

# URBAN ARID GREEN

A sustainable approach to address population growth and urbanisation in arid areas, via a case study to Tamansourt

Rosa de Wolf, 19 January 2023



# PHOTO BOOK

**Urban Arid Green** - A sustainable approach to address population growth and urbanisation in arid areas, via a case study to Tamansourt

*Rosa de Wolf, January 2023*



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TINARIWEN  
ELWAN

# Sastanàqqàm





# Programme

14:45 | (Online) Walk-in

15:00 | Graduation presentation

15:30 | Q&A

15:45 | Commission withdraws

16:00 | Graduation ceremony

# URBAN ARID GREEN

A sustainable approach to address population growth and urbanisation in arid areas, via a case study to Tamansourt

Rosa de Wolf, 19 January 2023





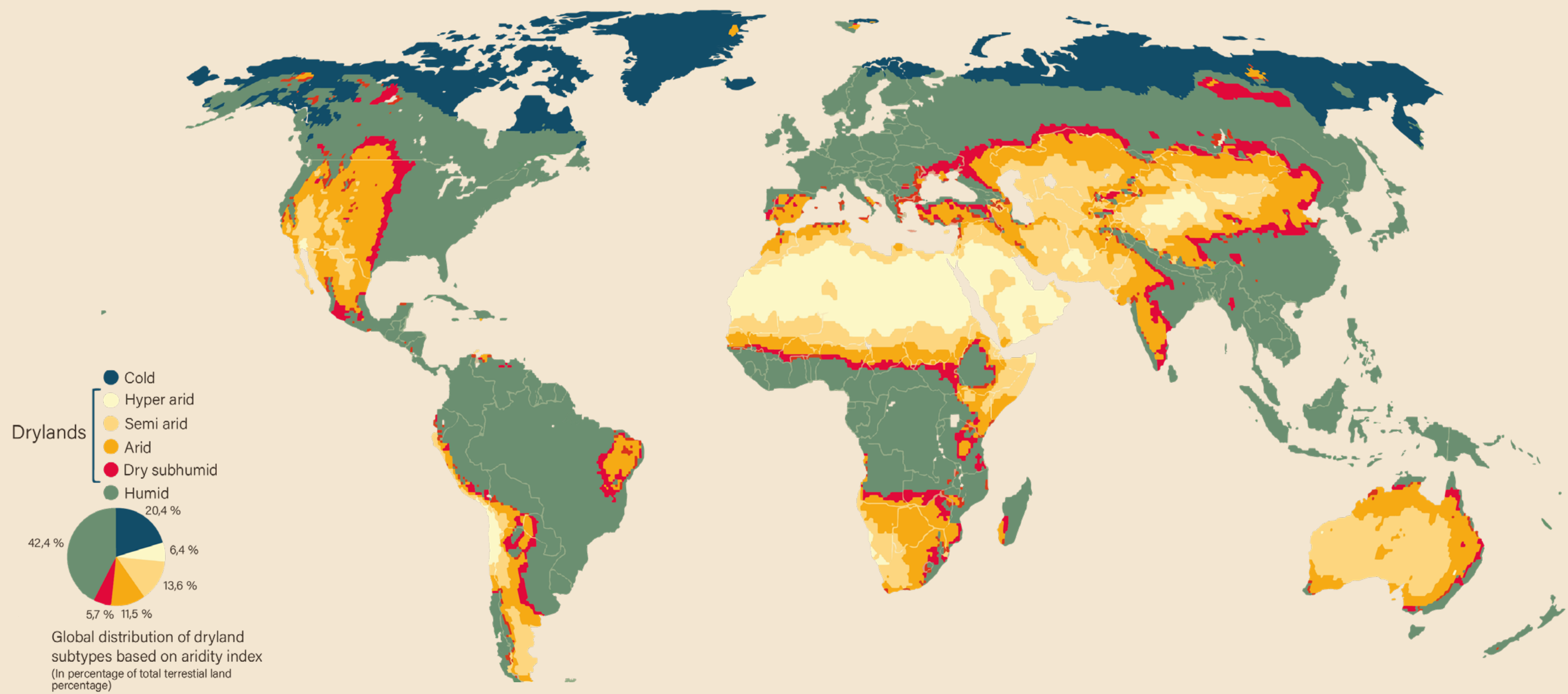
- 1. Problematisation**
- 2. Research by Design**
- 3. Analysis**
- 4. Vision**
- 5. Strategy**
- 6. Design**
- 7. Conclusion**

# 1. PROBLEMATISATION



# UNEQUAL DISTRIBUTION

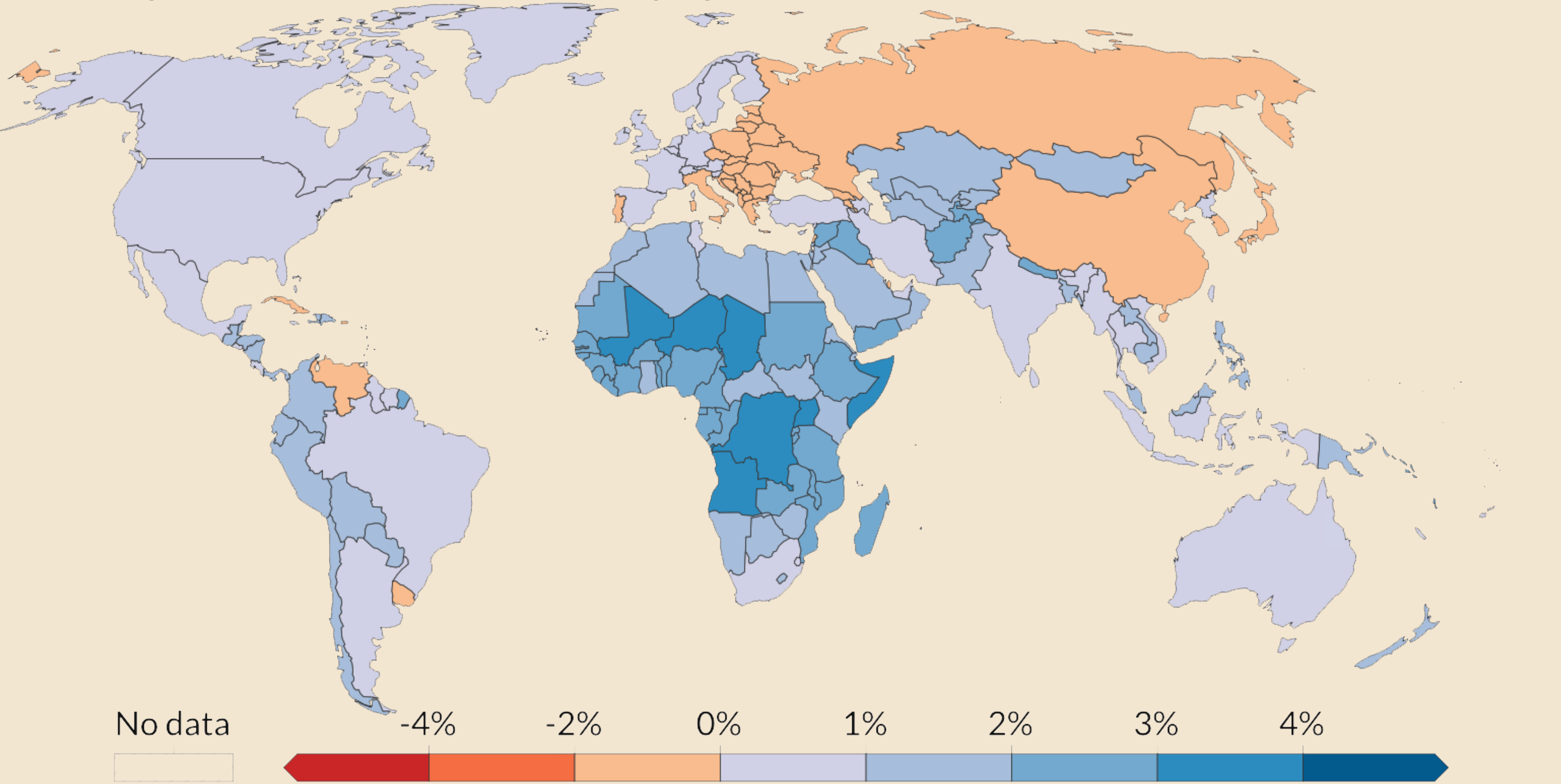
Scarce natural resources such as water and food in dry lands, growing due to climate change, challenging human societies.



*Global distribution of dryland subtypes based on aridity index, (World Atlas of Desertification, 2019).*

# DEMOGRAPHIC TRENDS

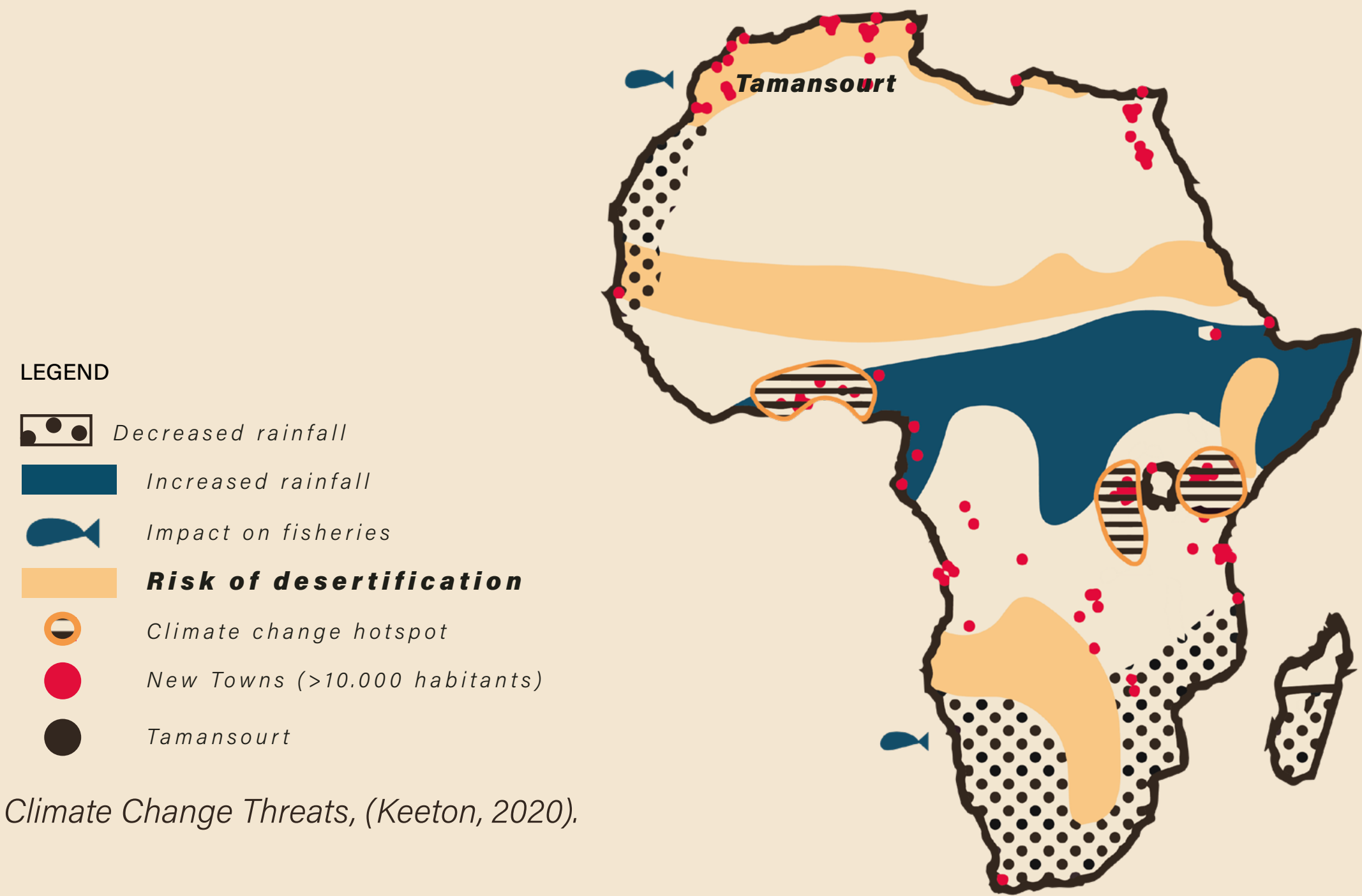
Population growth & urbanisation, challenging the human societies even more.





# NEW TOWNS

Moroccan new towns face the risk of desertification, due to climate change.



*Climate Change Threats, (Keeton, 2020).*

# VILLES NOUVELLES STRATEGY

Support population and economic growth and urbanisation.

LEGEND

New city

1

Tamansourt

2

Tamesna

3

Ibn Batouta New City

4

Chouiter

5

Chrafate

6

Lakhyayta

7

Riad Al Omrane

8

Tagadirt

9

Zaouite Sidi Othmane

10

Ras El Ma

11

Mohammed VI Green City

12

Green mine Khouribga

13

Forum El Oued Technology Cluster

14

Mazagan

15

Aroui

16

Casa-Anfa

17

Zenata Eco-City

18

Aïn Chkef (La cité du parc)

19

Mohammed VI Tanger Tech City

★

Capital

●

Main city

●

New cities

●

Urban pole

●

Satellite city

●

Industrial satellite city

●

Eco-city, smart city, technopole, green

—

city, knowledge city, independent financial district

—

Road

—

Administrative region boundry



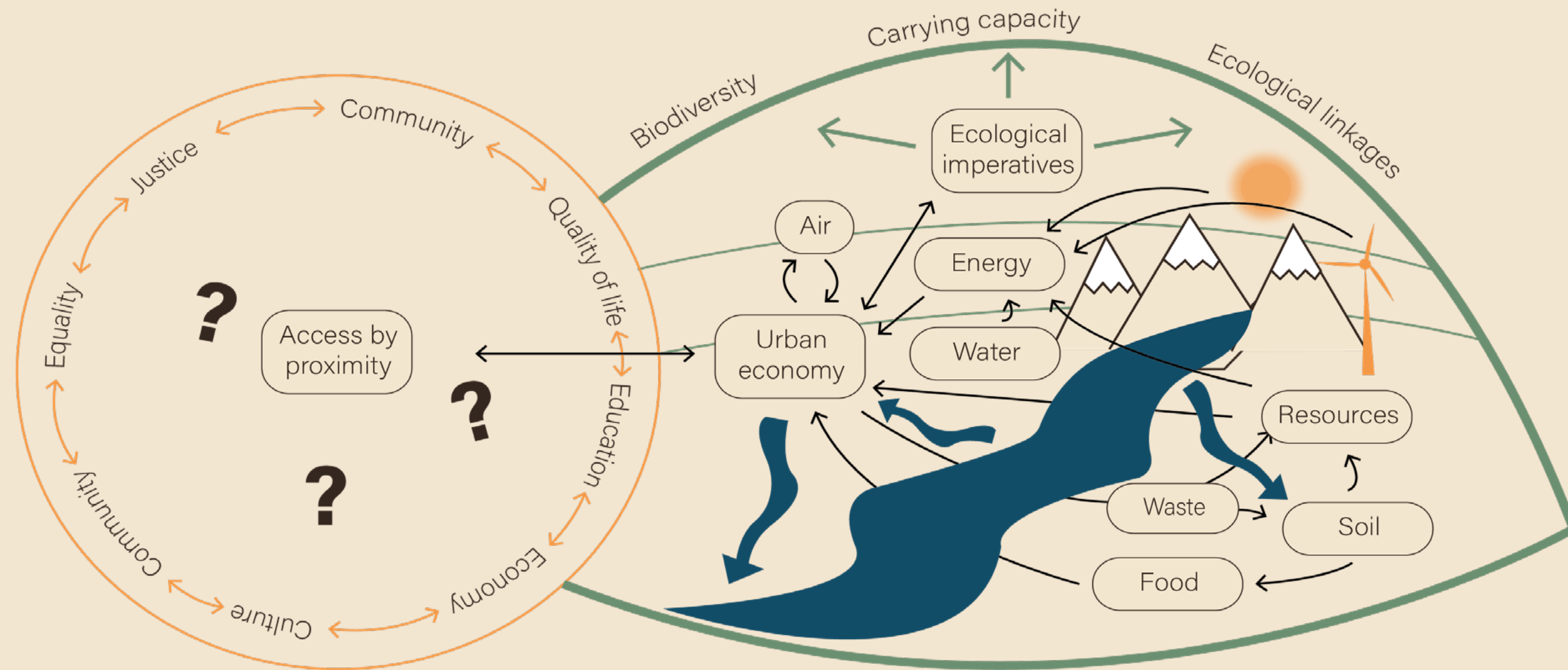
*Geographical distribution of new cities in Morocco. Made by author based on (Côté-Roy & Moser, 2022 - p.30)*



# 9/19 AIM TO TRANSITION INTO AN ECOCITY

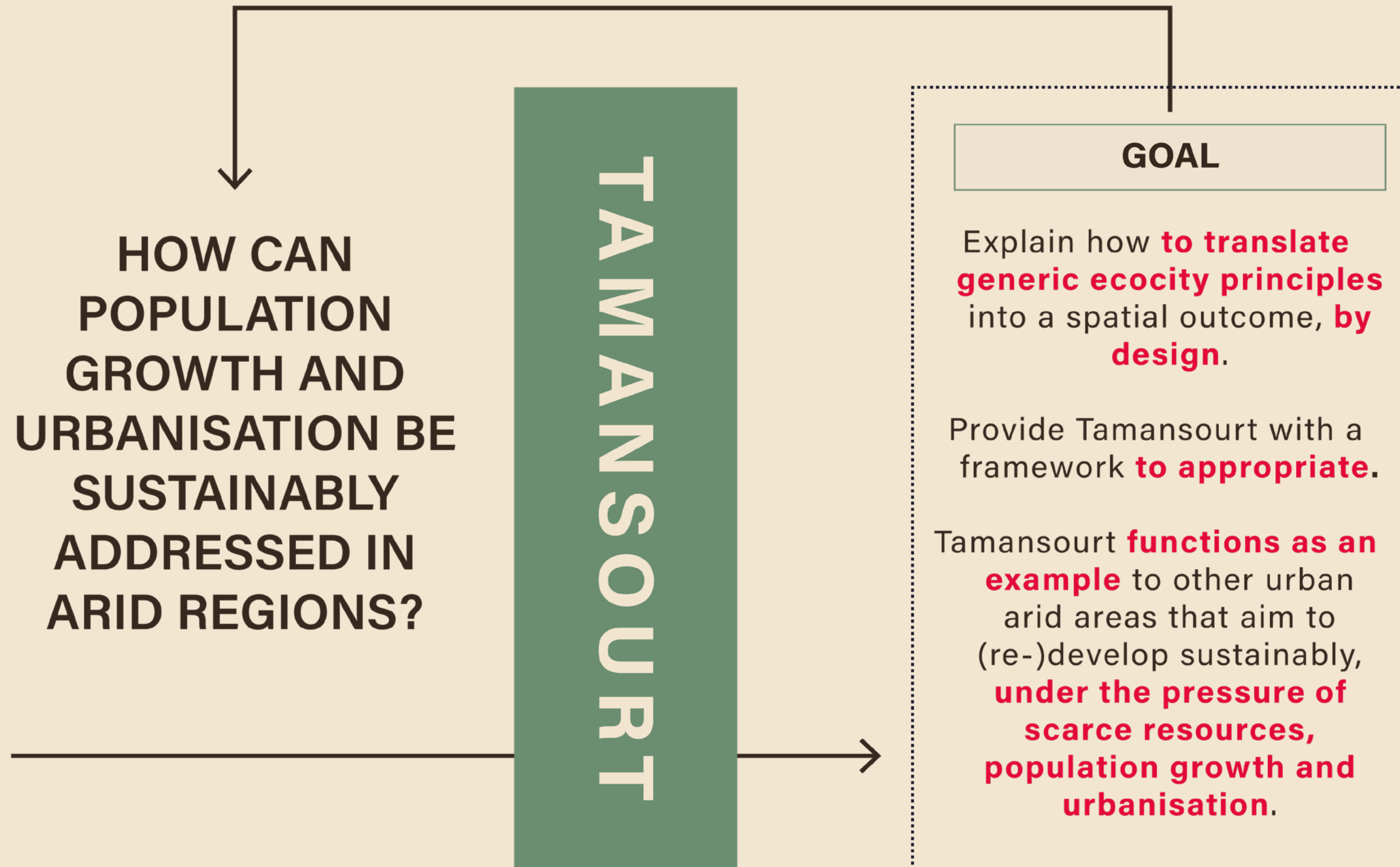
National-scale redevelopment plan: Ecocity Morocco.

- Sustainable use of resources.
- Inhabitants' ecological impact is supportive.
- Social order reflects fundamental principles of fairness, justice and reasonable equity.



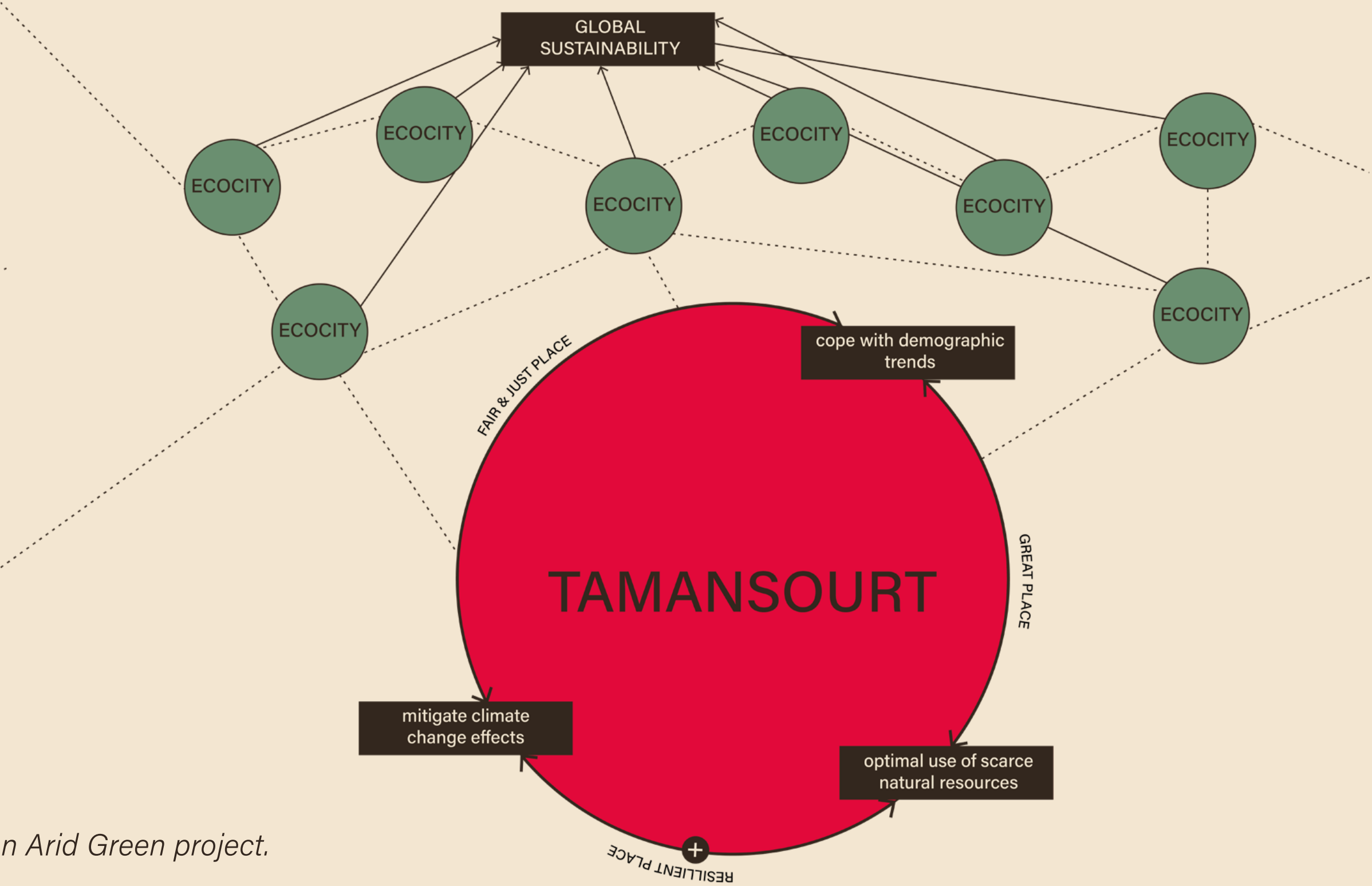
Urban design needed to advance on the transformative framework of an ecocity.

## 2. RESEARCH BY DESIGN



# CONTRIBUTE TO GLOBAL SUSTAINABILITY

Focus on one ecocity, starting a network of ecocitites. While working together, contribute to global sustainability.

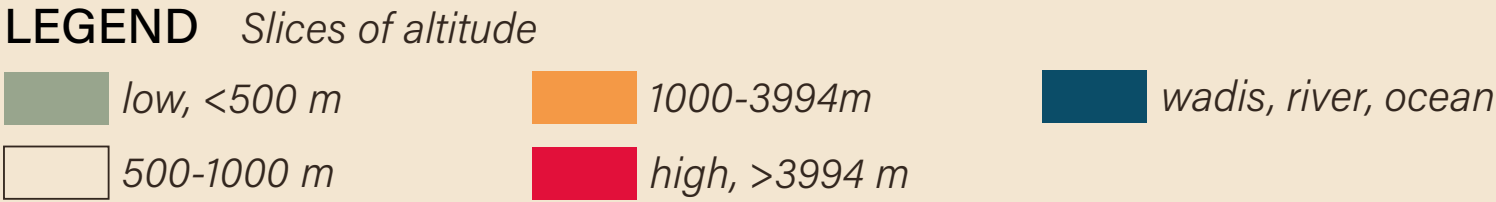
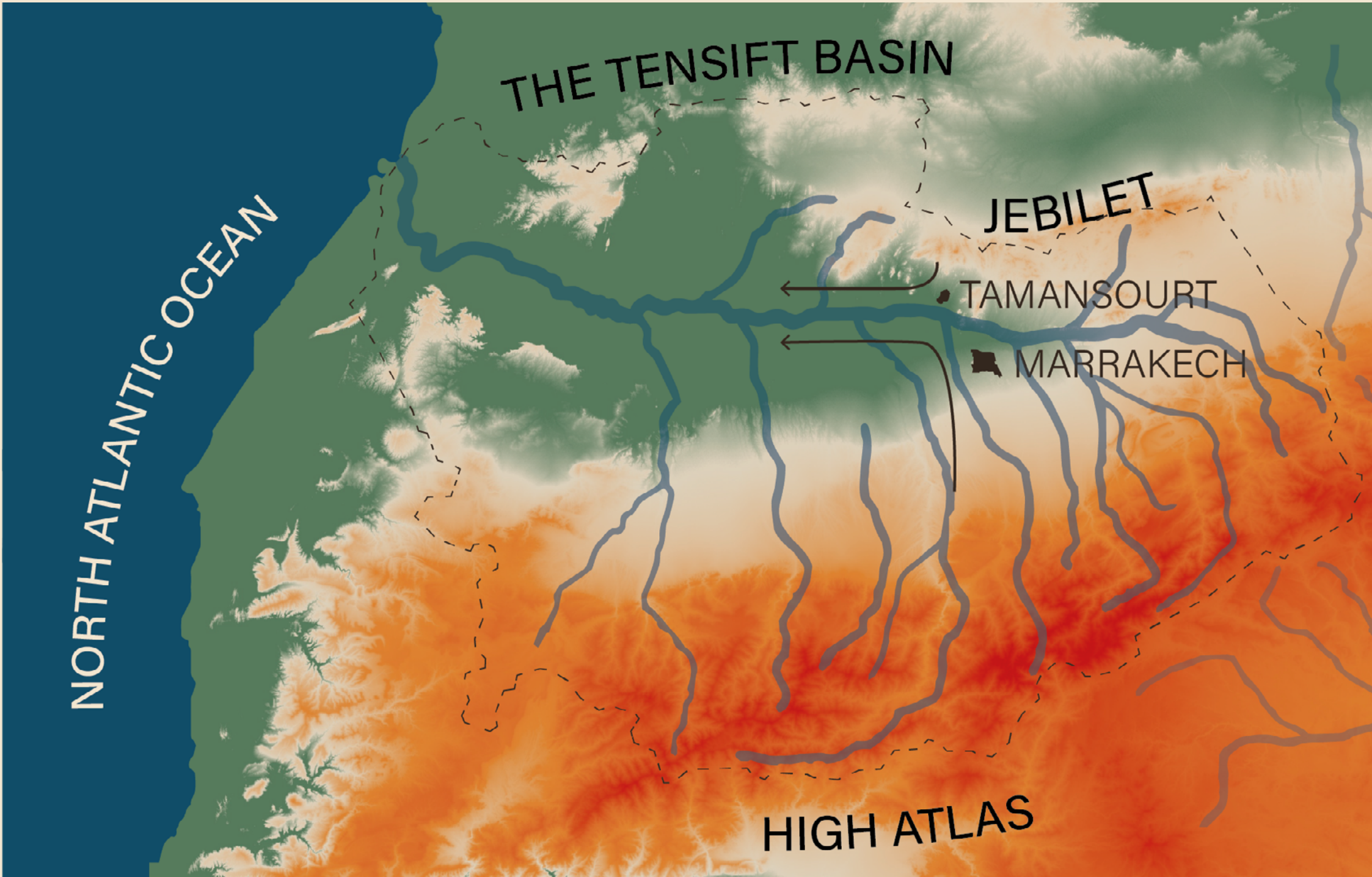


*Conceptual Framework Urban Arid Green project.*



# 3. ANALYSIS

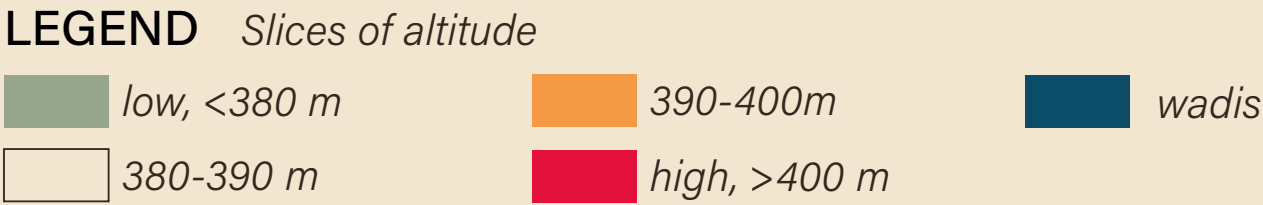
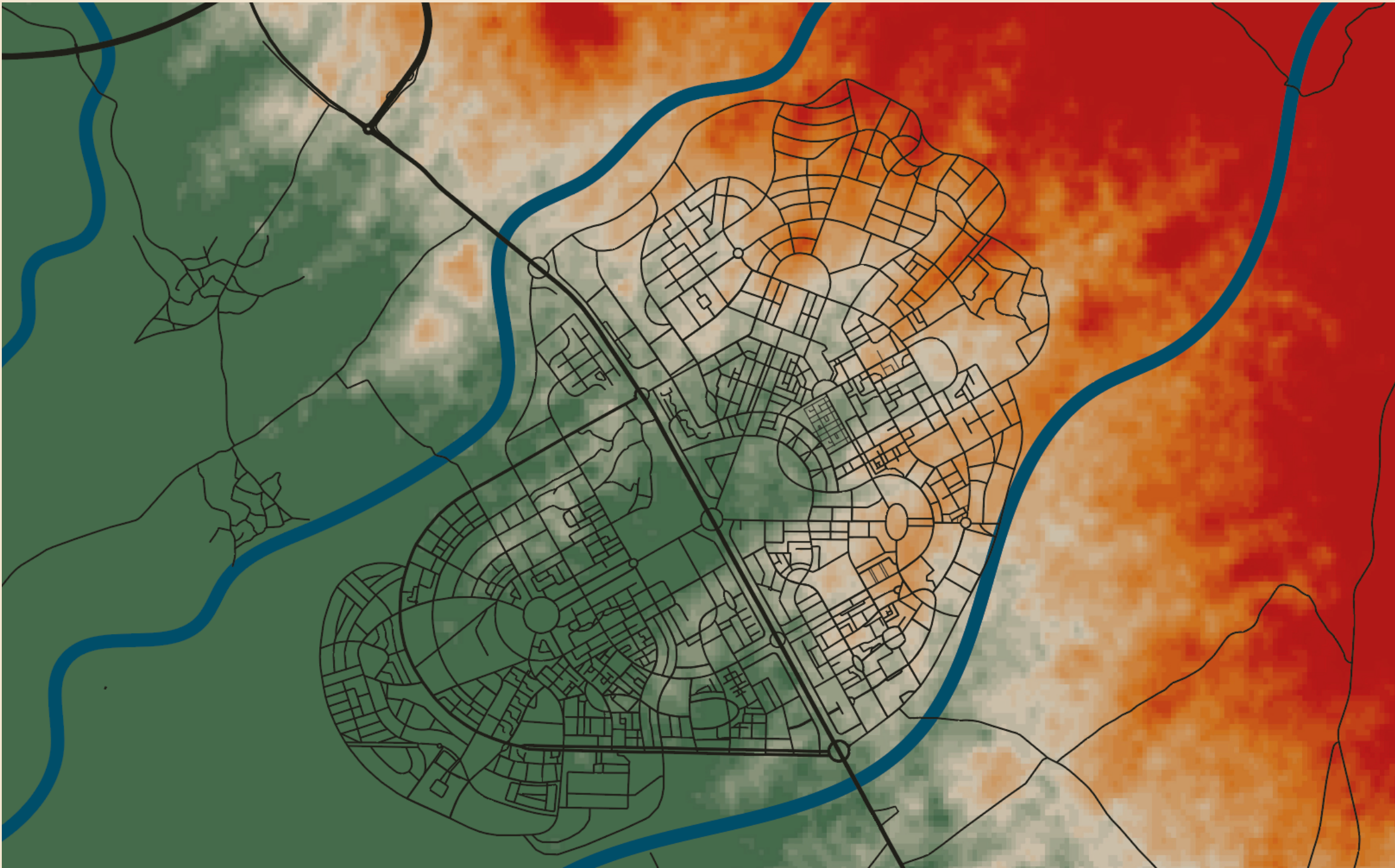
# SATELLITE TO MARRAKECH



*Scheme situation Tamansourt. SRTM elevation data, map the total Tensift basin.*



# ON FOOT OF THE JEBILET



*Scheme situation Tamansourt. SRTM elevation data, map Tamansourt.*

# TAMANSOURT FOUNDED ON UNSUITABLE LAND

1. Urban congestion



2. Protect agricultural land



3. Tamansourt founded on natural landscape





# DEGRADATION ALONG HUMAN DEVELOPMENT



1985



2004:  
FOUNDING  
TAMANSOURT

2006



2021

How to transition from a destructive to a  
constructive relationship with nature?



**ANALYSIS TAMANSOURT**





# ARID ROCKY SOIL AND EROSION

# ABSENCE OF VEGETATION COVER

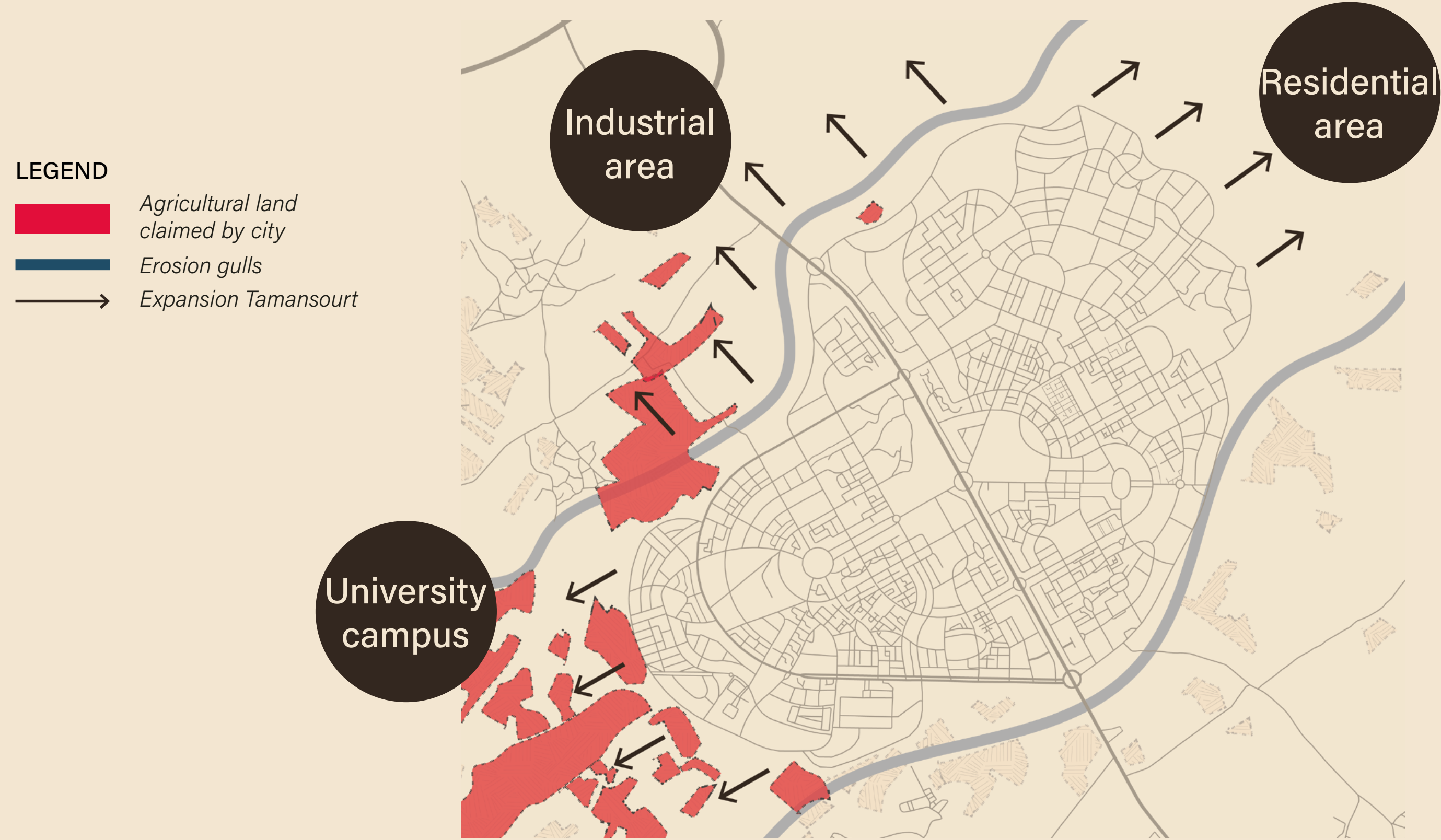




# UNSUSTAINABLE AGRICULTURAL ACTIVITIES

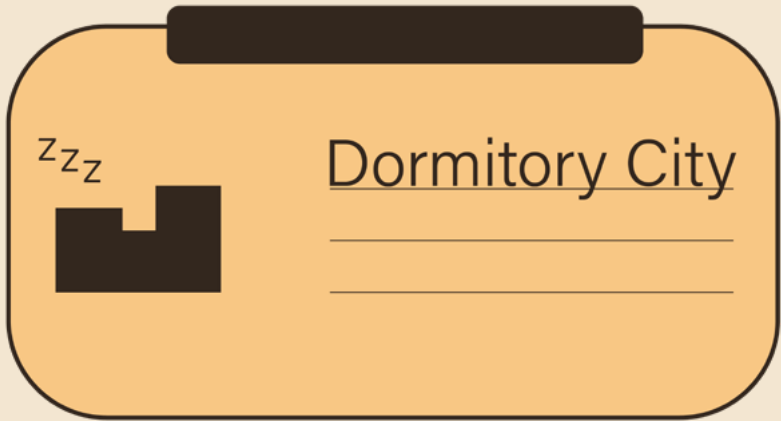


# BUILT ENVIRONMENT CLAIMS SPACE

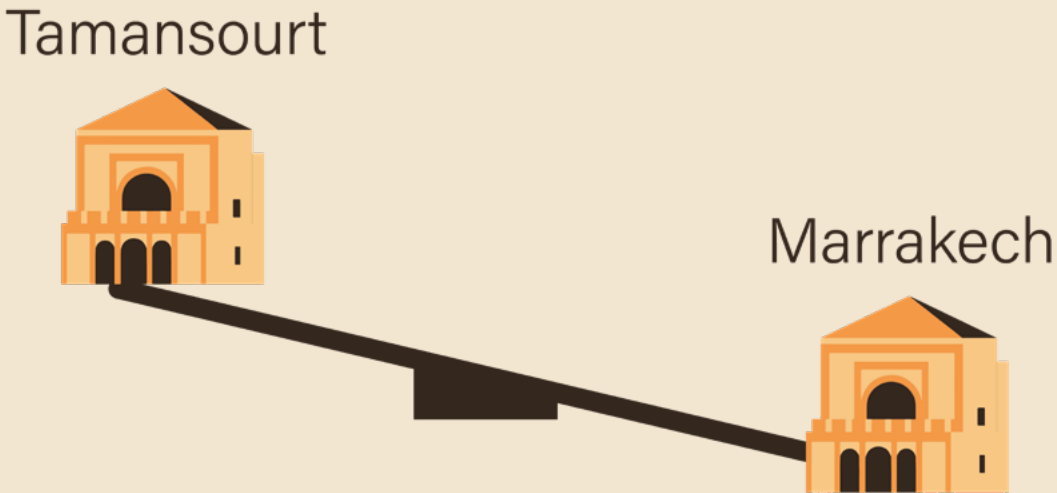


*Map showing built environment claiming agricultural land surrounding Tamansourt.*

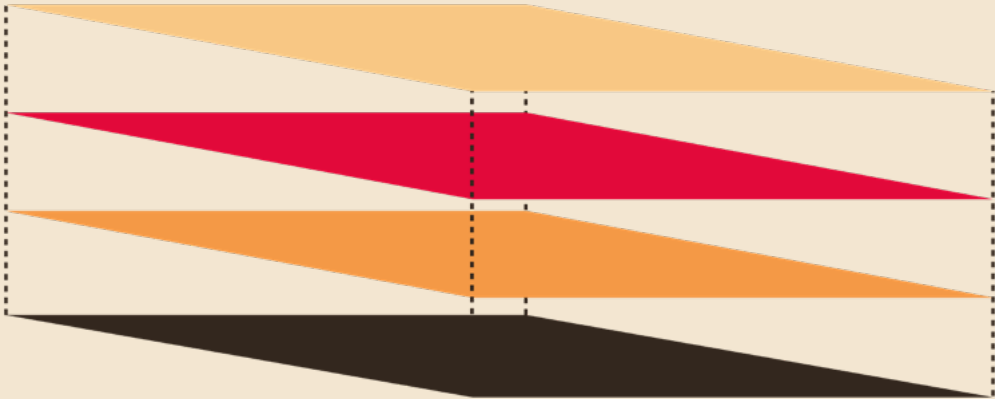
# SOCIAL ISSUES



LACKING AMENITIES/ACTIVITY



AFFORDABLE & SOCIAL



NO HISTORICAL LAYERING

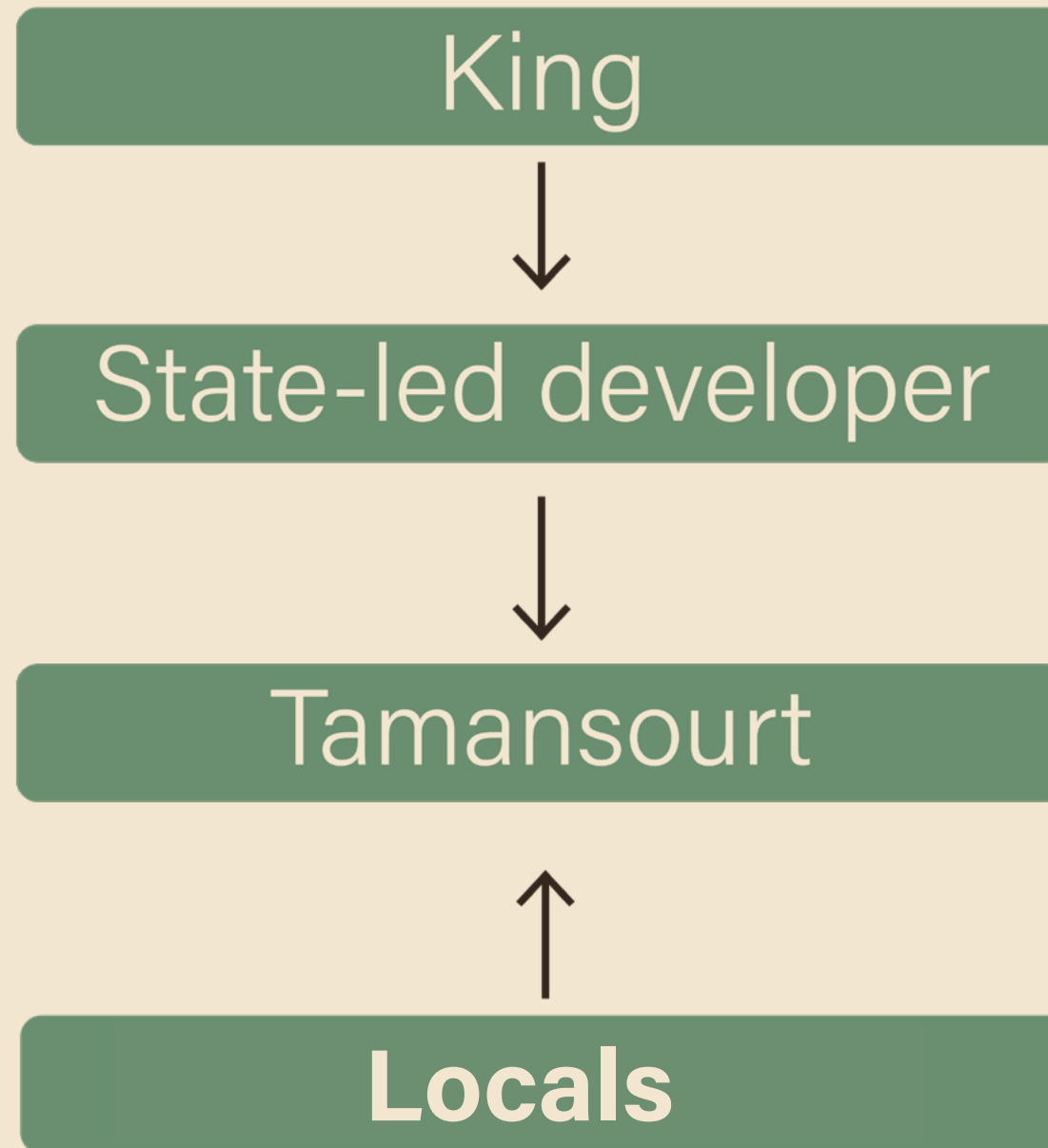
*“Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody.”*

- Jane Jacobs, The Death and Life of Great American Cities (1961)



# TOP-DOWN / BOTTOM-UP

Let's provide something in Tamansourt for everybody, by creating this ecocity together!





# DIALOGUES: EMPOWER LOCALS!

## Africa Wood Grow



*Photograph Africa Wood Grow Foundation. Retrieved from (Africa Wood Grow Foundation, n.d.).*

## Building With Nature Indonesia



*Photograph Building with Nature Indonesia newsflash 2016. Retrieved from (Building with Nature Indonesia, 2016).*





**CONTEXT, CULTURE, CLIMATE**



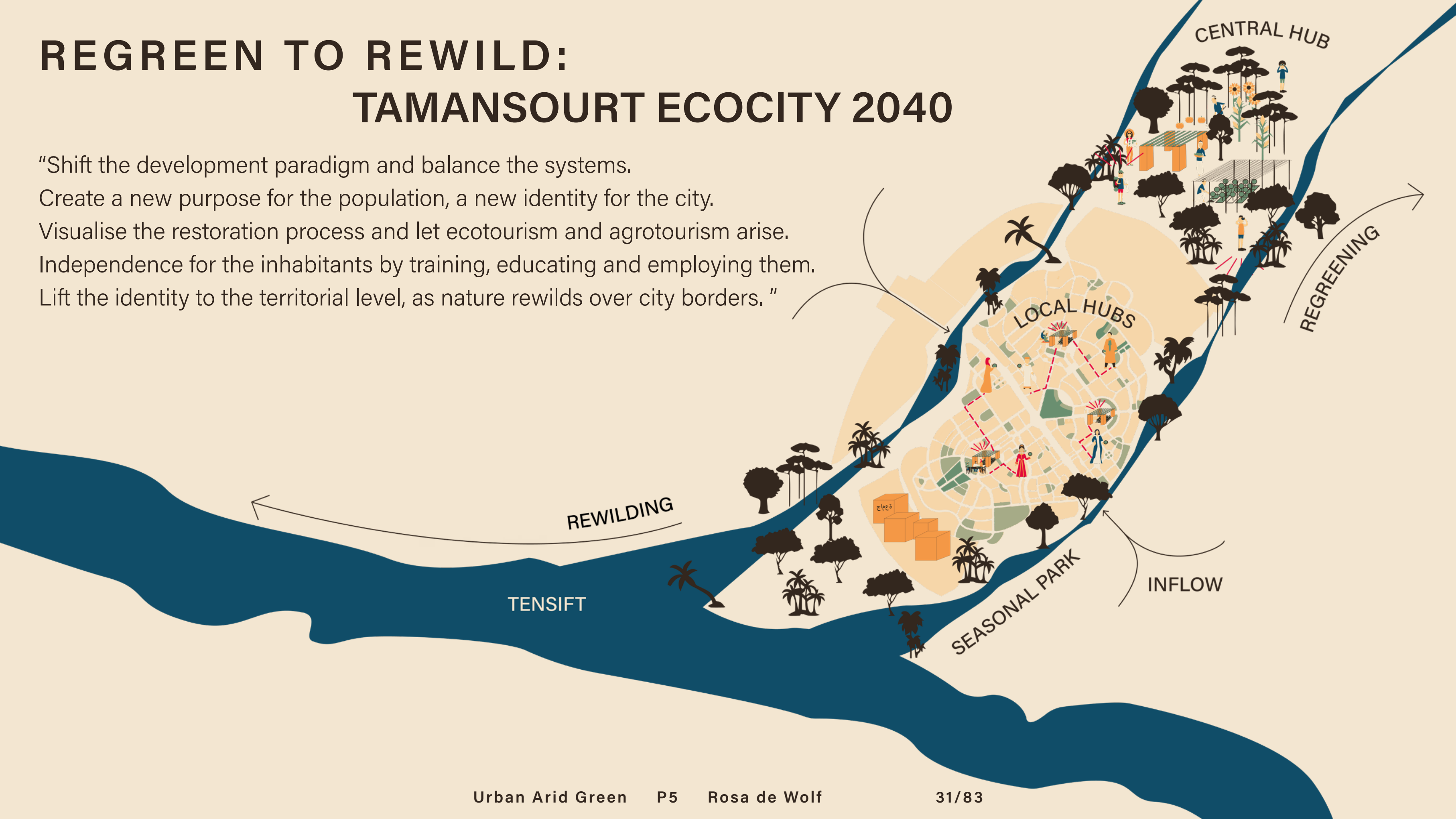
# 4.VISION

Formulating an integral approach to face the environmental, social and economic challenges at once.



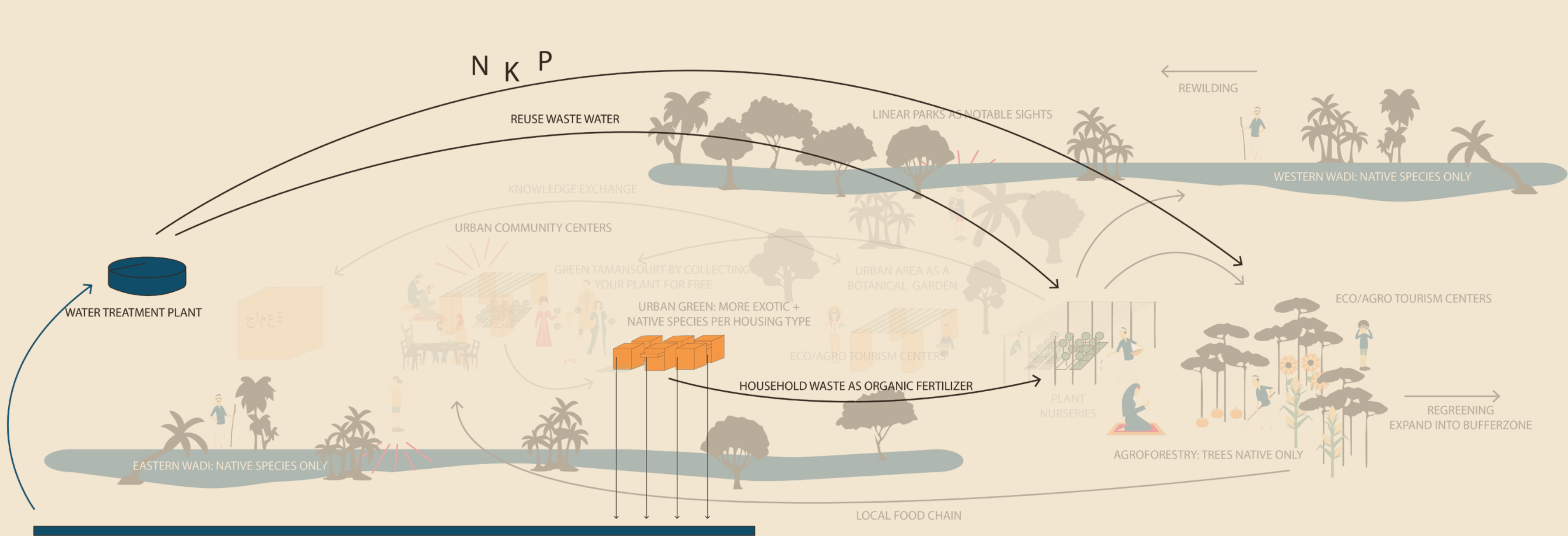
# REGREEN TO REWILD: TAMANSOURT ECOCITY 2040

"Shift the development paradigm and balance the systems.  
Create a new purpose for the population, a new identity for the city.  
Visualise the restoration process and let ecotourism and agrotourism arise.  
Independence for the inhabitants by training, educating and employing them.  
Lift the identity to the territorial level, as nature rewilds over city borders."



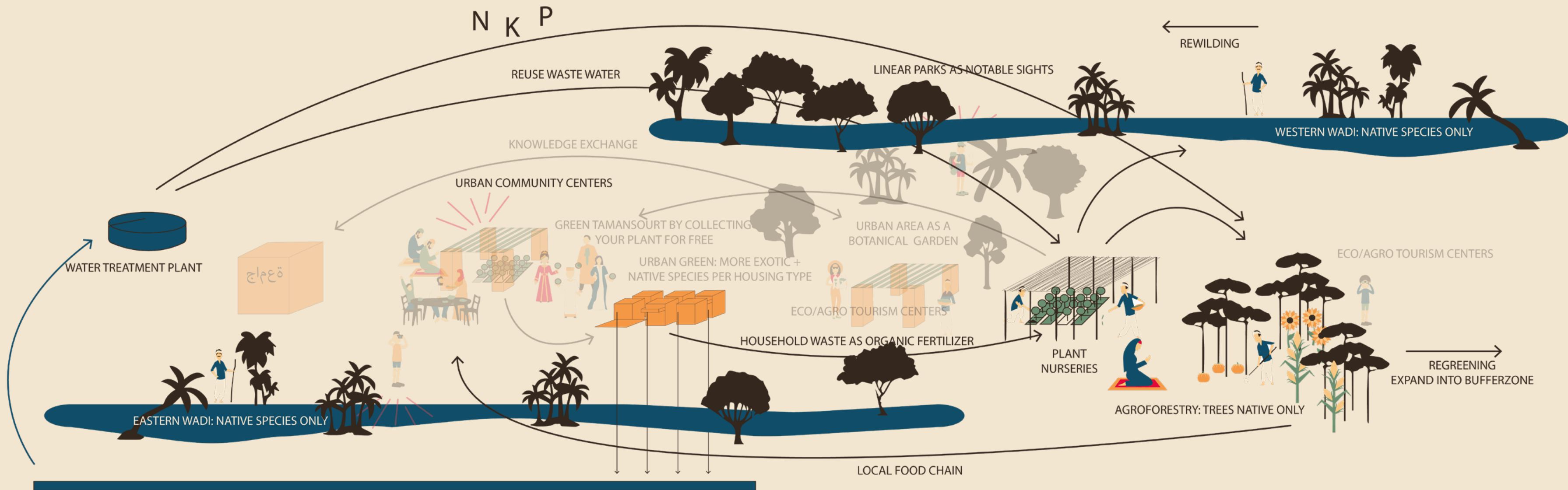
# ADDRESS THE INSECURITIES

- Close the water cycle and recovering nutrients
- The city facilitates the needs to form a local food chain



# GROW TO CAPTURE AND REGREEN

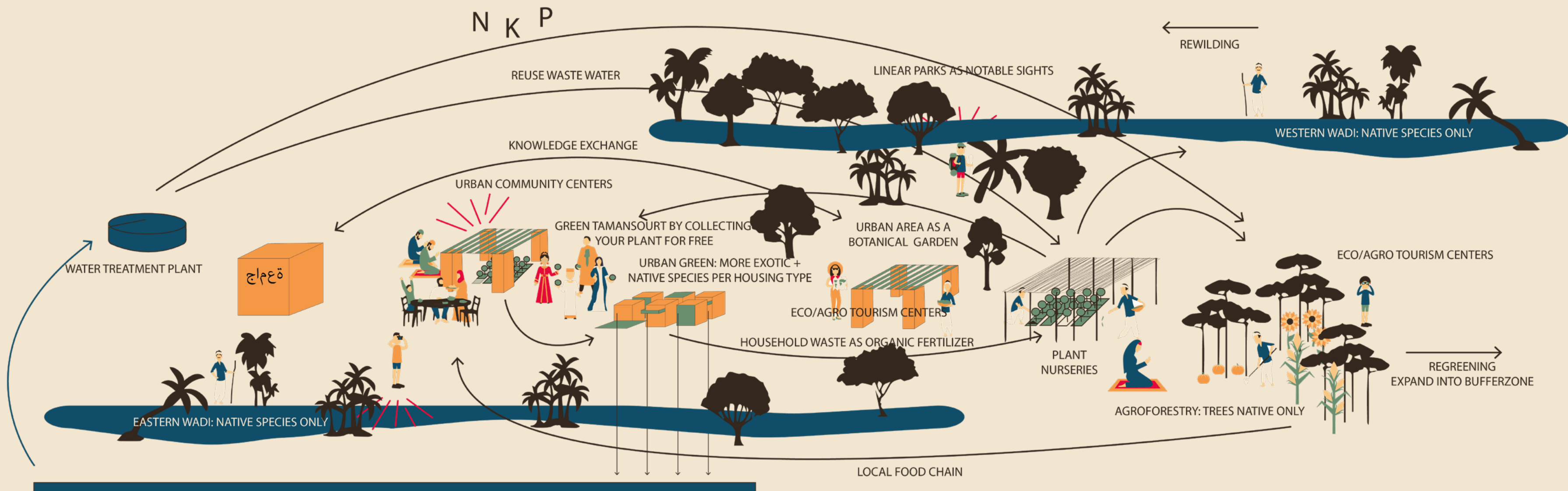
- Transform erosion gullies to seasonal parks, capturing water, improving soil quality
- Agroforestation in the central hub





# REWILD AND SPREAD

- Shops & green collecting in local hubs, activating the city
- Gain knowledge via education and research centres



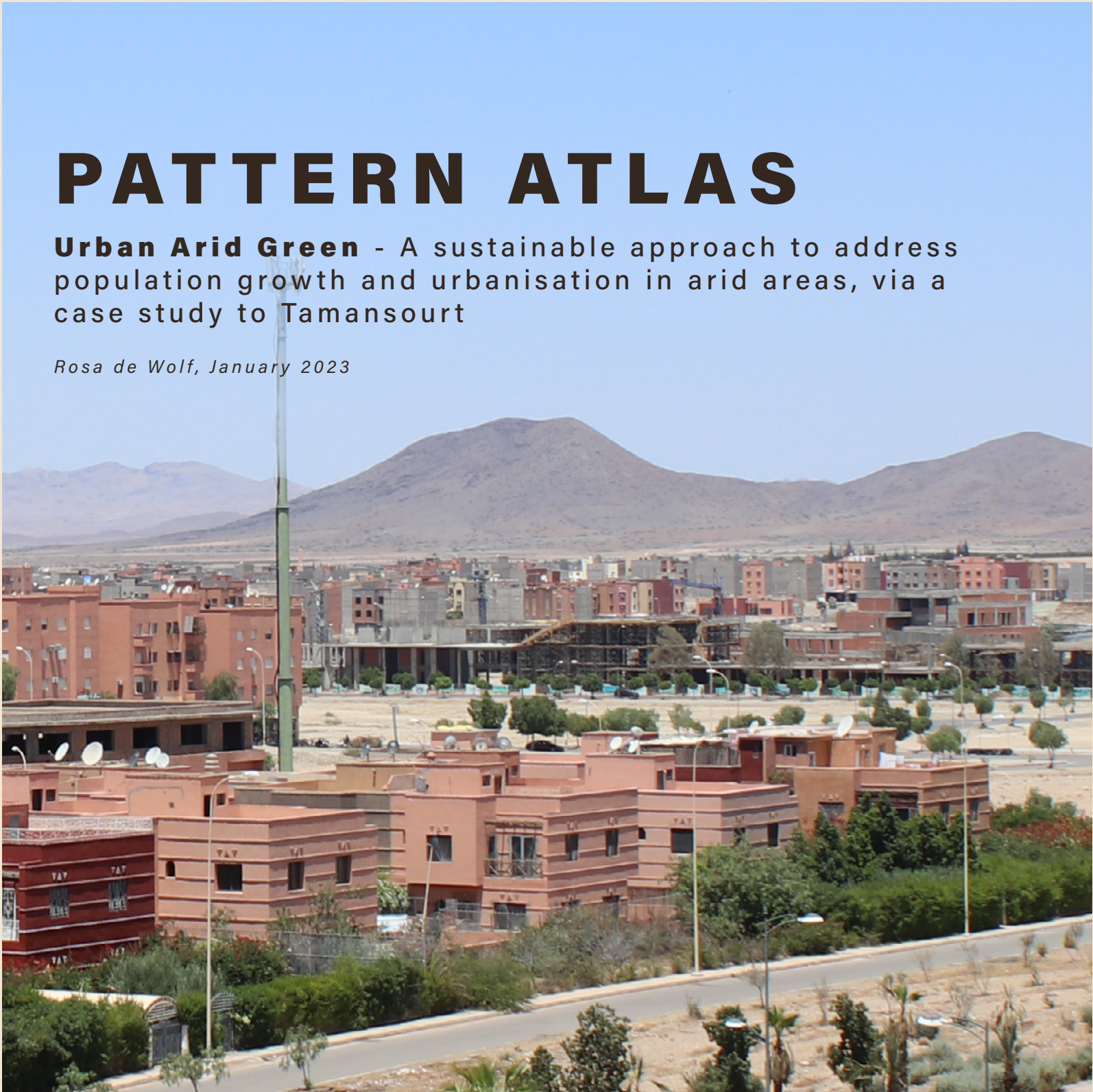
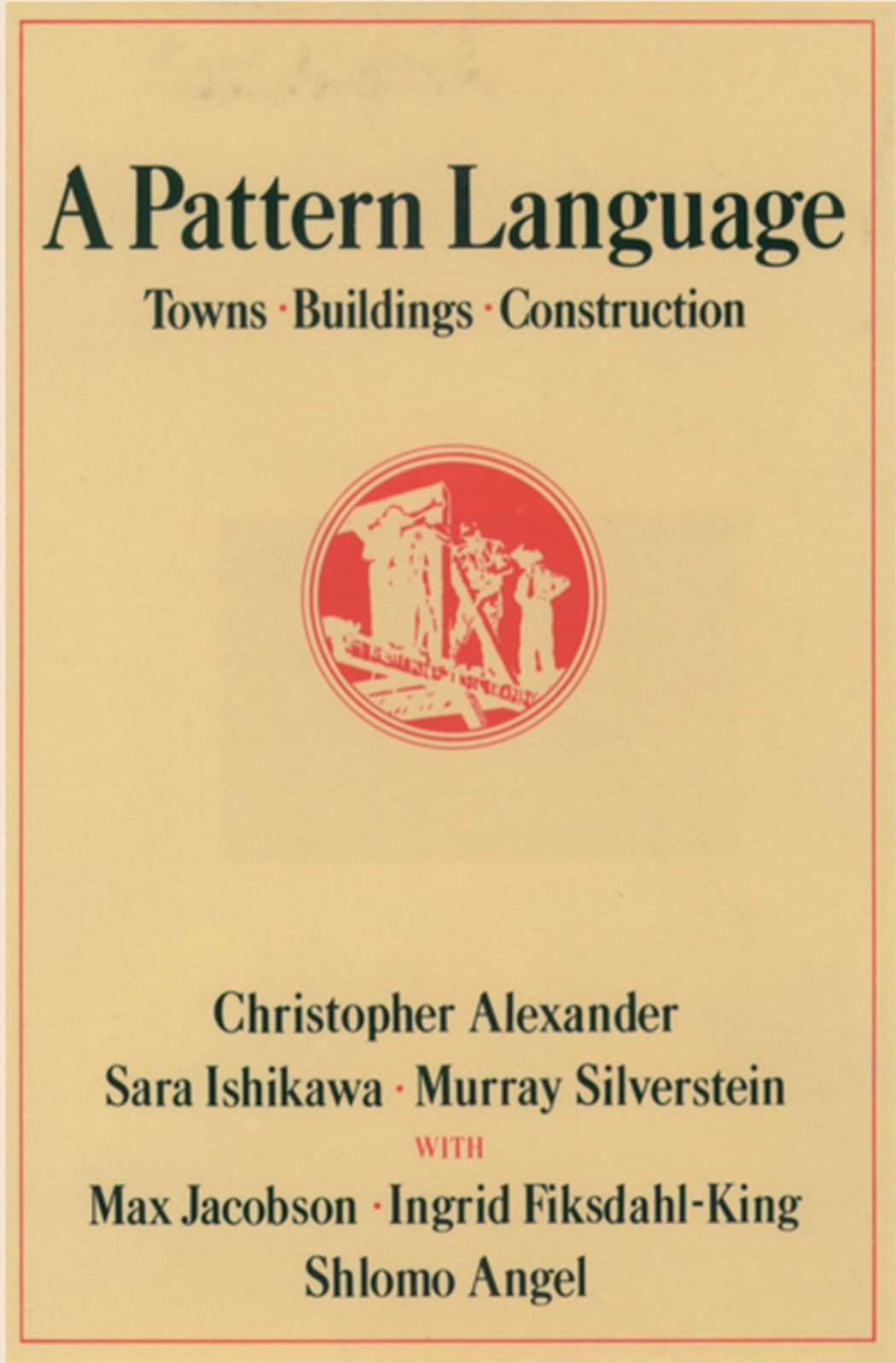


# 5. STRATEGY

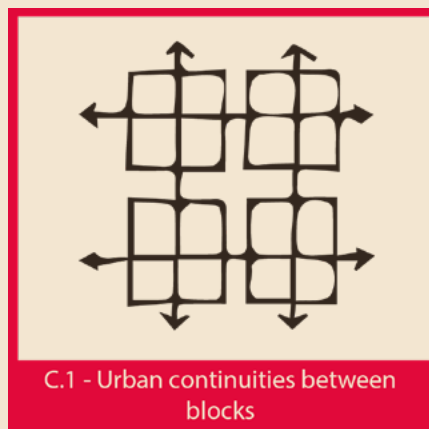
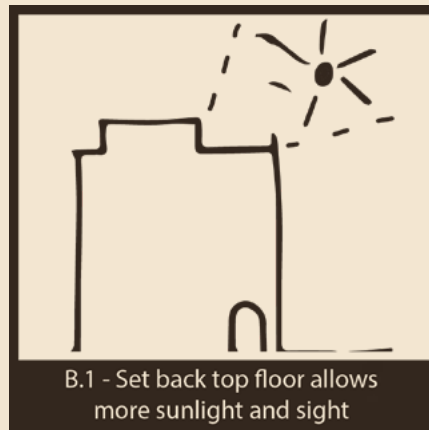
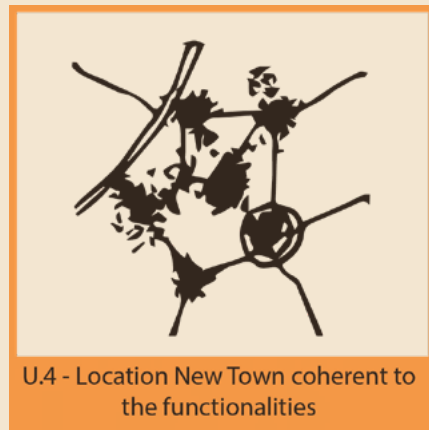


# FORMULATE A LANGUAGE

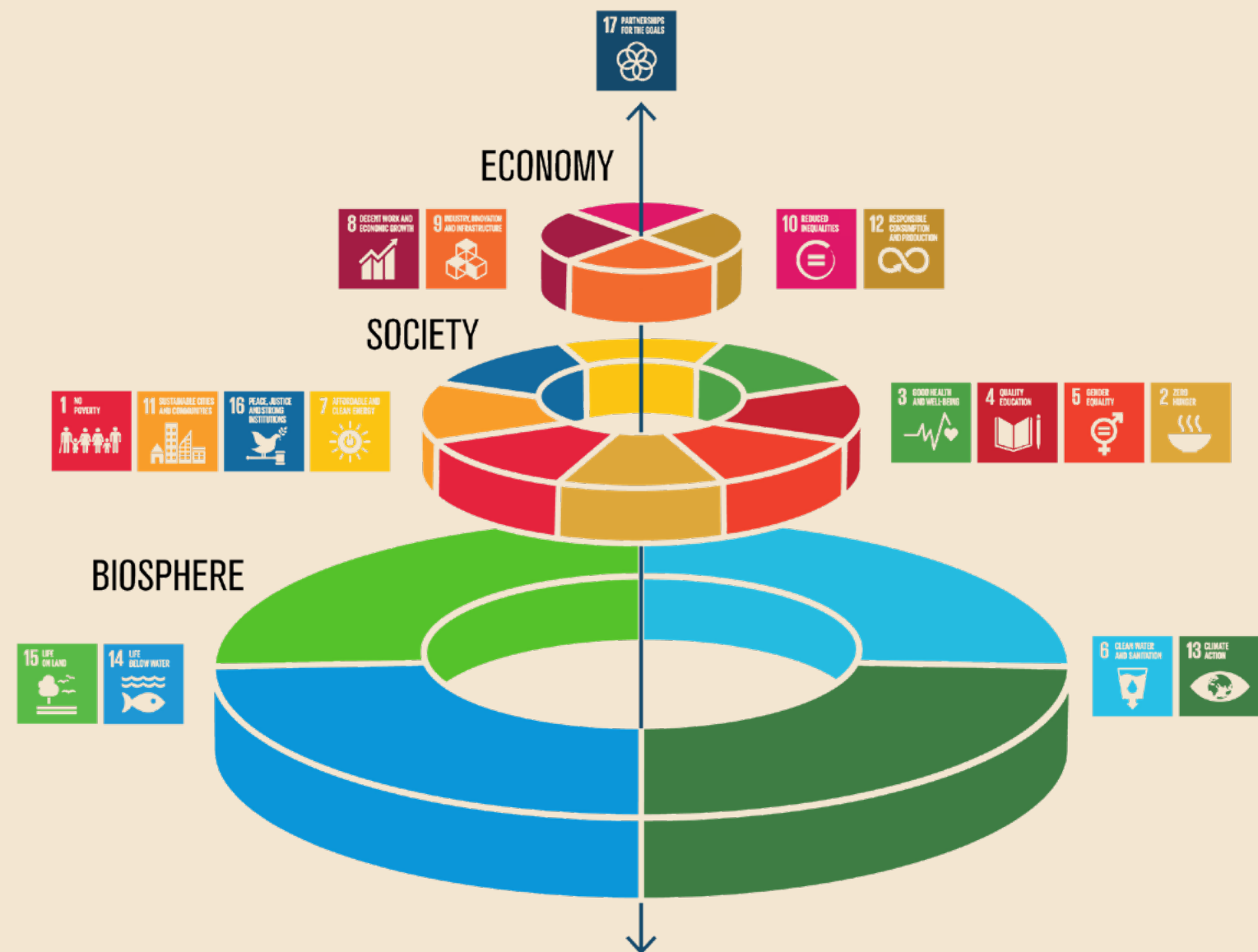
Understandable for all stakeholders.







*Design guidelines for Moroccan New Towns, based on (Al Omrane, 2010)*



Adapted by Anton Kozlovskiy

*Integrated Sustainable Development Goals. (Stockholm Resilience Centre, 2016).*

# URBAN ARID GREEN LANGUAGE

## Al Omrane, Supportive Lifestyles, Circularity & Ecology, Facilitating Fabric

B.2 CLEAN & MOROCCAN

Urban, landscape and architectural design refer to local architecture in a modern way. High maintenance is avoided.

Linked to: B.1/ D.6/C.4/C.6/C.7/C.9/R.5



D.6 INTERACTION

Buildings interact without seeking symmetry. There is a diversity in architecture between blocks, but unity within blocks.

Linked to: B.2/B.1/C.2/C.4



C.9 CLEAR STRUCTURE

The hierarchy in routes is clear and expandable. Different functions in different districts. Non-residential buildings are more expressive.


Linked to: B.1/B.2/D.3/D.6/C.2/C.3/C.4/C.5/C.7



R.5 INTEGRATED

The new towns are linked to other cities. They adapt to the relief and are integrated to the geographical and historical site. Their territory allows further development.

Linked to: R.4/R.3/C.4/C.5/C.7/C.9/D.6/B.2



B.1 PLOT GREENING

In the urban area, vegetation is included in every private plot. On the plot, this can be done in various ways via greening gardens, façades, balconies and roofs.

Linked to: O.5/O.2



O.5 KNOW-HOW

The population acquires know-how by education and training. This must be open to all, disregard one's status.

Linked to: O.1/O.2/O.3/D.1/D.3/D.4/R.1/R.2/M.1/M.2/M.3/D.5/R.3/C.2/R.4



D.5 LOW-PROFILE

Businesses are functioning via a low-profile business operation. Over-modern methods, equipment and technology is omitted.


Linked to: O.4/D.1/D.4/D.2/R.2/R.3/C.2/R.4



R.3 FAIR FINANCIAL SYSTEM

The financial system is fair.

Linked to: D.1/M.1/D.5/C.2



O.1 STIMULATE DIVERSITY

Support genetic diversity amongst vegetation, to stimulate its resilience.

Linked to: O.2/O.3/O.4/D.1/R.1/B.1/O.5/D.5/C.8



O.2 NATIVE SPECIES

Grow native species to green the environment.

Linked to: O.1/O.3/O.4/D.1/R.1/B.1/O.5/D.5/C.8



O.3 ORGANIC ONLY

On green spaces, only organic fertilizer is used, made out of household waste or nutrient recovery.

Linked to: M.2/M.4/O.4/O.5/D.5



O.4 VITAL SOIL

Create healthy soil ecosystems with techniques as cover cropping, residue mulching, conservation agriculture, phase rotations and creating continuous vegetative cover.


Linked to: O.1/O.2/O.3/D.4/O.5/D.5/R.3



D.1 AGROFORESTRY

On agricultural land, perennials are mixed with annual crops.

Linked to: O.1/O.2/D.4/O.5/D.5/R.3



D.2 STOP DEPLETION

Stop depletion of the aquifer by lowering the water intake from the aquifer on agricultural land.

Linked to: D.3/D.2/R.1/R.2/M.3/M.4/M.1



D.3 SAFE REUSE

Water reuse is safe, following possible restrictions as for instance covered irrigation only.

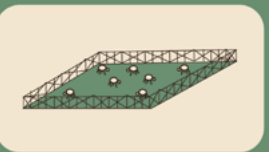
Linked to: D.3/D.2/R.1/R.2/R.3/M.3/M.4/M.1



D.4 CONTROLLED GRAZING

Livestock/wildlife is not repeatedly grazing of vegetation at such a pace that the vegetation does not have the time to regrow.


Linked to: R.1/O.4/D.1/C.8/C.3



R.1 REDUCE FLASH FLOODS

Flash floods must be reduced by infiltrating water as soon as possible. Downstream, room for the river is made to lower peaks in discharge.


Linked to: O.4/D.2/D.4/C.8/O.5/M.1



R.2 INTAKE & RETURN

Water is not only taken from the natural system. Clean water is also returned to nature, replenishing the aquifer.


Linked to: D.2/D.3/R.1/M.1/M.4



M.1 REDUCE, REUSE, PRODUCE

Aim for closed cycles on every level, that have as little negative impact on the environment as possible.

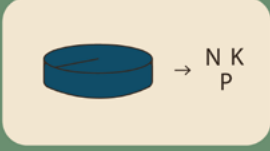
Linked to: D.2/D.3/R.2/M.2/M.3/M.4/O.5



M.2 NUTRIENT RECOVERY

Nutrients are recovered from wastewater. This can be done via centralised and decentralised methods, on different scales.

Linked to: O.3/O.4/D.4/M.4/O.5



M.3 STORE & SAVE

Excess water is captured and stored for later purposes.

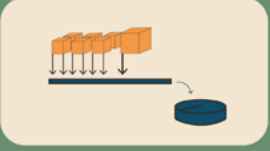
Linked to: D.1/D.2/R.2/M.1/O.5/C.8



M.4 WASTEWATER TREATMENT

Wastewater is treated. This can be done via centralised and decentralised methods, on different scales.

Linked to: O.3/O.4/D.2/D.3/R.1/R.2/M.1/M.2/M.3/O.5



C.1 LIFE CYCLE DURABILITY

The urban form of the city allows inhabitants to grow through different stages of life.


Linked to: D.6/R.5/C.2/C.3/C.4



C.2 COMMON INTERESTS

Spaces for common interest around the city are available to everyone.


Linked to: O.3/D.1/M.1/B.1/D.5/R.3



C.3 GATHERING SPACES

Safe & comfortable spaces allow people to come together in public space.

Linked to: O.1/O.2/O.4/C.8/D.5/C.9/B.2



C.4 EASY TO EXPLORE

The urban form is super clear. It is easy and safe to explore areas one does not necessarily has to go to.

Linked to: C.9/C.2



C.5 BREAK THE BARRIER

Within the city, there are no barriers in form of obstacles. The human settlement is not defined by a clear border.

Linked to: C.4/D.1/R.1/D.2/R.4



C.6 ALLOW INDIVIDUALITY

Identity must be created. Although a city must look as one whole, the city allows individuality.

Linked to: B.2/D.6



C.7 CREATE ENTITIES

Entities are created throughout the city.

Linked to: B.2/D.6/C.2



C.8 IMPROVE QUALITY OF SPACE

Development must ensure an improvement of the quality of space.

Linked to: B.2/D.6



R.4 LIFTING THE ECOCITY

The idea of the Ecocity is lifted to the regional scale.

Linked to: R.5/O.5/D.5/R.3/D.1/O.4/D.2/R.1/R.2





B(uilding) scale, #2



Al Omrane pathway

## B.2 CLEAN & MOROCCAN

Title

The architecture of buildings refer to local architecture in a modern way. The façades are clean and neat, low maintenance.

Brief discription

Linked to B.1/ D.6/C.4/C.6/C.7/C.9/R.5

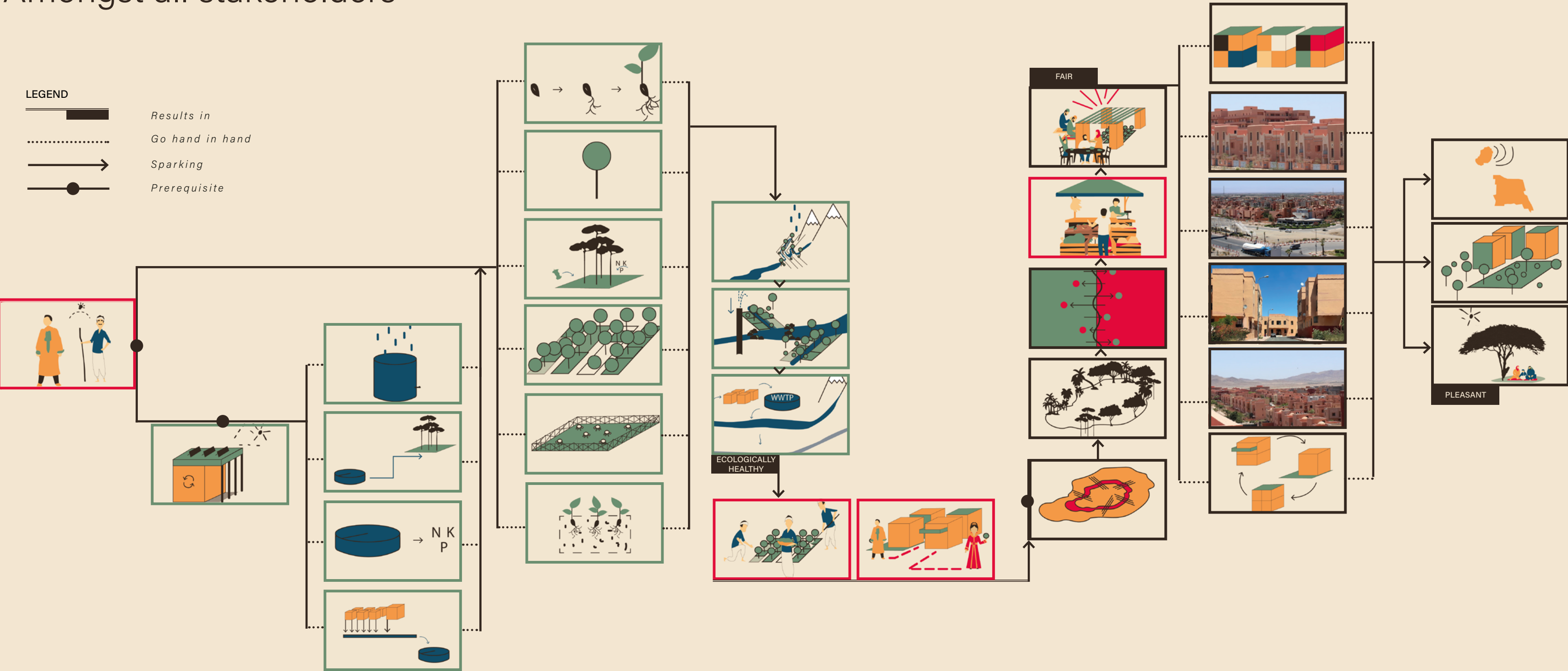
Related Patterns



Visualisation

# A COMMON UNDERSTANDING

Amongst all stakeholders





## 6.DESIGN

Translate into a landscape-based design of a framework,  
for the people of Tamansourt to appropriate.



# ADVANCE ON THE PLAN BY AL OMRANE



Vision map Tamansourt by Al Omrane. (Al Omrane Marrakech, 2008. p-182)

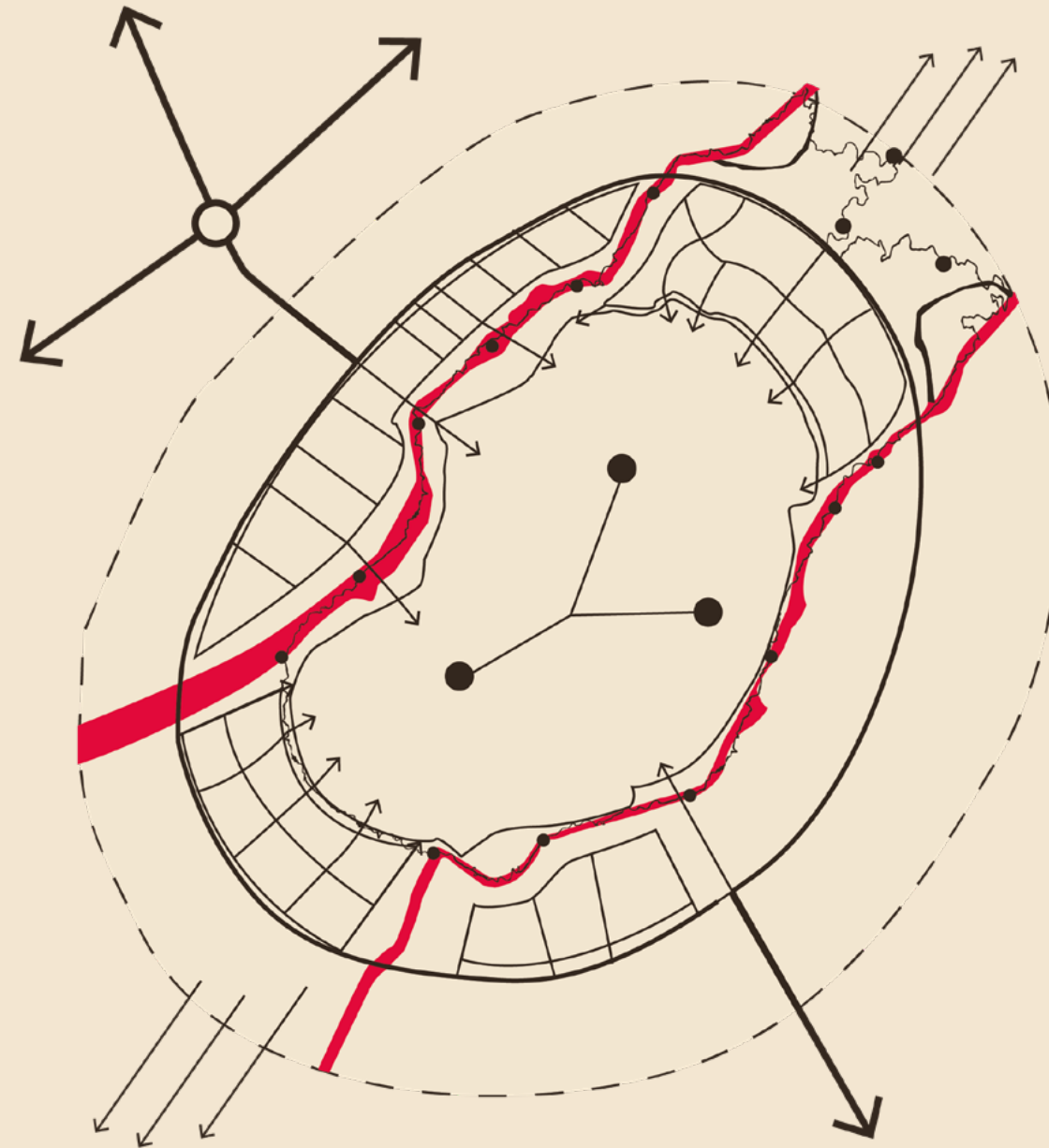
# CHANGE TO TAMANSOURT-ORIENTED



Tamansourt-oriented plan

# SEASONAL PARKS

Enclose the ecocity, as old Moroccan medinas are enclosed by city walls.





# NEW SIGHTLINES





# EFFICIENT USE OF SPACE

Rethinking the unbuilt buffer zone.





# REWILDING



START: 2023



PHASE 1: 2025



PHASE 2: 2027

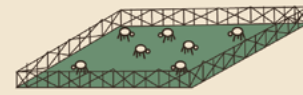


PHASE 3: 2040





D.4 CONTROLLED GRAZING



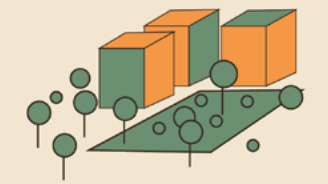
O.2 NATIVE SPECIES



R.1 REDUCE FLASH FLOODS



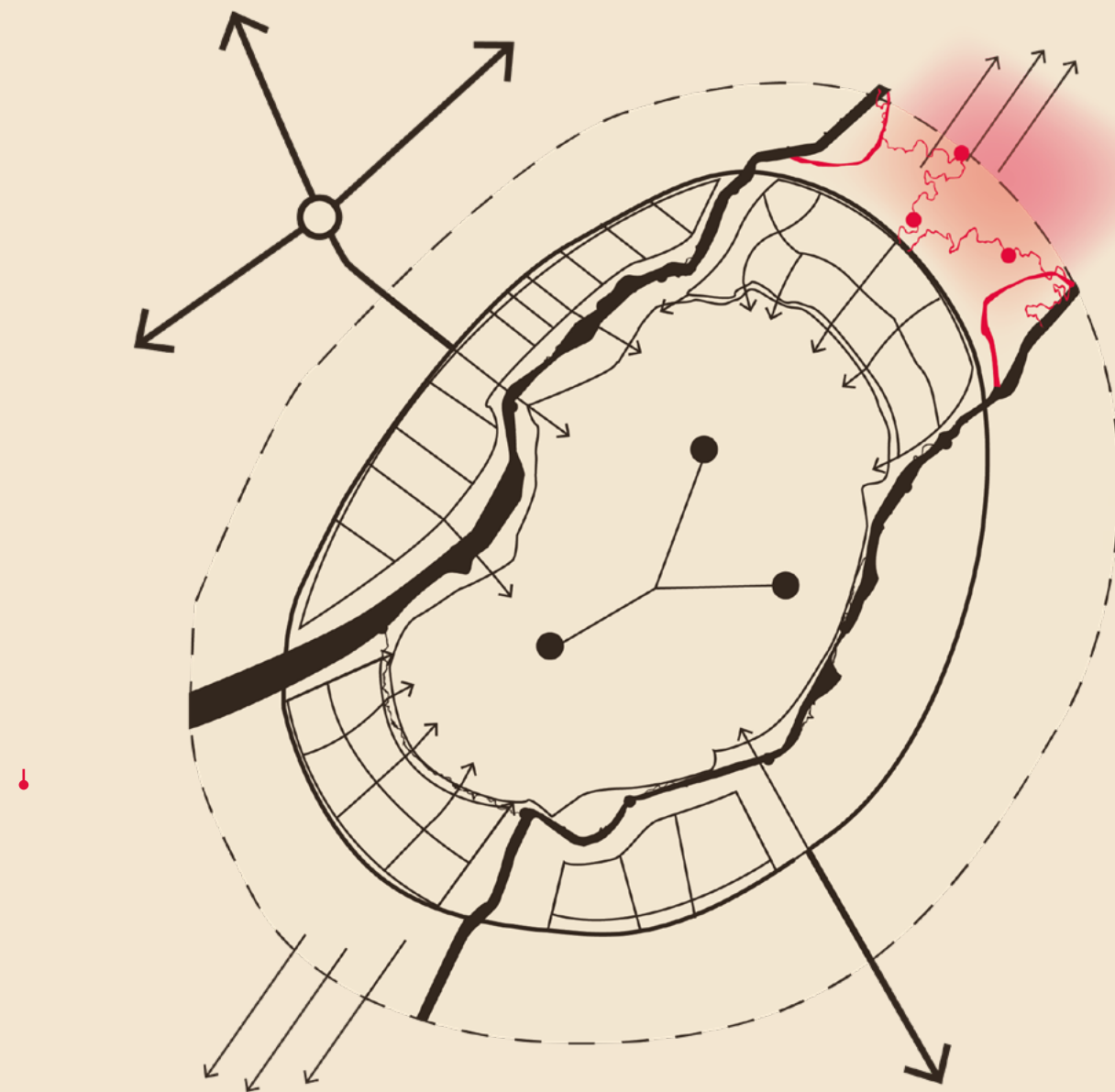
C.8 IMPROVE QUALITY OF SPACE





# CENTRAL HUB

The workshop of the ecocity: the place to educate, train and employ people, producing food to sell in the local hubs.





LEGEND

- Road
- Outer road
- Main avenue - sightline
- Pedestrian route
- Trees
- Livestock barrier
- Activity strip
- 5m elevation lines
- Wadi + extra channel
- Main water body
- Urban green
- Residential - plan Al Omrane
- Added built volumes
- Experimental garden
- Start agroforestry - nurseries
- First target area - nurseries
- Second target area - nurseries
- Space for social gathering
- Downstream dams


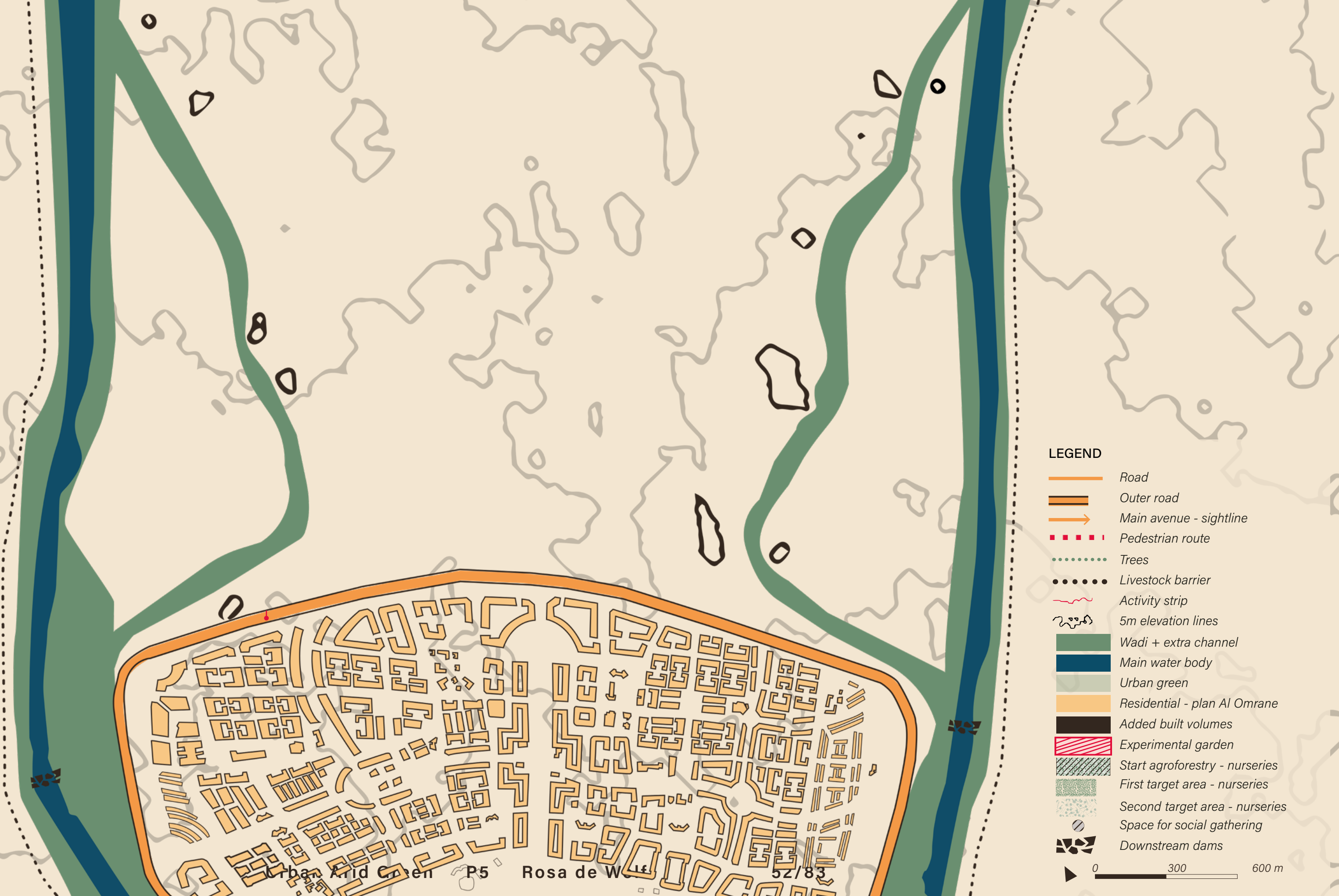
0 300 600 m



**D.4 CONTROLLED GRAZING**



**R.1 REDUCE FLASH FLOODS**

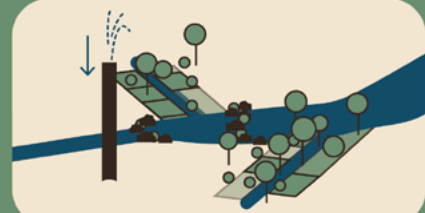
**LEGEND**

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0 300 600 m



## D.2 STOP DEPLETION



## O.4 VITAL SOIL



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0 300 600 m

Urban Arid Green

P5

Rosa de W.

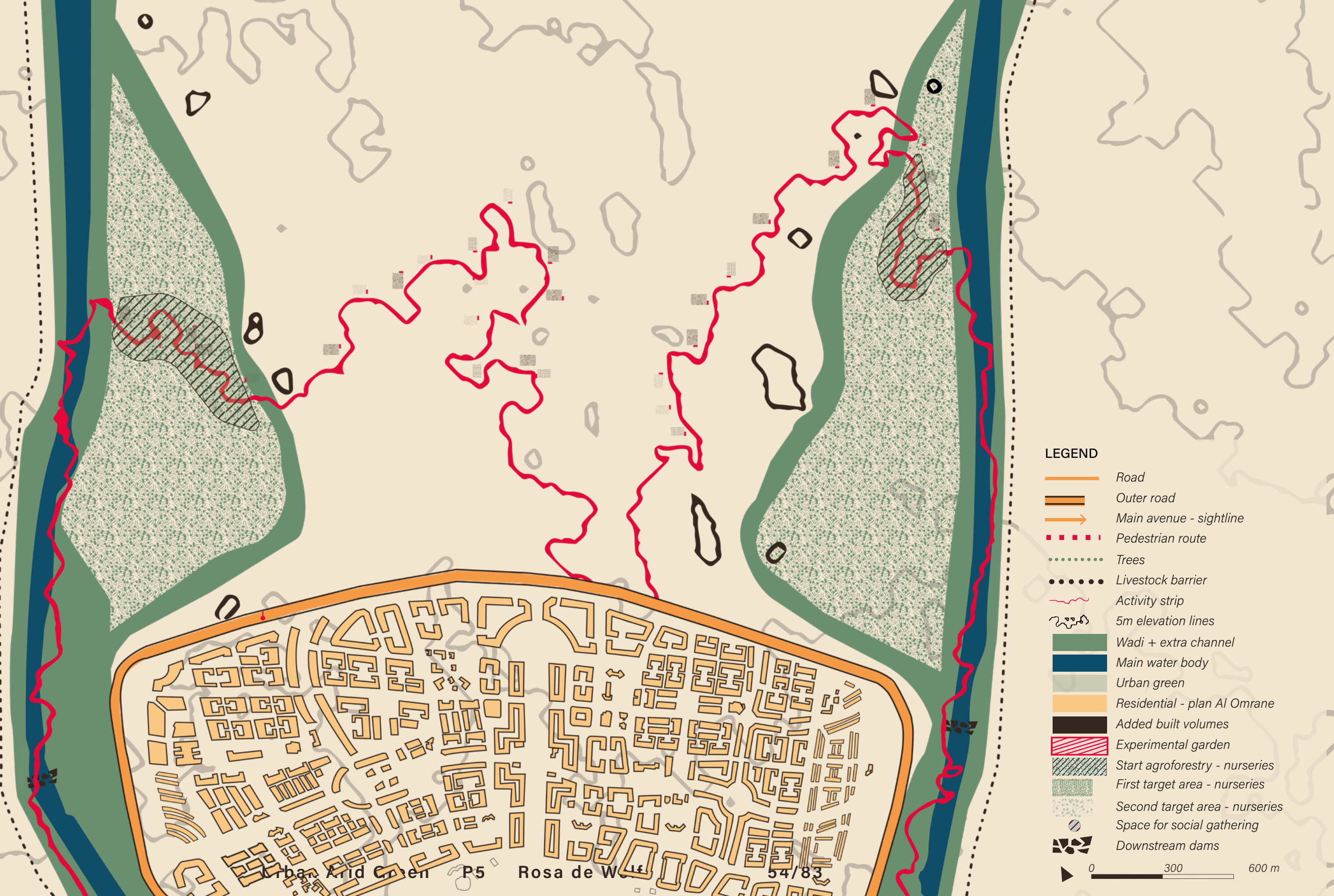
53/83



R.5 INTEGRATED



D.5 LOW-PROFILE



LEGEND

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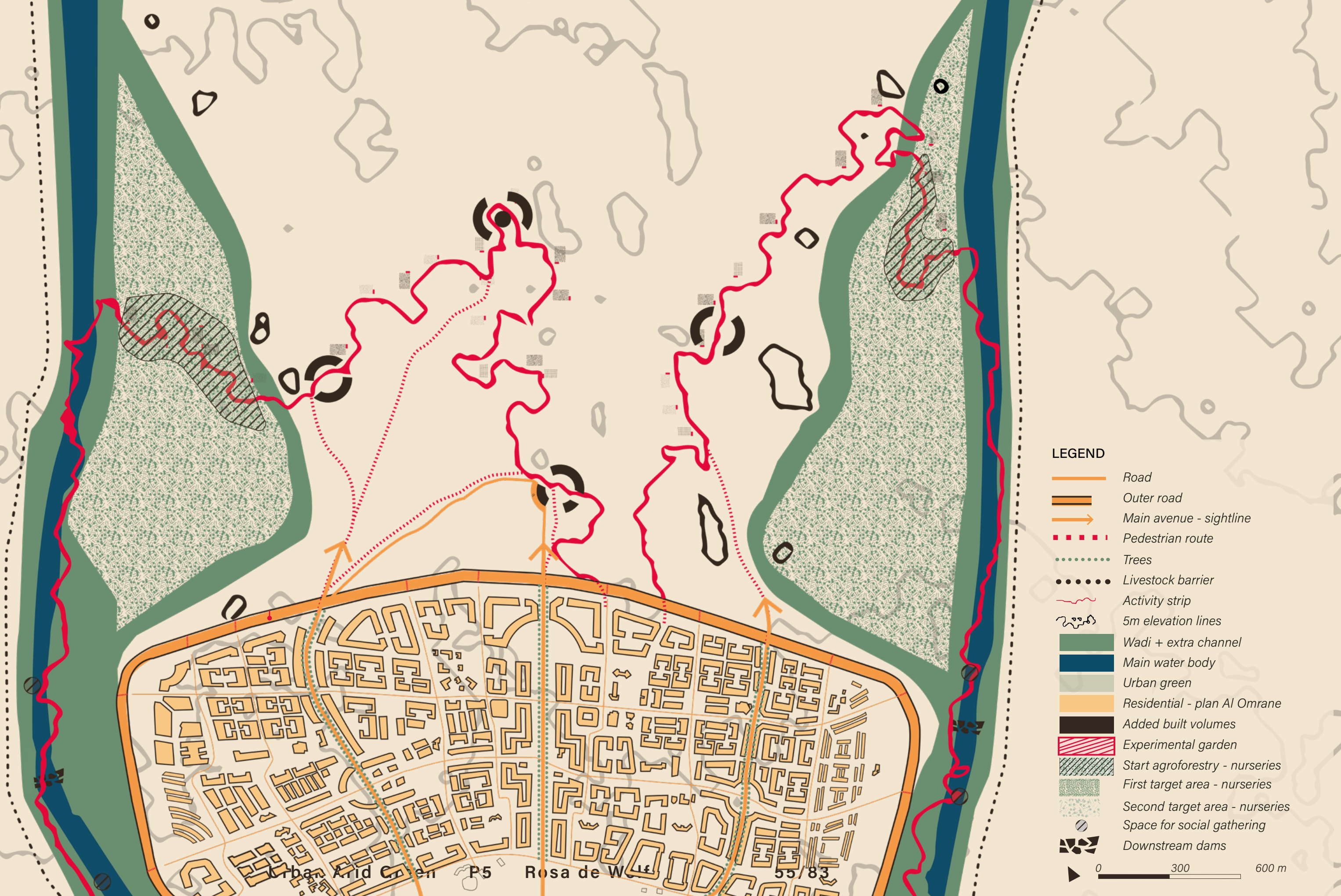
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## C.9 CLEAR STRUCTURE



## C.4 EASY TO EXPLORE





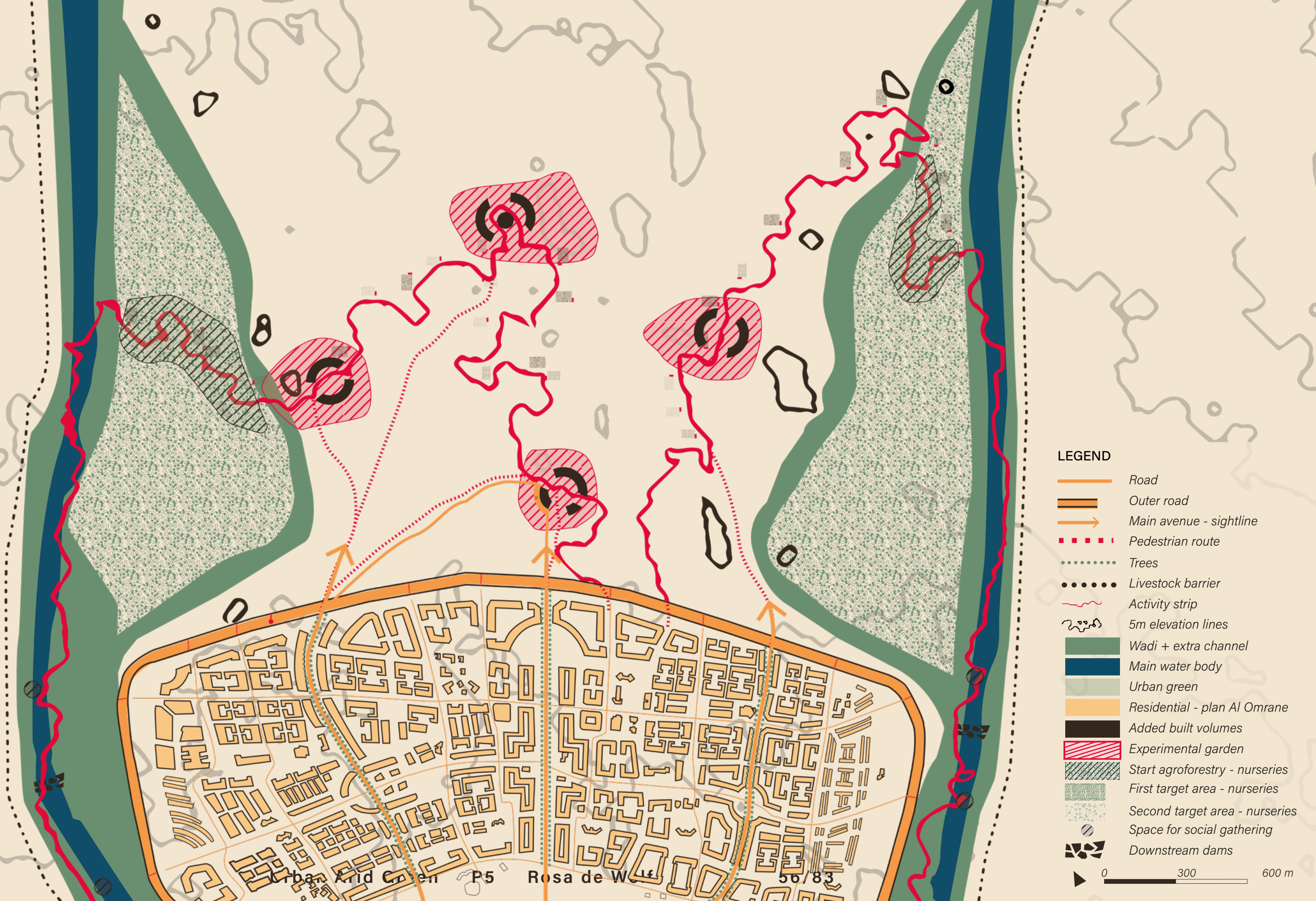
## 0.5 KNOW-HOW



## C.2 COMMON INTERESTS



An illustration within a rounded rectangle on a dark background. It shows a group of five people (three men and two women) sitting around a dark table. Behind them is a large, stylized orange cube with green diagonal stripes on its top face. Above the cube are several red lines radiating outwards, resembling a sun or a signal. The entire scene is set against a light beige background within the rounded rectangle.

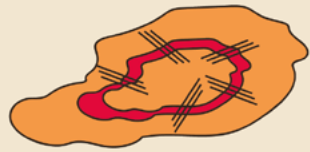




# R.4 LIFTING THE ECOCITY



# C.5 BREAK THE BARRIER



## LEGEND

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- Main water body
- Urban green
- Residential - plan Al Omrane
- Added built volumes
- Experimental garden
- Start agroforestry - nurseries
- First target area - nurseries
- Second target area - nurseries
- Space for social gathering
- Downstream dams

0 300 600 m



Urban Arid Green P5 Rosa de W 57/83



# EASY TO EXPLORE

Guided to encounter the different activities. Creating a whole different scene, one that was missing in Tamansourt.





# AGROFFORESTATION



START: 2023



PHASE 1: MICROCLIMATE



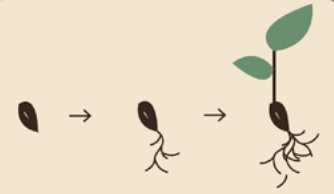
PHASE 2: SOIL FORMATION



PHASE 3: AGROFFORESTATION



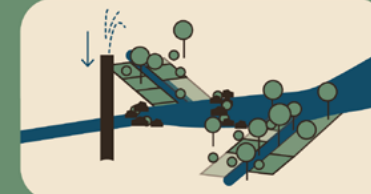
O.1 STIMULATE  
DIVERSITY



D.1 AGROFORESTRY



D.2 STOP DEPLETION



D.5 LOW-PROFILE





R.3 FAIR FINANCIAL



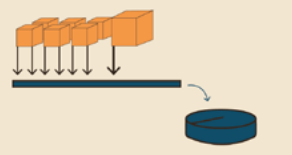
C.2 COMMON INTERESTS



M.2 NUTRIENT  
RECOVERY



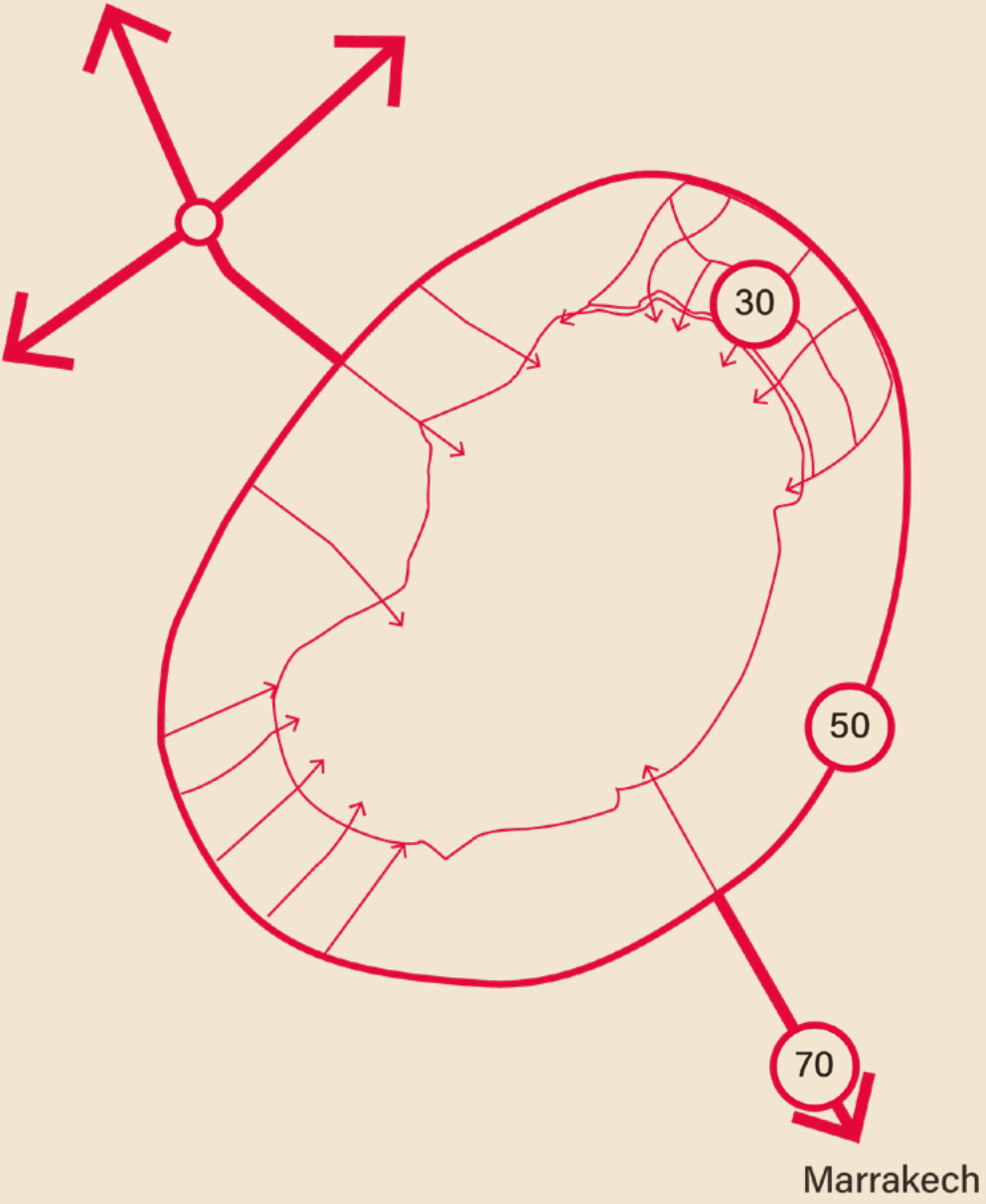
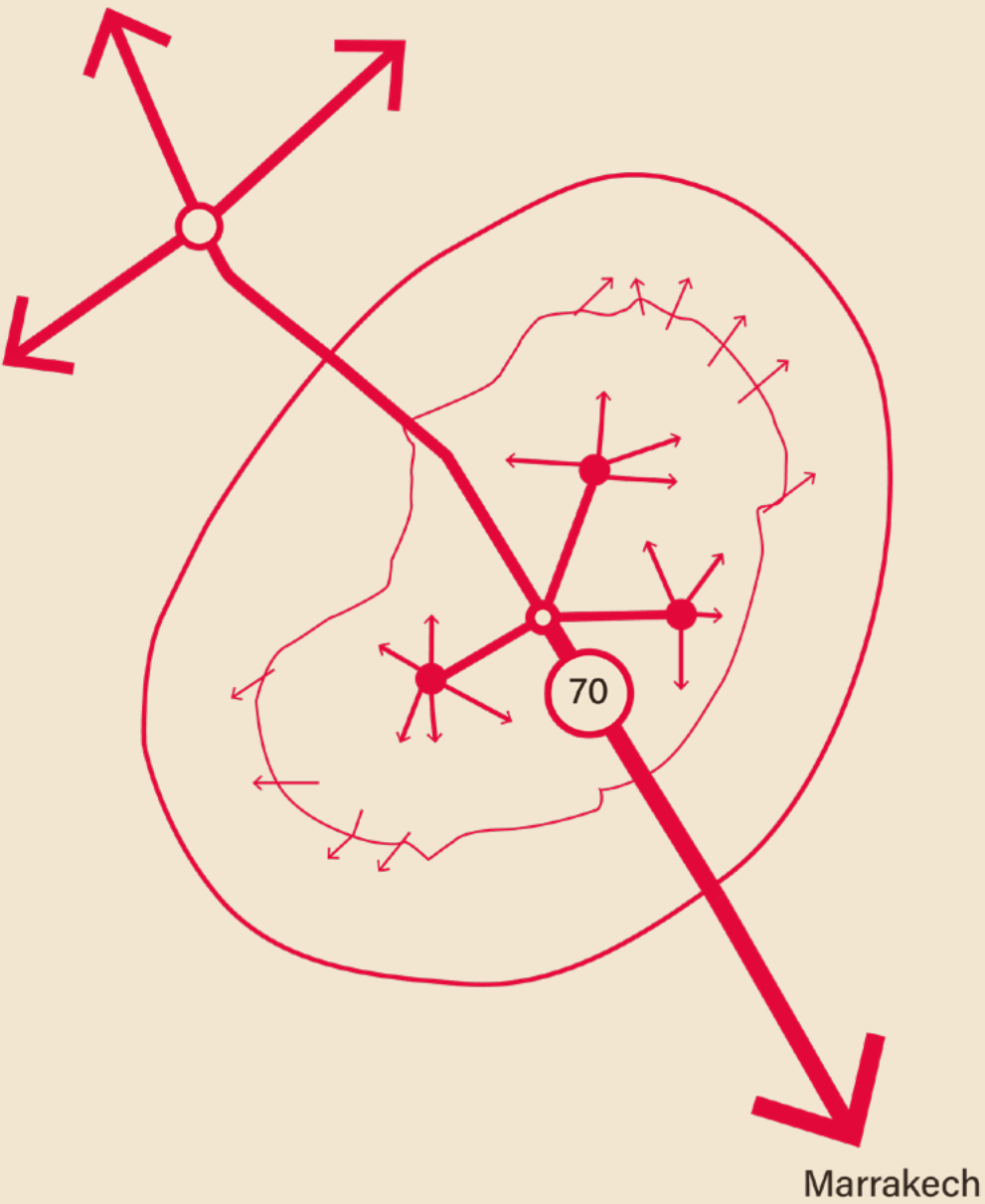
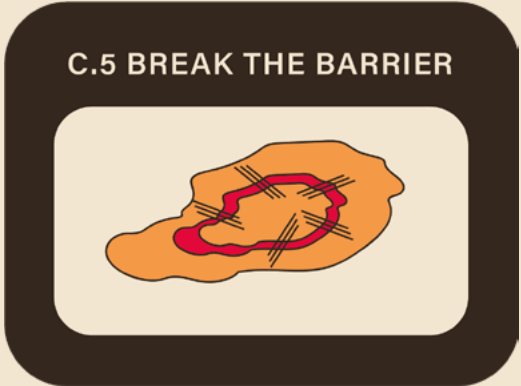
M.4 WASTEWATER  
TREATMENT





# MOBILITY SHIFT

To break the barrier



Current mobility vision, based on vision map Tamansourt by Al Omrane.  
(Al Omrane Marrakech, 2008. p-182)

Rethought mobility vision

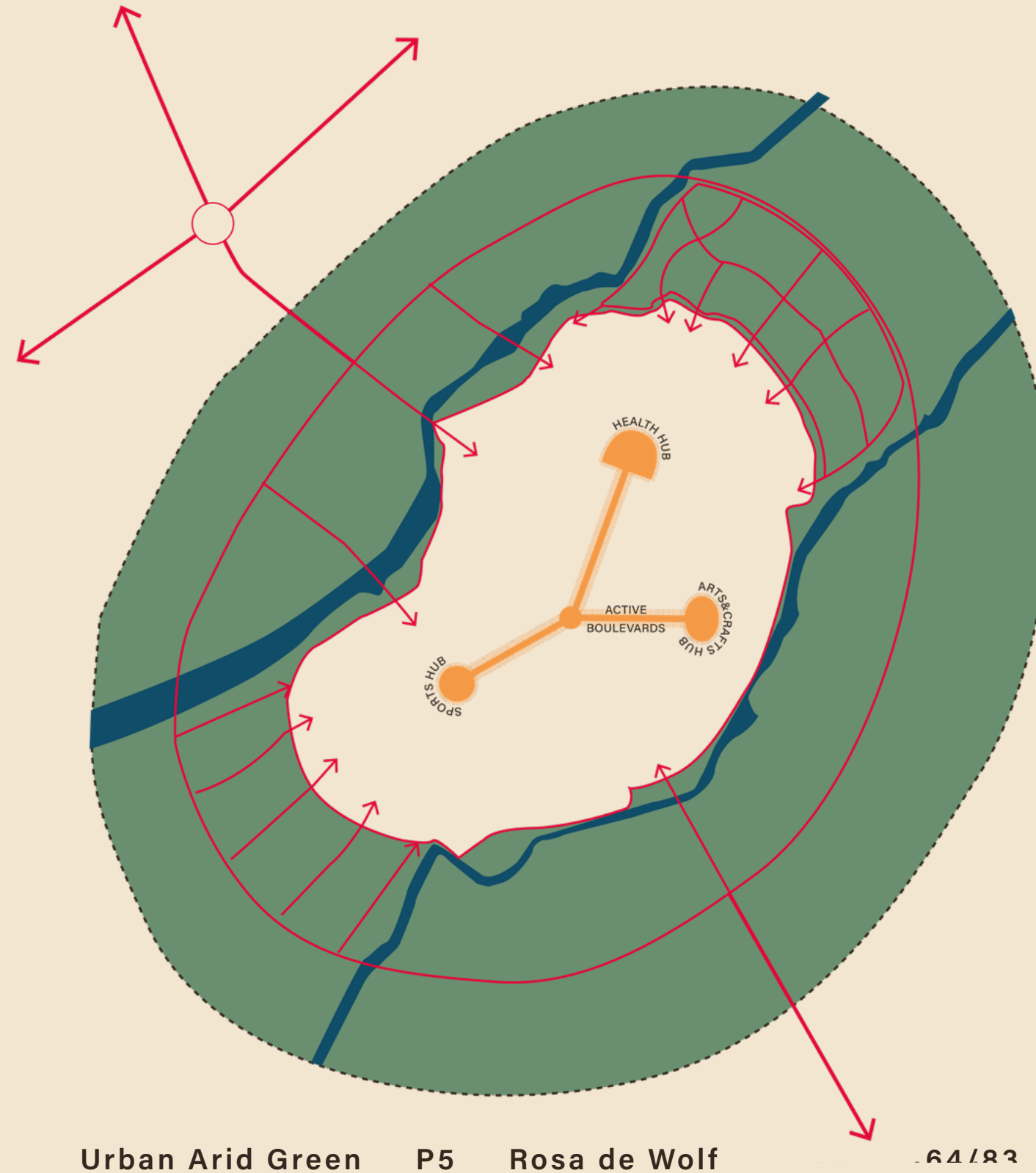






# LOCAL HUBS

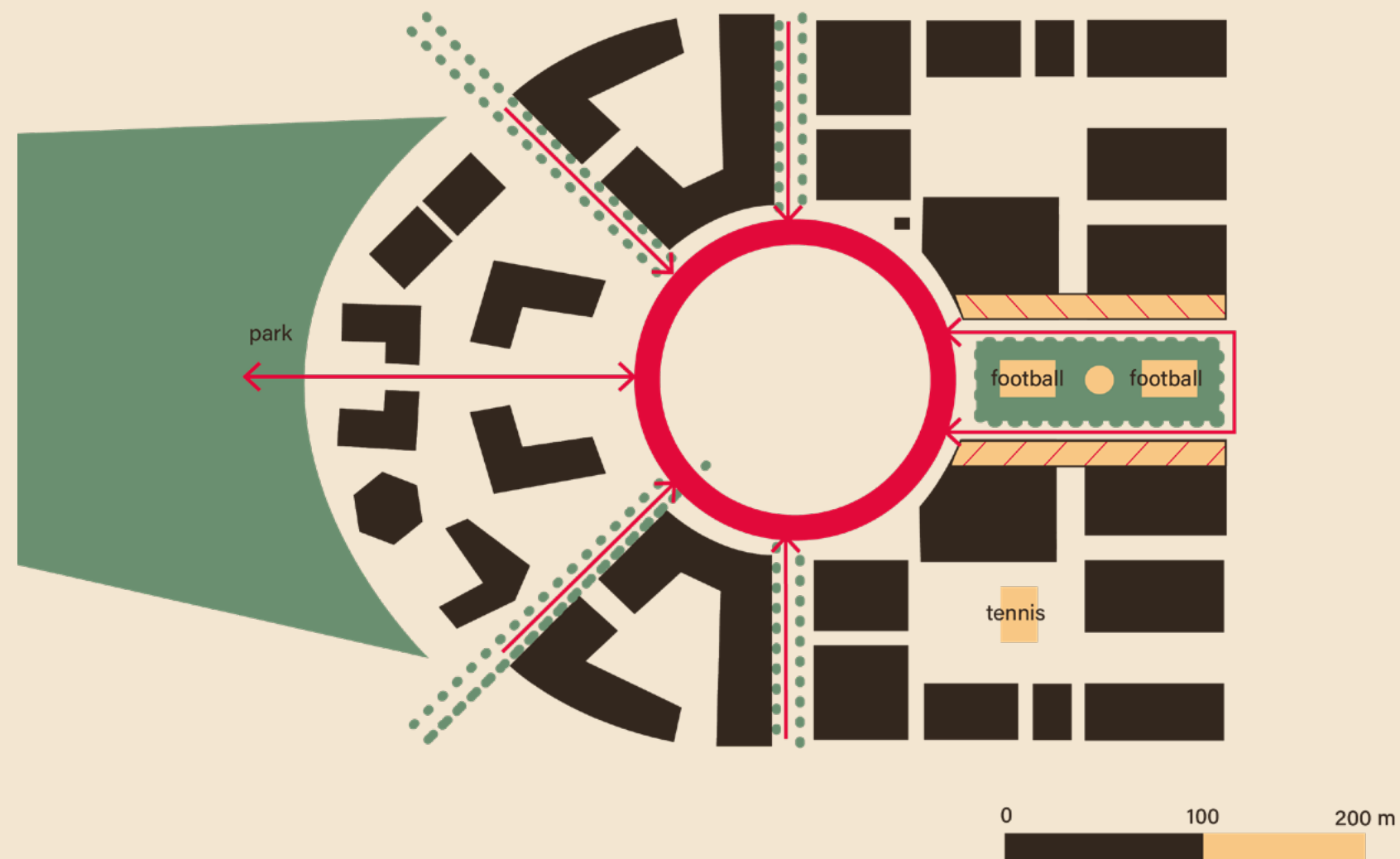
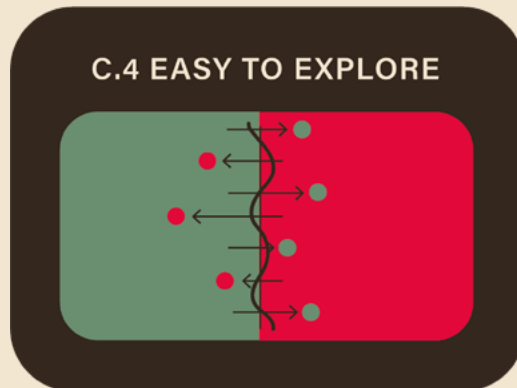
Mobility shift allows local hubs to activate the city centres. Include generic & hub-specific functions, to add the missing urban amenities and stimulate interaction.





## EFFICIENT USE OF SPACE

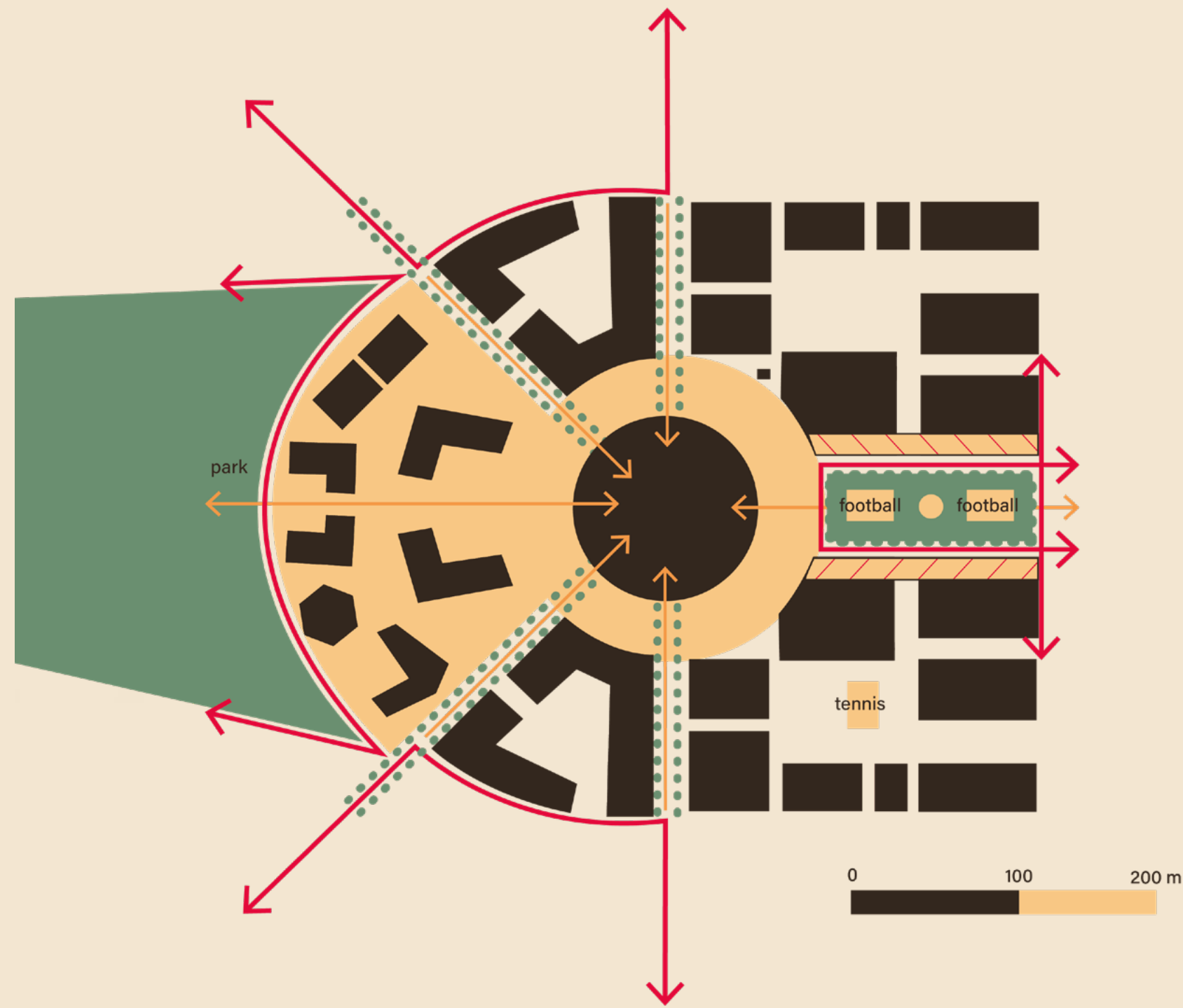
The mobility shift opens up space, no need for a 200 m wide roundabout. Advancing on the Al Omrane Pathway, using the hierarchy in urban form to activate the city.





# GUIDED TOWARDS COMMUNITY CENTRE

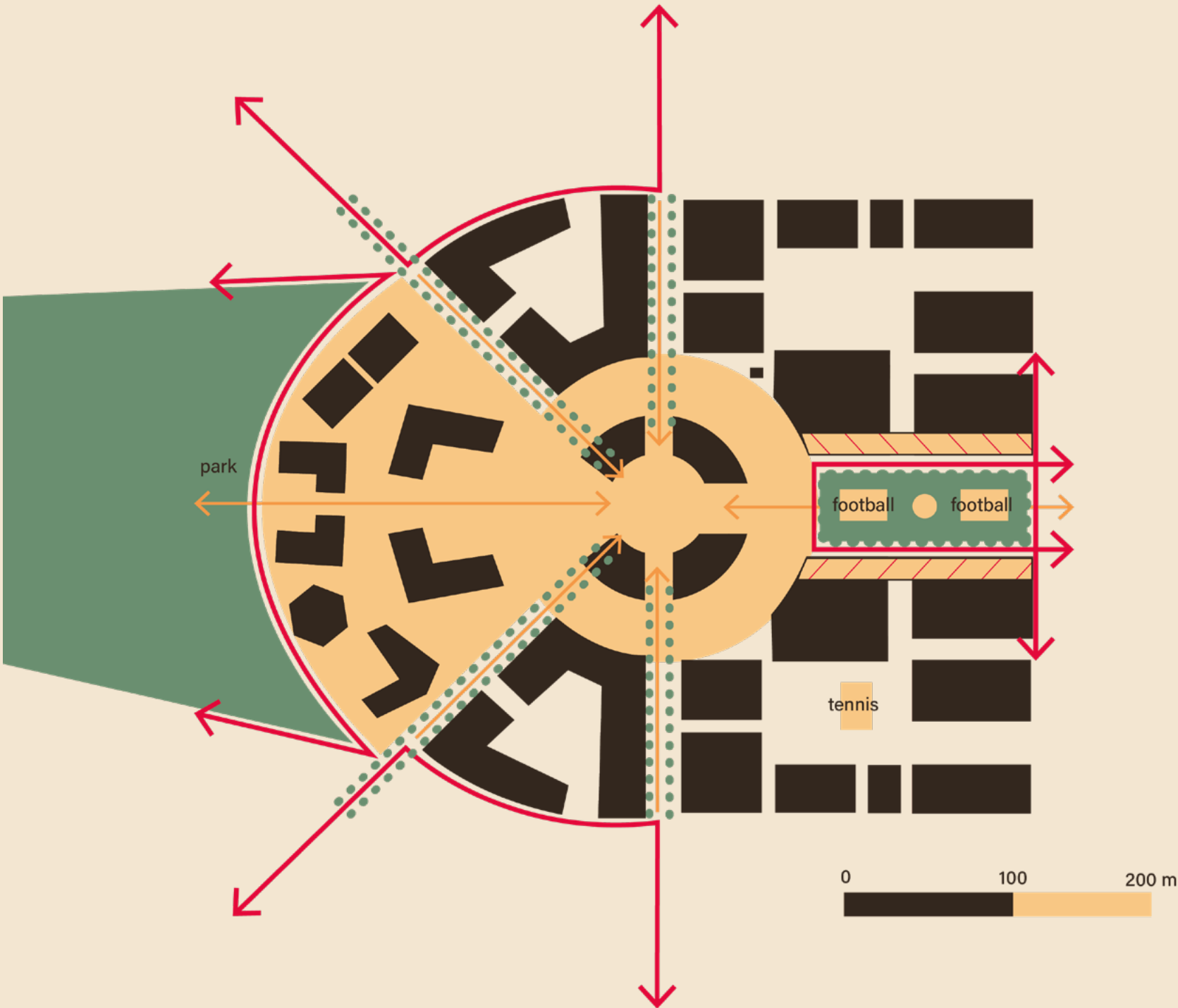
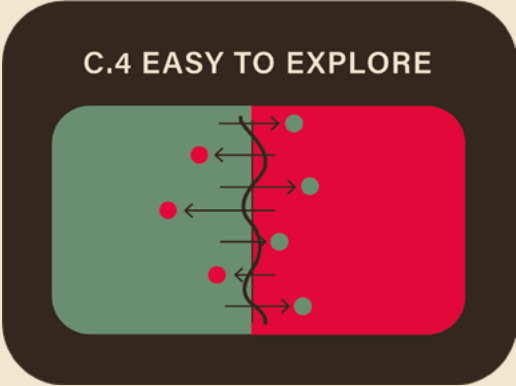
Following the urban form, one will easily encounter a community centre. The mass must interact with its surroundings.





# FOLLOW SIGHTLINES AND FLOWS

The community centres acknowledge the sightlines envisioned by Al Omrane.





# INTEGRATE TO HEIGHTS

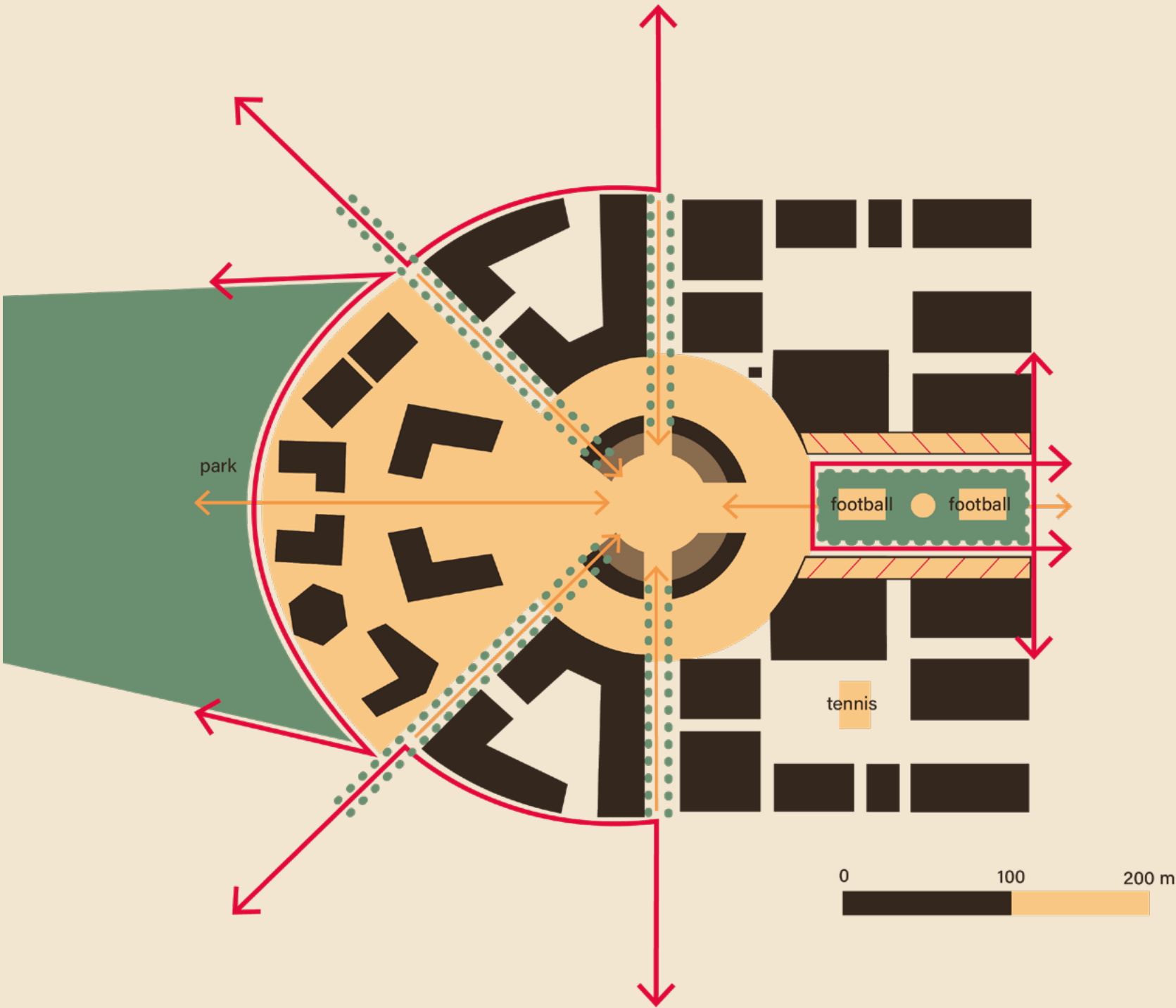
By lowering the heights of the inner mass, a more intimate feeling is created.

C.2 COMMON INTERESTS



C.6 ALLOW INDIVIDUALITY









# FOCUS ON NURSERY

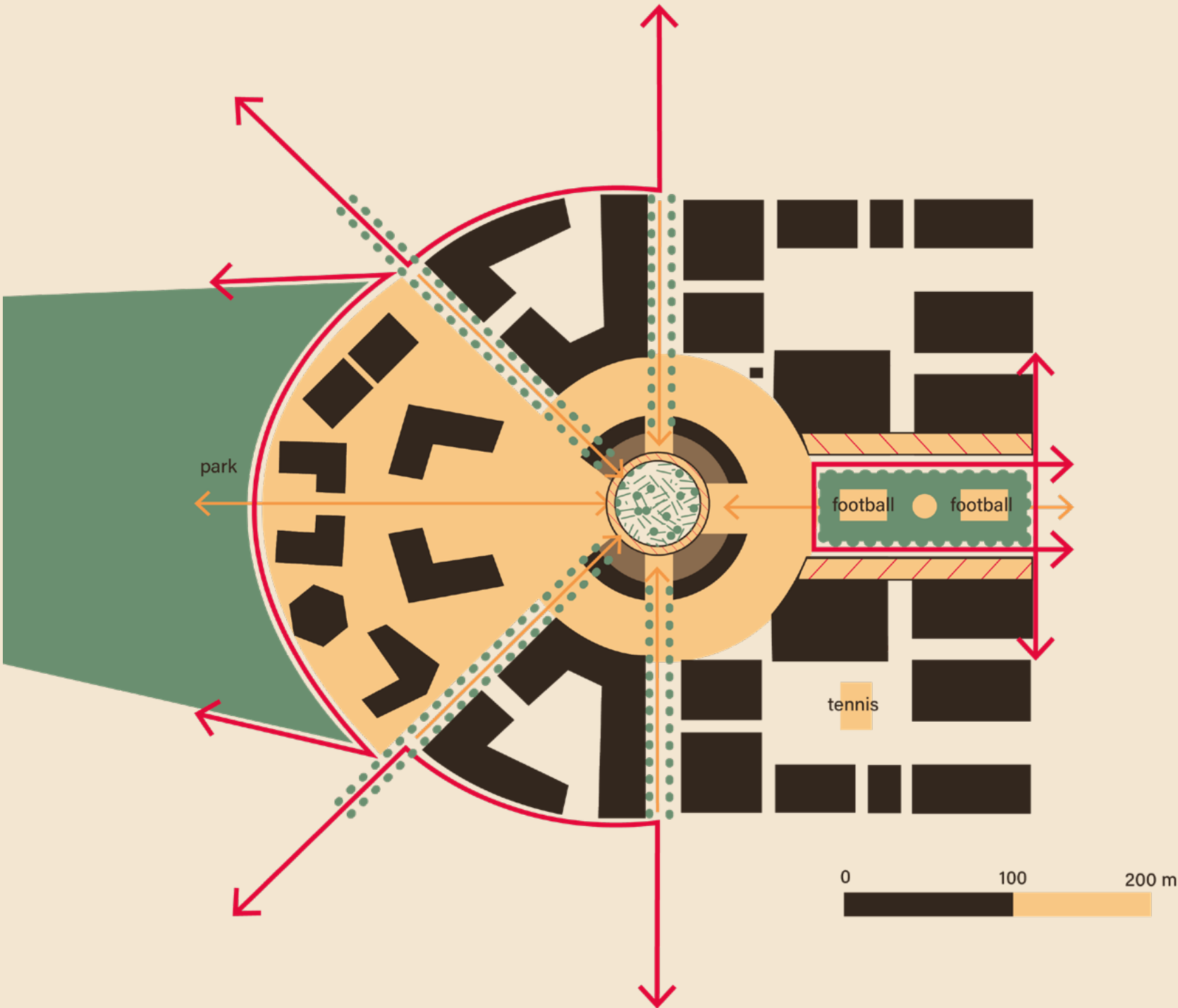
The centre is oriented towards the nursery.

D.5 LOW-PROFILE



B.1 PLOT GREENING



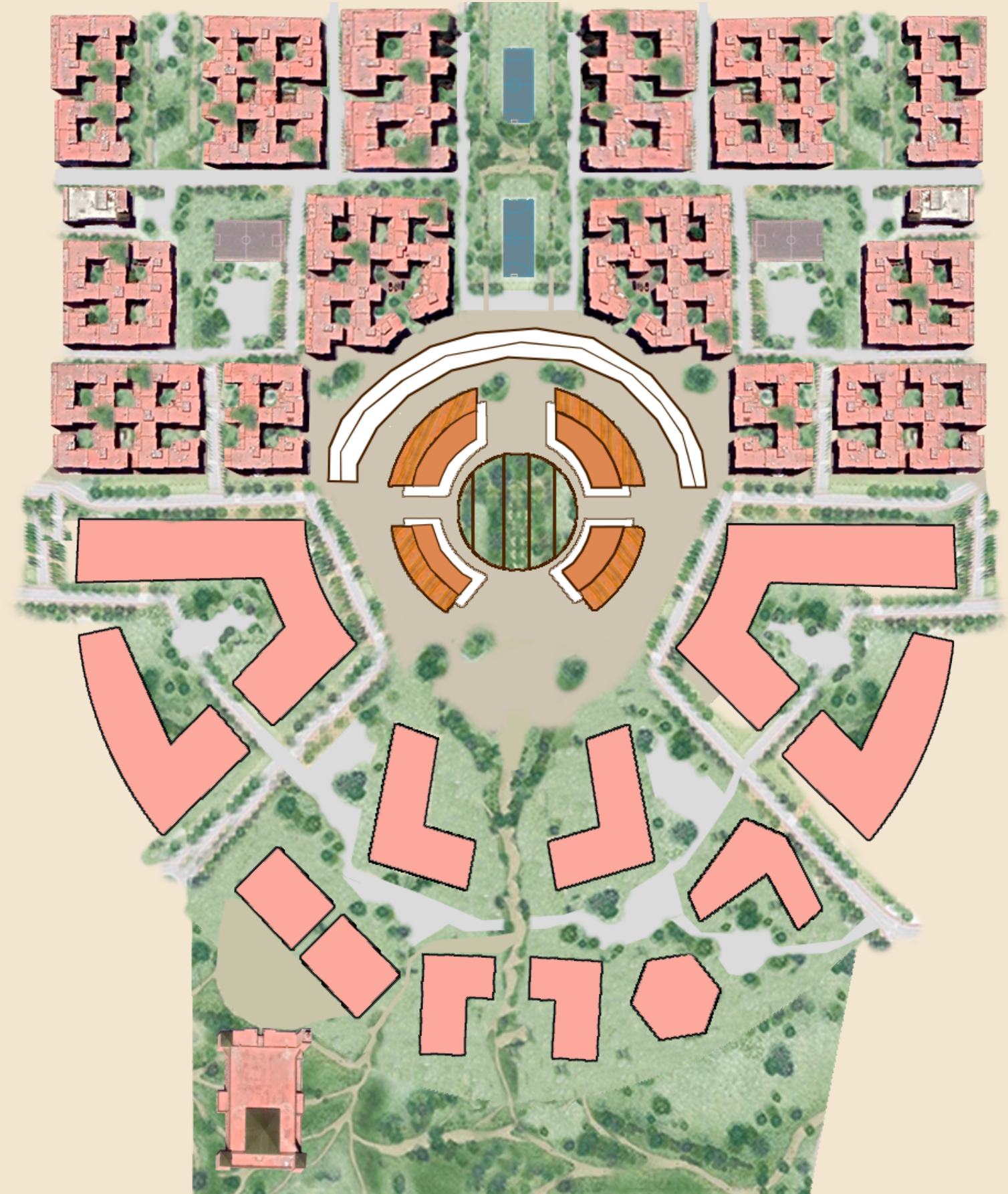




# PLAN

Stand out in architecture and form, creating recognition.

Leave space for the locals to appropriate, for instance, to organise a Saturday Souq.



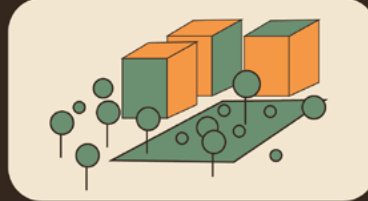




C.9 CLEAR STRUCTURE



C.8 IMPROVE QUALITY OF SPACE



B.2 CLEAN & MOROCCAN



C.4 EASY TO EXPLORE



*Impression from active boulevard to Sports hub, including the different users.*





C.2 COMMON INTERESTS



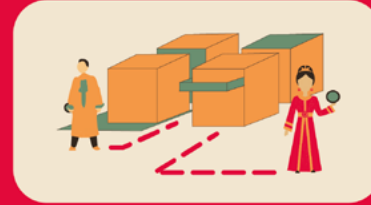
R.3 FAIR FINANCIAL



C.3 GATHERING SPACES



B.1 PLOT GREENING





# DIFFERENT LOCATION, DIFFERENT SPECIES

## Urban



- Native
- Ornamental
- More maintenance

## Agroforest



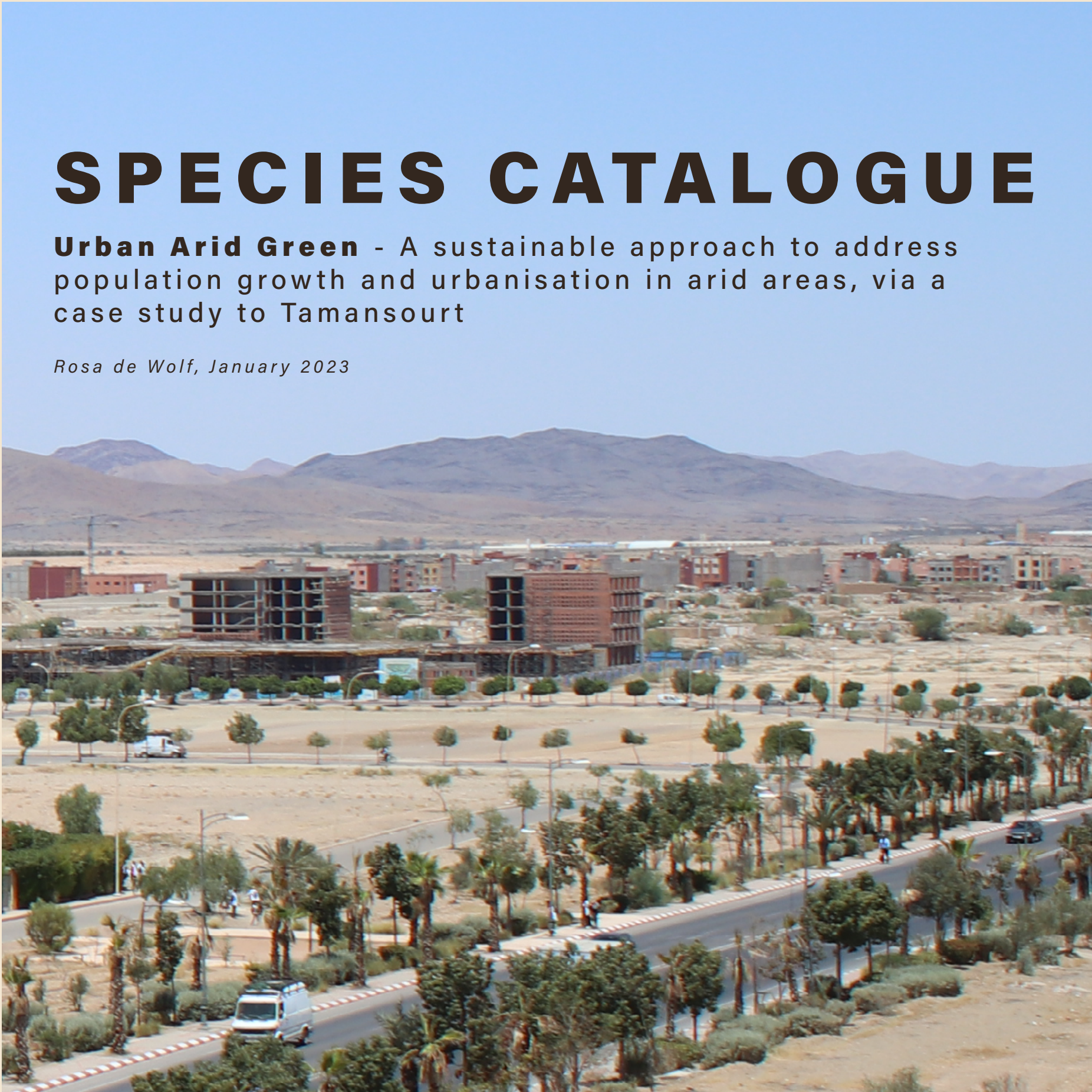
- Native
- Edible / economic
- More maintenance

## Parks



- Native
- Erosion control
- Less maintenance

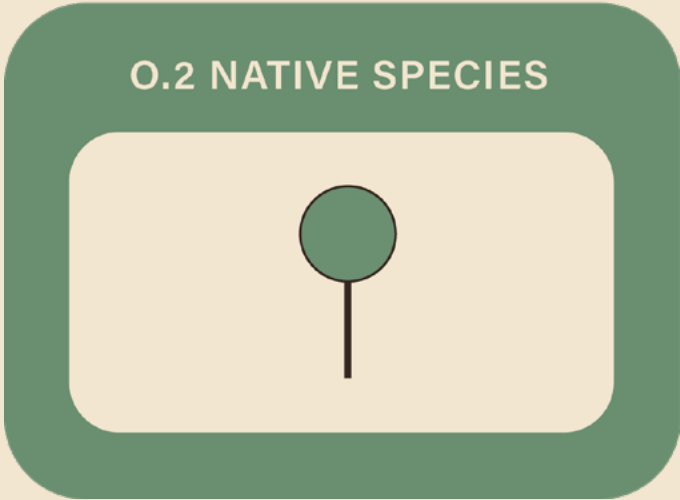




# SPECIES CATALOGUE

**Urban Arid Green** - A sustainable approach to address population growth and urbanisation in arid areas, via a case study to Tamansourt

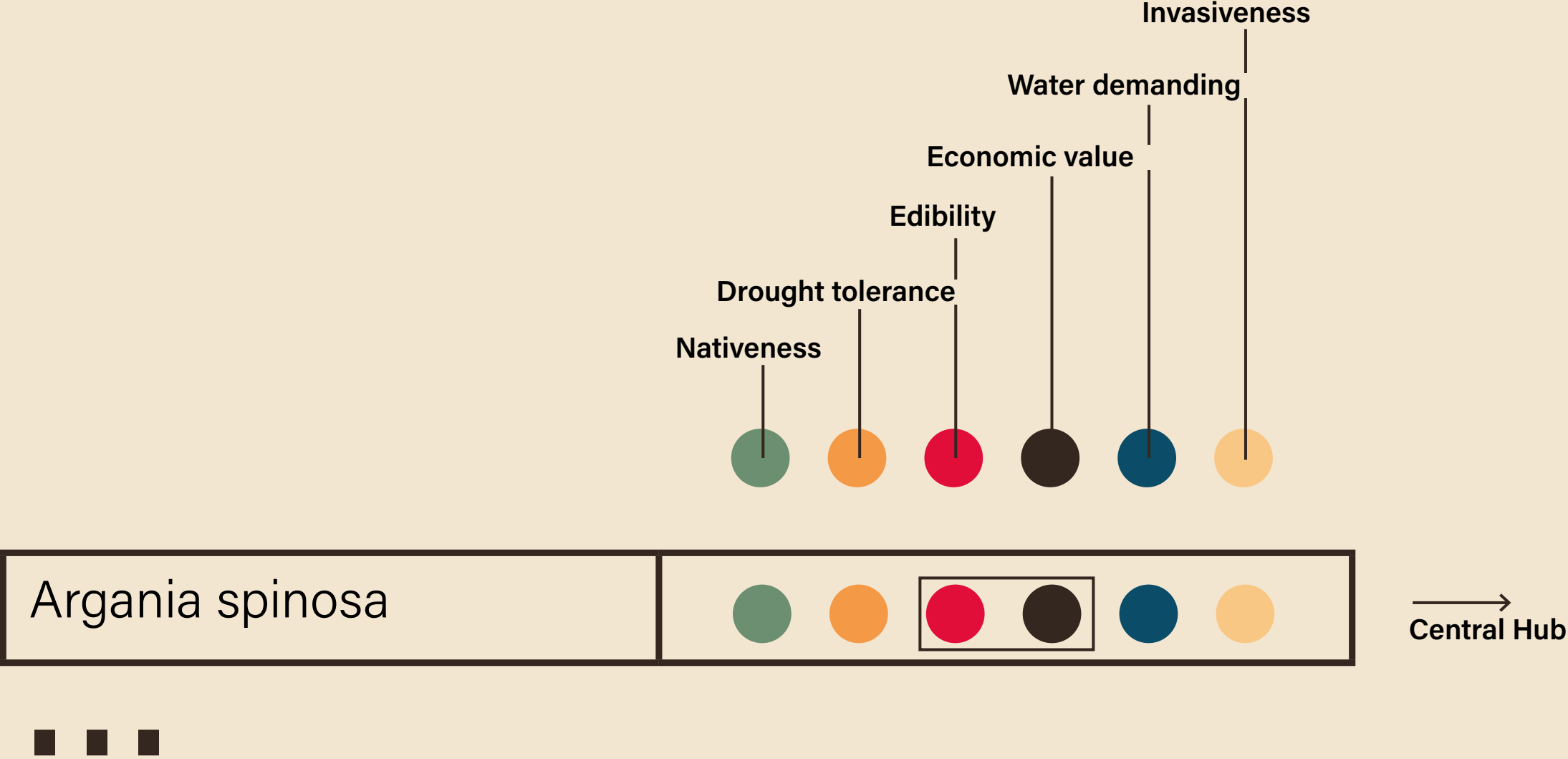
*Rosa de Wolf, January 2023*



STARTED WITH  
144 SPECIES



# SPECIES SET PER LOCATION, BASED ON CHARACTERISTICS AND REQUIREMENTS





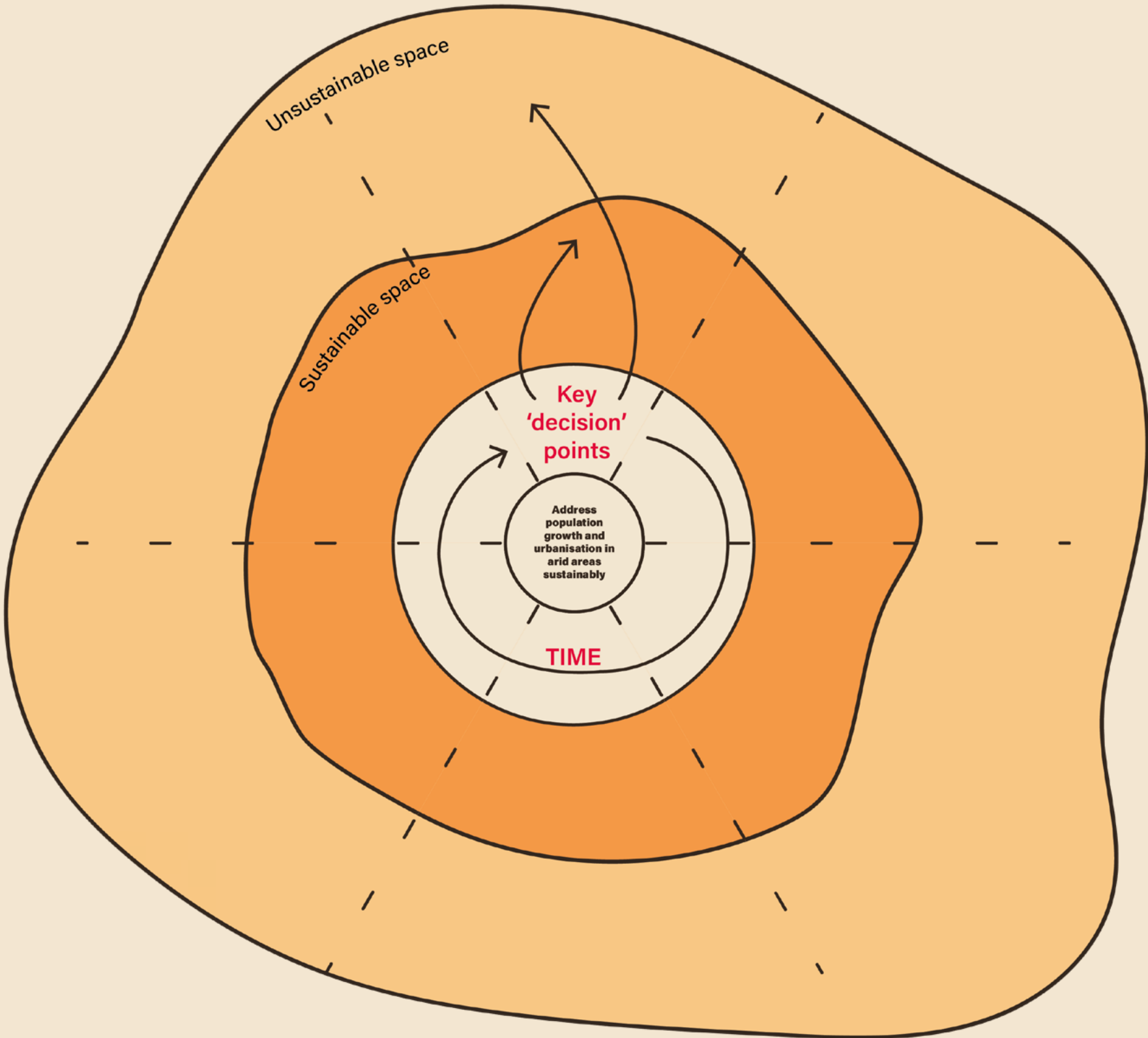




# URGENCY WITH WILLINGNESS TO BE PATIENT

The natural system takes time to develop and as we are experimenting, we might face a trial & error process.

Within the development, constant reflection on process is needed. Sustainable aims cannot overshoot into the unsustainable space.



*Adaptive Pathway Approach to address population growth and urbanisation sustainably.*



# 7. CONCLUSION



# #1 NEW TOWN ECO CITY

Tamansourt will be the first new-town ecocity that uses the scarce natural resources as a driver for a regenerative productive urban landscape.



# ONE FRAMEWORK FOR POLYPROBLEM

Contribute to the reversal of desertification,  
address water and food insecurities,  
allow and stimulate the population growth and urbanisation.



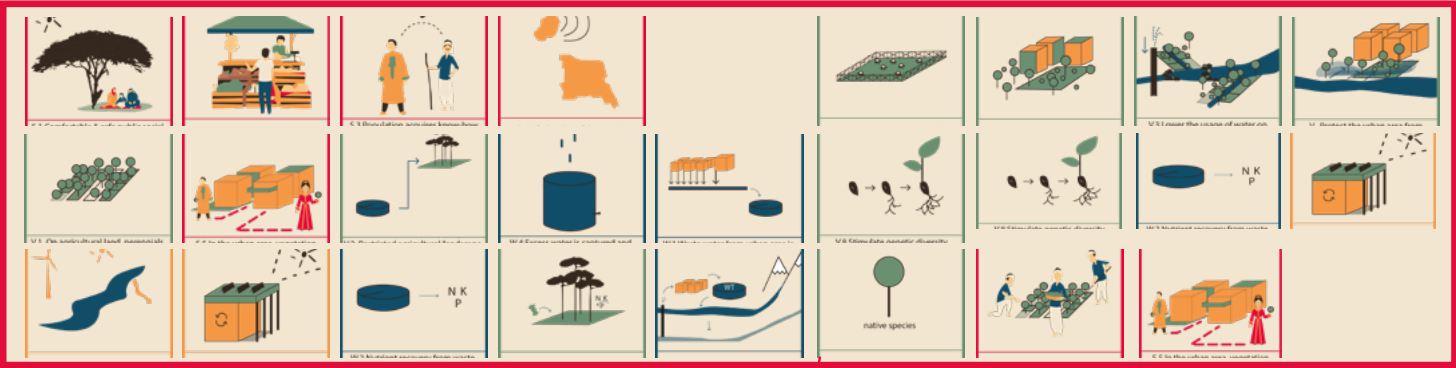
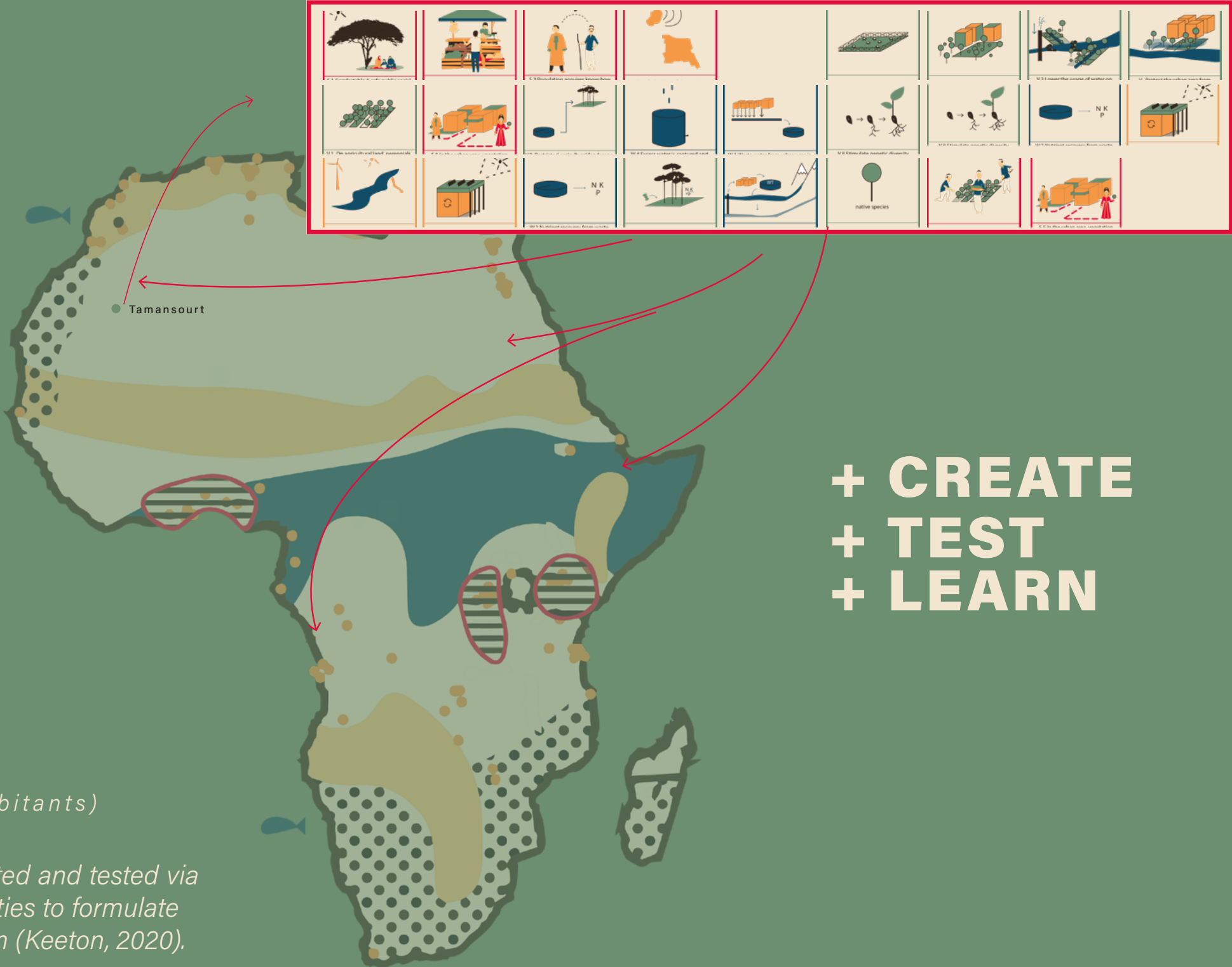
# ALLOWING DIFFERENT DIALECTS

Moroccan Villes Nouvelles: Al Omrane Pathway  
Other (arid) cities: formulate their own Pathway



# EXEMPLARY FUNCTION

Tamansourt sets an example to other arid cities by designing and testing the Urban Arid Green language, sparking a network of ecocities and contributing to global sustainability.



+ CREATE  
+ TEST  
+ LEARN

LEGEND

- Decreased rainfall
- Increased rainfall
- Impact on fisheries
- Risk of desertification
- Climate change hotspot
- New Towns (>10.000 habitants)
- Tamansourt

Urban Arid Green language created and tested via Tamansourt, shared with other cities to formulate different dialects. Background frm (Keeton, 2020).



# URBAN ARID GREEN

A sustainable approach to address population growth and urbanisation in arid areas, via a case study to Tamansourt

Rosa de Wolf, 19 January 2023

