

MAP THE SYSTEMS - 2023

REGENERATIVE AGRICULTURE & GENDER EQUITY IN MEXICO: SYNERGIES AND DYNAMICS



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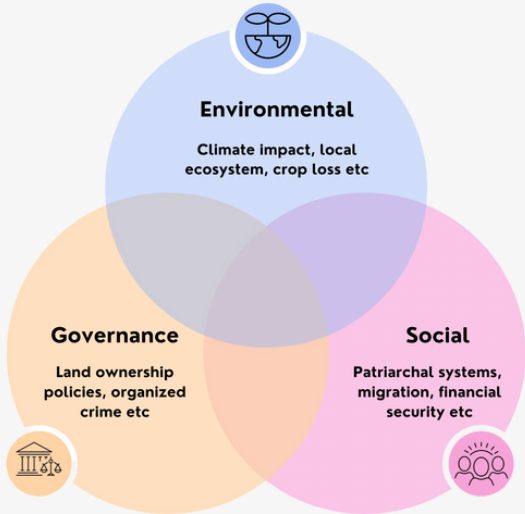
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1. ISSUE OVERVIEW

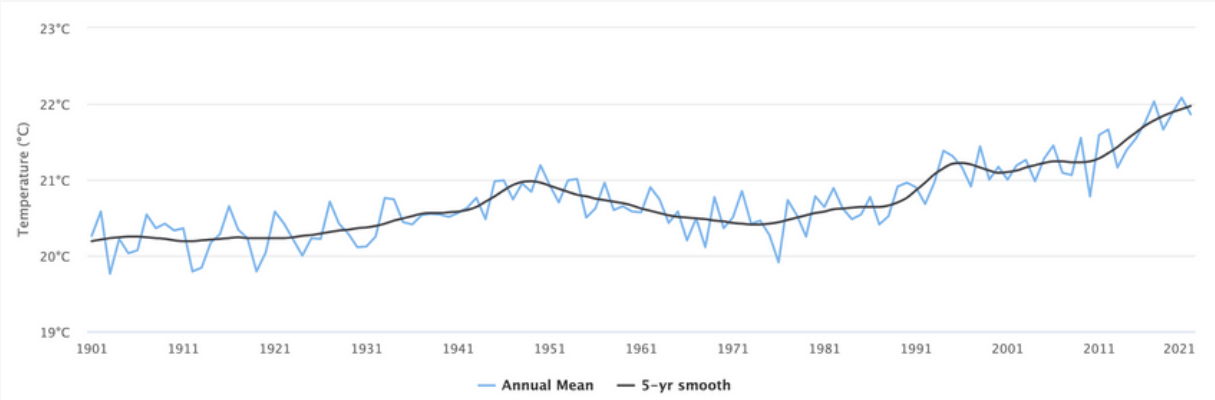
Gender inequality and climate change are persistent issues in Mexico. Our research explores the connection between regenerative agriculture and gender equality as a way for building social and sustainable transformation in the country.



CLIMATE CHANGE AND ITS IMPACT ON MEXICO'S AGRICULTURE

The IPCC's latest synthesis report in 2023 has underscored a concerning reality: the probability of surpassing 1.5°C in global warming stands at 50%. This development will have particularly harsh consequences in developing countries, where agriculture is vital to the economy and local populations' livelihoods. Mexico is already feeling the impacts of climate change on agriculture, with decreasing yields and lower-quality production due to erratic rainfall patterns [1].

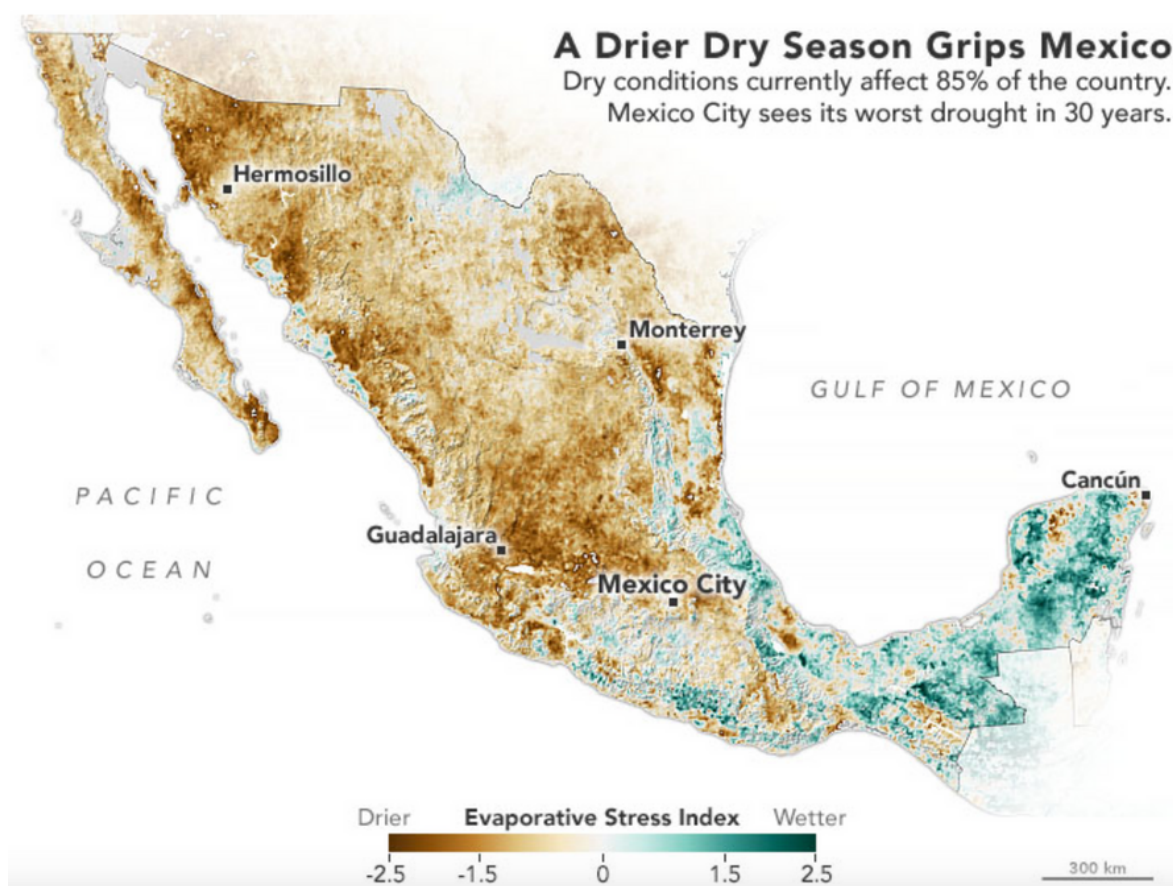
Figure 1: Observed average Annual-Mean Temperature in Mexico 1901-2021



Source: Climate change knowledge portal

The combination of growing water needs for human consumption and agricultural production, inadequate water management practices, and a lack of contingency plans have led to a fast depletion of water reserves in Mexico, particularly in Northern Mexico [2]. As of 2021, nearly 85% of Mexico is facing drought conditions leading to water resources shortage for drinking, farming, and irrigation [3]. As a result, the economic well-being of Mexican farmers in some regions has been adversely affected, leading many to struggle financially and, in some cases, to migrate to find alternative sources of income.

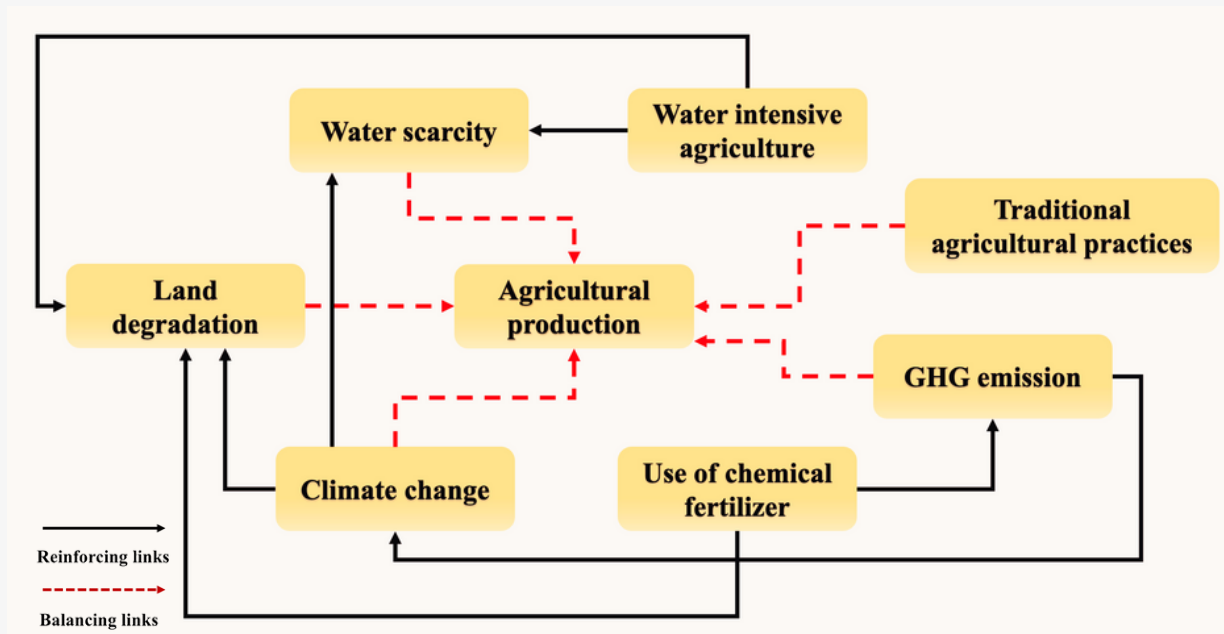
Figure 2: Areas where vegetation is stressed due to lack of water



Source: Earthobservatory.nasa.gov. (2021)

The traditional agricultural practices are resource intensive and it is imperative for the government and the community members to take prompt action to implement regenerative techniques and policies that support farmers and provide them with access to the resources necessary to adapt to a changing climate. Regenerative agriculture can improve soil health, increase biodiversity, reduce environmental impact, and potentially increase crop yields. It also has the potential to mitigate climate change by sequestering carbon in the soil.

Figure 3: Factors affecting the agricultural production in Mexico



Traditional agriculture practices in Mexico have not been able to provide the expected returns in some areas, leading to men migrating to cities and other countries in search of better economic opportunities. This situation has damaged the social fabric and forced women to replace men on farms. To address this issue, there is a need to invest in modern and sustainable agricultural practices, provide better infrastructure and services, and create economic opportunities in these rural areas.

Gender equity and women's participation in agriculture are interconnected issues in Mexico because they produce more than 50% of the agriculture production in the country.

Comisión Nacional de Derechos Humanos [25]

RURAL MEXICAN WOMEN: THE HURDLE AND POTENTIAL

Gender equity and women's participation in agriculture are critical issues in Mexico. Despite legal improvements over the years, women in Mexico continue to face discrimination, misogyny, and institutional barriers that prevent them from achieving gender equality. The roots of gender discrimination in Mexico can be traced back to the country's patriarchal culture, which has been exacerbated by corruption in the federal, local, and municipal governments and by organized crime [4] [5] [6].

Land ownership is not part of women's reality, and just eight states of 32 have legislation to promote woman's land tenure

Comisión Nacional de Derechos Humanos [25]



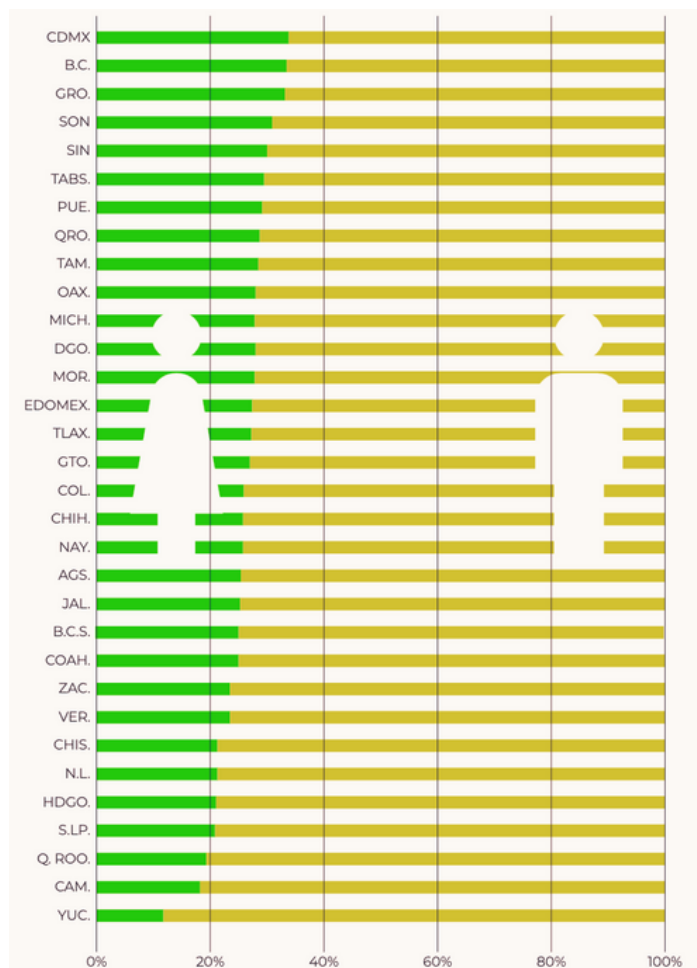
Throughout history, religion, customs, education, and culture have perpetuated stereotypical notions of women's inferiority, creating unequal conditions for women. Although Mexican women achieved legal equality in 1974, gender inequity, misogyny, and male privilege continue to permeate various aspects of Mexican society, including family property land tradition, uses, housework distribution, educative system, economic activity, religions, language, political institutions, and cultural expressions [7].

Moreover, Mexican women face institutional discrimination, politics, and poor access to justice every day. In Mexico, women face several challenges when it comes to land ownership [8]. These challenges are rooted in the country's cultural and legal systems, which often discriminate against women in terms of property rights.

Although Mexico has laws that guarantee women's equal rights to own land, women often have difficulty accessing and securing land titles. This is particularly true in rural areas, where women's rights are often ignored in traditional land tenure systems.

On the other hand, globalization has displaced women to exploit the land's resources. Multiple transnational companies have degraded the ecosystems, hindering their access to land and water. The result has been that globalization has reinforced the link between poverty, vulnerability, and Mexican women because it is focused on optimizing economic benefits, and it forgets social, human, and equity rights [9][10][11][12]. The spiral of poverty produced by globalization has brought an increase of women and children global trafficking for prostitution and forced labor perpetrated by organized crime [13][4][11].

Figure 4: Land ownership in Mexico by the entity and sex (percentages), 2019

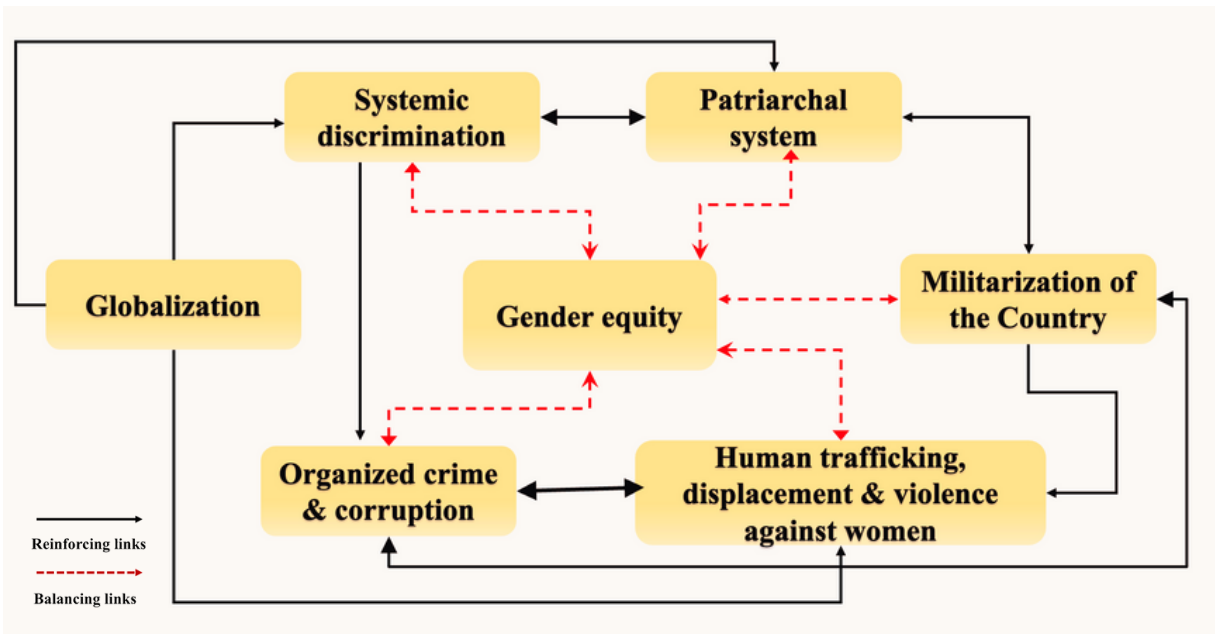


Source: Instituto Nacional de Mujeres, 2020

Finally, Mexico is facing a women's security crisis caused by the militarization of the country, organized crime, gender-based violence, the dismantling of public policies to protect women, and the systematic reduction of budgets to eradicate and avoid gender inequality and women violence, all rotted in the women institutional and historical orphanhood [4][6][14] that have forced women to defend their life, communities, dignity, and lands personally [15][12].

Women represent more than 50% of the workforce in the agro-food industry, (Gobierno de México) and during 2022, Mexico's agricultural exports (to all countries) totaled about \$46.6 billion. Economic Research Service, US Department of Agriculture [26].

Figure 5: Factors affecting gender equity and women empowerment in Mexico



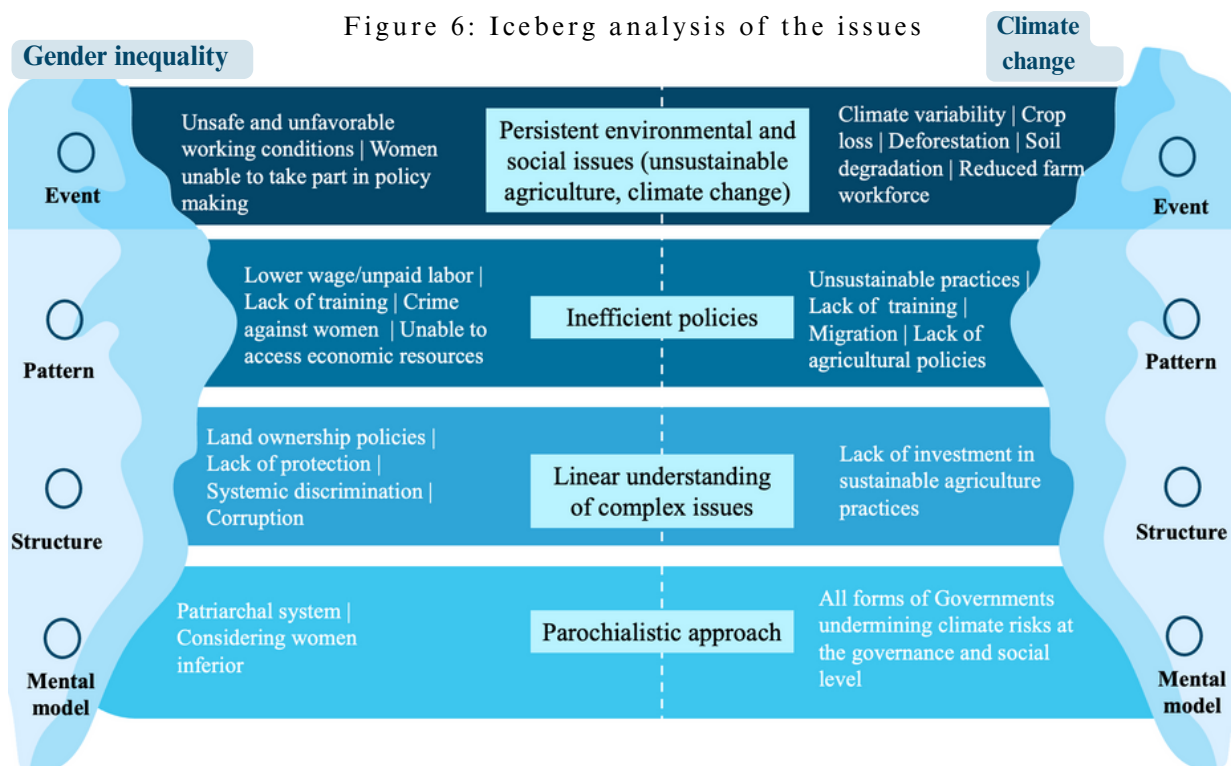
These inequalities have overexploited women, so to provide favorable conditions for women to participate in agriculture, it is crucial to address these structural challenges and ensure that women have access to resources, education, and legal protection.

In Tiltepec municipality in Mexico, the community authority banded traditional techniques and implemented regenerative agriculture. The crops grew up from 1.5 to 5 tons. The Nature Conservancy [27]

2. ICEBERG ANALYSIS

In Mexico, gender inequality is characterized by unsafe working conditions, lack of participation of women in policy-making, and lower or lack of wages for women. Women also face discrimination and violence and are often unable to access economic resources. The mental model of gender inequality is rooted in the patriarchal system.

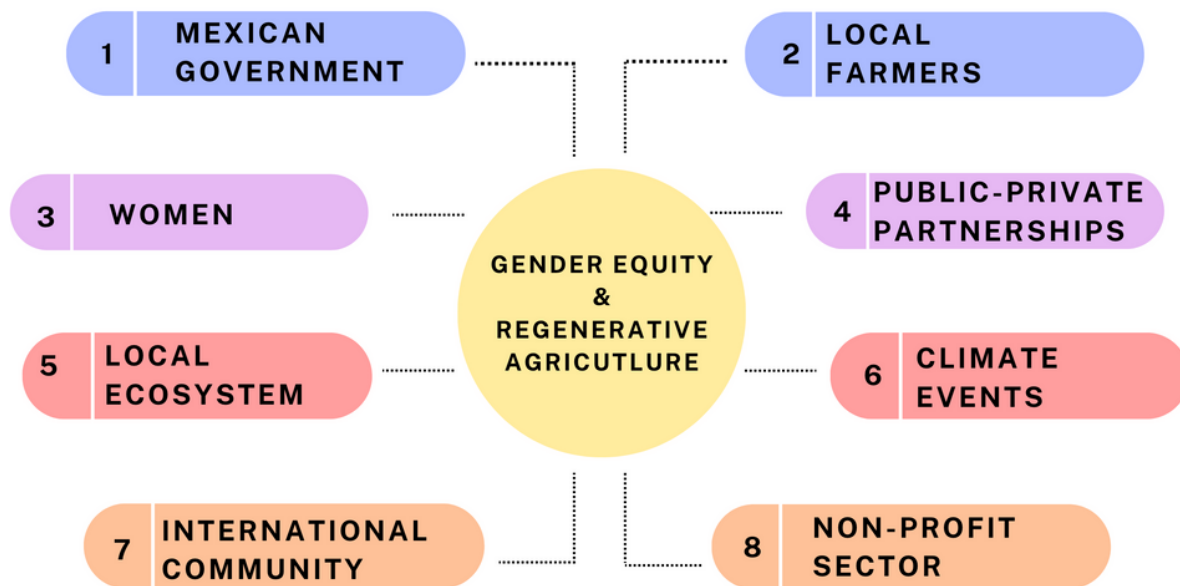
Climate change significantly impacts agricultural production in multiple regions of Mexico, leading to crop losses, deforestation, soil degradation, and reduced farm workforce. Unsustainable practices and lack of training exacerbate these issues, while the lack of investment in sustainable agriculture practices reflects the mental model of governments undermining climate risks at the governance and social level.



The intersection between gender inequality and climate change in Mexico shows persistent environmental and social issues such as unsustainable agriculture, climate change, and gender inequality. Inefficient policies and a linear understanding of complex issues perpetuate these problems. The mental model of a parochialistic approach fails to address the interconnected nature of these issues.

3. STAKEHOLDERS IDENTIFIED

Figure 7: Stakeholders associated with gender inequality & climate change in Mexico



Mexican Government: Responsible for supporting farmers and adapting to climate change.

Farmers: Affected by climate change, leading to lower yields and quality.

Women: Affected by gender inequality deeply rooted in culture.

Public-private partnerships: Necessary to address smallholder economic marginalization and offer work opportunities for local women.

Non-profit sector: Can advocate for policies supporting farmers and addressing gender inequality, women's security crisis, and poverty.

International community: Can provide financial assistance and technical expertise to address climate change, gender inequality, and poverty.

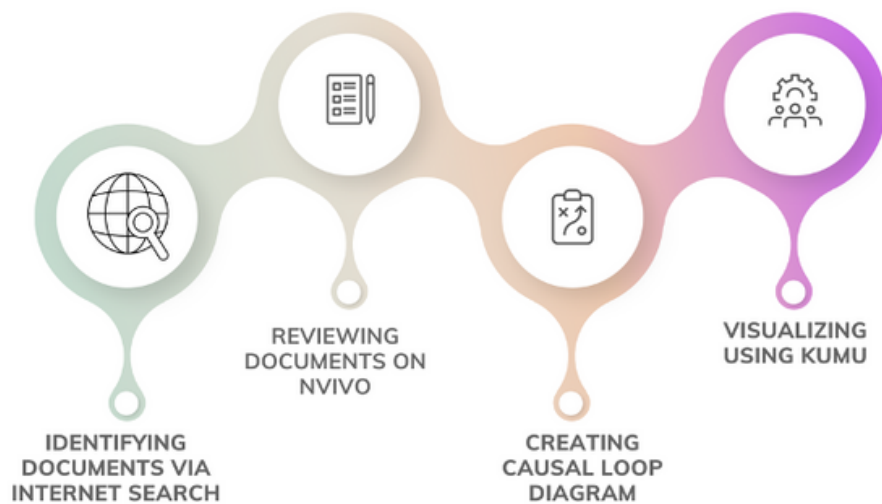
Climate events: Impact agriculture and farmers' livelihoods in developing countries like Mexico.

Local ecosystem: Provides essential goods and services for human well-being and survival.

4. MAPPING PROCESS

The research methodology for this study involves a mixed-method approach to data collection and analysis. To understand the broader topics of gender inequality, climate change, and agricultural production in Mexico, we conducted an online internet search for relevant documents (see the documents in supplementary material). We identified a total of 15 documents, including news articles (n=7), and research papers (n=8) that were closely related to our research topic.

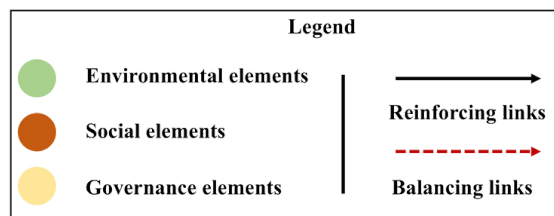
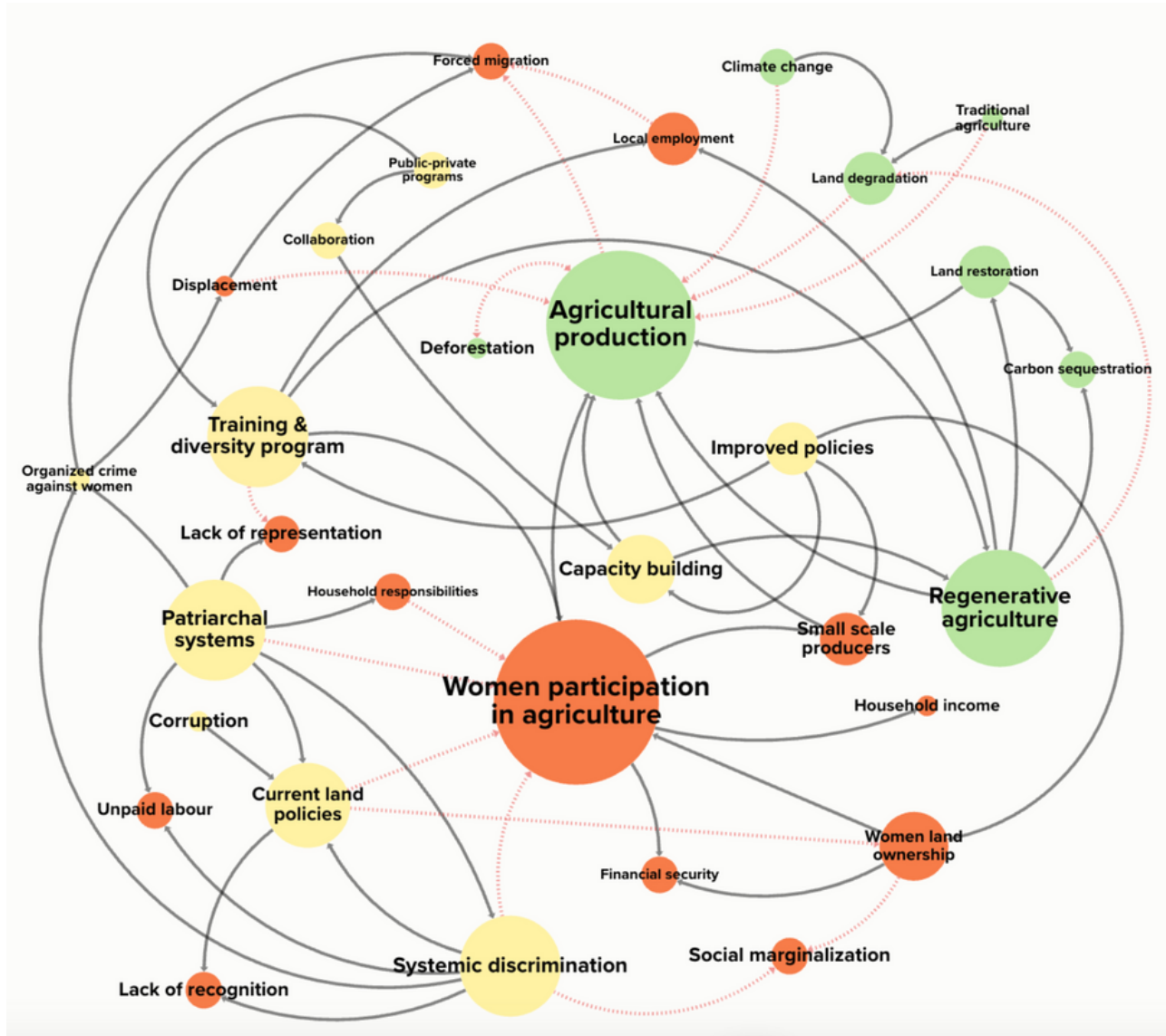
Figure 8: Research process



To identify nodes that were relevant to our research, we employed an inductive coding technique and categorized them into environmental, social, and governance elements. We also highlighted the excerpts containing the identified nodes to create a Causal Loop Diagram (CLD) that demonstrated their causal relationships. CLDs are graphical representations that depict the interconnected system nodes and their dynamic behavior, providing an enhanced understanding of the causality between individual components and sets of elements [24]. To create the CLD, we followed the approach used by Gholipour et al. (2023) by detecting nodes through the inductive coding method and determining their causal relationships from the highlighted excerpts in the transcripts. Upon reviewing all the documents, we synthesized the data and created a single systems map using Kumu to gain a holistic view of the research topic. Figure 4 exhibits the applied process to develop the final systems map and further analysis.

5. SYSTEMS MAP

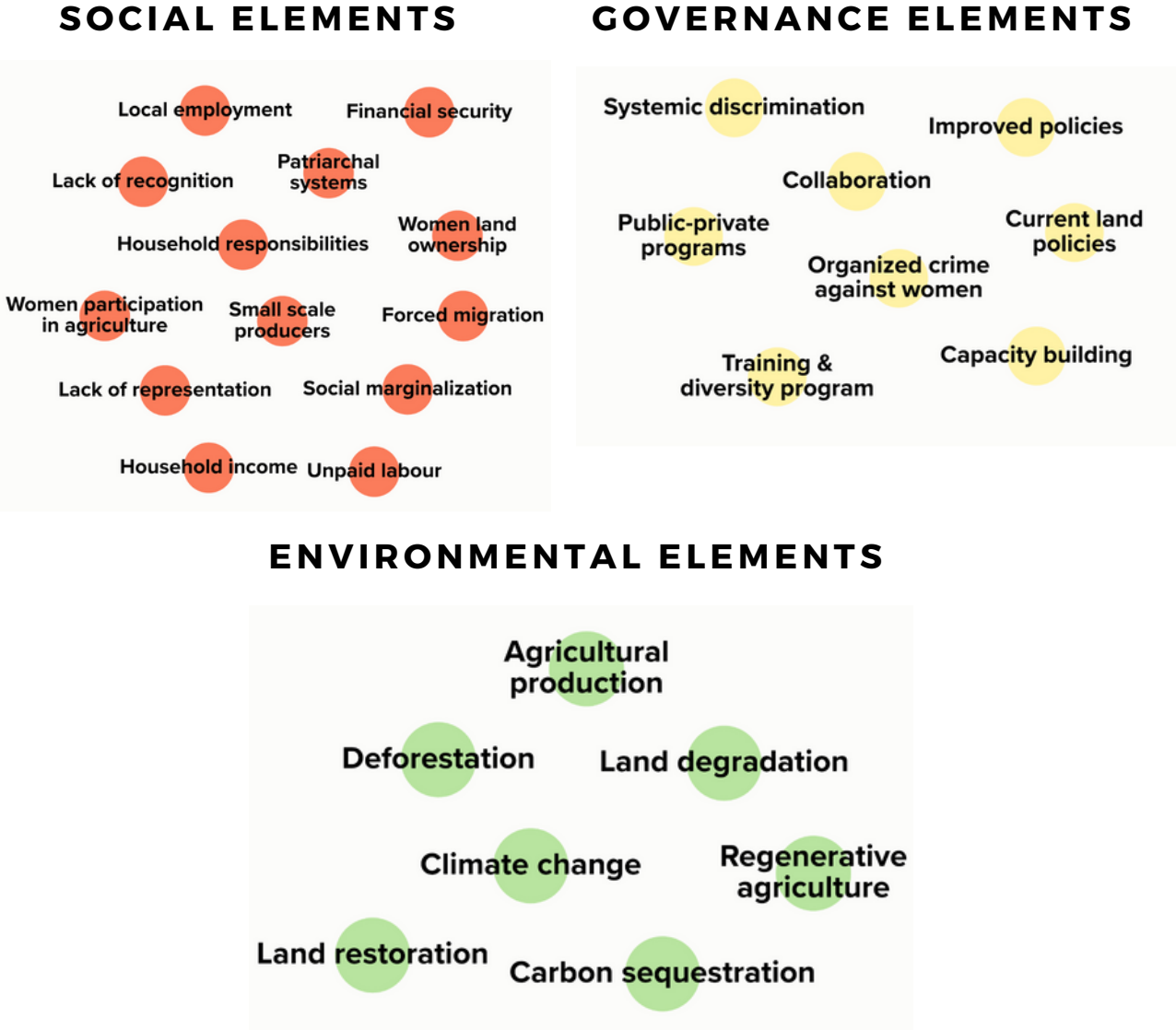
Figure 9: Systems map constructed from the document review



6. OUR UNDERSTANDING OF THE ISSUE

The nodes in the systems map are categorized into three sections, i.e., Environmental, Social, and Governance (see figure 6). The color of the nodes indicates the category of the nodes and the connection type (i.e., solid or dashed) indicates the type of the relationship. The relationship is two types, reinforcing links indicates that both the nodes move in the same direction, while balancing link indicates that both the nodes move in the opposite direction.

Figure 10: Distribution of nodes across three sections



Systemic discrimination, including social marginalization and lack of recognition, affects fair women's participation in agriculture and ownership of land, leading to a lack of **financial security** and income for women. **Patriarchal systems** and household responsibilities also impact women's decision-making process participation in agriculture.

Patriarchal systems play a role in reinforcing gender inequality by placing **household responsibilities** on women, leaving them with less time and resources to participate in agriculture decision-making processes and receiving inadequate or no compensation for their work.

Current land policies contribute to gender inequality by not recognizing **women's land ownership rights**. **Small-scale producers**, who are often women, face challenges in increasing agricultural production and achieving financial stability. Climate change exacerbates these challenges by affecting agricultural production, leading to land degradation, deforestation, and forced migration. The interdependence of these elements suggests a need for a holistic and integrated approach to address the challenges facing agricultural production and the livelihoods of small-scale producers, particularly in the context of climate change.

In Mexico, where the impact of **climate change** on agriculture is becoming increasingly apparent, utilizing the women workforce and their knowledge of regenerative agriculture could help create a more climate-resilient agriculture sector. Women have traditionally played a significant role in Mexican agriculture, but they have been systematically excluded from access to resources and decision-making processes. **Collaboration** between stakeholders, including the private sector, not profit, and the government can help achieve these goals.

7. GAPS & LEVERS OF CHANGE

Figure 11: Potential levers of change and its potential impact

Levers of change	Gap	Intervention
Improving land policies	Lack of land ownership	Gender-based policies and regulations
Socio-cultural mindset	Gender inequity	Gender-aware policies, Ensure women's access to education, training, and resources
Multi-institutional collaboration	Lack of awareness and women participation in decision making	Partnerships among stakeholders to improve the agricultural supply chain through responsible gender-sensitive investing
Imparting regenerative agriculture techniques	Unsustainable practices of traditional agriculture	Investing in women's education and training
Protection against crime	Forced displacement and violence	Public policies to prevent displacement and guarantee assistance with a gender approach

IMPROVING LAND OWNERSHIP POLICIES

Land ownership is a social asset key to women's economic empowerment, access to credit, cultural identity, political power, and participation in decision-making[16]. The current inequity and historical discrimination create a gap in women's rights to land and property. To close the gap, it is necessary to develop efficient policies and gender-based regulations at all levels of the government. The policies should address fair inheritance rules, social norms, and gender ideology and must recognize the potential of women's farm industry.

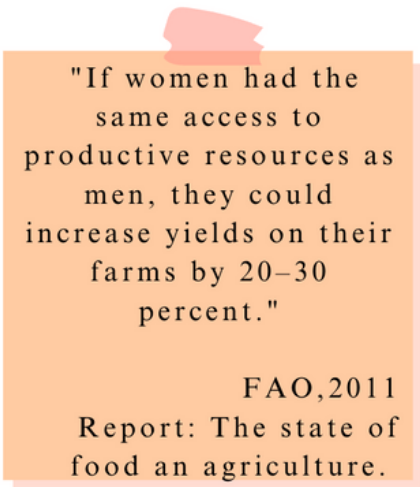
Policies should be developed and implemented according to the local context. Also, women's participation in the process of developing land policies is fundamental to increasing women's right to land [16].

Studies have shown that giving women equal rights to land and property can have positive impacts not only on women themselves but also on their families and communities. An efficient legal frame will help to constitute land ownership and representation of local women.

SOCIO-CULTURAL MINDSET


Mexican societies have deeply ingrained gender norms that place a disproportionate burden of household and child-rearing activities on women, which can limit their ability to access education and economic opportunities. Also, the existent patriarchal gender mindsets limit women's decision-making power. These socio-cultural mindsets are important factors in the existent gender gap.

Some actions to close this gap are implementing gender-aware policies and well-designed development projects [17]. Within the policies is critical to establish anti-patriarchal gender norms to address the constraints on women's ability to take advantage of new opportunities arising from rural transformation[18]. Also, a key element is to secure women's access to education, training and resources. By granting education to women, we can create a more equitable and inclusive society. Ultimately, promoting gender equality is not only a matter of social justice but also has important economic and social benefits for society as a whole.



"If women had the same access to productive resources as men, they could increase yields on their farms by 20–30 percent."

FAO,2011
Report: The state of food an agriculture.



"Deep engagement on gender equality can make women safer and help people eat more."

Care.org
Report: Gender based violence and food insecurity

ENSURING PROTECTION AGAINST ORGANIZED CRIME

Due to the current violent context in Mexico entire communities are displaced through violence. Forced displacement generates a wave of violence and human rights violations where women are a vulnerable sector. Among the impacts, women are more likely to live in poverty due to systemic gender inequality and the indifference of the government in not recognizing this problem [19]. Organized crime adds a layer of complexity to the system where women are pushed into a more vulnerable situation and require specific protection measures.

To overcome this issue it is necessary to design and implement public policies in the three levels of government, to prevent the root causes of internal displacement and to guarantee humanitarian assistance during their displacement and reparations with a gender approach [20]. Protecting the rights and dignity of those who are forced to flee their homes is not only a matter of social justice, but it is also essential to building a more stable, secure, and prosperous society. By prioritizing the needs of the most vulnerable, we can create a more inclusive and equitable future for everyone.

MULTI-INSTITUTIONAL COLLABORATION

The lack of awareness and engagement of women in agriculture among the stakeholders prevents concrete actions to undertake the current gender-specific obstacles (land ownership, access to resources and education, equal treatment, among others). Multi-institutional collaboration and collective actions could help close this gap.

Partnerships with development agencies, companies, and certification bodies to improve the agricultural supply chain through responsible gender-sensitive investing could be an important driver of change. The engagement of private companies and non-governmental organizations in supporting regenerative practices and gender equality enhances local actions and generates social awareness and capacity building.

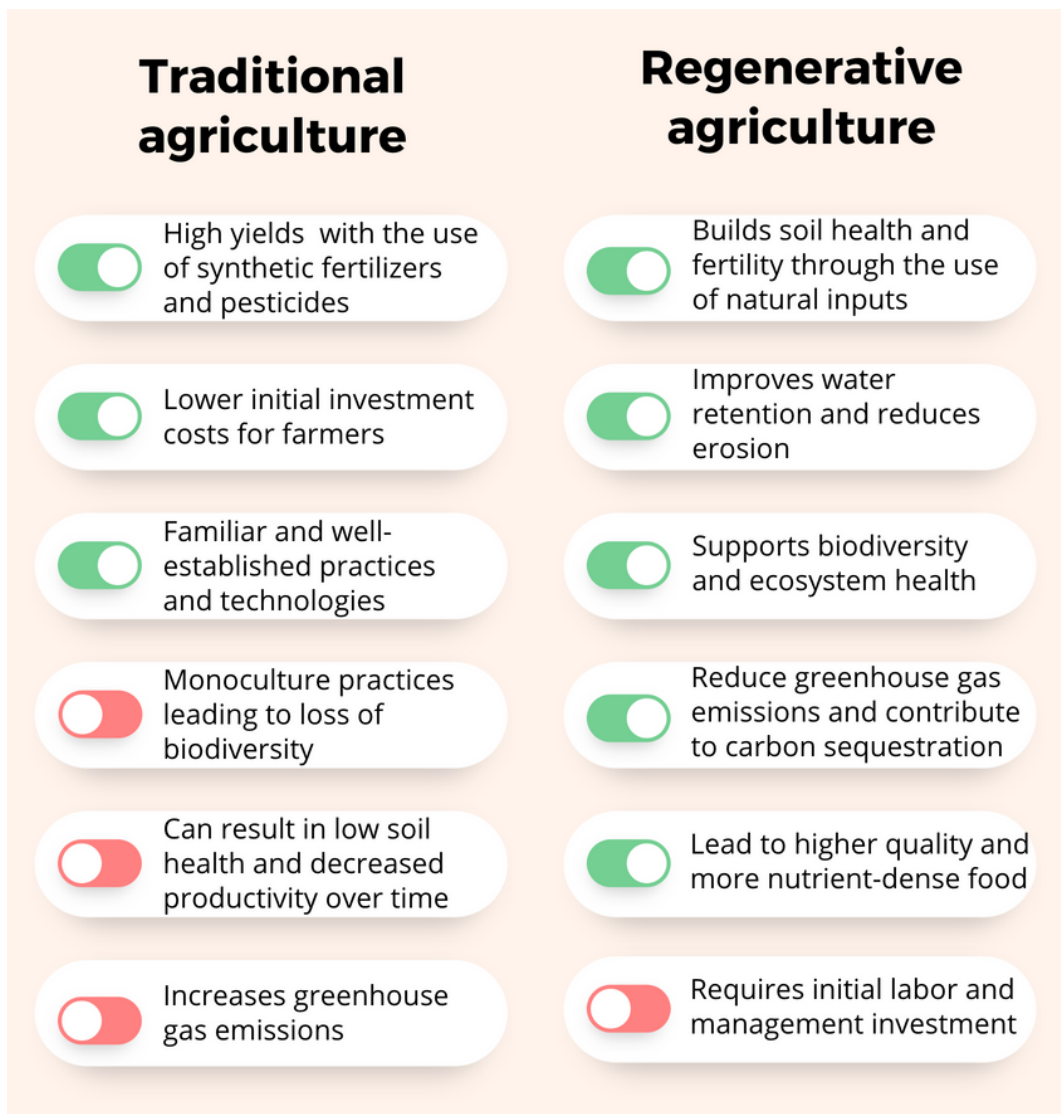
Also, women's community-based organizations and other forms of collective action can be an effective means of building social capital and addressing gender gaps [17]. Women's collective actions can reduce transaction costs, develop skills, build confidence, and enhance women's participation in government bodies or other civic organizations.

IMPARTING REGENERATIVE AGRICULTURE TRAINING

Regenerative agriculture promotes soil health, biodiversity, and resilience to climate change, while also providing nutritious food, supporting rural communities, and reducing environmental impacts. Regenerative agriculture training can empower women by providing them with knowledge and skills to improve their livelihoods and promote sustainable food production.

Investing in women's education and training in regenerative agriculture practices is critical to building more equitable and sustainable food systems. This can benefit women farmers, their families, and their communities while contributing to global efforts to address poverty, malnutrition, and climate change. Women often play a crucial role in farming, and regenerative agriculture can help them improve yields, reduce input costs, and increase resilience to climate change.

Figure 12: Traditional agriculture vs Regenerative agriculture



FINAL THOUGHTS

Promoting a new culture of inclusion and partnership among the entire community considering women as crucial actors for change.

Systems mapping shows how isolated interventions have limited effects, and how relevant could be a paradigm change to flip not just specific situations but, dynamics. Mexico is facing multiple crises that interact with each other generating chaotic dynamics. The analysis of the Mexican complex systems helps to infer the limited effect of isolated interventions, and also shows that no matter the challenges in terms of national security, gender inequity, food security, poverty, accelerated ecosystems degradation, or migration, there is an opportunity: women farmers represent a resilient and strong workforce with the potential for implementing the regeneration of the land and bringing back life and peace to their ecosystems [21].

To empower women farmers and regenerate the land, it is essential to understand the dynamics, look for patterns and find the place for implementing cultural, legal, political, financial, educative, and social actions that could shift the pattern of exploitation based on the enormous potential of women farmers, regenerative agriculture, and Mexican agro-industry [22].

It is about changing women and land exploitation dynamics through multiple interconnected actions that require the engagement of different actors and the acknowledgment of the role of women and land as resilient and powerful stakeholders, as the soul of life, and the as the home for all. It is about empowering and respecting them to release their full potential [23][12].

We understand that the partnership of gender equity and regenerative agriculture can be a change-maker in the agriculture sector and the overall social aspects of Mexican agro communities. These interventions will require major support from the Government and multiple stakeholders. By imparting regenerative training, the local women can be encouraged to participate more and apply techniques that are not resource intensive.

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