METAVALLEY

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
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- Research question & hypothesis
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Theory

Regenerative Development and Design

-A system of technologies and strategies
-Generation of whole system understanding of a place
-Development of strategic systemic thinking capacities
-Engagement of the stakeholders required to ensure regenerative design
Theory

Regenerative Development and Design

- A system of technologies and strategies
- Generation of the systemic understanding of a place
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Theory

Regenerative Development and Design

Practice

Planning

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

Regenerative Development and Design

Socio-ecological frameworks; governance frameworks; multiscalality; trandisciplinarity

Practice

Planning

Picket et al. (2003)
Scott et al. (2013)
Aalto et al. (2018)
vander Leer et al. (2018)
Metropolitan Area of the Valley of Mexico
Why the MAVM as a case study?
Urbanisation

Water management
Urbanisation
Urbanisation

Social and informal housing

Informal housing

Social housing

Image: Google Maps, 2018

Image: Google Maps, 2018
Marginalisation - Social housing development
Marginalisation - Informal housing development

Image: De Jong, 2017
Marginalisation-Central city
Water management
Water management
Water management
Water management
Water management
Water scarcity - subsidence

Subsidence risk
- Risk

Registered subsidence
- High
- Medium
- Low

Image: Alef, 2017

Image: Salasau, 2017
Water scarcity- floodings

Drought and flooding risk
- High
- Low
Water scarcity- draughts

Image: Olvera, 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?
Theory

Regenerative Development and Design

Socio-ecological frameworks; governance frameworks; multiscalarity; transdisciplinarity

Practice

Planning

Picket et al. (2003)
Scott et al. (2013)
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Theory
Regenerative Development and Design

Geodesign
Social-Ecological Systems Framework

Practice
Planning
Geodesign

Social-Ecological Systems Framework
Geodesign

Social-Ecological Systems Framework
Geodesign

Social-Ecological Systems Framework

→ Multiscalarity
Social-ecological systems
Governance framework
Adapted geodesign model

Geodesign team

- R.M. I: Resource system & units
- P.M. I: Current interactions
- E.M. I: Current outcomes
- C.M. I: Alternative interactions
- I.M. I: Alternative outcomes
- D.M. I: Governance system and actors

Stakeholders

- R.M. II: Resource system & units
- P.M. II: Current interactions
- E.M. II: Current outcomes
- C.M. II: Alternative interactions
- I.M. II: Alternative outcomes
- D.M. II: Governance system and actors

Modelling Methods Selection

- R.M. III: Resource system & units
- P.M. III: Current interactions
- E.M. III: Current outcomes
- C.M. III: Alternative interactions
- I.M. III: Alternative outcomes
- D.M. III: Governance system and actors

Geodesign framework

- Steps
- Steps sequence
- Decision
Adapted geodesign model

Geodesign

Social-Ecological Systems Framework

Trandiscplinarity

Multiscularity
Social-ecological systems Governance framework
Adapted geodesign model
Iteration 0

Macro-scale

Meso-scale
Macro-scale
Resource systems and subsystems

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

Meso-scale
Resource systems and subsystems
Iteration 0

Macro-scale

Resource systems and subsystems

value-generating capacities

Meso-scale

Resource systems and subsystems
Social system and subsystems

Ecological system and subsystems
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
Accessibility to employment centers

Public transport and pedestrian accessibility

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

Metavalley
Iteration 0
Existing social and informal housing developments
Macro-scale
Resource systems and subsystems

Meso-scale
Resource systems and subsystems

interactions
Macro-scale
- Resource systems and subsystems

Meso-scale
- Resource systems and subsystems

Governance system and actors

Interactions
Macro-scale
Resource systems and subsystems

Meso-scale
Resource systems and subsystems

governance system and actors

interactions

outcomes
Current interactions

Developments of social housing far from employment centers

Runoff to discharge

Groundwater extraction

Rainfall catchment
Alternative interactions

Developments of social housing near to employment centers

Runoff delayment

Runoff infiltration

Rainfall catchment

Wastewater treatment
Governance system and actors
Governance system and actors

- National
  - Governmental sector
    - Regional
    - Local
  - Private sector
  - Civil sector

- Territorial governance organizations
  - SEDATU
    - SEDUVI, SEDUYM
    - Federal entities
    - Municipalities, mayoralities
Governance system and actors
Outcomes

Social performance
- Accessibility to services
- Accessibility to infrastructure

Ecological performance
- Infiltration 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
Outcomes → governance system and actors → designer → Interactions
Iteration 3

Outcomes

governance system and actors + designer

Interactions
Iteration 3

Outcomes

Interactions

governance system and actors + designer
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
Treatment of wastewater in existing WTP
Catalogue

Treatment of wastewater in improved WTP

Existing WTP
Treatment of wastewater in WTP turned to anaerobic
Catalogue

Treatment of greywater in wetlands

Zone 1
Zone 2
Zone 3
Groundwater extraction

Extraction wells
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 wells (minus Z2)

New wells (minus Z3)
Delamant and infiltration of runoff with vegetation

Low slopes

High slopes
Delayment and infiltration of runoff with terraces

Low slopes

High slopes
Delayment and infiltration of runoff with vegetation and terraces

Low slopes

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

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

Urban water system
- Future housing development
- WTP
- Extraction wells
- Infiltration 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
Infiltration lagoons
Vegetation and terraces
Designers' Business-As-Usual Scenario

Designers' Regenerative Development Scenario

2020

Social-ecological performance

2020

Social-ecological performance
governance system and actors

Outcomes

Interactions
Workshop

Informal housing associations
Angelica Bartra
Representative of their interests

SEDATU
Edgar Buenrostro
Territorial development director at SEDATU

Social housing associations
Anahí Valera
Representative of Flor de Mayo association

CONAGUA/CAEM
Alfonso Figueroa
Policy player

Social impact organisation
Andrea Plego
Entrepreneur

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

Ecological impact companies
Enrique Lomelín
Entrepreneur at HS Urbano
Stakeholders’ Business-As-Usual Scenario (Process Model)

Development in Zone 3
Rainwater catchment Z3
Source separation Z3
Improved WTP
Infiltration wells

Stakeholders’ Regenerative Development Scenario (Change Model)

Development in Zone 2
Rainwater catchment Z2
Improved WTP
Wetlands Z2
Infiltration wells
Vegetation in high slopes
Stakeholders’ Business-As-Usual Scenario

Stakeholders’ Regenerative Development Scenario

Social-ecological performance

2020

Social-ecological performance

2020
Outcomes

Interactions

governance system and actors + designer
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)
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
Infiltration lagoons
Vegetation in high slopes
Rainwater catchment in ISH
Wetlands in ISH
Co-planned Regenerative Scenario

Social-ecological performance 2020
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

Social-ecological performance

2020

2050
Theory

Regenerative Development and Design

Adapted geodesign framework

Socio-ecological frameworks; governance frameworks; multiscalality; transdisciplinarity

Practice

Planning
Thank you