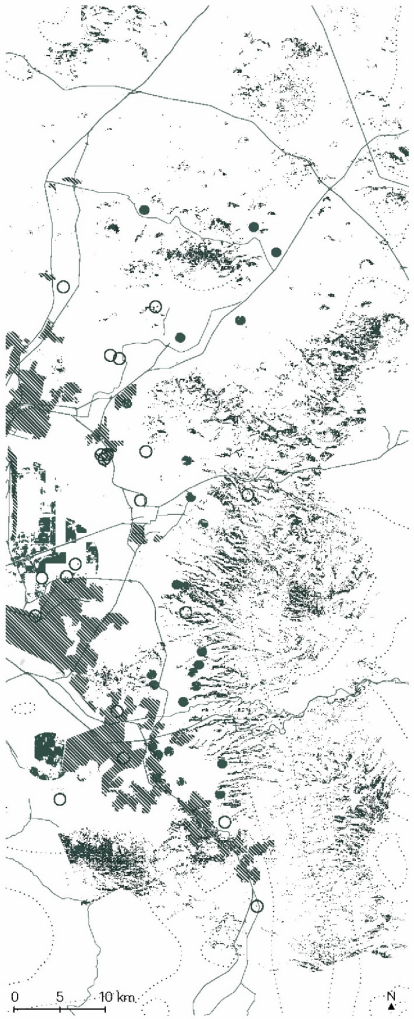
Devemopment in Zone 3
Existing WTP
New anaerobic WTP
Increase of extraction



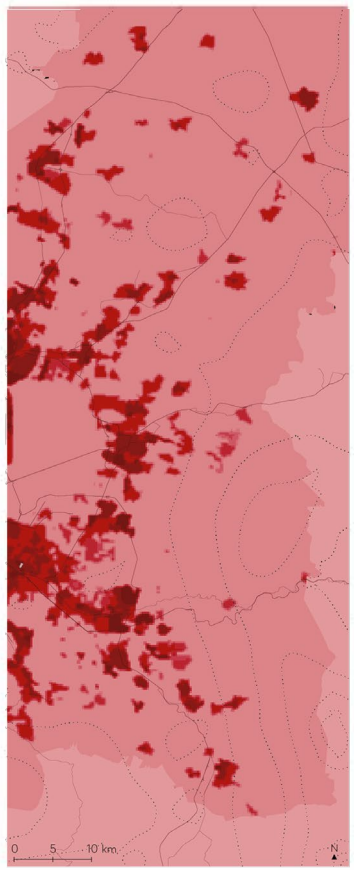
Urban water system
- Future housing development
- WTP
- Extraction wells
- Infilitration areas
- Employment centers
- Built environment
- Primary street network

Designer's Regenerative Development Scenario (Change Model)

Development in Zone 1
Rainwater catchment in ISH
Rainwater catchment in Z1
Source separation in Z1
Wetlands ISH
Infilitration lagoons
Vegetation and terraces



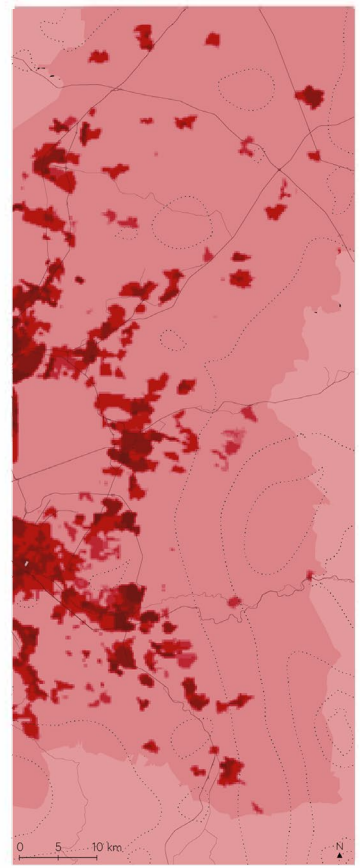
Designer's Business-As-Usual Scenario



2020

Social-ecological performance

Designer's Regenerative Development Scenario

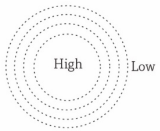


2020

Social-ecological performance

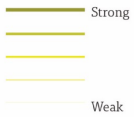
Stakeholders' Business-As-Usual Scenario (Process Model)

RD engagement



RD knowledge

Ad-hoc

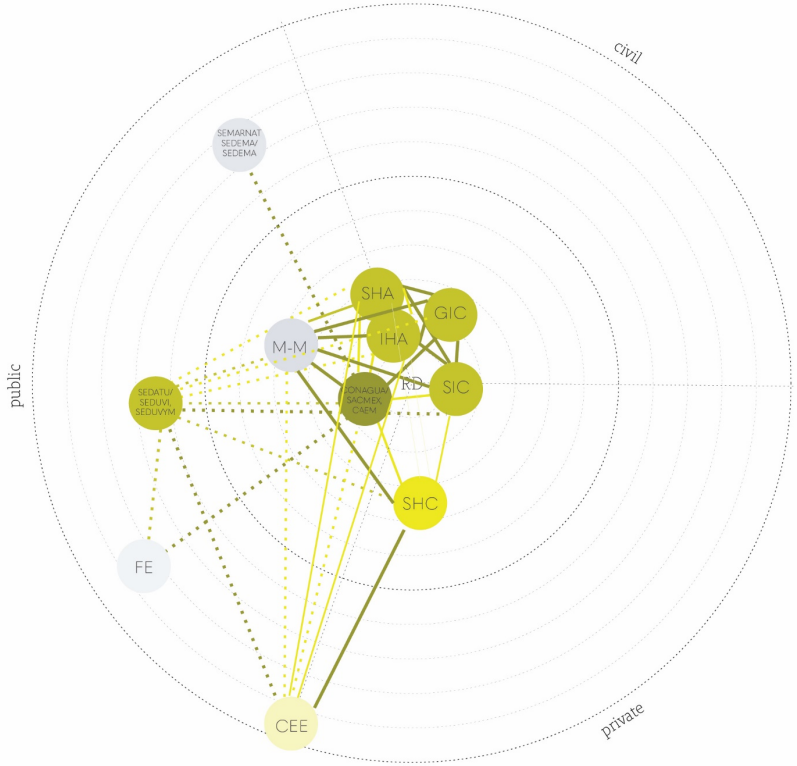


Indirect relation

M-M	Local governments
FE	Federal entites governments
SHC	Social housing companies
SHA	Social housing associations
IHA	Informal housing associations
GIC	Green impact companies
SIC	Social impact companies

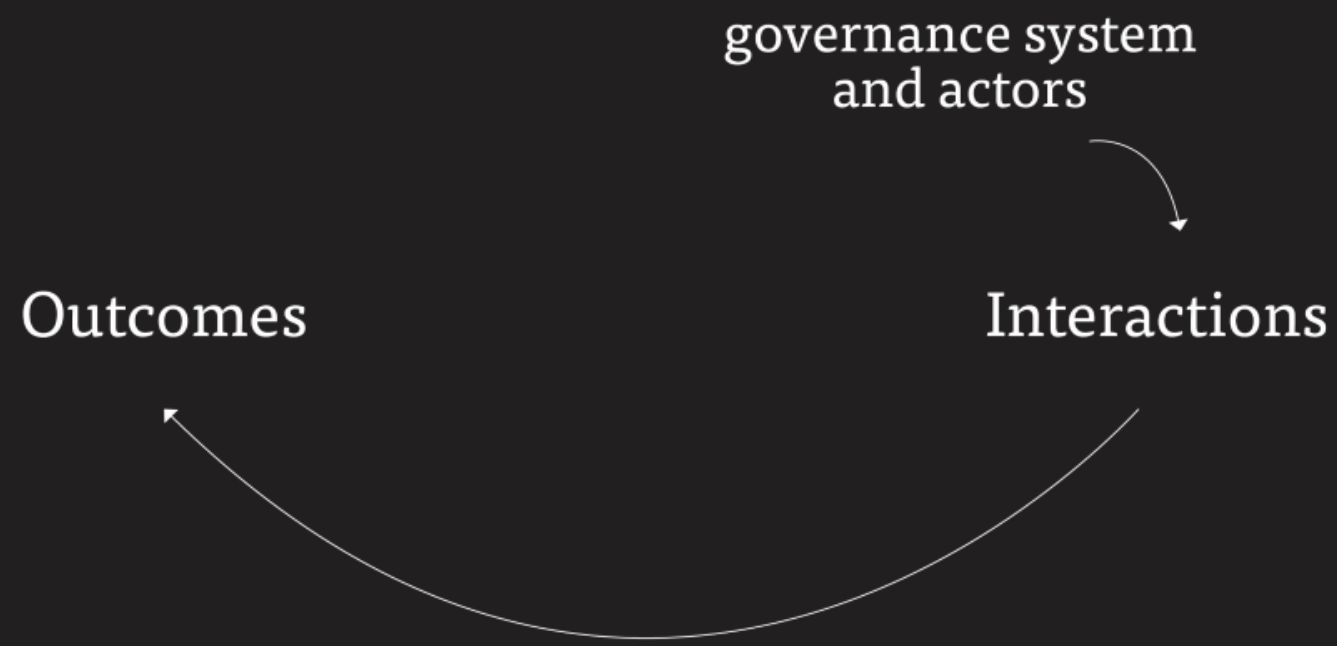
Governance performance

Stakeholders' Regenerative Development Scenario (Change Model)



Governance performance

Iteration 3-sub-iteration 3



Workshop

Informal housing associations
Ángelica Barrera
Representative of their interests

SEDATU
Edgar Buenrostro
Territorial ordenance direction at SEDATU

Social housing associations
Anahí Valera
Representative of Flor de Maíz associatio

CONAGUA/CAEM
Alan Figot
Role-played

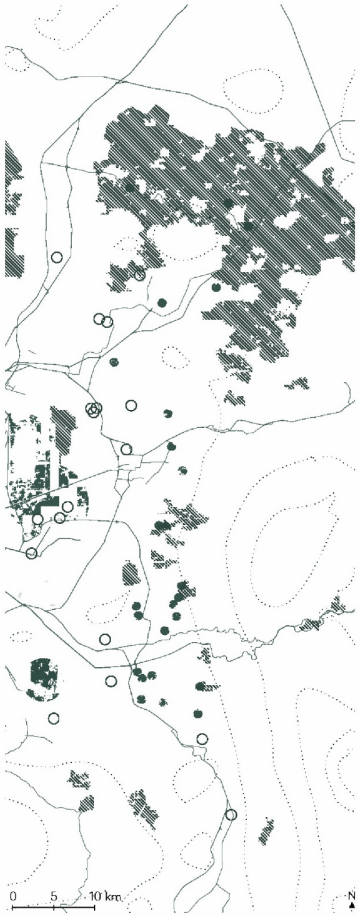
Social impact organisation
Andrea Pliego
Entrepreneur

Federal Credit Society (FCS)/ Social housing developer
Marco Figueroa
Retired from the FCS, developed extensive housing

Ecological impact companies
Enrique Lomnitz
Entrepreneur at Isla Urbana

Stakeholders' Business-As-Usual Scenario (Process Model)

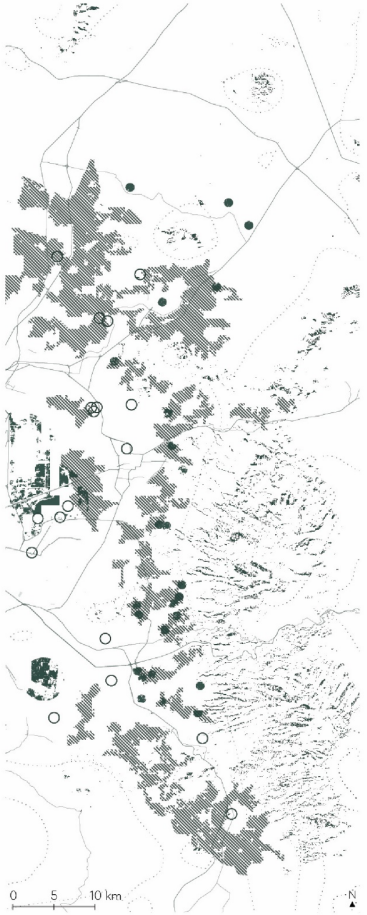
Devemopment in Zone 3
Rainwater catchment Z3
Source separaion Z3
Improved WTP
Infilitration wells



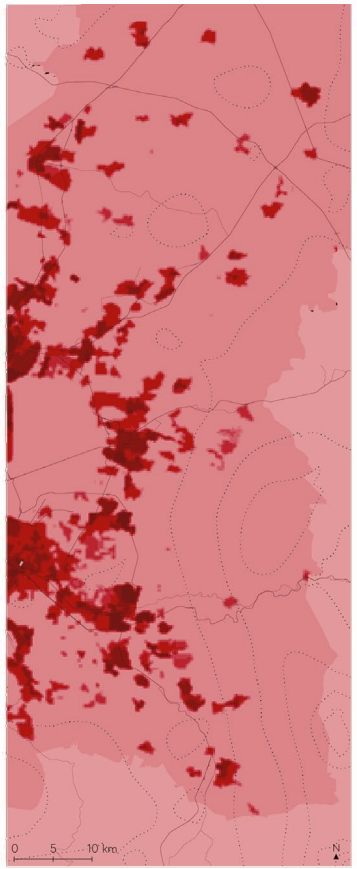
Urban water system
- Future housing development
- WTP
- Extraction wells
- Infilitration areas
- Employment centers
- Built environment
- Primary street network

Stakeholders' Regenerative Development Scenario (Change Model)

Development in Zone 2
Rainwater catchment Z2
Improved WTP
Wetlands Z2
Infilitration wells
Vegetation in high slopes



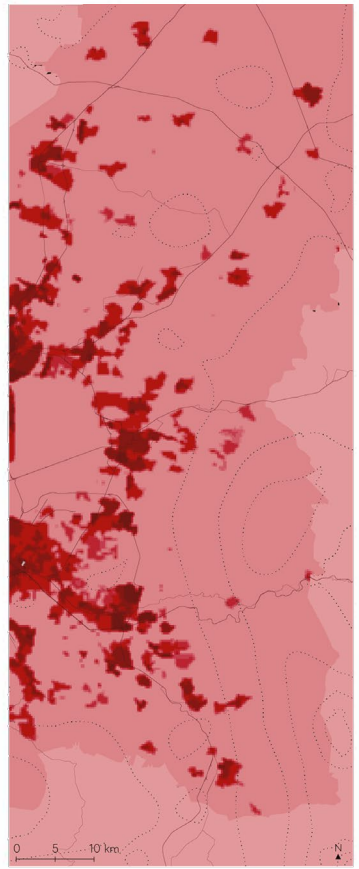
Stakeholders' Business-As-Usual Scenario



2020

Social-ecological performance

Stakeholders' Regenerative Development Scenario

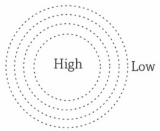


2020

Social-ecological performance

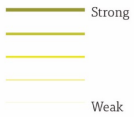
Stakeholders' Business-As-Usual Scenario (Process Model)

RD engagement



RD knowledge

Ad-hoc



Indirect relation

M-M	Local governments
FE	Federal entites governments
SHC	Social housing companies
SHA	Social housing associations
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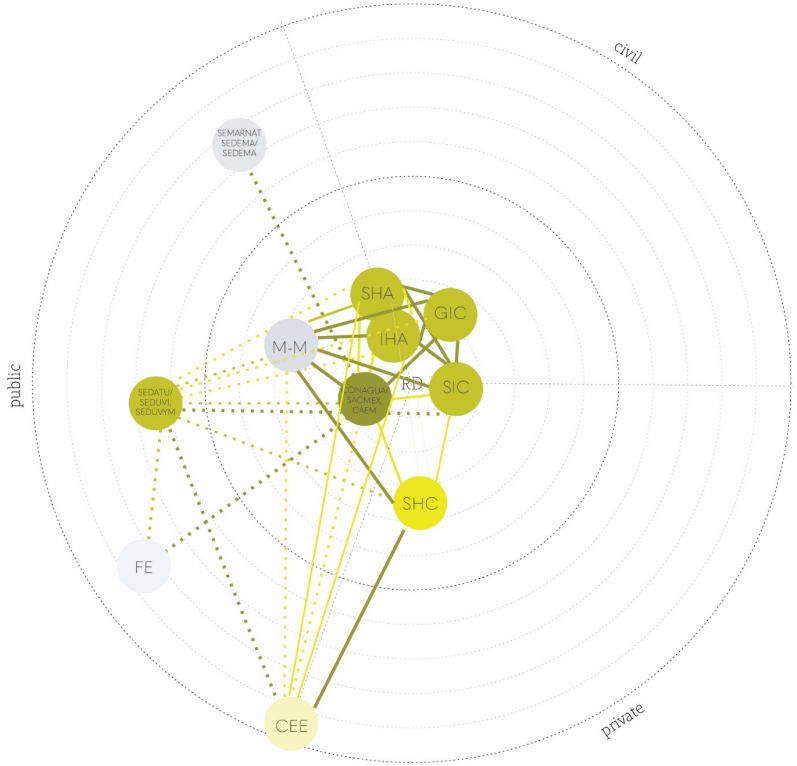
GIC	Green impact companies
SIC	Social impact companies

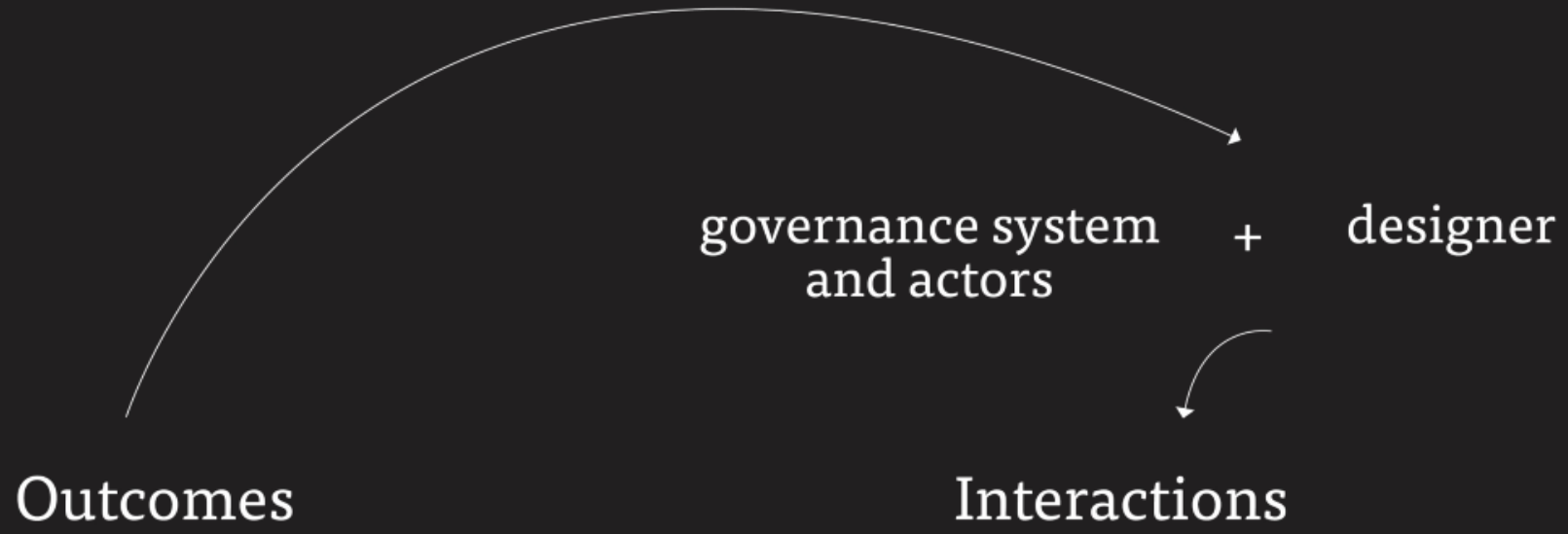
Governance performance

Stakeholders' Regenerative Development Scenario (Change Model)

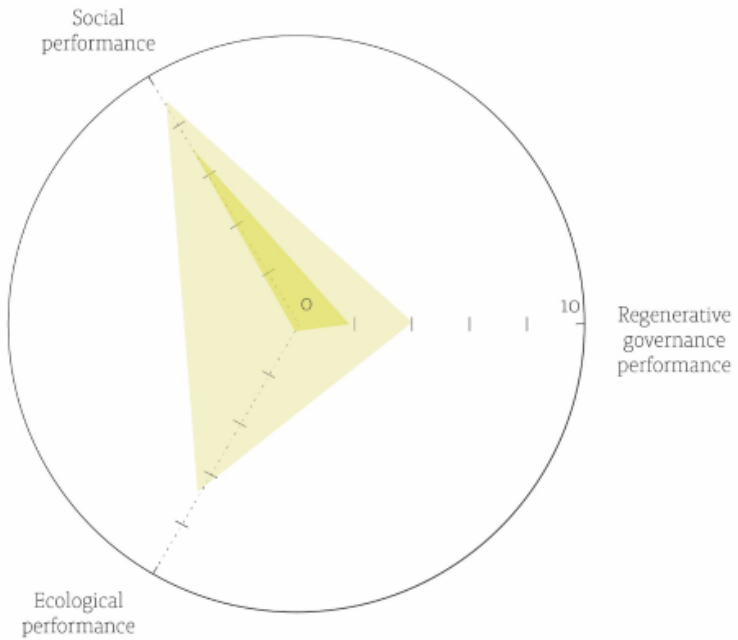


Governance performance

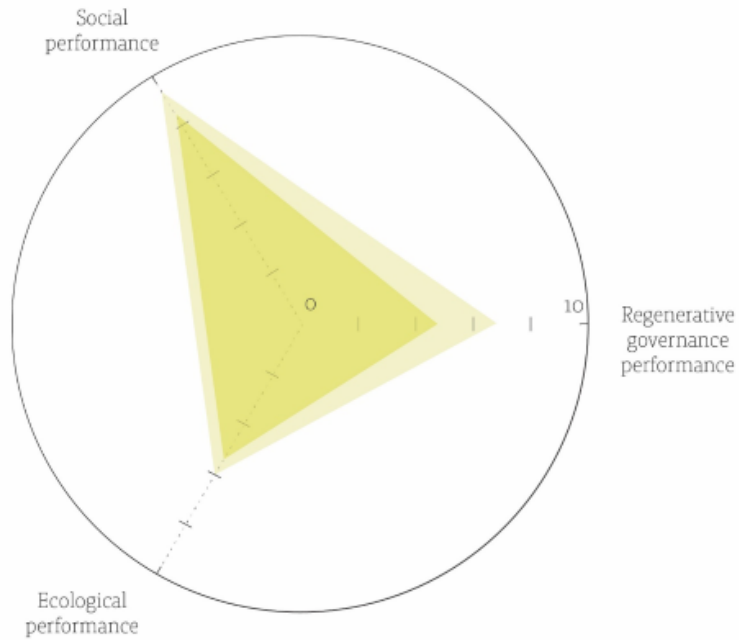
Iteration 3-sub-iteration 4



Performance improvement from the Business-As-Usual to the Regenerative Development Scenarios



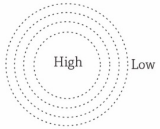
When developed by the researcher



When developed by the stakeholders

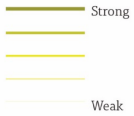
Co-planned Regenerative Scenario (Change Model)

RD engagement



RD knowledge

Ad-hoc



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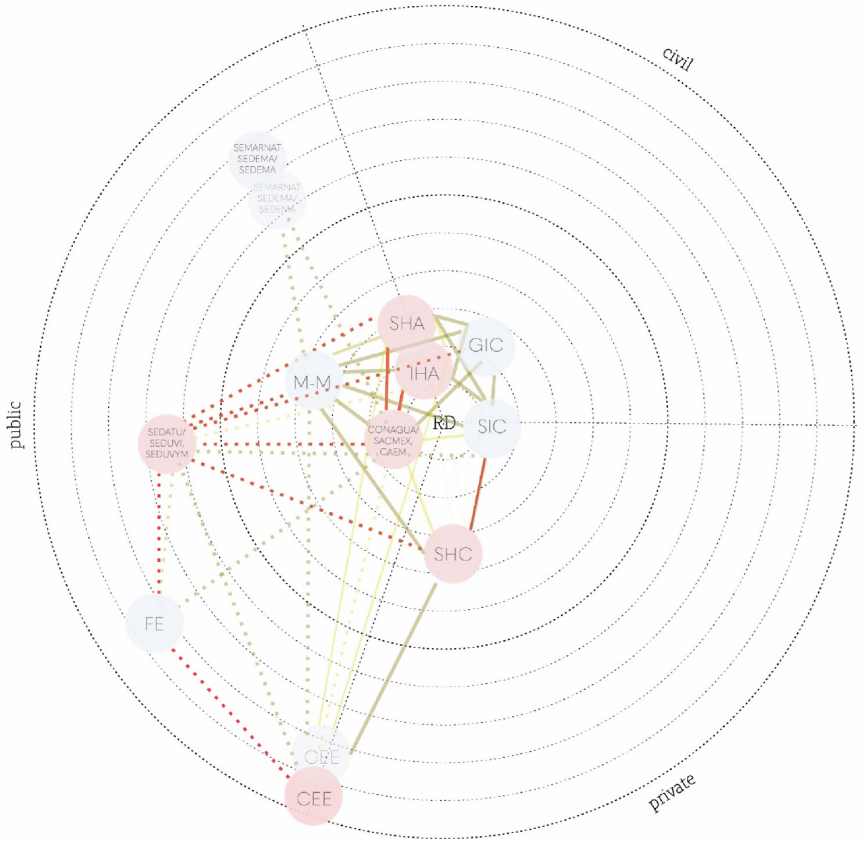
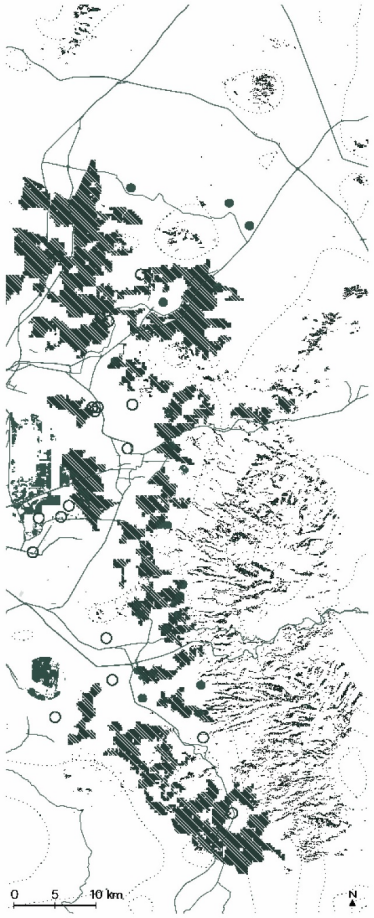


Governance performance

Co-planned Regenerative Scenario (Change Model)

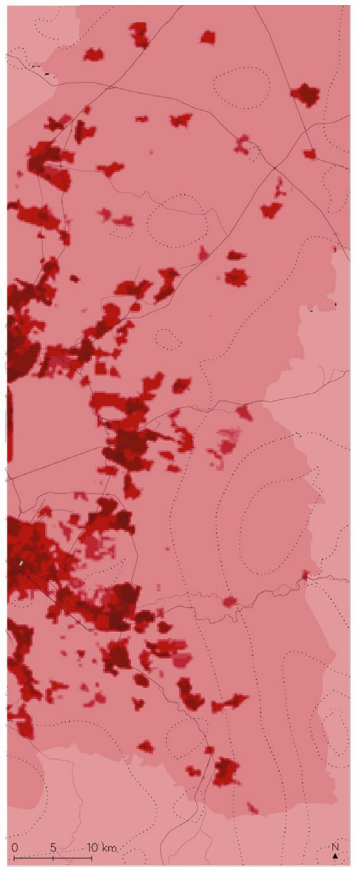
Development in Zone 1
Development in Zone 2
Rainwater catchment in Zone 1
Rainwater catchment in Zone 2
Source separation in Zone 1
Source separation in Zone 2
Anaerobic WTP
New anaerobic WTP
Infilitration lagoons
Vegetation in high slopes
Rainwater catchment in ISH
Wetlands in ISH



Urban water system

- Future housing development
- WTP
- Extraction wells
- Infilitration areas
- Employment centers
- Built environment
- Primary street network

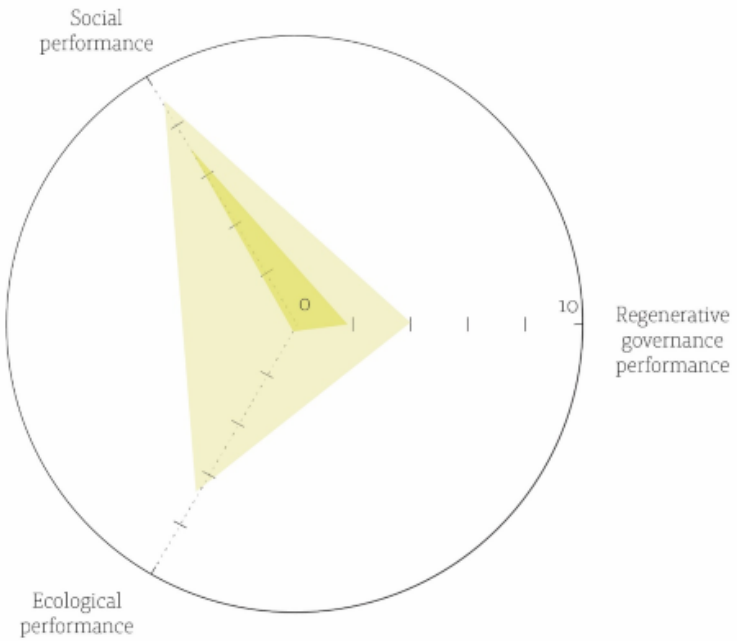
Co-planned Regenerative Scenario



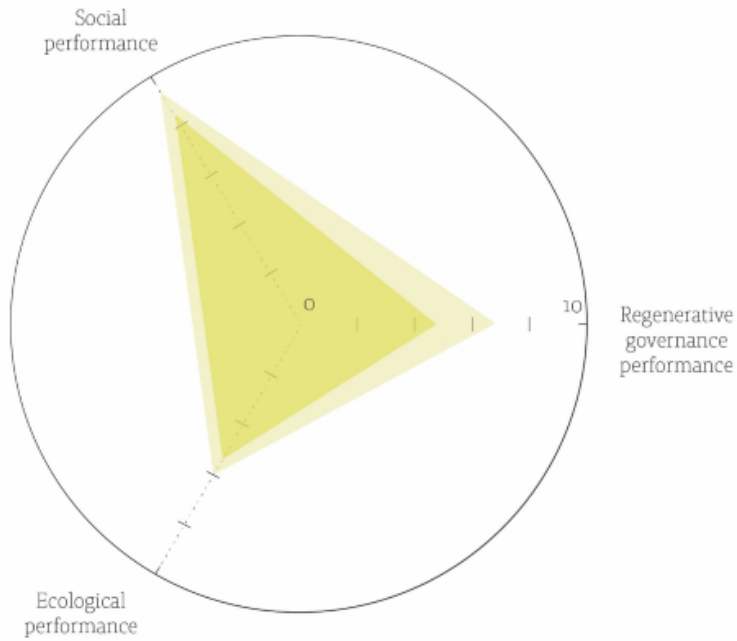
2020

Social-ecological performance

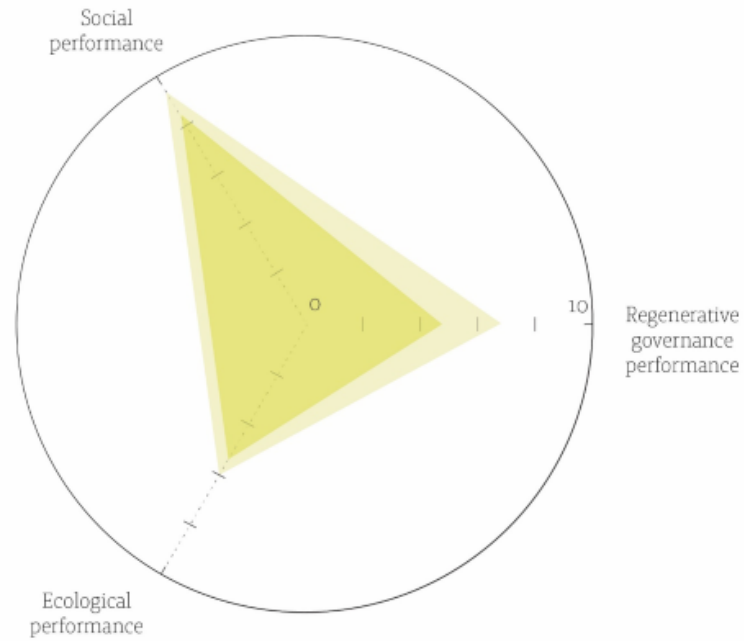
Performance improvement from the Business-As-Usual to the Regenerative Development Scenarios



When developed by the researcher

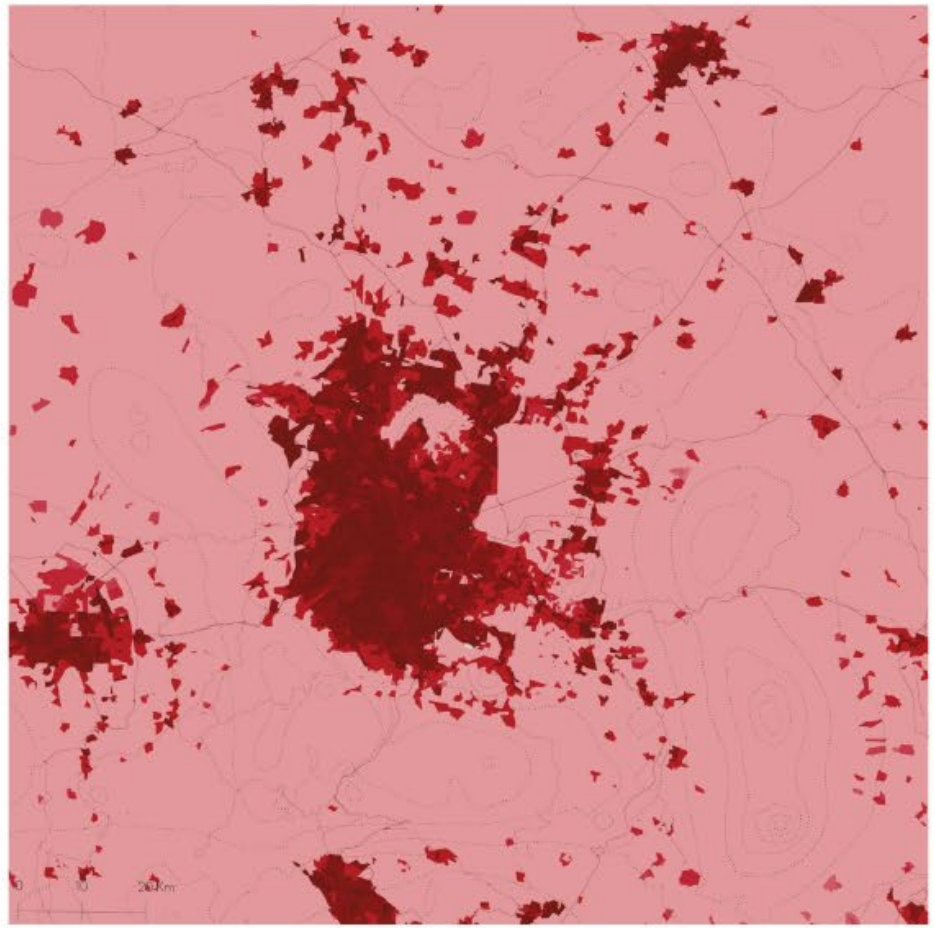


When developed by the stakeholders

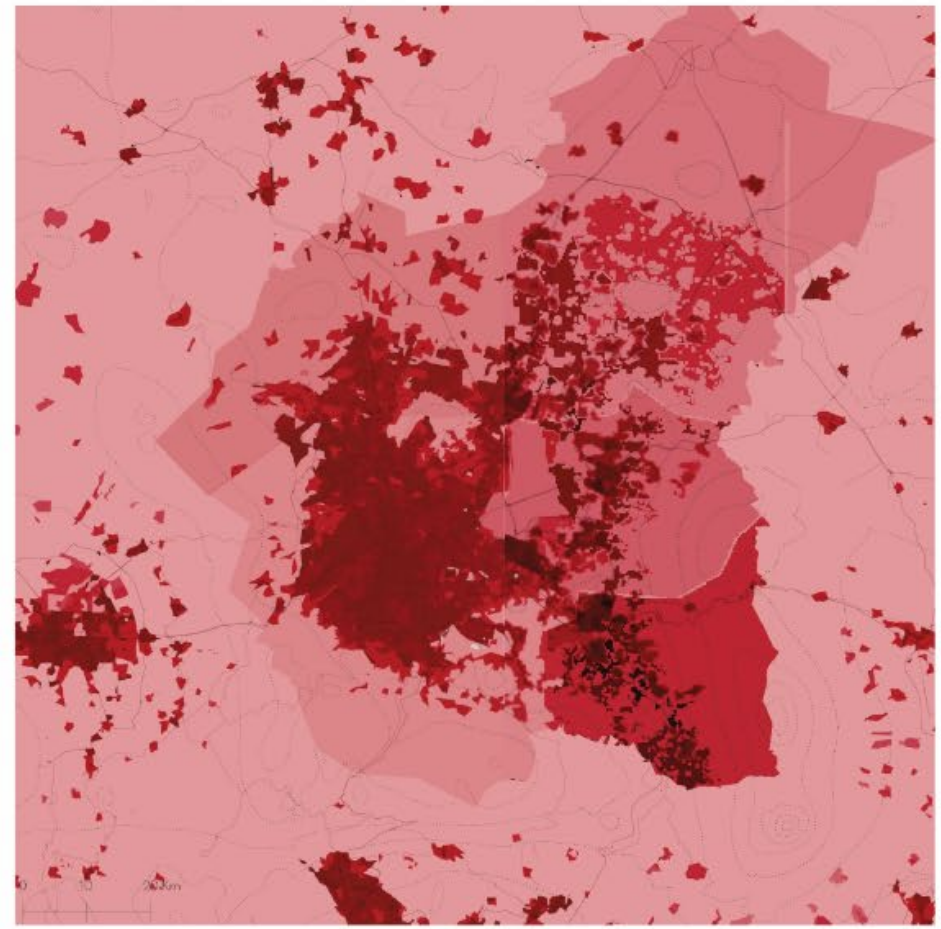


When co-planned

Regeneration in the MAVM



2020



2050

Social-ecological performance
10
1


Theory
Regenerative Development and Design
Adapted geodesign framework
Socio-ecological frameworks; governance frameworks; multiscalarity; trandiscplinarity
Practice
Planning

Thank you