CAFES

Coffee Agroecosystems Fostering
Environmental Sustainability

Transformation of coffee landscapes:
co-production of pathways for sustainability
through participatory serious board games

Coffee Agroecosystems Fostering Environmental Sustainability
Social-ecological board game for the transformation of coffee landscapes

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Transformation of coffee landscapes

Coffee farms represent an important component of the tropical montane landscapes of Mexico and Central America. Coffee is cultivated under secondary forests and interspersed with other land covers, which are managed mainly by smallholders. These plantations constitute a rich agroecological matrix of great ecological, social, and cultural significance that historically provided adequate livelihoods to local families. However, in recent decades, the cumulative effects of socio-environmental crises have transformed these landscapes and affected the livelihoods of producers and their management practices. In this region, the coffee-leaf rust (CLR) outbreak, caused by the fungus Hemileia vastatrix, infected varieties of Coffea arabica, the main coffee species grown in Mexico. This crisis prompted a massive reorganization of the coffee sector, resulting in alterations to management practices, including reduction in canopy cover, the replacement of coffee varieties, and the incorporation of monocrops. These changes have led to the simplification and homogenization of coffee farms and, consequently, the landscape.


Between 2020 and 2022, we conducted research to evaluate the impact of the CLR crisis on the management practices of coffee producers and their effect on the landscape configuration in central Veracruz, Mexico. The results indicated that after the epidemic, deforestation rates in the region increased and were associated with the intensification of coffee plantations, which shifted from shade-grown to sun-grown coffee or even to other commercial crops such as citrus or sugarcane or to cattle production. However, the responses of the producers to the crisis differed: those who worked independently were more vulnerable to the epidemic, while those who were associated with cooperatives and peasant organizations were able to access better markets, thereby providing economic stability in the face of fluctuating coffee prices and the environmental crisis. These results prompted us to disseminate our findings to the relevant stakeholders. However, we believed that an academic presentation would not elicit the reflection we sought, and therefore designed a serious board game (CAFES: Coffee Agroecosystems Fostering Environmental Sustainability) as a tool to engage relevant stakeholders in the conversation and generate active reflection on the local challenges faced by the coffee sector.

Serious board games (SBGs) are stylized representations of social-ecological systems on a board that allow different stakeholders to elucidate the core dynamics of the system, imagine desired futures, and explore transformation scenarios. SBGs consist of a board that includes game sets and resources, as well as rules, roles, and a probabilistic chance of the occurrence of certain unpredictable events, represented by dice and cards. In contrast to purely recreational and educational games, SBGs are regarded as analytical tools for participatory research since they maintain a record of all the decisions made by the players. These decisions are then analyzed to evaluate the emergent game trajectories. SBGs are implemented through community workshops, during which, after the game session, a final dynamic of group reflection takes place. This allows local actors to express their impressions of the tool and evaluate the extent to which the game successfully triggered social learning.

We conducted pilot workshops with producers and academics to assess the implementation and reach of CAFES. Once we had established a final design, a series of workshops were held with coffee producers and relevant stakeholders (many of whom were interviewed for the CLR research study) invited to play and then discuss the results. In all workshops, the participants highlighted the extent
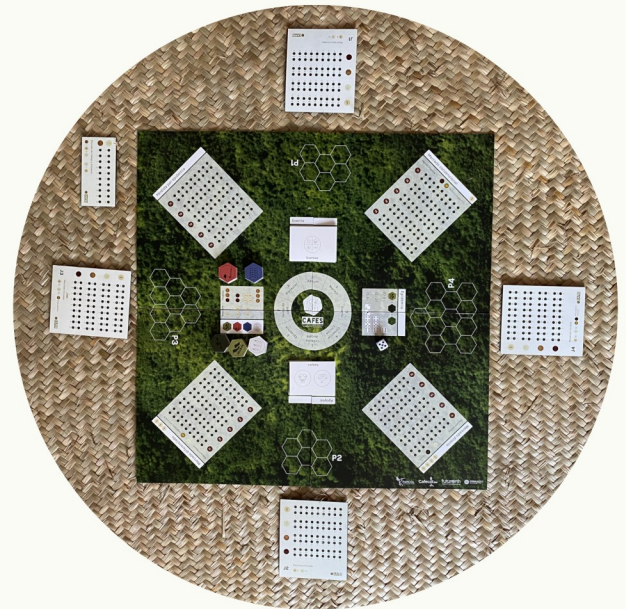
to which the SBG accurately represented their livelihoods, as well as the challenges, and opportunities of the coffee sector. The results presented here are derived from the reflections generated in those workshops.

The workshops created spaces in which to learn and reflect on the impact of land management practices, their influence on the CLR crisis, and the different approaches that coffee producers could adopt in response to it. The participants envisioned six general desired futures related to the coffee sector, local livelihoods, and landscape sustainability: 1) Partnership with government and non-profit organizations; 2) Profitability (cost-effectiveness) and entrepreneurship; 3) Food sovereignty; 4) Autonomy; 5) Dignified life through coffee livelihoods; and 6) Coffee livelihoods for future generations. Moreover, during the workshop, participants also identified the obstacles to achieving these imagined futures, the actions required to overcome the challenge, and the agents of change associated with each action.

Implementation of workshops

Between February and April 2024, we held participatory workshops on the serious board game CAFES in three municipalities: Ursulo Galvan, Zongolica, and Huatusco. These communities represent three important coffee-producing regions of the state of Veracruz, Mexico, and have a long history of coffee production. In Ursulo Galvan, the workshop had 12 participants, six men and six women, from three different communities. In Zongolica, the workshop had 32 participants, 19 men and 13 women, from 18 different communities. In Huatusco, the workshop had 21 participants, 17 men and 4 women, from 11 different communities. The total number of participants comprised 65 actors from the coffee sector, from a total of 32 communities.

The participatory workshops began with a brief introduction to the objectives of the game, followed by the granting of informed consent, game sessions, and a group reflection or debriefing. The total duration of each workshop was approximately 4 hours. A total of 15 game sessions were conducted, corresponding to five annual rounds in each game for a total simulation of 75 coffee production cycles. The debriefings were guided by the conceptual frameworks of the pathways to sustainability and the leverage points for the transformation of social-ecological systems. The debriefings were conducted in community plenaries, where the participants discussed their results in groups while we recorded their experiences and concerns on poster boards placed on the walls of the community centers where the workshops were implemented.

Pathways and Envisioned Futures

During the debriefing part of the game sessions, we identified the desired visions of the future, the challenges to achieving them, the actions necessary to overcome these obstacles, and the agents important to performing such actions.

Challenges

Access to alternative markets
Climatic events
Complex tax legislation
Global market volatility
High market competitiveness
High reliance on government aid
Individualism
Influence of agribusiness
Labor shortage
Low coffee yield
Lack of equipment and training for coffee processing
Lack of generational shift
Lack of government aid
Land tenure
Low coffee yield
Low profitability of coffee
Negative impact of institutions
Public safety
Relevance of public policy
Undervaluation of coffee production
Undervaluation of coffee quality
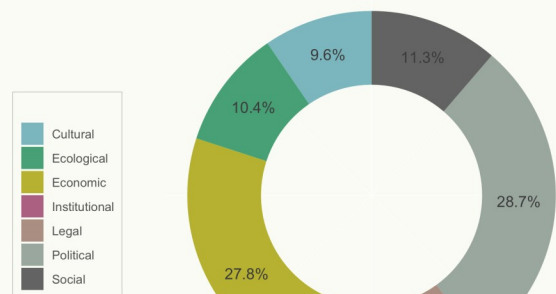Undervaluation of local knowledge
Weakening of cooperatives

Actors

Communities
Coffee hoarders
Cooperatives
Education sector
Engineers (students)
Extension agents
Field schools
Government
Laborers
Market
Municipal agent
Producers

Actions

Access to processing technology
Consolidation of fair and alternative markets
Cooperation among producers
Government programs for smallholders
Increase coffee yield
Increase coffee quality
Intersectorial alliances
Keep company with younger generations
Livelihood diversification
Market regulation
Market research for alternative crops
Producers decide the relevance of programs
Producers establish coffee prices
Promote rural savings
Proper use of government aid
Reassume family labor
Reduce dependence on government aid
Sustainable management practices
Training for agroecological management

Challenges

Legend:
- Cultural
- Ecological
- Economic
- Institutional
- Legal
- Political
- Social

9.6%
11.3%
10.4%
28.7%
27.8%
3.5%
8.7%

The challenges mentioned were representative of seven general categories: Cultural, Ecological, Economical, Institutional, Legal, Political, and Social. Most were either Economic or Political, although other types of challenges were found to be very important under certain futures.

The actions required to achieve each envisioned future were categorized according to the leverage points framework. More than half of the leverage points were Social and Structural, followed by Physical, Informational, and Behavioral Patterns and Mental Models.

Leverage points

Legend:
- Informational and Behavioral Mental models
- Mental models
- Physical
- Social and Structural

57%
12.3%
10.5%
20.2%
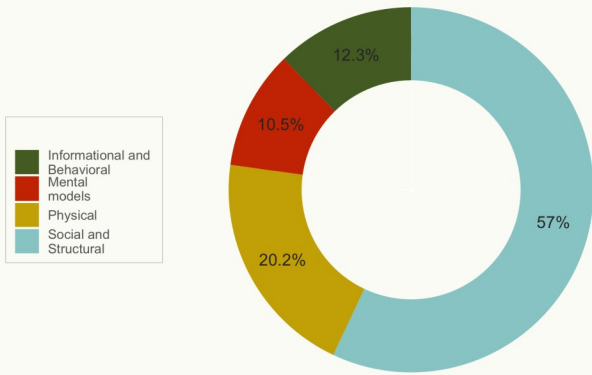
Six futures were envisioned during the workshops:
• Food sovereignty
• Profitability and entrepreneurship
• Autonomy
• Dignified life through coffee
• Coffee livelihoods for future generations
• Partnership with government and non-profit organizations

Each of these futures presents a unique combination of associated challenges, actions, actors, and leverage points. None of them are completely independent from the others since there are many points of overlap among them.

Food sovereignty

Dignified life through coffee landscapes

Autonomy

Envisioned futures

Profitability and entrepreneurship

Coffee livelihoods for future generations

Partnership with government and nonprofit organizations
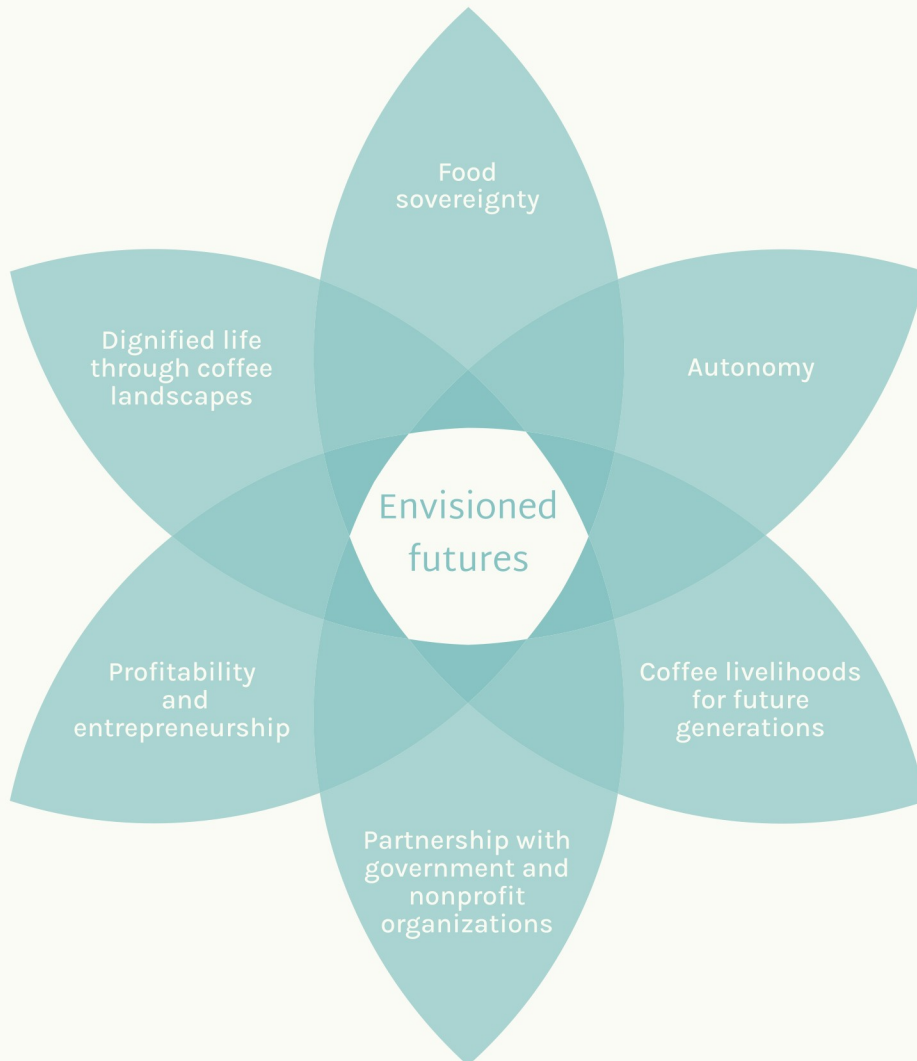
Vision 1. Food sovereignty

This envisioned future is focused on meeting local nutritional needs with no dependence on other actors, as well as achieving the capacity to produce and commercialize food and coffee locally. To achieve this, changes are required in information flows, patterns of behavior, and structures. The government, producers, and cooperatives are the key agents for achieving the diversification of livelihoods and adoption of agroecological management practices.

Challenges — **Actions** — **Actors**

Challenges: Undervaluation of coffee production; Low profitability of coffee; Low coffee yield; Climatic events; High market competitiveness

Actions: Livelihood diversification; Training for agroecological management; Sustainable management practices

Actors: Government; Education sector; Producers; Cooperatives

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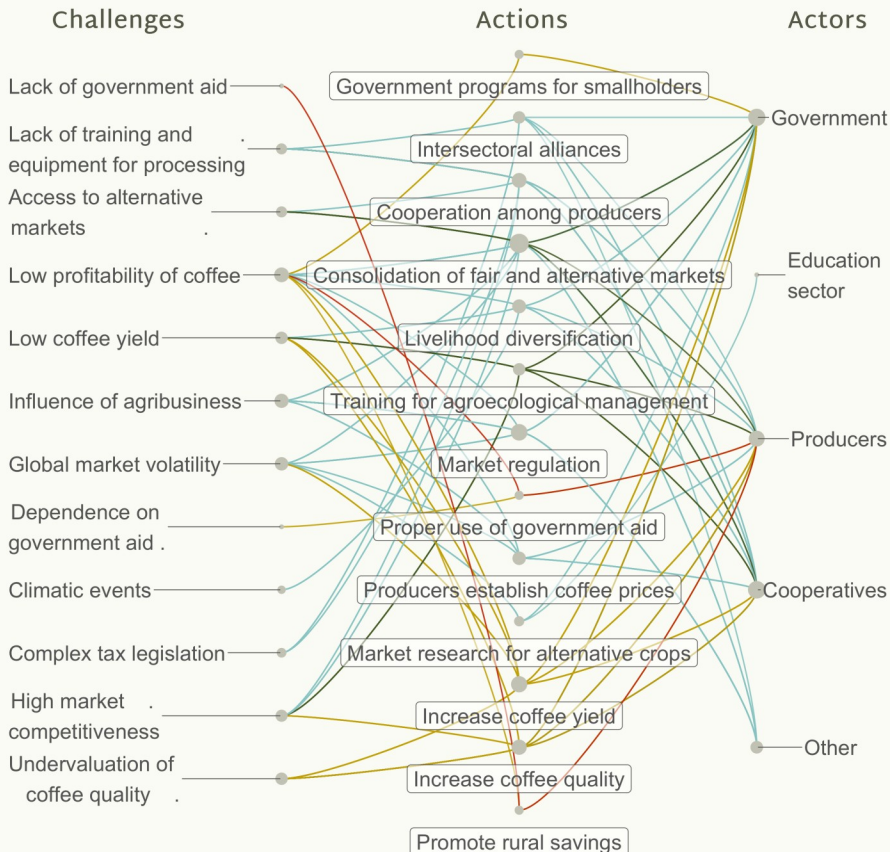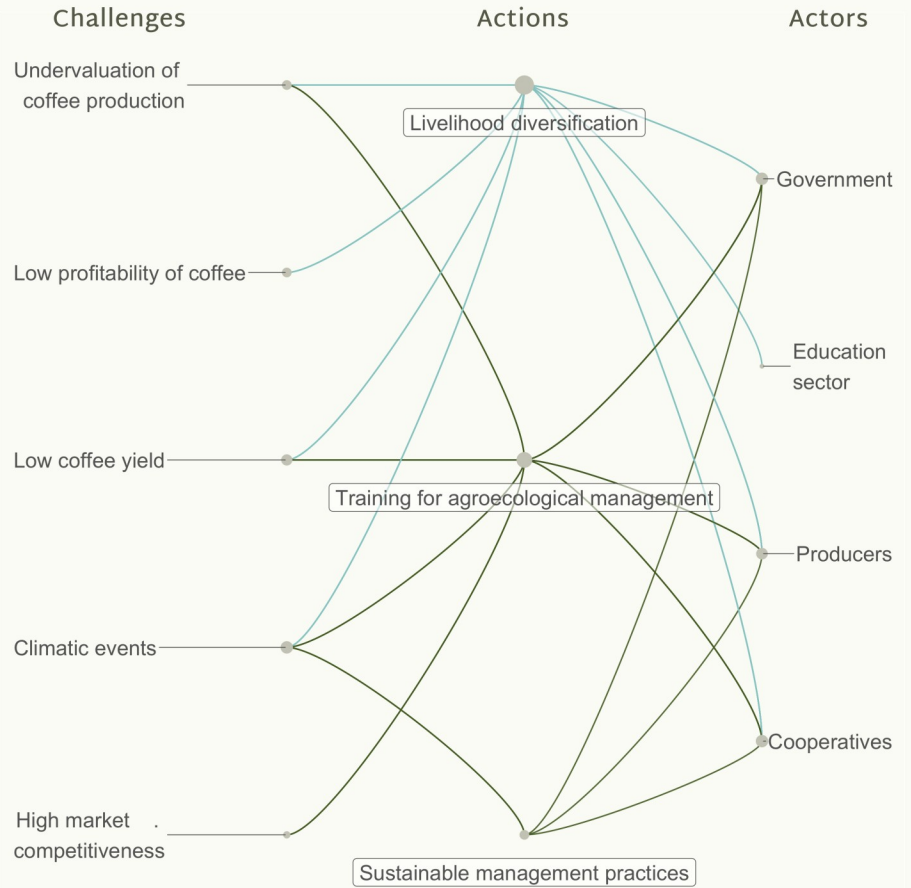
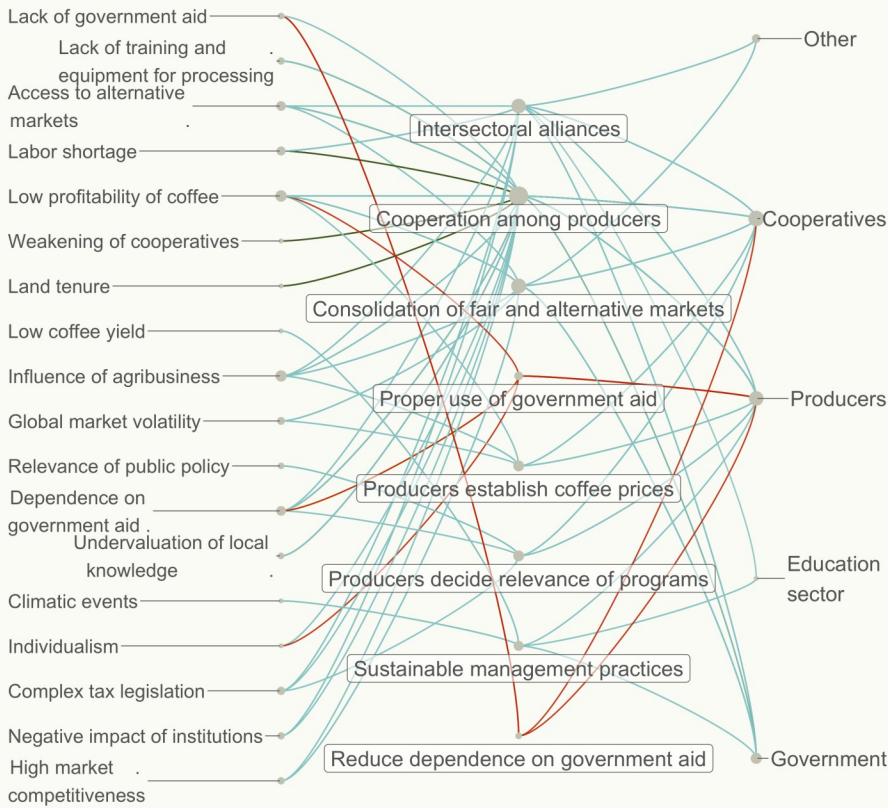## Vision 2. Profitability and entrepreneurship

This envisioned future is focused on increasing coffee profitability and rural entrepreneurship. To achieve this, actions are required in every leverage point: physical, informational, behavioral, structural, and mental models. The government is of great importance, as are the cooperatives and producers. Here, cooperation between producers, market regulation, and increases in coffee yield and quality all play a crucial role.

Challenges — **Actions** — **Actors**

Challenges: Lack of government aid; Lack of training and equipment for processing; Access to alternative markets; Low profitability of coffee; Low coffee yield; Influence of agribusiness; Global market volatility; Dependence on government aid; Climatic events; Complex tax legislation; High market competitiveness; Undervaluation of coffee quality

Actions: Government programs for smallholders; Intersectoral alliances; Cooperation among producers; Consolidation of fair and alternative markets; Livelihood diversification; Training for agroecological management; Market regulation; Proper use of government aid; Producers establish coffee prices; Market research for alternative crops; Increase coffee yield; Increase coffee quality; Promote rural savings

Actors: Government; Education sector; Producers; Cooperatives; Other

Vision 3. Autonomy

Challenges
- Lack of government aid
- Lack of training and equipment for processing
- Access to alternative markets
- Labor shortage
- Low profitability of coffee
- Weakening of cooperatives
- Land tenure
- Low coffee yield
- Influence of agribusiness
- Global market volatility
- Relevance of public policy
- Dependence on government aid
- Undervaluation of local knowledge
- Climatic events
- Individualism
- Complex tax legislation
- Negative impact of institutions
- High market competitiveness

Actions
- Intersectoral alliances
- Cooperation among producers
- Consolidation of fair and alternative markets
- Proper use of government aid
- Producers establish coffee prices
- Producers decide relevance of programs
- Sustainable management practices
- Reduce dependence on government aid

Actors
- Other
- Cooperatives
- Producers
- Education sector
- Government

This envisioned future is focused on achieving a relative degree of autonomy in terms of deciding the direction of the coffee sector. Changes to social structures and mental models are involved. The main actors are producers and cooperatives. Cooperation among producers and intersectoral alliances are important strategies to enable producers to establish relevant programs and build fair markets in which they determine coffee prices.
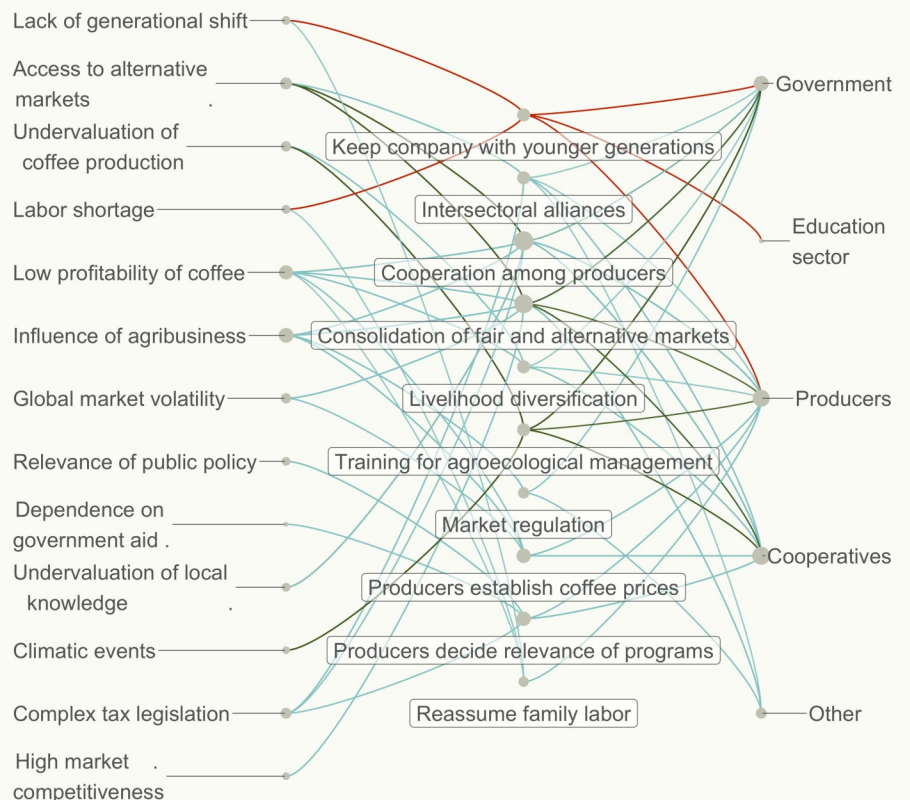

Vision 4. Dignified life through coffee landscapes

This envisioned future proposes approaching well-being through coffee landscapes. To achieve this, changes in the social structures, behavior, and mental models would be expected. Cooperatives and producers are crucially important in fostering cooperation among producers, building fair markets, and determining prices and the relevance of programs. Emphasis is placed on the diversification of livelihoods and support of future generations. The government plays a role in the regulation of markets and facilitation of programs for agroecological diversification and youth education.
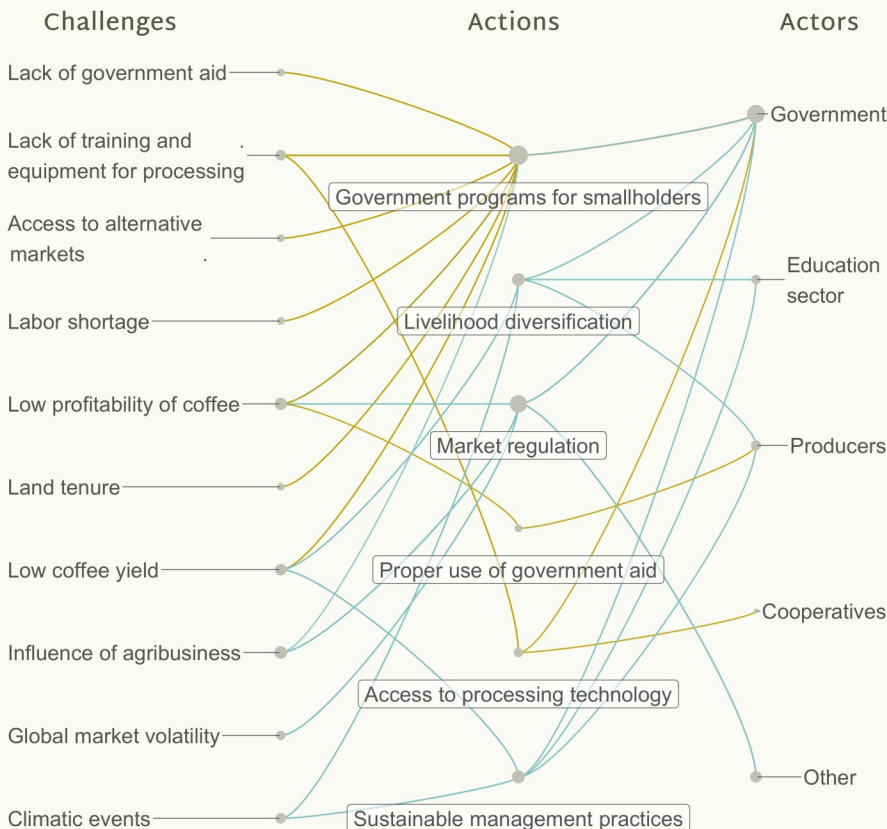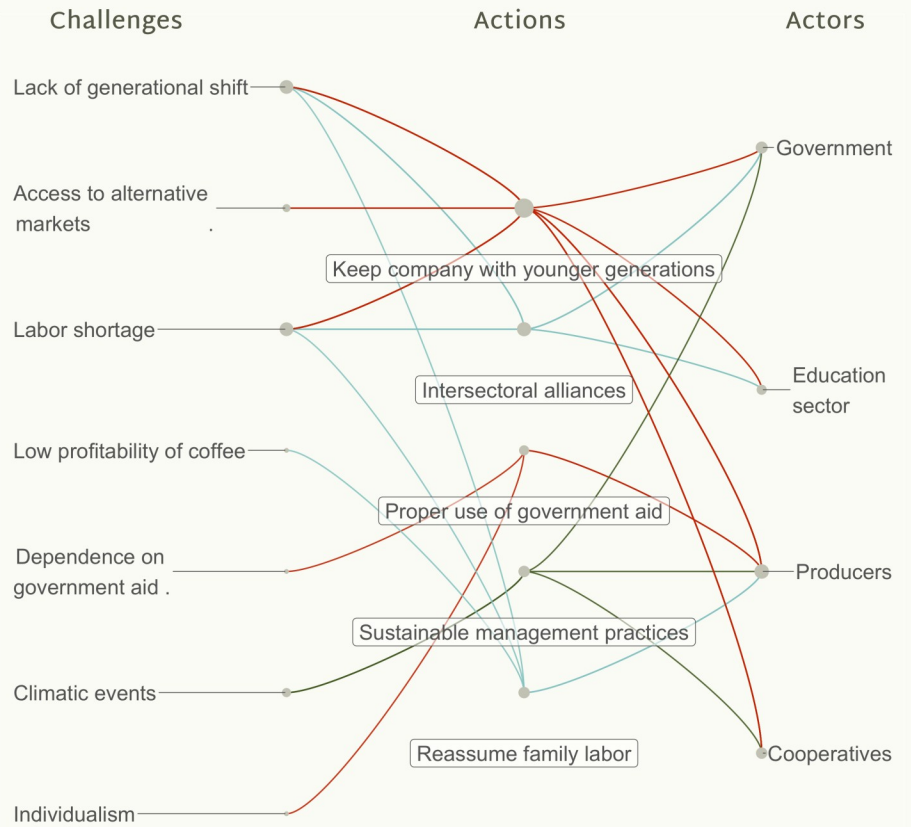
Challenges
- Lack of generational shift
- Access to alternative markets
- Undervaluation of coffee production
- Labor shortage
- Low profitability of coffee
- Influence of agribusiness
- Global market volatility
- Relevance of public policy
- Dependence on government aid
- Undervaluation of local knowledge
- Climatic events
- Complex tax legislation
- High market competitiveness

Actions
- Keep company with younger generations
- Intersectoral alliances
- Cooperation among producers
- Consolidation of fair and alternative markets
- Livelihood diversification
- Training for agroecological management
- Market regulation
- Producers establish coffee prices
- Producers decide relevance of programs
- Reassume family labor

Actors
- Government
- Education sector
- Producers
- Cooperatives
- Other

Vision 5. Coffee livelihoods for future generations

This envisioned future seeks to maintain coffee landscapes for the well-being of future generations. To achieve this, changes are expected in the mental models, behaviors, and social structures. The government, producers, cooperatives, and education sector are of great importance for teaching future generations how to work in the coffee sector. Emphasis is placed on intersectoral alliances and education to overcome problems of generational shift and labor scarcity.

Challenges | Actions | Actors

Lack of generational shift
Access to alternative markets
Labor shortage
Low profitability of coffee
Dependence on government aid
Climatic events
Individualism

Keep company with younger generations
Intersectoral alliances
Proper use of government aid
Sustainable management practices
Reassume family labor

Government
Education sector
Producers
Cooperatives

Challenges | Actions | Actors

Lack of government aid
Lack of training and equipment for processing
Access to alternative markets
Labor shortage
Low profitability of coffee
Land tenure
Low coffee yield
Influence of agribusiness
Global market volatility
Climatic events

Government programs for smallholders
Livelihood diversification
Market regulation
Proper use of government aid
Access to processing technology
Sustainable management practices

Government
Education sector
Producers
Cooperatives
Other

Vision 6. Partnership with government and nonprofits

This envisioned future is focused on strengthening and improving the alliances with government and non-profit organizations to enhance the efficiency of the sector. The changes required to achieve this are primarily physical and social. In this vision, the government assumes a pivotal role in defining more effective programs for smallholders, diversifying livelihoods, and regulating markets.

The ludic research experience achieved through the implementation of CAFES highlights the importance of exploring cutting-edge methodologies to communicate scientific results in less rigid formats. CAFES is a participatory and multi-stakeholder research tool that can be adapted and implemented in many coffee-production contexts around the world. The Future Earth Pathways Communication Grant enabled the production of a digital version of the board game, an instructional video, and an implementation manual, all of which are available free of charge.

Digital version (Spanish)   Digital version (English)   Instructional video

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