



**Science in Action: Intersecting pathways to the SDGs across scales in the Drylands**

Local to Global Dialogue: Challenges and solutions to reach the SDGs in the Drylands

January 25th 2024



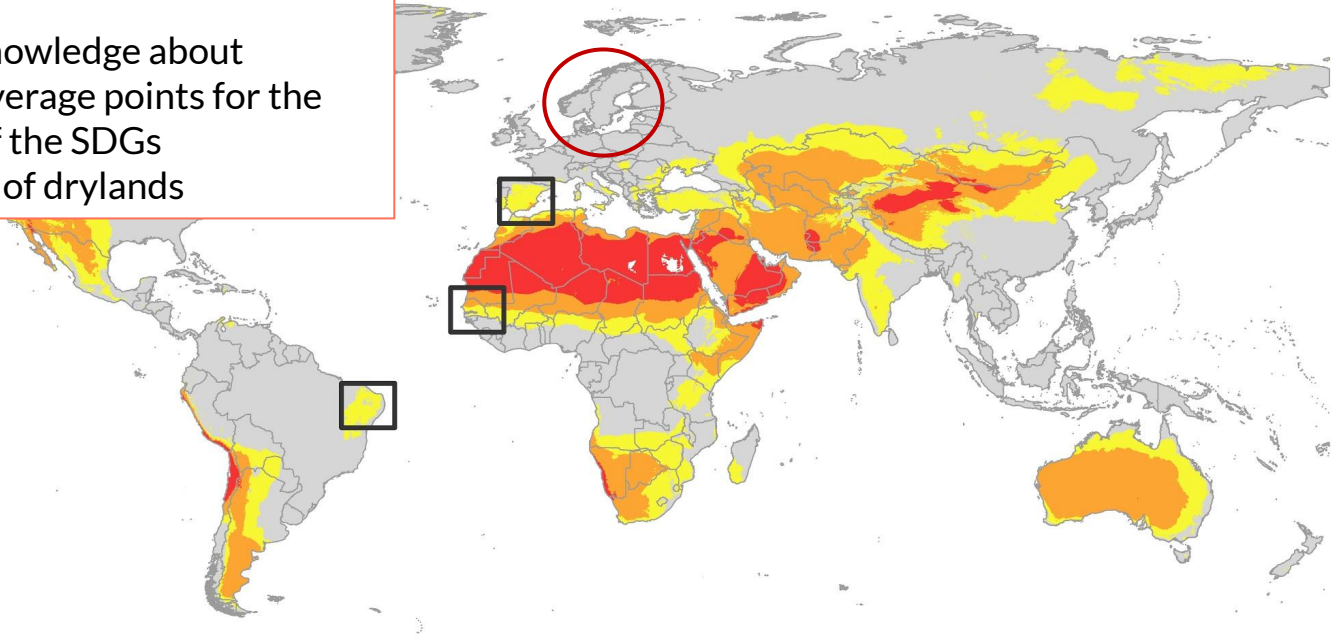
Source: UN

## Why XPaths and selected case studies?

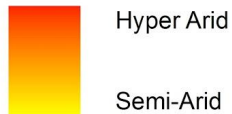
Ana Paula Dutra de Aguiar  
Brazilian Institute for Space Research (INPE)  
and Stockholm Resilience Centre

## Goal:

Advance the knowledge about barriers and leverage points for the achievement of the SDGs  
- in the context of drylands



### Global Aridity Index



Case study locations (within Brazil, Senegal, Spain)



# The world's goals to save humanity are hugely ambitious – but they are still the best option

Not one of the United Nations Sustainable Development Goals looks set to be achieved by 2030. But deadlines can help focus the mind, and scientists should double down on their work to support the goals.

## Goal:

Advance the knowledge about barriers and leverage points for the achievement of the SDGs - in the context of drylands

### SPAIN



### BRAZIL



### SENEGAL

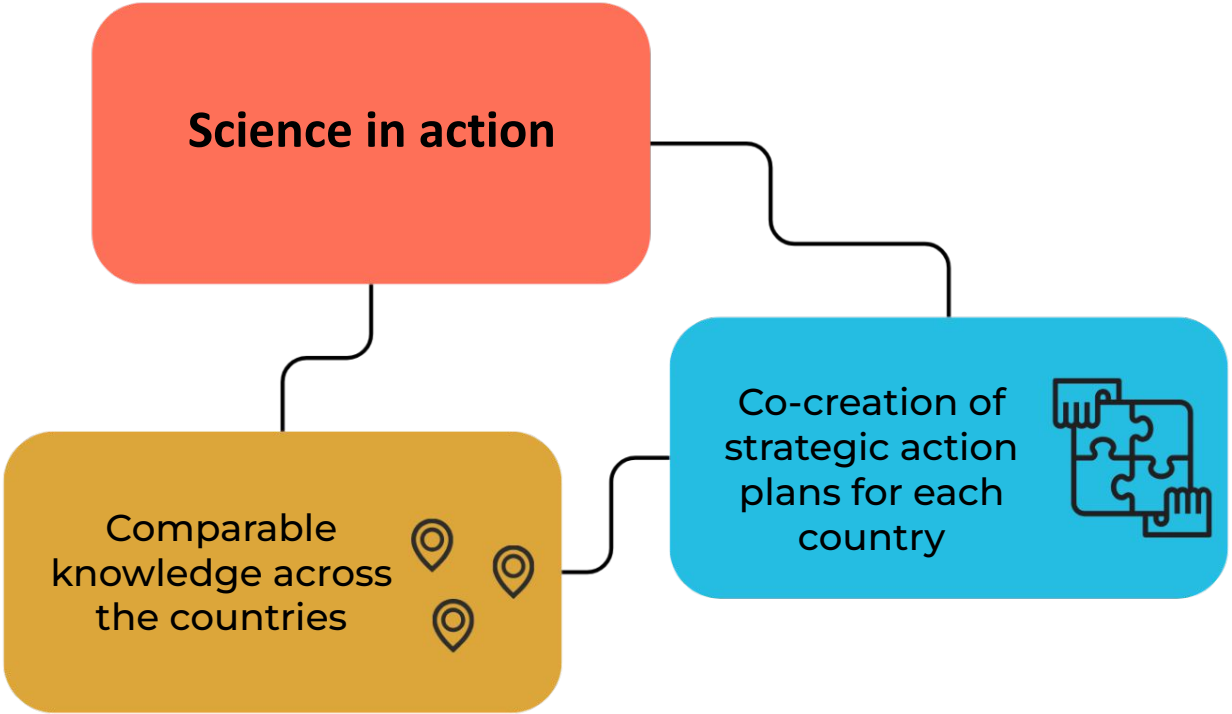




# Transformation is possible! with political will and action across levels

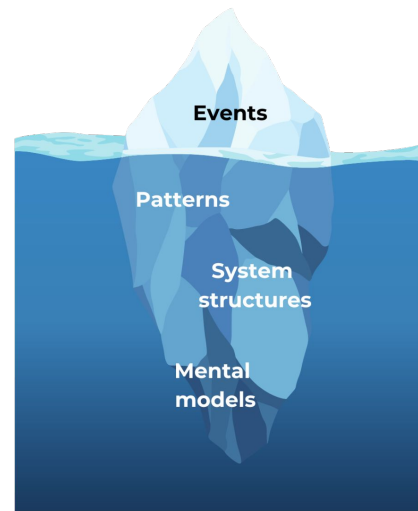
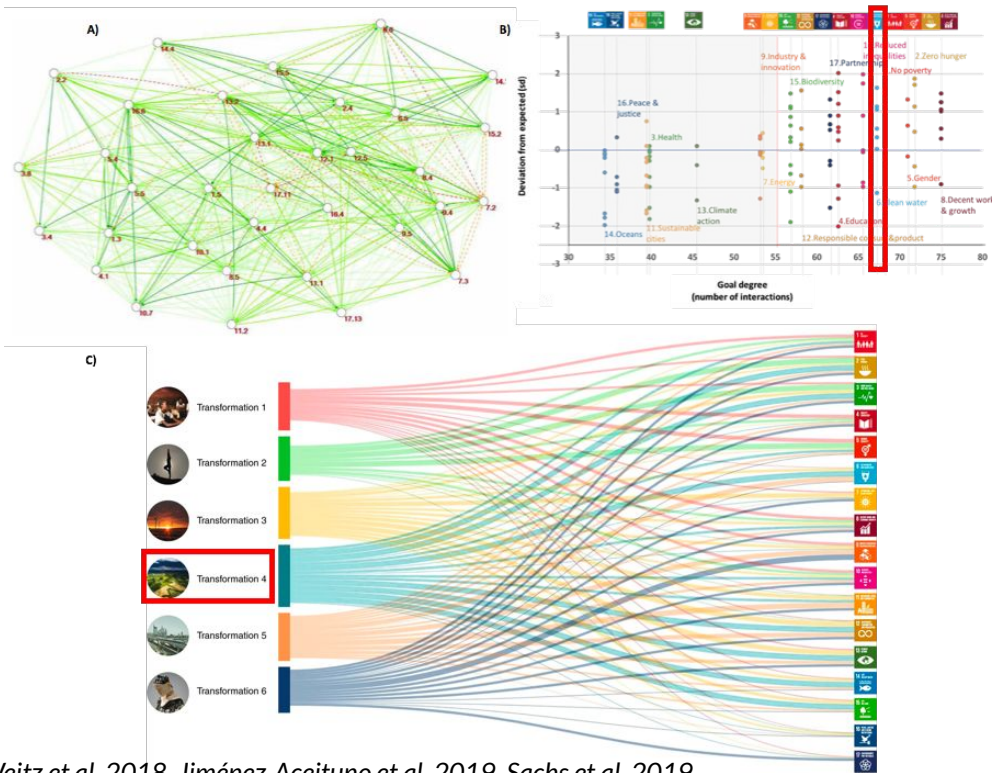


# Science in action: intersecting pathways to the SDGs across scales in the drylands



# Assumption 1: How to address the integrated nature of the SDGs

Pathways to achieve *all* the SDGs requires understanding root causes and systemic structures locking the country in unsustainable pathways



Source: Tove Mattsson

Impactos esperados nos ODS:

Positivo direto	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Positivo indireto																	
Não impacta																	
Negativa indireta																	
Negativo direto																	

SDG Impact Assessment Tool:  
<https://sdgimpactassessmenttool.org>



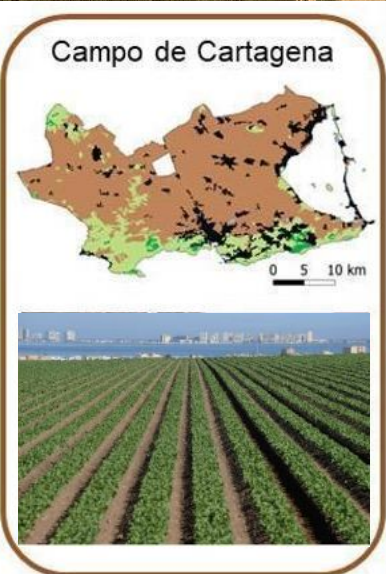
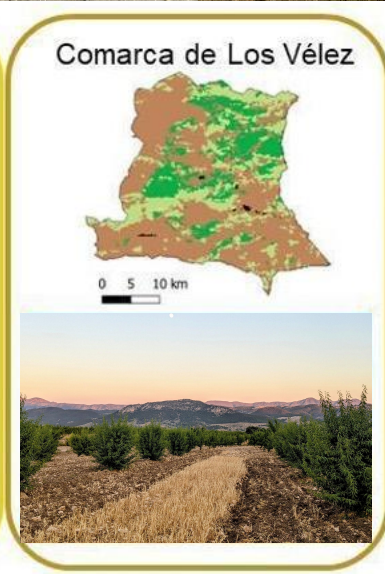
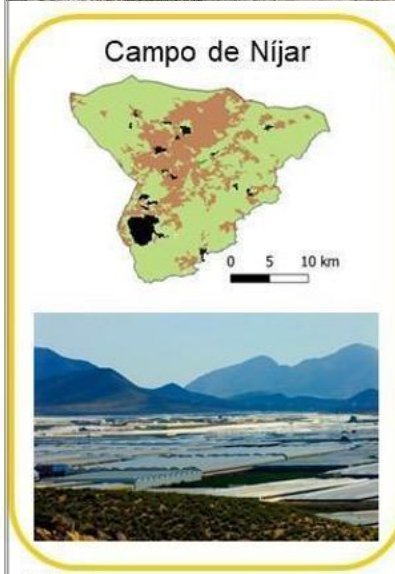
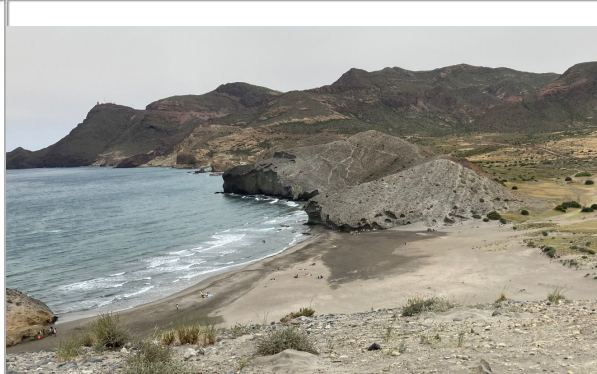
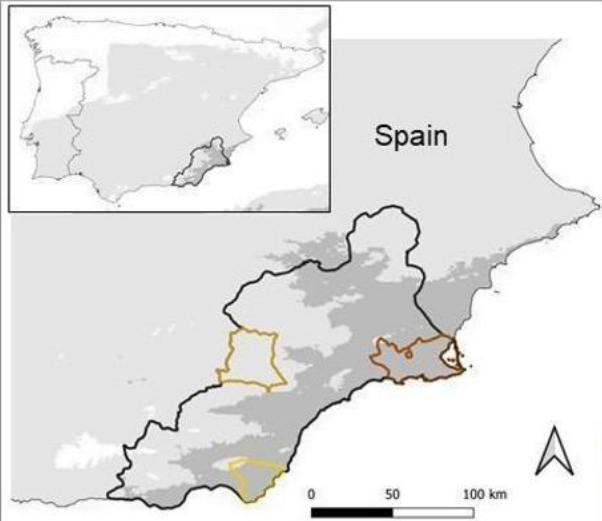
# Assumption 2: Importance of localizing the SDGs

Achieving the SDGs requires a sense making process about what sustainable and just futures mean at multiple levels, considering multiple perspectives

Three contrasted social-ecological systems inside each selected region in each country







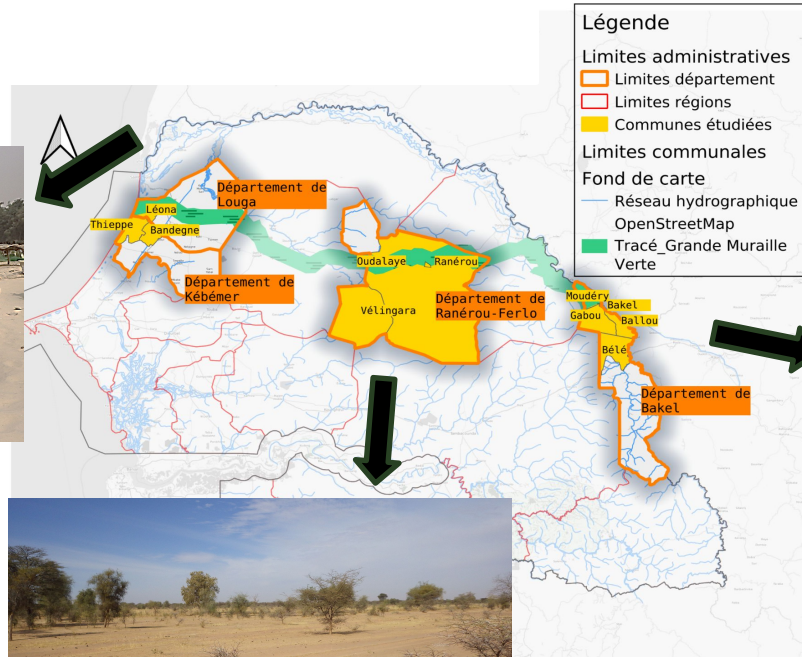
Photos: Amanda Jiménez Aceituno  
 Maps: María D. López-Rodríguez et al (under review)



# Northern Senegal



Niayes



Ranérou

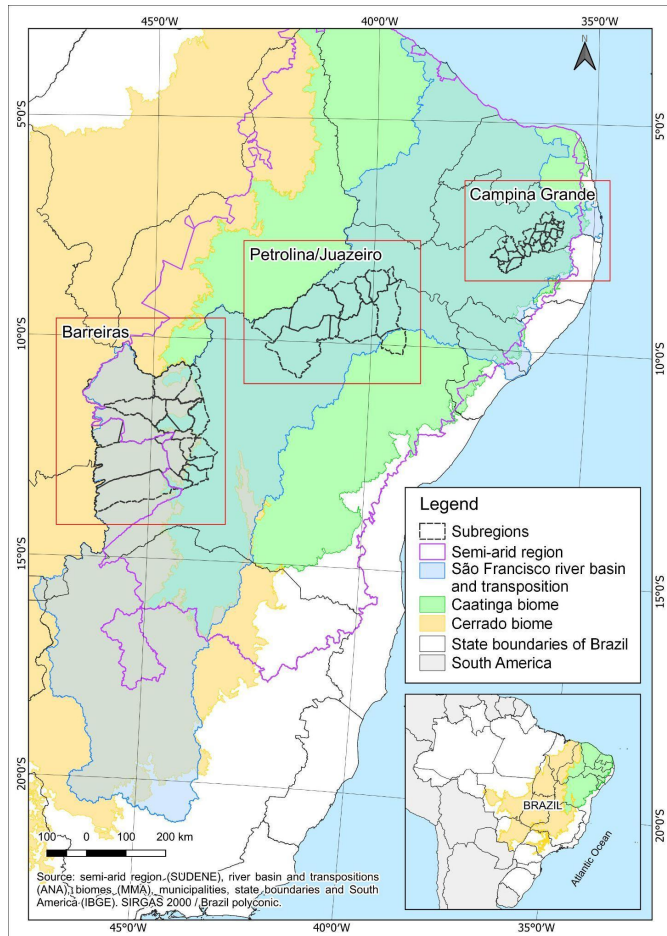


Bakel





# Brazil: São Francisco River Basin and Transposition Area



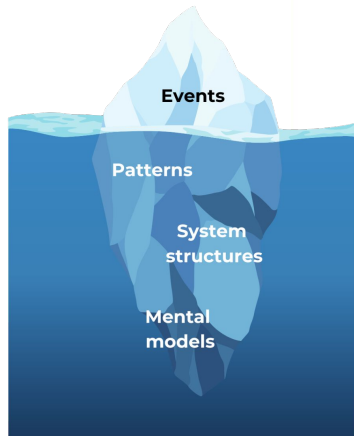


# State-of-the art multiscale participatory methods with system thinking tools and arts (3H-CLD approach)

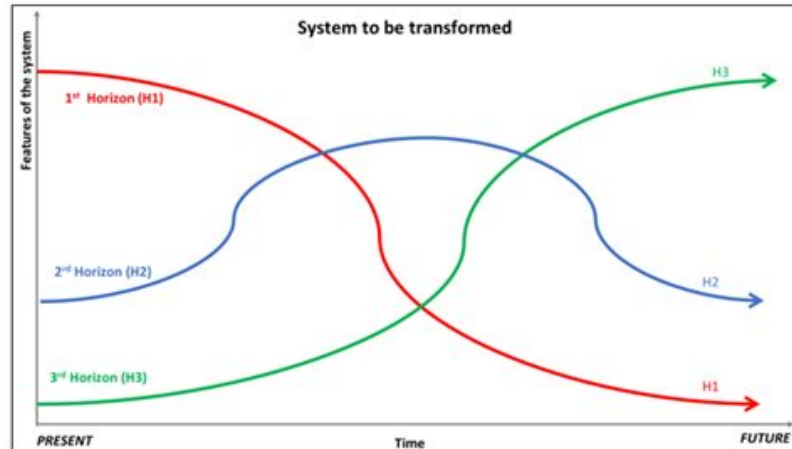
National

Regional

Local



Source: Tove Mattsson



## Three Horizons Framework

(adapted from Sharpe et al. 2016)

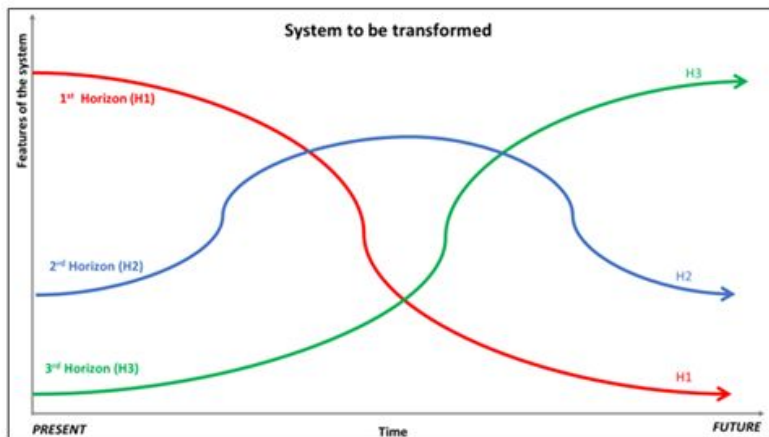


# State-of-the art multiscale participatory methods with system thinking tools and arts (3H-CLD approach)

National

Regional

Local



For each 3H-CLD workshop at different scales and sites:

- ✓ Visions of **desired futures** (post-its and groupings into themes)
- ✓ Good “**seeds**” already existing in the present
- ✓ **Problems/challenges of the present** (post-its and groupings into themes)
- ✓ Systemic understanding of the root causes of the problems (**Causal Loop Diagrams**)
- ✓ **Actions** to achieve sustainable futures and grow seeds
- ✓ **Creative processes**



# 3H-CLD multiscale dialogue results in each country



## SYNTHESIS AND ANALYSES



In each country (Brazil, Senegal and Spain):

- **How results differ across scales**
- **Identification of systemic causes of the main problems with a view to co-producing strategic action plans to achieve the SDGs.**
- **Co-production of a theater piece based on creative products aiming to facilitate communication between scales.**

**Comparison between countries: visions, problems, systemic causes, actions and actors.**

**Analysis of how EU policies can support implementation of the SDGs.**



*Final dialogue in January 2024 (online, global)  
Wide dissemination of results*





# AGENDA

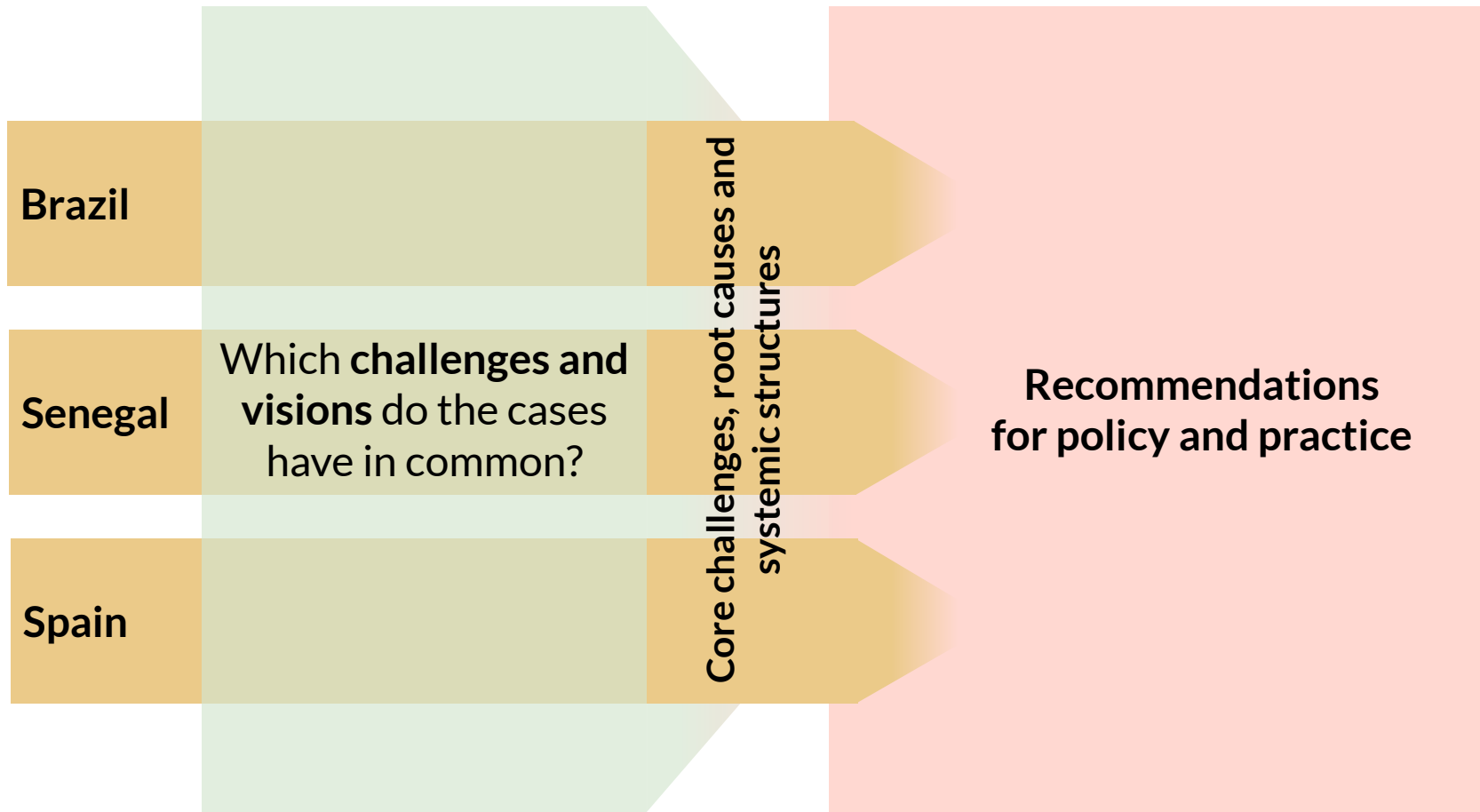
**2:00 pm - Welcome and agenda**

**2:05 pm - Why XPath and selected case studies?**

**2:20 pm - Key results and insights**

*3:00 pm - 5-minute break with video*

**3:05 pm - Invited commentaries and questions from participants**



**Brazil**

**Senegal**

Which challenges and visions do the cases have in common?

**Spain**

Core challenges, root causes and systemic structures

Recommendations for policy and practice



Brazil

Senegal

Spain

Which **challenges and visions** do the cases have in common?

Recommendations for policy and practice



# Governance

- Challenges:
  - The lack of **political will and sectionalism.**
  - The lack of **participation.**
- Visions:
  - **Integration between sectors, an efficient state, contextualized policies, and enhanced political will.**
  - **Increased, inclusive, and efficient participation through formal mechanisms, building alliances, and reducing power asymmetries.**





# Economy

- Challenges:
  - **Limited incentives for alternative economic activities.**
  - Limited support for **local businesses.**
- Visions:
  - **Economic diversification and support for local economies.**
  - Implementation of **novel economic models.**

**8** DECENT WORK AND  
ECONOMIC GROWTH



**9** INDUSTRY, INNOVATION  
AND INFRASTRUCTURE



**12** RESPONSIBLE  
CONSUMPTION  
AND PRODUCTION



# Education and training

- Challenges:
  - **Access to education** (basic/ environmental/ sustainability/ citizen).
  - **Capacity building for income generation and new types of economic activities** in the changing world.
- Visions:
  - **Better access to quality education.**

4 QUALITY EDUCATION



5 GENDER EQUALITY



8 DECENT WORK AND ECONOMIC GROWTH



# Well-being

- Challenges:
  - **The access to public services, including sanitation, housing, health services and infrastructure.**
    - In Brazil and Spain, these topics were explicitly expressed as concerns around **inequality and poverty.**
- Visions:
  - **Local and regional development and decent living conditions.**

**1** NO  
POVERTY



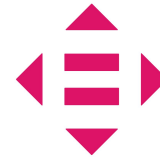
**3** GOOD HEALTH  
AND WELL-BEING



**6** CLEAN WATER  
AND SANITATION



**10** REDUCED  
INEQUALITIES



# Identity, heritage, rights

- Challenges:
  - Challenges related to identity, heritage and rights **nuanced** across the cases.
- Visions:
  - **Recognition and protection of traditional/local communities' rights.**
  - **Preservation of cultural identity and heritage.**

10 REDUCED  
INEQUALITIES



16 PEACE, JUSTICE  
AND STRONG  
INSTITUTIONS



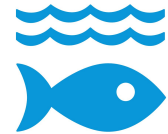
# Environment

- Challenges:
  - **Biodiversity loss, ecosystem degradation, soil and water issues, inappropriate use of natural resources.**
    - **Deforestation** posing a specific concern in Brazil and Senegal.
- Visions:
  - **Reducing environmental pressure and the restoration of areas, soil, and water ecosystems.**
  - **Enhanced protection and conservation.**

13 CLIMATE ACTION



14 LIFE BELOW WATER



15 LIFE ON LAND



# The food, water, and energy nexus

- Challenges:
  - **Water scarcity, water pollution.**
- Visions:
  - Ensuring **secure water access**, tailored to local conditions through **context-specific solutions**.
  - **Diverse visions** around the **expansion of intensive agriculture** and its social-ecological impacts.

**6** CLEAN WATER AND SANITATION



**13** CLIMATE ACTION



**7** AFFORDABLE AND CLEAN ENERGY



**12** RESPONSIBLE CONSUMPTION AND PRODUCTION



# Concluding remarks

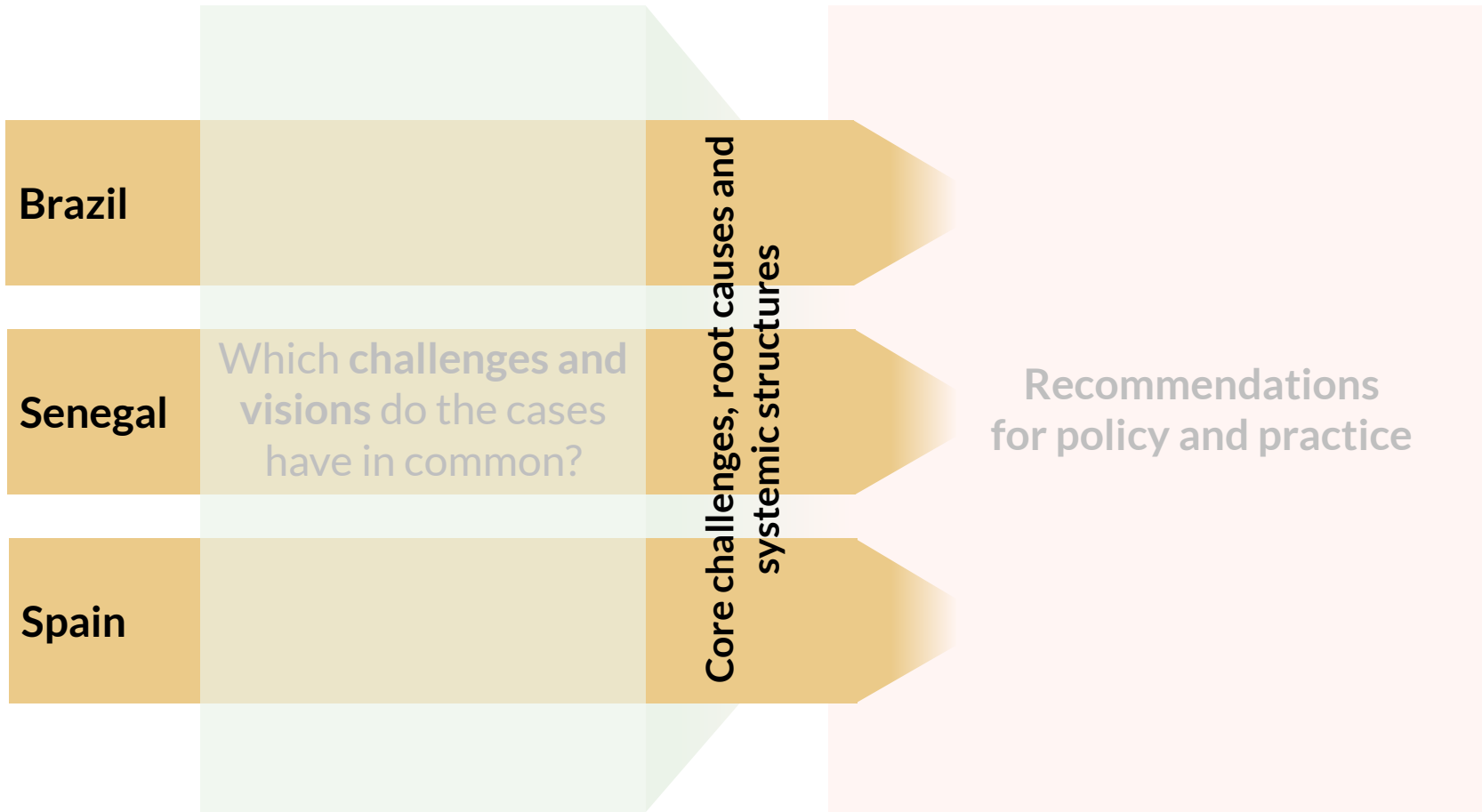


Source: ChatGPT

- Interesting **similarities** despite different historical and socioeconomic contexts
- Still, the **nuances** of the challenges and solutions are **distinct across cases**







# Brazilian Case Study

Ana Paula Dutra de Aguiar, Taís Sonetti-González, Minella Martins,  
Gilney Bezerra, Amanda Silvino and María Mancilla García  
(and other INPE/NEXUS collaborators)



# Core challenges:

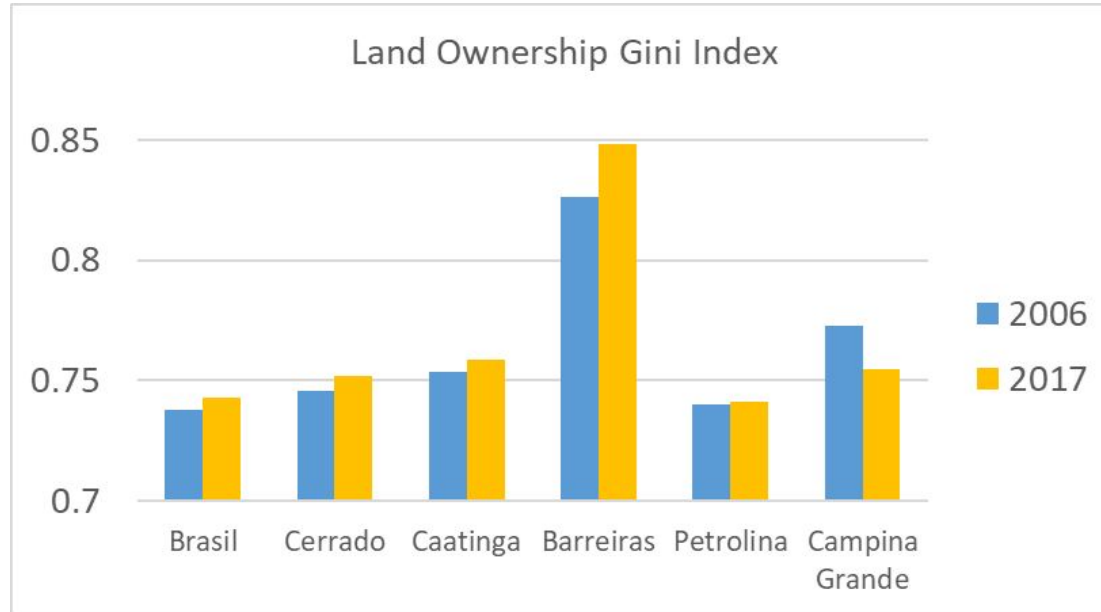
- Multiple inequalities (income, wealth, land access, power, etc.) and poverty;
- Violence, social-ecological conflicts and environmental racism;
- Multiple types of environmental degradation (deforestation, soil degradation, salinization, water pollution)

Source: Taís Sonetti González



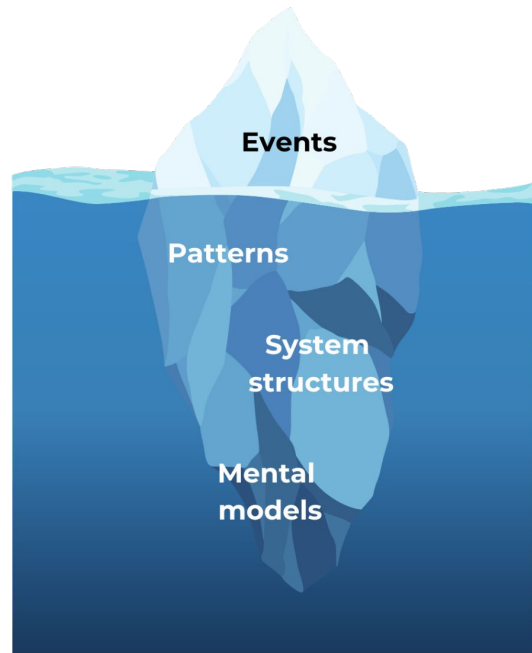
# Root causes:

- Lack of Execution and continuity of public policies .
- Land concentration
- Dependence on commodities
- Deindustrialization



# Systemic structures

relating the core challenges and the the **lack of execution** and continuity of public policies



Source: Tove Mattsson

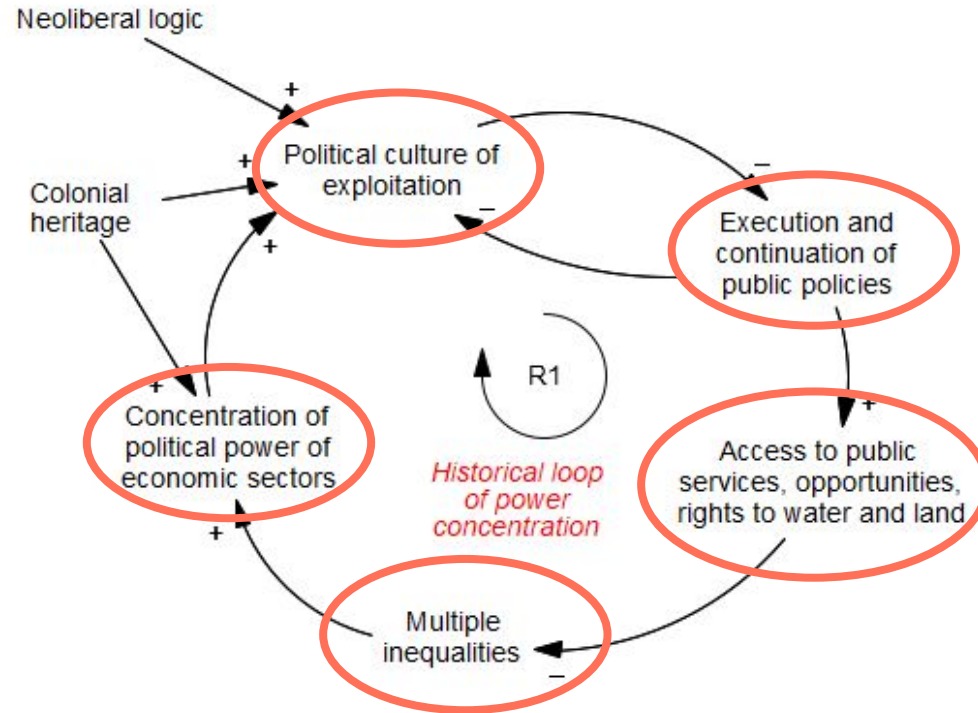


Diagram: Aguiar A. et al (in prep)





# Systemic structures

relating the core challenges and the the **Land concentration, dependence on commodities and deindustrialization**

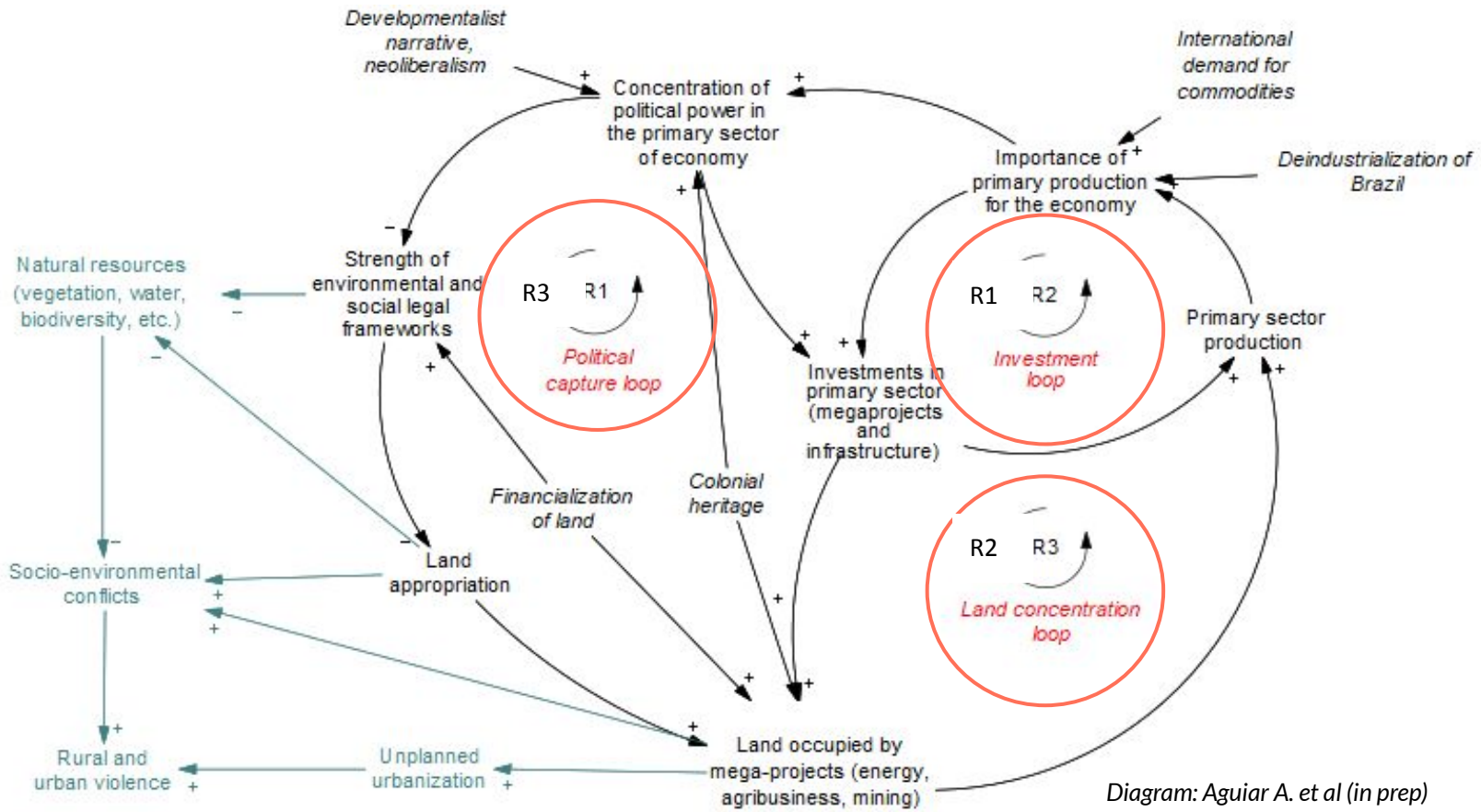
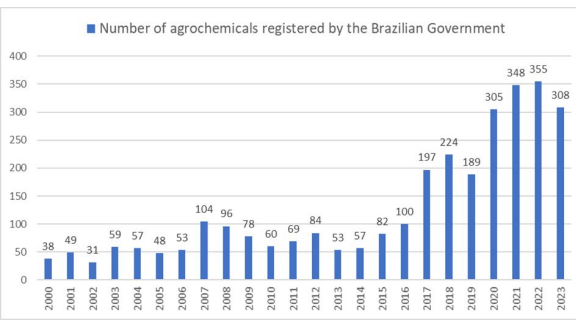
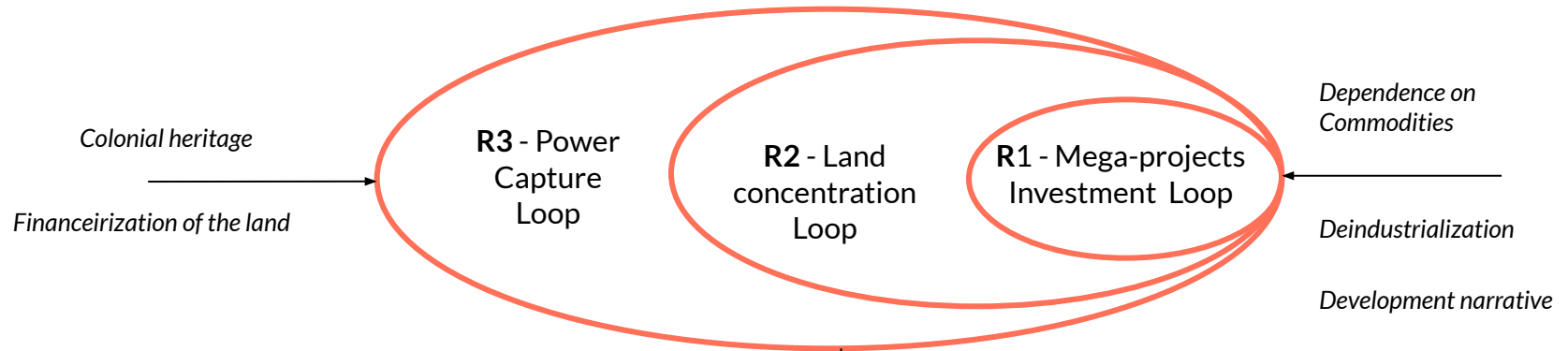


Diagram: Aguiar A. et al (in prep)

# Systemic structures

relating the core challenges and the the **Land concentration, dependence on commodities and deindustrialization**



Weakening of legal sociaecological frameworks, land appropriation

Environmental degratation, overexploitation of natural resources, socio-ecological conflicts, violence, unplanned urbanization, etc.

Source: Ana Paula Aguiar





# Strategic Actions

**Environmental Education, Communication and Social Mobilization Program** for the São Francisco River Basin.

**Agrarian reform** compatible with the traditional practices of the biomes and demarcation of territories of traditional peoples and communities.

**Political capacitation project** to increase social awareness and political participation, leading to the formation of new leaderships and changes in the political system.

**Foster new development models and re-industrialization** based on the local socio-environmental diversity to impose limits and conditions to the commodities-related activities. (National- and international level)



## Plano de Ações Estratégicas

Ações estratégicas o Semiárido Brasileiro  
- com foco na Bacia do Rio São Francisco e  
Área de Transposição resultantes do  
Processo Participativo Multiescala 3H-ODS

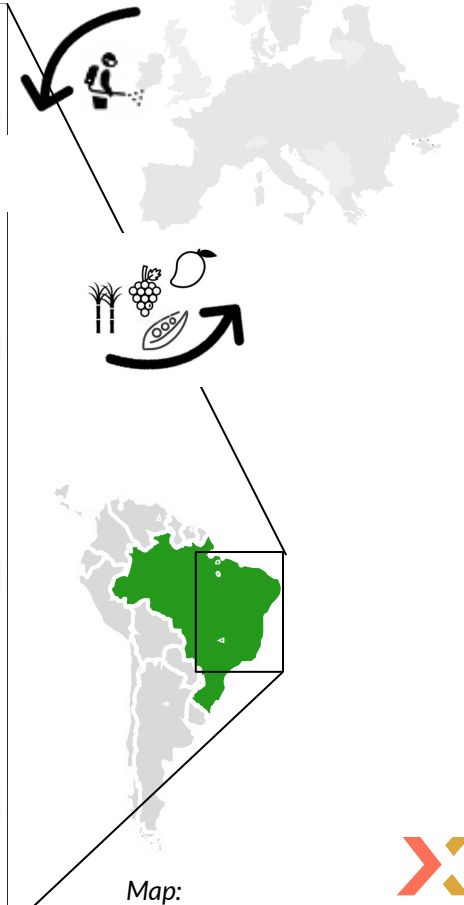
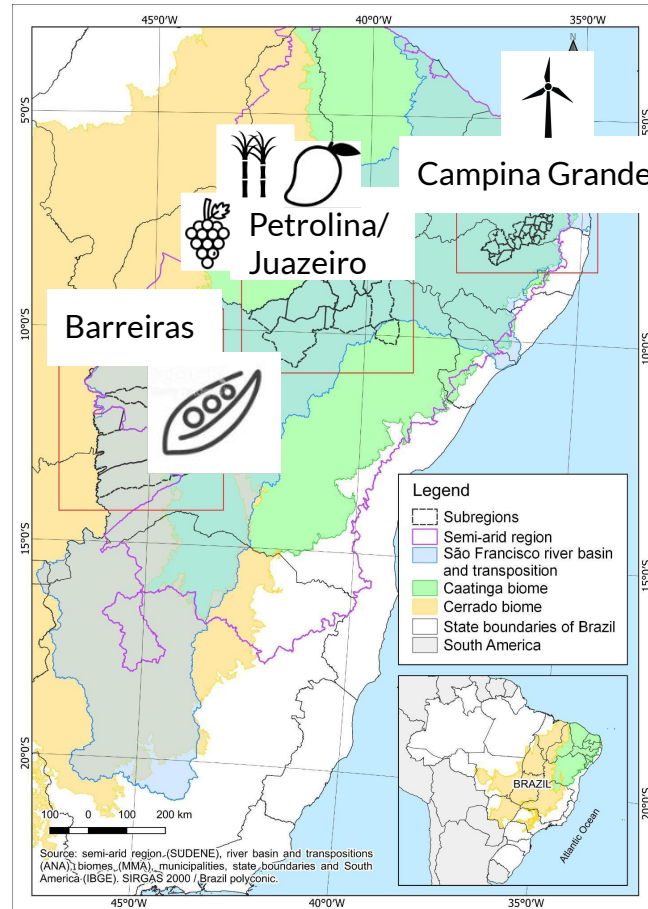
National level actions	International level actions
<p>(a) <b>Diversification of food production: focus on food sovereignty, agroecological transition and, small-scale farming support</b></p> <p>(c) <b>Re-industrialization</b> for sustainability (circular economy, etc.).</p> <p>(c) Strengthening and updating of <b>socio-environmental legal frameworks.</b></p> <p>(d) Public policies to combat and minimize <b>multiple inequalities.</b></p>	<p>(a) Monitoring and <b>control of commodity production chains and investments:</b> beyond environmental impacts - land foreignization/financialization (and dispossession).</p> <p>(b) <b>Dissemination of the information about social-ecological impacts of commodities</b> (renewable energy, food, water, transition minerals), beyond deforestation.</p> <p>(c) <b>Review of international frameworks and agreements</b> (e.g., ILO Convention 169, Mercosur-EU Agreements, etc.).</p>

Foster **new development models and re-industrialization** based on the local socio-environmental diversity to impose limits and conditions to the commodities-related activities. (National- and international level)



# Impacts of EU policies in case areas - Brazil

1. Our case areas are **not protected** through the deforestation regulation
2. The EU-Mercosur trade agreement is expected to **increase trade flows**, but consequences are not problematized
3. EU invests in renewable energy projects, but **lack of consultation and displacement** are concerns



# Spanish Case Study

Amanda Jiménez Aceituno, Maria D. López Rodríguez, Antonio Castro, Sofia Cortés, Lena Roelfer and Maria Mancilla García



Let's go to the South East of Spain...



Natural park - Cabo de Gata (Almería)



# Brief history of the area & core challenges

**19th:** Open mining (lead and iron); rainfed intensely and small cultivated valleys (huertas, vegas)

**20th:** grapes and oranges; expansion of irrigated land- groundwater

1800

1900

1970

**Early 1900:** mining crisis, economic, social and env. crisis, poverty and emigration

**1970 - :** new agricultural model: greenhouses, groundwater, water transfers; tourist boom



Greenhouses of the Campo de Dalías, Almería Province, Spain. Nasa Earth Observatory, 24<sup>th</sup> May 2022

- “Europe’s vegetable garden” → 78% of fruit & vegetables are exported
- The most arid region of continental Europe + High ecological value
- Conflicts, dilemmas and the need for spaces for dialogue



# Root causes

- A governance model that **lacks cooperation** and fosters **polarized views**
- An agricultural model **surpassing the biophysical limits**
- A production model sustained in the **exploitation of migrant labour**

*Source: Amanda Jiménez Aceituno*

# Core Solutions

1. **Socially inclusive and participatory governance system**
2. **Alternative educational model to reconnect with nature and foster social cohesion**
3. **Integral model of environmental planning and management- agroecology and nature-based solutions**
4. **Economic diversification of territory**





# Core Solutions

1. Socially inclusive and participatory governance system
2. Alternative educational model to reconnect with nature and foster social cohesion
3. Integral model of environmental planning and management- **agroecology** and **nature-based solutions**
4. Economic diversification of territory

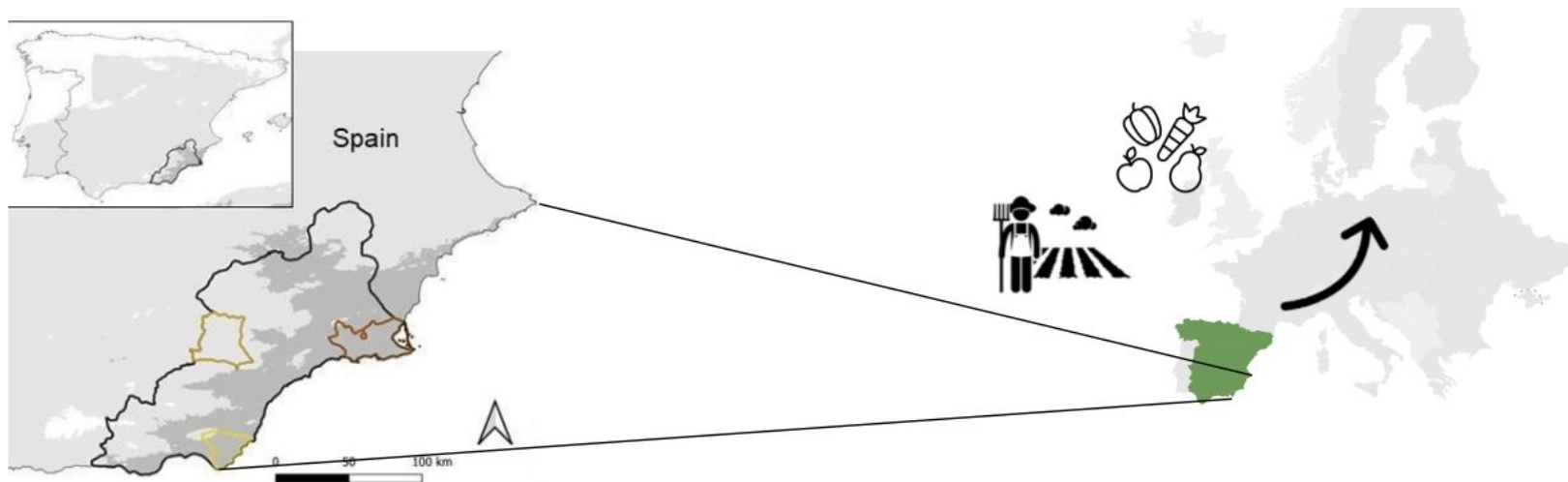


# Transitioning towards an agroecological model based on nature-based solutions

- Divergences: **reducing vs. maintaining**
- Agreement: **agroecology and nature-based solutions**
  - Biological **pest control**, bio fertilizers
  - Recovering traditional practices
  - Fostering **added value**, denomination of origin
  - Short commercialization channels, e.g., changing public incentives for food contracts
  - Regional certification systems



# Impacts of EU policies in case areas - Spain



## Study area cases

Regional scale:

Almería and Murcia

Local scale:

Campo de Níjar

Comarca de Los Vélez

Campo de Cartagena

Ecosystems:

Semiarid

1. Consumption of fruits and vegetables in EU countries maintains **intense year round cropping** in a very dry area
2. Common Agriculture Policy **shape conditions**
3. Production is **labor intensive** the year around

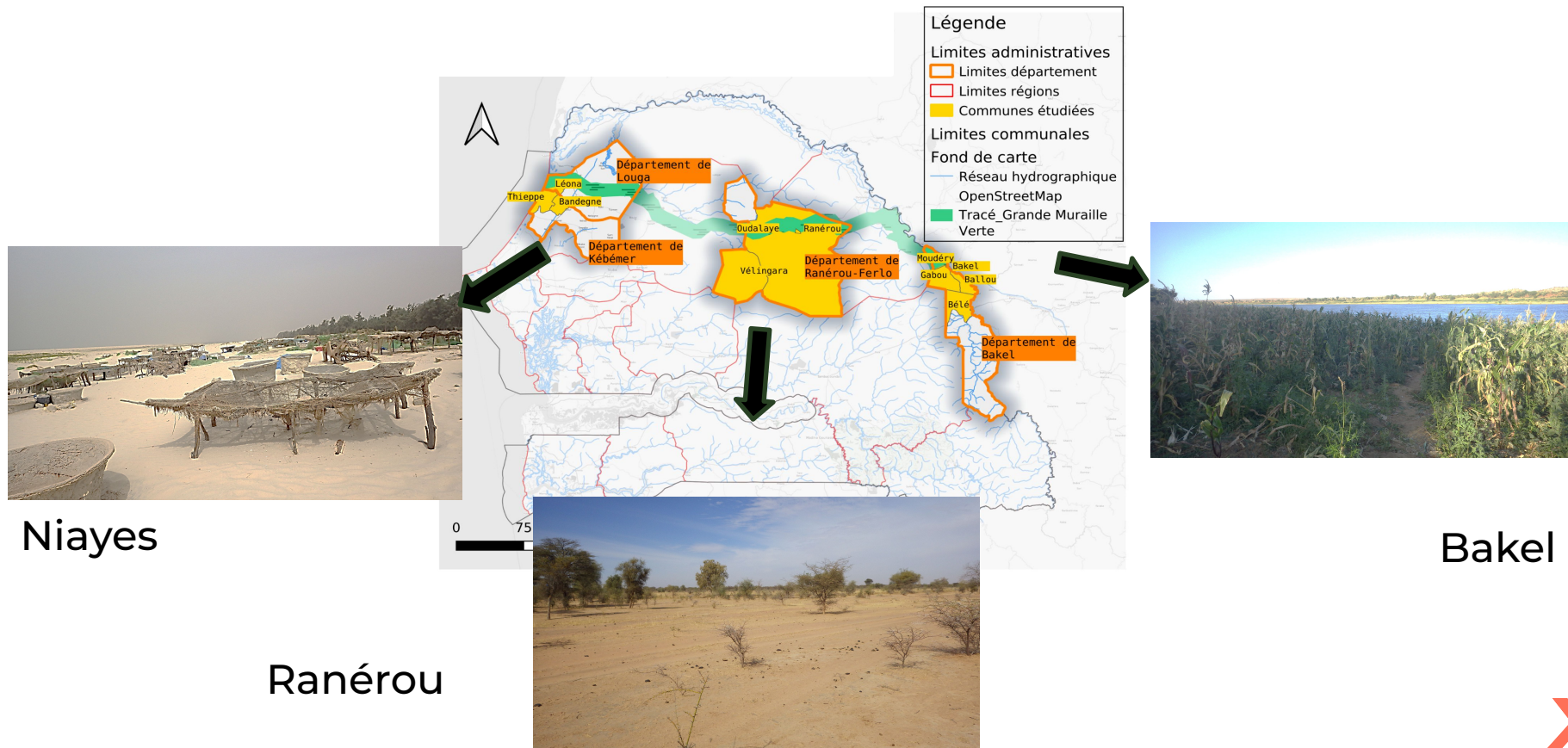


# Senegal Case Study

Deborah Goffner, Amadou Diallo, Claire Stragier, Hanna Sinare



# Three contrasted Xpaths sites in Northern Senegal





# Core problems to sustainability: Unsustainable governance and use of natural resources

*leads to...*

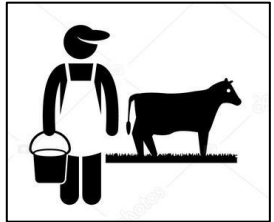


- Poor soil fertility
- Low yields

CURRENT DEVELOPMENT STRATEGIES



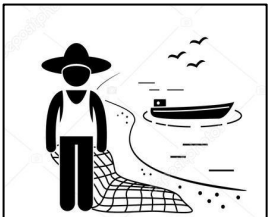
*Intensification  
Agribusiness,  
Agricultural expansion*



- Pastureland degradation



*Livestock intensification*



- Depletion of fish stocks, biodiversity loss



*Pisciculture*

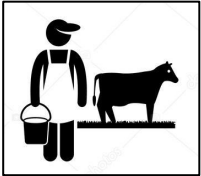


# Locally-identified solutions to optimize natural resource governance and use



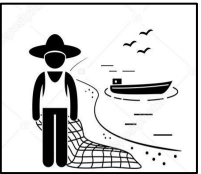
## Improved production practices (i.e. adaptation to climate change) :

- *technical support/ training*
- *climate-adapted inputs*
- *a combination of innovative and ancestral practices*
- *access to decision-making information (i.e. climate data)*



## Legal recognition and capacity building of “pastoral units”

*(locally-governed zones around water access points throughout silvo-pastoral areas)*



**Enforcement and respect of existing fishing laws**  
**Limitation of the number of fishing permits issued**



**Co-construction and dissemination of equitable, integrated land management plans that benefit all land users**



# Core problem: Development practice “mismatch” between national decision-making and local needs



## National

- Top-down governance despite decentralization laws
- Sectoral approach to development
- Development initiatives are rarely contextualized

## District

- Local development actors lack agency and resources to implement development initiatives

-“Project capture” by the local elite

-Producer organizations lack power and legitimacy to channel up their needs

## Communal

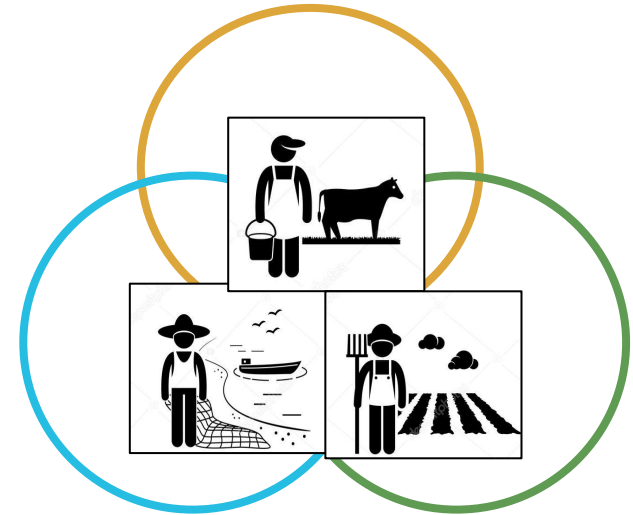
- Lack of solidarity due to social tension and cleavage amongst political factions





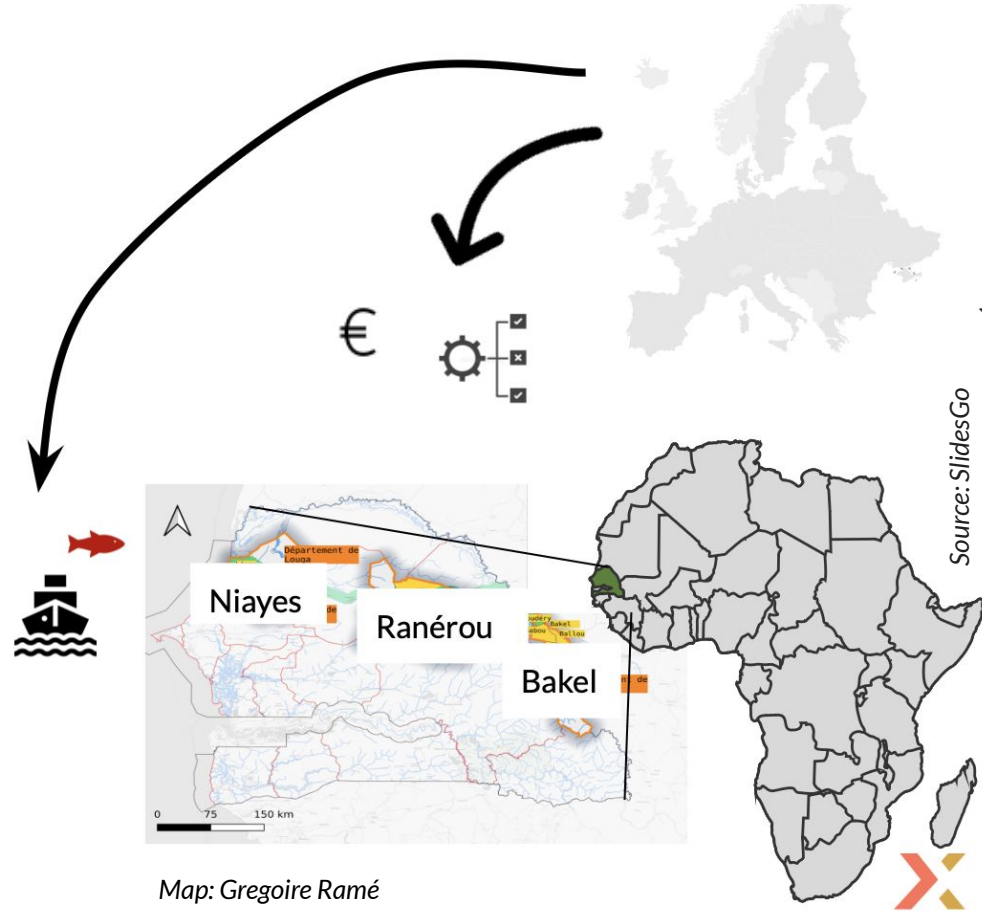
# Identification of cross food-system solutions

- A systemic approach to public policies (intersectoral, cross-scale) must become more mainstream; this would lead to a better contextualization of development programs implemented at local scales
- Better structured food production system sectors with **more empowered producer organizations** at the core. At the national level, they must benefit from more legitimacy. At the local level, organizations need to be less politicized by their members



# Impacts of EU policies in case areas - Senegal

1. Projects for development are **not coordinated and not aligned** with local contexts
2. The EU-Senegal strategy is **guided by Senegal's national development plan**
3. **Transparency clause is lacking** in EU-Senegal fisheries agreement



Brazil

Senegal

Which challenges and  
visions do the cases  
have in common?

Spain

**Recommendations  
for policy and practice**



# General International level recommendations

Photo: Raimond Klavins/Unsplash



Photo: Jaime Dantas/Unsplash



Global initiatives that influence local sustainability (such as trade agreements, EU-level policies, Development aid programs) need to consider:

- Local concerns and solutions, not necessarily aligned with country-level hegemonic perspectives.
- **Multiple socio-ecological impacts** (water use and quality, pollution, health issues, loss of natural vegetation and biodiversity, etc.) - *beyond rain-forest loss*
- Multiple inequalities/**asymmetrical power relations** that can potentially be reinforced by actions.



# Food Systems Transformation: divergent narratives



Source: no-one-cares/Unsplash

The dominant narrative of agricultural intensification and expansion is incentivising and encouraged by, for example, the proposed draft document of the EU Mercosur, Development Cooperation Strategy with Senegal, etc.

There are **divergent perspectives** about this narrative, leading to **conflict and violence at the local scale** - implications to social, ecological and economic aspects.

Brazil, Spain and Senegal are at **different stages** of this process.

Integrated planning and management is key (**Energy, Water and Land Tenure nexus**).

**Land ownership unequal distribution issues** are often neglected in the literature.

# Usefulness of the 3H-CLD Multiscale Participatory Process



Source: ChatGPT

Bring **multiple perspectives** from different sectors social groups to the table (including marginalized voices).

Pathways for sustainability include a combination of small-scale, easily accessible actions for **small wins**, and “**bigger**” actions (**structural changes**) for deeper change, and transformation.

Understanding the **systemic structures** locking the sustainable pathways is critical to underpin structural change. Our approach offers a novel combination of system thinking and pathways approaches.





# Thank you!

<https://www.xpathsfutures.org/>

Youtube channel: @xpathsdrylands (Theatre)

SDG Impact Assessment Tool: <https://sdgimpactassessmenttool.org>



# Paths 2021-2024



UNIVERSITE CHEIKH ANTA DIOP DE DAKAR



FORMAS

Realizing the SDGs Call 2019/2020

