THE TRANSFORMATION LABORATORY

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NARRATIVE OF THE PROCESS AND METHODOLOGICAL GUIDE



ACKNOWLEDGEMENTS:

The project "The Transformation Laboratory of the Xochimilco Social-Ecological System, Mexico City" was developed by the National Laboratory of Sustainability Sciences (LANCIS) of the Institute of Ecology, and by the Research Institute in Applied Mathematics and Systems, both housed at the National Autonomous University of Mexico (UNAM), and the School of Sustainability of Arizona State University (ASU), as part of the STEPS Pathways to Sustainability Global Consortium (https://steps-centre.org/global/).

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We greatly appreciate and thank all the Xochimilco T-Lab participants for their valuable time, effort, and interest in sharing their experiences and knowledge throughout the process.

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PATHWAYS TO SUSTAINABILITY PROJECT

The "Pathways to Sustainability Global Consortium - STEPS Centre" [http://steps-centre.org/about/global/] coordinates an international project "Transformative Pathways to Sustainability Network" [http://steps-centre.org/project/tkn/], in order to create learning experiences, a dialogue between academic and non-academic communities, and develop and combine the use of inter- and transdisciplinary research methods in six countries (Mexico, India, Argentina, UK, China, and Kenya). The case studies are compared to build understanding of the key elements needed to promote transformations to sustainability. The LANCIS-IE-UNAM, IIMAS-UNAM and SOS-ASU partnership contributed to this project with the project "The Transformation Laboratory of the Social-Ecological System of Xochimilco, Mexico City".



BROAD OBJECTIVE :

The broad objective of the Pathways to Sustainability Network [https:// steps-centre.org/project/pathways-network/] is to help understand and build alternative pathways to address key sustainability problems in different regions. The three sustainability problems addressed are:

a) Urban water in cities (Mexico and India)
 b) Low carbon energy transitions (Kenya and China)
 c) Sustainable agricultural and food systems (Argentina and UK)

SPECIFIC OBJECTIVES:

 To experiment in processes of research, engagement and impact;
 To explore ways of learning from differences across contexts, challenges, approaches, disciplines, etc.

https://steps-centre.org/global/

T-LAB XOCHIMILCO



01 INTRODUCTION

02 THE T-LAB XOCHIMILCO PROCESS

03

METHODOLOGICAL DESCRIPTION OF THE **ACTIVITIES**

-Lab Xochimilco experience



HOW TO READ THIS GUIDE

The activities described in this guide are designed to support participatory research in the search for transformative pathways to social-ecological system sustainability. The guide offers activities with practical examples to help researchers creatively explore new ways for participants to relate to each other and to their environment.

The process of a Transformation Laboratory (T-Lab) has an unconventional structure; the activities are not designed in the traditional approach of problem analysis and planning. Instead, the T-Lab seeks to explore the perceptions and experiences of individuals through continuous dialogue, in order to identify and articulate ways to connect worlds and perspectives. The activities we compiled here thus help link personal and collective experiences in a gradual and creative way. In the Xochimilco T-Lab, the activities were carried out in the order presented in this guide, to generate a process of sharing, talking and exchanging perceptions and experiences.

THE STRUCTURE FOR EACH ACTIVITY IN THIS GUIDE IS AS FOLLOWS:

Name of the activity

Type of interaction: Individual 🔘 / Collective 👘

- Objective: what we expect to achieve with the activity.
- **Method:** the type of activity with which to achieve the objective.
- Description: the instructions to implement the activity.

The experience of implementing the activity within the Xochimilco T-Lab

The Annexes have a complementary activity matrix that contains:

- **Duration:** each activity has a suggested duration, but it depends on the total time available and what the organizers expect in terms of the depth of the participants' reflections. It also depends on the total number of participants: the greater the number, the longer the duration.
- **Materials:** the materials that are suggested to carryout the activity.

The Annexes have a detailed description of the instructions and further design guidance for the activities that require it, as in the case of the game and the Tiny Books.

This document presents LANCIS-IE-UNAM, IIMAS-UNAM and SOS-ASU the experience of implementing the project "The Transformation Laboratory of the Social-Ecological System of Xochimilco, Mexico City."

Here we describe the process and methodology developed in the project between 2016 and 2019, as well as provide practical resources associated with the main activities we implemented, in order to facilitate similar processes in different contexts. We hope this guide will be of use to other groups who are genuinely committed to the sustainability of the social-ecological systems they inhabit.

INTRODUCTION TO THE TRANSFORMATION LABORATORY

WHAT IS A TRANSFORMATION LABORATORY?

A Transformation Laboratory (T-Lab) is a participatory and transdisciplinary process that creates a safe space that cultivates creativity, innovation, and experimentation among individuals to reveal novel transformative pathways towards sustainability of social-ecological systems. Social-ecological transformations are profound changes that help create more just and sustainable outcomes for society and the environment.

T-Labs are specifically designed to empower individuals and groups and to foster changes in the conditions that make social-ecological systems unsustainable. In these spaces, people who share an interest in solving problems as well as have some ability to bring about change participate, even though they may have different perspectives and play different roles.

THE OBJECTIVES OF THE T-LABS ARE:

- Conceptualize the central challenge or problem and identify innovators in order to strengthen their capacity to meet the challenge more effectively.
- Develop a change strategy that tests multiple solutions, which in turn helps address the central challenge.



XOCHIMILCO T-LAB

The project "Transformation Laboratory of the Social-Ecological System of Xochimilco, Mexico City" was held from June 2016 to March 2019 in Xochimilco, Mexico City. Recognizing that transformations take time and that both individual and collective agency are essential conditions to generate these processes of transformation, the project focused on seeking the continued participation of 12 people linked to the Xochimilco wetland in various ways. Participants were involved in intensive and immersive experiences that sought to provoke conversations about their different understandings, values and meanings associated with the degradation of the lacustrine zone of Xochimilco and the related urbanization processes. We hoped that through this process we would begin to transform people's interactions within the social-ecological system and generate new knowledge and relationships to create and promote change.

T-LAB XOCHIMILCO

MAIN PROBLEM OR CHALLENGE:

Lack of collective action to address the degradation of the lake area of Xochimilco, which translates into the absence of an effective strategy to address the urbanization processes.

GENERAL OBJETIVE:

Create a space that promotes the empowerment of participants through participatory methods that involve re-framing the problem and the role of participants within the social-ecological system and, in doing so, achieve a change in individual's perception of their own agency. In addition, through this process, activate the collective agency of the group involved in order to take advantage of new opportunities for transformation towards more sustainable states.

HUMAN AGENCY

KEY TO TRANSFORMATION

Agency is the ability to mobilize different skills, knowledge, and experiences in order to act in a certain way within a system. Therefore, social-ecological system dynamics are closely related to:

- Individual agency, including a person's perception of the system and how she or he perceives his or her own capacity to act in the system,
- Collective agency, the relationships between individuals that are conducive to generate and achieve change that is beyond the capacity of a single individual

In order to invite changes that promote processes of transformation towards sustainable system trajectories, we focused the T-Lab on the identification of, and potential change, in individual agency as well as the emergence of collective agency amongst participants.

T-Lab activities should support individual reflection about the participants' own positions in the system. Each individual's role is associated with different rules and social networks, that are part of each participant's social group which, in turn, influence the participant's perceptions and behavior. Recognizing that there are different individuals and "worlds" in the system and noting the importance of this diversity in generating transformative changes, we sought to create and strengthen personal bonds among participants during the process. These interpersonal relationships allow the exchange of experiences, perceptions, knowledge and distinct values. In addition, they constitute a foundation from which to think differently about (and within) the system, its components, and types of change towards more sustainable futures. Relationships allow individuals to look at the system from other positions, understand the reasons that underlie differences, and seek new collaborations.

WHAT ACTIVITIES WERE IMPLEMENTED IN XOCHIMILCO T-LAB?

Four main activities were carried out to identify individual agency:

- Social network mapping to identify the role of individuals in the system, i.e., their collaborators and practices they perform with others;
- Fuzzy cognitive mapping to understand their perception of the system and the relationships between some of its components (such as processes and states);
- Q-method to understand their assessment of certain aspects of the system through categorizing different issues and relevant aspects of the system;
- Avatar creation to identify each person's particular capabilities (or powers).

T-LAB XOCHIMILCC

These four activities were implemented at the beginning of the process to establish a baseline of individual agency; after the September 2017 earthquake, when several participants initiated joint actions; and at the end of the process. This allowed us to evaluate changes which, though cannot be attributed solely to the T-Lab project, can be linked to it through participants' testimonies. The four exercises supported:

- the identification and re-conceptualization of the roles that each participant plays in the system;
- the visualization of desirable futures and the search for common strategies through which to achieve them;
- reflexivity about the different capabilities (or powers) that each individual has, how these capabilities are activated in different circumstances, and how they combine with and complement those of other individuals.

The execution of the activities required the continuous and convivial interaction of participants in creative and unconventional activities, which represented a challenge both for the facilitators and participants. For more than two years, participants reflected on their perceptions and how their actions contribute to maintaining or changing the current state of the system, as well as the different capabilities that each one has and how they can be combined to achieve shared goals. All the interactions were designed to generate a safe space for self-reflection and friendship. The design was interactive and adaptive. After each interaction, the members of the facilitation-research team held documentation and analysis sessions about what occurred and was learned during the interaction. Throughout the project, specific interests and suggestions were collected from the participants that emerged partly as a result of the activities that were developed and partly motivated by their own activities outside the project, in particular the crisis that caused the September 2017 earthquake in Mexico City. By integrating these concerns into the activities of the following interaction, the project was designed collaboratively by the facilitation-research team and the participants, that is, the design was co-produced.





Xochimilco is like a spider web, apparently invisible but sticky. This fabric weaves together objects, places, practices and people, which we can see directly. The fabric that unites them is harder to see, but in it one finds the essence, soul and strength of Xochimilco. In the Transformation Laboratory we want to make this fabric more visible, understand how we are personally or not embedded in it, in order to be able to repair the most frayed pieces, connect better to the place and weave the threads that can connect us better as a group. The fabric is in poor condition and it seems as if the deterioration cannot be stopped. The task of repairing and re-weaving is not simple. First, we must abandon habitual ways of thinking that lead us to see Xochimilco as a set of disconnected things that we want to preserve individually. We must focus on the fabric and make it stronger so that it holds the objects, places and practices that we value. When we forget to keep the fabric or we do not see it, holes are created and what we value tends to fall and disappear, and each time we feel more disconnected and isolated, more individualistic. But if we are able to see the fabric clearly and organize ourselves to repair it, we feel connected and the fabric has more strength to attract and encompass new objects, places, practices and people.

[May 2017]

by Lakshmi Charli-Joseph, David Manuel-Navarrete, Rebecca Shelton, Hallie Eakin, J. Mario Siqueiros García and Beatriz Ruizpalacios



ticipant, we conducted semi-structuborated a cognitive map of how they and degradation in the study area, the individuals with whom they collaborate and through what actions, and

One of the participants took the lead in organizing and facilitating a workshop to identify and organize the problems that the Xochimilco wetland faces. The works-

A workshop was held to encourage reflection on the







People with different roles and interests exchanged their visions of the system and its problems through the board game "Pathways to Sustainability," created specifically for this event. The aim was to unveil the different perspective of the players in order to find points of agreement from which to build bridges across communities (urban and chinampa). It also sought to explore various scenarios created from collective decisions



The same exercises applied at the beginning of the project were applied again to identify any possible changes of per-ception, alliances, assessments, etc. for each participant.

The process and the products of each interaction were presented back to the participants, and we agreed to organize results

about transformation traps

easuring potential change. Cognitive map, Agency Network, Q Method

Baseline. Cognitive Map, Agency Network, Q Method

Problem Tree

One day at the chinampa

Climbing Teuhtli volcano

Post earthquake Sept. 19, 2017

Courses of Action

Building bridges



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tuate undesirable cycles (e.g., poverty, injustice, etc.). Understanding these traps is key to develop transformative stra-tegies to break free from them. The questions were:

Do you think that the word "trap" describes the situation of Xochimilco in relation to water, urbanization, etc.? Why? Why not?
 What do you consider are the causes that generate this "trap" in your community?

A question asking for an overall evaluation of the project was also included.



Feedback T-Lab 1 Individual semi-structured interviews were conducted to evaluate T-Lab 1

T-Lab 1

T-Lab 2

Feedback T-Lab 2 Individual interviews were conducted for feedback on the second laboratory experience.

local route up the volcano, with the support of young people

commitment, and project management experience were summo-ned to a planning meeting. The goal was to collectively decide on and design the final phase of the project according to local needs as un-



sidered themselves as active forces of change, innovation and inspiration.





The second and final laboratory was designed based on participants' concerns for achie-ving concrete actions. During one day, the products of other sessions were integrated into shared and prioritized concerns and topics in order to choose a project to be carried out in the near future. The concrete project that emerged from this interaction was a proposal from the participants to carry out education workshops for transformation based on the theme of water with the aim of creating bridges between the different worlds of Xochimilco







ITERATIVE PROCESS OF INTERACTIONS

The profound changes required to transform social-ecological systems towards more sustainable states are associated with understanding and promoting changes in individual agency, and the strengthening of groups that can act and work in trust and harmony, in other words, the creation of collective agency. To encourage these changes, various group activities were designed that allowed the following specific objectives to be addressed, iteratively:

- Re-conceptualize and re-frame the problem: Understanding how other people perceive the same problem (both causes and effects) is crucial for broadening one's own understanding and encouraging collaborative work.
- 2) Question dominant narratives and meanings: Some dynamics and processes of degradation are strengthened through dominant discourses, so it is important to question them both in order to understand them and to ensure that the narratives of marginalized communities are included.
- 3) Reflect on agency: Knowing the role and capabilities of each individual allows us to understand both individuals' responsibilities towards the system and its members, as well as the potential actions that might be undertaken as a group.
- 4) Explore alternative pathways to change: There is no single way to achieve a desired change, so it is important to explore the diverse trajectories that a group may wish to pursue.
- 5) Identify barriers to change: There are many causes, some that are more deeply engrained than others, that make it difficult or impossible to achieve desired changes; stopping and discussing these barriers or challenges allows us to imagine new ways to change.
- 6) Re-design and co-create new practices and actions: This type of participatory process should inspire the co-creation of alternative actions through which to achieve a shared goal. It is important that once the actions or possible solutions are put forward, they are again reviewed and discussed/assessed for how transformative and innovative they are ... it may be necessary to redesign them.

The outline presented below shows the specific objectives that were addressed with each of the activities. It also illustrates which activities were directed towards individuals and which sought to foster the interaction of the group. Finally, we show the activities that were developed in each interaction.



INTERACTIONS	Re-conceptualize and re-frame the problem	Question dominant narratives and meanings	Reflect on agency (eg. capacities, responsibilities and role)	Explore alternative pathways to change	Identify barriers to change	Re-design and co-create new practices	Evaluation
Baseline: Cognitive Map, 💿				•			
T-Labı 🎄							
Avatars Mapping values							
Feedback T-Lab 1 🔘			•				•
I1. Problem Tree 🙀							
I2. A day in the chinampa 🔅	•						
I3. Climbing Teuhtli volcano 🅸	•						
I4. Post earthquake 🙀				•			
 Avatars Agency Networks Dioramas O Mercado de oferta-demanda 							
I5. Courses of Action 🏽							
I6. Building bridges 🎉 across worlds	•		•	•	•		
Avatars Q Game Interviews							
I7. Session with women 🔅 from irregular settlements							
T-Lab 2 இ Ø Cognitive Map ● Participatory Planning ● ● Tiny Books ●	•				•		•
Feedback T-Lab 2 💿							
Measuring Potential Change: Cognitive Map, Agency 🙀 Network, Q Method	•		•				
Presenting results							
Workshop Exploring participatory			•	•			
Videos about () transformation traps					•		•
Methods Individual interactions Individual interactions							

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GENERAL RESULTS OF THE XOCHIMILCO T-LAB

by Federico Contreras Participant of T-Lab Xochi, September 2018

Although at the beginning the participants' perceptions and interests on the system primarily identified with either one of two traditional groups of Xochimilco (agricultural producers/ chinamperos or urban residents), the dialogues and processes that took place over the almost three years of the project allowed them to recognize that they share some values and meanings. They also recognized that various worlds coexist around the urban wetland of Xochimilco (many more than two) and that since they share the same system, it was more important to build bridges between them than to remain divided; thus, they began to understand their respective positions, and the agricultural producers developed greater empathy for the residents of urban settlements, particularly those living in informal settlements. In some cases there were even new collaborations across these groups and seeds were planted for future, joint actions. One of the most important results was that the participants recognized the need to "change the chip," that is, to change from within, to change the paradigm, and thus the importance of changing the relational dynamics concerning what is happening among their neighbors and other members of the community.

METHODOLOGICAL DESCRIPTION OF THE **ACTIVITIES**

Experiences of the Xochimilco T-Lab

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ACTIVITIES

A.1	
A.2	COGNITIVE MAP
A.3	VALUES, MEANINGS AND BELIEFS
A.4	AGENCY NETWORK
A.5	
A.6	MAPPING VALUES AND MEANINGS
A.7	SEEING THROUGH THE EYES OF OT
A.8	DIORAMAS OF POSSIBLE WORLDS
A.9	PATHWAYS TO SUSTAINABILITY (
A.10	TINY BOOKS
A.11	EXPLORING PARTICIPATORY EDUCA TOOLS SUPPORTING TRANSFORMAT

PARTICIPANTS' SELECTION

The selection of the individuals that participate in a process must be pursued with care. In this case, we suggest considering two fundamental aspects:

- Diversity among the participants Diversity is achieved by involving people who represent different points of view on the issues that will be addressed and who have different capacities to implement proposed actions.
- 2) The potential for collaboration Willingness to collaborate is important so that participants agree to work with individuals who may think differently and so that they are willing to find solutions and proposals even when the process is uncertain or different than their expectations. (However, sometimes it can also be interesting and useful to incorporate a participant who does not comply with this. In other words, to invite a potential disruptor that may be capable of contributing provocative statements and perspectives that generate deeper conversations in the group, specifically when they are questioning dominant discourses about the issues).

Communication and the establishment of clear objectives regarding the relationship between the facilitators-researchers and the participants is also key in order to ensure that the invited participants remain involved in the process.

Thus, from the beginning, it is important to establish a mode of communication. This is essential in order to maintain constant communication with the participants, both individually and with the group as a whole. It is important that both the facilitators and the group decide from the beginning what the objectives of their communication are, since the medium they choose will depend on it. For example, you can choose closed or open media platforms, and allow communication to flow between everyone, e.g., using social networks or group messages/chats.

In the project, individuals were selected according to the following criteria:

- Access to different types of resources, knowledge, and roles within the social networks of the system (e.g. mobilization capacity, connections, influence, responsibility).
- Ability to provide diverse skills, perspectives and ideas from other places to think more creatively.
- Have expressed attachment to the place, willingness to work with diverse individuals and in uncommon methods, and have shown solidarity and empathy with other members of their community.
- Greater propensity to collaborate than to generate conflict.
- Have shown determination and willingness to conserve social-ecological attributes of the system, and change current, unsustainable conditions.
- Have experience in alternative activities (e.g. organic farming, ecotourism, eco-technologies).
- Experience working on community development and grassroots innovation issues.





Photographs: E. Hjort / Group discussions during T-Lab1

IDENTIFY INDIVIDUAL AGENCY

A.2 **COGNITIVE MAP**

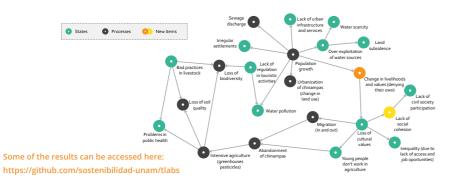
OBJECTIVE: To know how the participant conceptualizes the system and perceives the relationships between the problems that are experienced within it.

METHOD: Fuzzy cognitive mapping, through a semi-structured interview.

DESCRIPTION: Cognitive maps are mental representations of cause and effect relationships between elements, chains of events, or flows of materials and information with which people explain how they perceive their environment. Themes or elements (also called variables) are selected from pre-existing information about the social-ecological system (based on previous research and interviews) to assist the individual in explaining these system relationships. These variables tend to represent system processes (for example, the urbanization of chinampas) and system states (for example, poor water quality).

Participants organize these variables according to their perception of the cause-effect relationships between them. They can also add more variables that they believe help explain the system and its problems. The variables are joined by drawing arrows between them in the direction of the relationship, starting from the causes and ending in the consequences or effects. They should seek to establish at least one connection for all of the provided variables, unless the participant does not consider it relevant, in which case it will be removed.

The result is a map that explains how the participant perceives the causes and effects of certain system problems or issues.



T-LAB XOCHI: These maps allowed us to observe in two different moments how the participants conceptualized the system: one at the beginning of the process to establish the baseline and another at the end o see possible changes. The central themes of the variables we used are associated with deep problems Xochimilco. When comparing the cognitive maps of the participants we could observe two opposing ositions or perceptions which formed groups of narratives: those who are in favor of the conservation of chinampas and those who defend the rights of the inhabitants of urbanized areas. The comparison of the cognitive maps between participants also allowed us to observe where there were echoes with the agency networks (see section A.4), when evaluating if their action space coincides with the most important variables in the cognitive maps. The comparison of the cognitive maps in different times allowed us to observe the subjects or relationships that were most important to the participants.

IDENTIFY INDIVIDUAL AGENCY VALUES, MEANINGS AND BELIEFS WITH Q METHOD

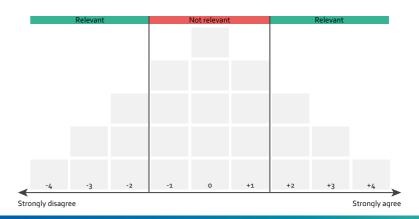
OBJECTIVE: Evaluate how the participant perceives different aspects of the socialecological system in order to understand to which of the attributes they assign greatest importance. This method groups different individuals around shared visions or perceptions about certain aspects of the same social-ecological system.

METHOD: Q-Method, through a semi-structured interview.

DESCRIPTION: The Q-Method reveals orderings of sets of opinion or subjective positions adopted by each individual. First, statements or arguments of the selected topics are drawn up, which describe various aspects of the social-ecological system based on research, documents or interviews previously conducted in the study area. Each participant must fit the arguments into a pyramid, which ranges from -4 (denotes statements with which the participant is in total disagreement) up to +4 (denotes statements with which the participant is in total agreement). At the center are the arguments towards which the participant has a neutral opinion.

Through a factorial analysis in the statistics program R, the responses as a whole identify the clusters that are formed between participants who have similar perceptions of the system.

The result reflects how the participant understands the different elements and attributes of the system.



T-LAB XOCHI: In our project, we elaborated 28 statements referring to four themes: property rights, identity and values, pressures in the ecosystem and livelihoods. The participants did the exercise twice: once at the beginning to establish a baseline and to document the narratives of each par ticipant and again at the end of the process, to document possible changes in perception or prioritie that reflect changes in the conceptualization of the problem.

> https://qmethod.org https://cran.r-project.org/web/packages/qmethod/qmethod.pdf

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IDENTIFY INDIVIDUAL AGENCY **a** 4 **AGENCY NETWORK**

OBJECTIVE: To identify the existing collaboration network among the participants, which constitutes their space of social action.

METHOD: Mapping of social networks, through semi-structured interviews.

DESCRIPTION: On a flip chart, three concentric circles are drawn, like a target, and subdivided into four quadrants. Each circle represents the closeness of their collaboration (for example, in terms of frequency), while each quadrant represents a sector: government, civil society, academia and the private sector.

The participant must identify the individuals with whom he/she collaborates through work, research, or activism related to their central activity. To do this, the participant writes the name of each collaborator on a sticky paper in a color that corresponds to the sector to which that collaborator is associated (government, civil society, academia and private sector) and places them in the quadrant of the corresponding circle, where the central circle is the space of greatest frequency or intensity of collaboration, and the circle farthest from the center is the least frequent.

While the participant identifies his/her collaboration network, he/she lists the different activities or practices that he/she develops with each individual of their network, which constitute the practices through which they are linked. These practices are recorded in a list or at the side of the individuals in the network.

Once the individuals and practices of the network have been identified, the direction of the relationship between the subject and his/her collaborators is described. For this, the participant draws an arrow that unites her with each individual, indicating the direction of the relationship. There are three possible interactions directions: 1) the participant influences the identified collaborator, 2) the collaborator influences the participant, or 3) they both influence each other.

For network analysis we used Cytoscape software (https//cytoscape.org)

Participant

Collaborator

Practices (activities)

←→ Direction of influence

1 2 3 Strength of influence

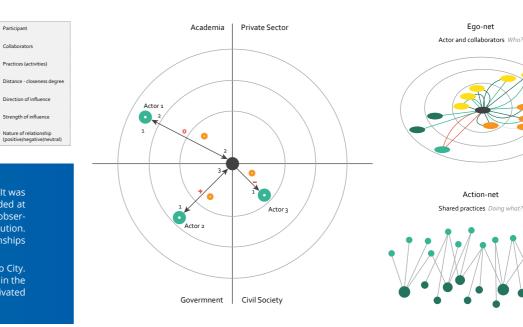
+ – O Nature of relationship

T-LAB XOCHI: The social network of the participants was continuously modified over time. It was important to be able to see the changes, which is why the participants' networks were recorded at the beginning of the project, and at the end of the project. In particular, we were interested in observing relationships in terms of closeness, collaboration practices, influence, diversity, and distribution. r example, if new relationships had been formed between new collaborators or if the relationships with old collaborators had changed in some way.

A very significant moment for change in collaboration was after the 2017 earthquake in Mexico City. Several participants spontaneously contacted each other to carry out reconstruction activities in the area. This suggests that alliances and collaborations can be in a dormant state and then activated when there are clear needs.



Photograph: B. Ruizpalacios / Participant creating her agency network





AVATARS - AGENTS OF CHANGE

OBJECTIVE: Identify characteristics or capabilities (which we call *powers*) that participants can share with the group and other individuals and that they can activate in order to achieve specific goals.

METHOD: Graphic self-representation

DESCRIPTION: The facilitation team prepares a list of characteristics based on the analysis of the profiles of the participants and general characteristics associated with collective agency. Each participant reflects on the characteristics (powers) that he/she has in the context of the project and chooses five from the list, or that they create themselves, to describe him/herself.

Subsequently, each participant draws an archetypal being or character that represents him/her, thinking of something or someone with whom he/she identifies, who describes him/her or who he/she would like to be. This being will be the symbol that represents the individual in the group. They also assign it a name.

Each participant hangs their avatar on the wall and presents it to the group, explaining why it has that name, that form, and those powers. These avatars will be invoked in subsequent activities when it is necessary to think of qualities or individual powers that can be activated to promote changes in the system and achieve set objectives. When the avatars are invoked, the existing powers, the new powers, or those that are no longer relevant, as well as those that were activated in the new circumstances, can be confirmed. The avatars are, then, malleable and changing beings, whose powers are continuously modified.

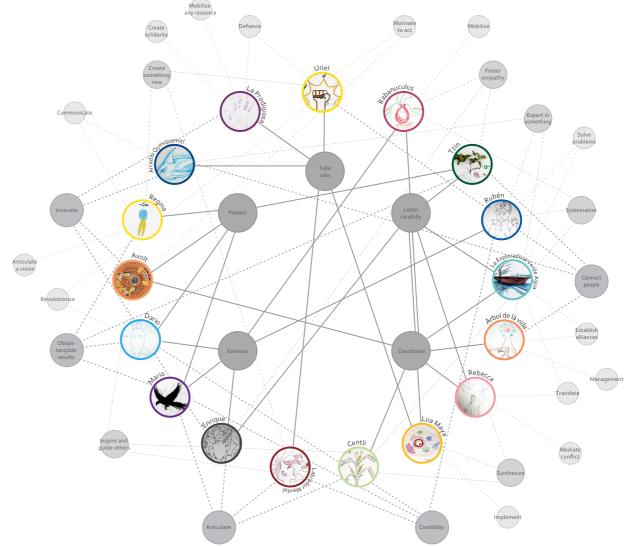


Image: Avatars and their powers

T-LAB XOCHI: The avatars were "activated" at various times throughout the project and were an effective way to motivate individual actions and associate them with collaborative activities; in other words, to think about the individual capabilities existing among the participants so that when they are activated they can contribute to achieving certain collective goals. This allowed us to observe agency in different contexts of planning or reaction to crisis.

Examples of two moments in which the avatars were used:

T-Lab Xochimilco activity
 Earthquake September 19, 2017

An activity was designed in which the participants had to identify elements or attributes of their community that they value most and the processes that could sustain those values or make them disappear. Later they had to associate the powers of their avatars with what is required in order to carry out the actions that they imagined were necessary to sustain what they value in their community. This activity allowed the participants to reflect on the different contexts in which they might activate one or several of their capacities/powers, in other words, the versatility of their individual agency, as well as their collective potential to achieve common objectives when they combined the capacities of more participants.

2 Mexico City suffered an earthquake on September 19, 2017 that greatly affected Xochimilco, particularly the town where several of the participants reside. In November, we held a meeting to identify the collaborative networks in which we could participate through specific activities to assist recovery. When reviewing the capabilities/powers of the avatars that were activated after the earthquake, we noticed that they had changed: some were confirmed, others were eliminated and new ones were added. This allowed us to reflect on the capabilities that we did not know we have, but that are activated in emergency situations and when we participate in new, collective activities.



MAPPING VALUES AND MEANINGS

OBJECTIVE: To allow the emergence of emotions associated with meaningful attributes in the community for each participant, in order to collectively define the boundaries of the system, define the system's problems, and connect these to the avatars.

METHOD: Participatory mapping

DESCRIPTION: This activity is implemented in two phases. In the first phase, the participants are divided into small groups to identify the attributes of greatest meaning to them in their community, following these steps:

- 1) Each participant lists the meaningful attributes that he/she values, and picks two.
- 2) Each participant represents these attributes through the use of symbols.
- 3) Each group discusses the attributes, their meaning, and why each attribute is valued, using the following guiding questions: Why do you value this? What does it provide you? How does it affect you emotionally?
- 4) Each group constructs a model of the system, representing the values and meanings of the group.

The facilitators use a chart to record each attribute, why it is valued and the corresponding emotions it evokes.

In the second phase, all the participants reflect on the system and the possible processes that could either maintain or modify the meanings of the valued community attributes, seeking to answer these questions: Can we preserve what we value in a different way than we are doing? If we value "x" for "y" reasons, can we preserve "x" in a new way? Are the different processes influencing the community attributes compatible or conflictive? Each group follows these steps:

- The group removes the physical symbols of the community attributes that they value from the table so that only their (written) meanings are left.
- They list the processes that could sustain what they value and discuss different pathways and powers that they could draw on to enable those processes.
- 3) They look for synergies among processes that could support what they value; they also identify processes that negatively affect what they value to the extent that sustainability would be impossible.
- 4) On a large roll of paper, the group collectively constructs a map of what they value in the community, noting which attributes they want to sustain, identifying and noting the actions that they could take to maintain the processes that help sustain each value, and listing the powers that each participant can provide that would be collaboratively useful in supporting the actions they identified.



T-LAB XOCHI: The project participants brought photographs of their chinampas, and discussed the traditions that make up the identity of the different villages in Xochimilco, some of which are colonial or even Pre-Hispanic in origin. During the session, we thought it was important to separate the material reality (e.g., a piece of land, like a chinampa) and the meaning associated with the material reality (e.g., self-sufficiency) in order to encourage deeper reflection about the element of loss (which is sometimes inevitable) in a process of transformation. This activity allowed us to identify the attributes that were valued in the community and those that were being lost through urbanization. We continued with the reflection and identification of the attributes that they wished to maintain, and the actions or processes that would be necessary to sustain them. We identified three primary attributes:

VALUED ATTRIBUTES / ELEMENTS	ATTRIBUTES TO SUSTAIN	ACTIONS / PROCESSES
a) identity	Associated with resistance, pre-hispanic, colonial and contemporary history and culture	Formation of alliances and collaboration
b) place aesthetics	Associated with the unique ecology of living in a urban wetland and the activities that this situation allows them to engage in and enjoy	Create new, feasible livelihood opportunities
c) self-sufficiency	Associated with the capacity to produce their own food in their chinampas, their homes and land, and harvesting rainwater	Local food consumption, restoration of traditional practices, and technological innovation



SEEING THROUGH THE EYES OF OTHERS

OBJECTIVE: Learn different points of view about common concerns by participating directly in the activities that are emblematic of the different viewpoints and the associated identities of different participants, in order to connect different worlds.

METHOD: Participant observation during excursions

DESCRIPTION: Select an emblematic activity, livelihood, or place that represents or from which emerges the point of view of one of the participants in the group. This person then organizes a participatory activity for the entire group, so that each participant can personally experience what it means to have the organizer's perspective.

By participating in "new and different" activities guided by "experts," for whom such activities are part of daily life, the words that participants use assume greater meaning: they begin to incorporporate individual and collective experiences with the values, meanings, knowledge and practices of the person who shares them. The "expert" guide allows the participants to better understand her arguments and reasoning, in other words, her particular point of view, which then enables greater empathy among the participants.

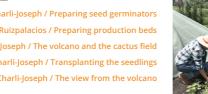
PROJECTS: A day in a chinampa and a climb up the volcano Teuhtli



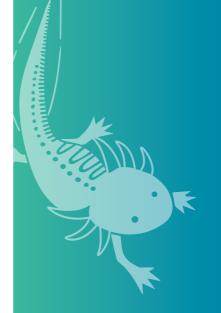


Photograph 1: L. Charli-Joseph / Preparing seed germinators Photograph 2: B. Ruizpalacios / Preparing production beds Photograph 3: L. Charli-Joseph / The volcano and the cactus field Photograph 4: L. Charli-Joseph / Transplanting the seedlings Photograph 5: L. Charli-Joseph / The view from the volcano









https://steps-centre.org/

blog/a-day-in-the-chinampas/

T-LAB XOCHI:

Participants in the project included chinampa farmers, members of civil society organizations that work with farming or eco-technologies, activists working with irregular settlements, academics, and urban residents: that is, people residing in the different worlds of Xochimilco. Each participant has a unique history in Xochimilco and thus has developed a unique point of view, and very particular interests and concerns. Among the participants there were two particularly contrasting perspectives: on the one hand, there were those who defended chinampa agriculture and were opposed to the urbanization that threatened it; and on the other were those who argued for the right of residents in irregular settlments to have basic services and to be recognized and integrated as part of municipal planning, even when they were settling on the chinampas and thus contributing to chinampa degradation.

The participants recognized that a variety of different worlds coexisted in Xochimilco in addition to these two contrasting positions. In order to learn a bit more about these two particular worlds, we organized two activities. The first consisted in participating in farming activities of the family of one of the participants who raised cows and goats and cultivated vegetables in a Xochimilca chinampa using local farming practices that they had improved with permaculture techniques. The second activity consisted in a traditional climb up the Teuhtli volcano, from which you could see the Xochimilco wetland and Mexico City. The walk has different meanings for different people; for some it is an annual pilgrimage, for others it is a rite of passage to adulthood, and for others it is an excuse to socialize and strengthen ties. In our case, it allowed us to see another side of Xochimilco, and to see, panoramically, how the urban area and the fragile chinampera agricultural zone compete for space over the wetland; in other words, a more systemic vision of the problem.





DIORAMAS OF POSSIBLE WORLDS

OBJECTIVE: Represent what the community considers as a desirable future, re-incorporating the attributes they value and want to preserve, and considering the barriers they face in making their community the place that they wish it to be, as well as the individual capabilities of the participants.

METHOD: Visioning

DESCRIPTION: The participants are divided into small groups of 2-4 people. The activity is implemented in three phases:

- The participants reflect on community events or moments that provided opportunities for new experiences or learning and that could represent an opportunity to design new approaches to addressing problems and differences in the community. Each participant takes turns commenting, in response to questions such as: "What type of processes are going to be acceptable, necessary, desirable?"
- Using different materials, each group constructs a diorama or three-dimensional model that represents the desirable future.
- 3) Returning to the avatars, the participants identify the powers that could be mobilized to overcome different challenges and barriers (institutional, cultural, etc.) encountered while trying to create the community's desirable future.

Photograph 1: S. González / Ecotechnologie. Water harvesting system and dry toilet Photograph 2: S. González / Living near the chinampas in adequate housing

T-LAB XOCHI: This activity was undertaken following the earthquake of September 2017; we thought that the need to rebuild Xochimilco could be an opportunity to think about constructing a new desirable future with less degradation. The participants designed a new settlement for Xochimilco, taking into account the chinampa area as well as the mainland, and reconsidering the values they had identified in their values mapping activity, and the barriers that they might confront in implementing the vision of their desired future for Xochimilco. The question that guided the participants was: "What type of urbanization would be acceptable?" The groups constructed a representation of what they would like the wetland area to look like, including the type of construction that the area could have, the type of land tenure, the materials, services and location of any construction, with water and trees, taking into account cultural barriers such as apathy and corruption.







PATHWAYS TO SUSTAINABILITY GAME

OBJECTIVE: Drawing from the different individual capabilities of the participants, explore pathways of change, in a safe space, through a process of making collective decisions to address pre-established conditions or scenarios, with the goal of shifting towards the community's sustainability.

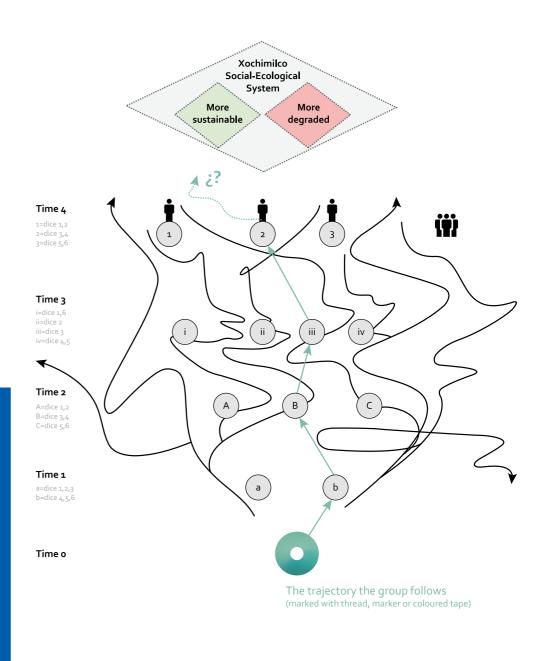
METHOD: Participatory game

DESCRIPTION: This game was designed to explore and expand participants' visions in terms of the problems and needs of the community, and illustrate the relationships that exist between the distinct realities present in the group. In the game, the participants make decisions that benefit the social-ecological system in its entirety and that, at the same time, bring them closer to their goal. They also assume different roles of responsibility in relation to the community, discuss the different dynamics that affect the community, and decide what specific actions they want to implement in both favorable and unfavorable contextual conditions. This process both recognizes and challenges the different opinions and positions of each participant. The game leads to an exchange of points of view, an exploration of the consequences of decisions for different parts of the community and the system as a whole, and a qualitative analysis of the distribution of benefits that occurs with each step in the game.

T-LAB XOCHI: The game was played by chinampa farmers and conservationists on the one hand, and residents of irregular settlements on the other, and activists collaborating with one or the other of these two groups. The game dynamics permited these participants, who normally would be in an-tagonistic relationships, to seek shared goals and explore different ways of achieving them. Sharing goals and pathways was important because the players represented different worlds within Xochimilco that are often in conflict. This is, in part, because of what Xochimilco represents for each group, and in part because they each blame the other for the degradation they observe in the community and for the corresponding difficulty in acheiving their respective needs.

The discussion permitted each group to reveal their positions. The residents of the irregular settlements sought a safe place to live with access to potable water and sanitation. The farmers sought ways to maintain their traditional livelihoods and their identity as chinamperos, while at the same time conserving the ecosystem and the ecological services that it provides. Both groups share an vinterest in conserving the patrimony of the wetland.

The aftermath of the 2017 earthquake was still evident in the community and the reconstruction was still underway. This fact animated the discussion of the participants who expressed their experiences, realities and conflicting perspectives in the simulated and safe space of the game, given that there was nothing real at stake. The scenarios and the game allowed for empathy, as the participants began to understand the motivations of each group and could identify shared goals, such as the significance of living in a vulnerable system threatened by urbanization, but over which their actions, and desires to continue to enjoy the predominantly rural landscape, might have limited influence.



https://steps-centre.org/blog/creating-bridgesthrough-the-pathways-to-sustainability-game/

A.10 TINY BOOKS

OBJECTIVE: Distill one or several ideas, express points of view, capture experiences and assessments through written narratives and illustrations.

METHOD: Narrative evaluation

DESCRIPTION: These Tiny Books are developed in the spirt of democratizing knowledge and making different ways of being and living in the world accesible to everyone.

The inspiration to create Tiny Books was drawn from the the Living Aulas meeting (June 2018, Colombia) coordinated by the T-Learning network (Transformative Learning Network), together with the Acknowl-EJ network (Academic-Activist Co-Produced Knowledge for Environmental Justice) and Pathways Project (Pathways: Transformation to Sustainability network), all financed by the program Transformations to Sustainability of the International Science Council.



Fold three times a piece of letter-sized paper to obtain a 16-page Tiny Book. The edges that are folded become the bottom part of the books (see the Annex).

The participants narrate their experiences and assessment of the Project in the form of one or more stories. The content will depend on the form of guiding questions that the facilitation team proposes.

To finish, make copies of each "Tiny Book" for each participant; cut the paper along the blue lines (in the form of a cross), make the book covers (ideally using a thicker paper, of a different color) and staple or sew each Tiny Book. Then give each participant a miniature library with a copy of each book.

https://transformationstosustainability.org/magazine/tiny-books-for-t-learning/ http://transgressivelearning.org/2018/08/24/transgressive-learning-through-a-tiny-library/

T-LAB XOCHI: During T-Lab2, the participants made the Tiny Books with text and illustrations, prompted by the following questions:

- 1) What is the Xochimilco T-Lab for you? What made it different or distinct from other project processes you've engaged in?
- 2) How do you imagine a sustainability transformation for Xochimilco? What would your avatar do to make it happen?

3) How would your project contribute to a desirable transformation for Xochimilco?4) In two years time, what will you remember about this process that you'll want to relate to others?

Each participant represented his or her reponse to the questions with illustrations, narrative and story telling.

EXPLORING PARTICIPATORY EDUCATION TOOLS SUPPORTING TRANSFORMATION

OBJECTIVE: Strengthening the capacities of the participants to undertake transformative action in their communities.

METHOD: Participatory workshop

DESCRIPTION: This activity should be planned according to the particular interests expressed by the participants during the T-Lab process. This activity overlaps with planning and other activities that demonstrate different methodological tools to enable participants to design and implement activities in the future. In this way, the participants experience using these tools and, simultaneously, can plan as a group how to solidify their interests.

It is important that those who are the facilitators of the process participate in this activity along with the rest of the participants, and that the facilitation and training responsibility is given over to external participants who are neutral to the process. This helps diminish the possibility that participants will turn to the facilitators for guidance, and allows the participants to take on more leadership and responsibility.

Also, it is crucial that there is a space for reflection about the tool's purpose and recommended use at the end of this activity. It is also recommended that the organizers give each participant a written account of the workshop and a "box of tools and readings" for future consultation.



T-LAB XOCHI: This workshop was based on the the interests of the participants in:

1. Grounding their discussions and concerns in concrete actions to help their community's development, and 2. Learning participatory tools and facilitation techniques to enable them to take these and other actions in their community, and to realize the products they worked on during the T-Lab 2 (i.e., development of an educational project to connect different worlds of Xochimilco around the theme of water; this was the starting point for the actions proposed during the workshop).

A team of faciltators experienced in the use of participatory tools, popular education and theater was brought in to design and direct the workshop. The workshop took place on a chinampa given that this was a meaningful place for the participants. In the workshop, they experimented with and reflected on education for transformation and planning and facilitation of activities. They integrated personal experiences and expectations with definitions and academic content and were sensitivite to the collective interests. Each participant received a "tool box" of tools and readings so that they had material to design their own interventions.

ANNEXES

ACTIVITY LOGISTICS

ACTIVITY	MATERIALS	Ö DURATION
A.5 Avatars	Flipchart sheets, markers, adhesive tape.	40 minutes
A.6 Mapping values and meanings	Avatars, photographs that participants bring of what their community means to them, playdough or clay, figures for mockup (related to the topic of the pro- ject or activity such as animals, trees, cars, fences, construction objects), small objects (stones, branches, leaves, shells, etc.), kraft sheets of paper, sticky notes (post-its), markers.	3 hours
A.8 Dioramas of possible worlds	Avatars, colored playdough, wood stic- ks, objects for making mockups, other miniature objects.	1 ½ hours
A.9 Pathways to Sustainability Game	Avatars, board (one per group), dice (one per group), colored cards, markers, adhesive tape.	2 hours
A.10 Tiny Books	Letter size sheets with the marks of the template, markers, colored pencils.	40 minutes
A.11 Exploring participatory education tools supporting transformation	Colored cards, flipchart sheets, mar- kers, adhesive tape, yarn, glass bottle, post-its, spring, colored round labels, process materials, a personal object that represents the theme/territory.	1 day

A.9 GAME INSTRUCTIONS

The general aim of the game is to steer the system towards a more sustainable pathway and choose specific actions and projects to reach it. Groups of 4-6 people are formed. Each group acts as a committee (incorporating each individuals' actual capacities) that is in charge of making and implementing decisions. The game consists of sequential phases that reflect the three years of funding allocated to the committee. Each committee begins the game at 'Time 0' and finishes at 'Time 4'. At the beginning of every year, each committee has to define an action for which it has unrestricted, but realistic, funding. At 'Time 0', the committee has a preliminary set of actions to choose from; and for the subsequent phases, each action is created by the participants.

In addition to taking a decision, each year, after the throw of the dice, the committee faces specific 'conditions' that could either hamper or favor their chosen goal. The social-ecological system created in the game thus evolves through five states: a starting state (Time 0); three states which each emerge from the outcome of the committee's decision and the 'conditions' they encounter by rolling the dice; and, finally, an 'end' state (Time 4). Each time has a duration of 10 min aprox.

Time o	Time 1	Time 2	Time 3
Condition 1 The Xochimilco of today	Condition 2 (circle a) Water problems in Iztapalapa	Condition 4 (circle A) Xochimilco as a water storage reservoir	Condition 7 (circle i) Problems in Cutzamala basin and in water
Set of decisions: 1. Eliminate / destroy irregular settlements 2. Reconstruct irregular settlements, but in a way more compatible with the ecosystem. 3. Invest in recovery and renovation of the chinampas for agricultural use.	Condition 3 (circle b) Elections season in borough	Condition 5 (circle B) Potential to loose World Heritage designation Condition 6 (circle C) Mega urban development to be constructed in area	services demand Condition 8 (circle ii) New policy on "regularizing" irregular settlements Condition 9 (circle iii) Xochimilco as green city model
 Implement an ecological restoration program. 			Condition 10 (circle iv) Economic recession

At the end of each Time, ask:

After the decision has been made, what does the system look like in terms of: a) the ecological state; b) the social states regarding the wellbeing of the communities; c)state of the relationship between the sectors in the community; d) the state of the relationship between the community and the government.

Time 4

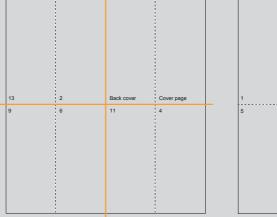
What would you imagine would be the characteristics of individuals living or working in Xochimilco in Time 4 in order to attain a more sustainable system? What powers-capacities of the population are needed to challenge the status guo and to achieve a more transformative state?

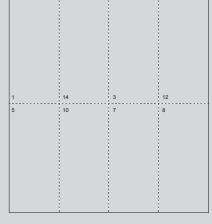
What strategies might enable both personal and community transformations in terms of: habits (eg. diet, consumption, transport); decision-making schemes; motivations (eg. work, young people); professional aspirations; types of entertainment; etc?

A.10 TEMPLATE FOR THE TINY BOOKS

Front:

Back:





RESOURCES AND REFERENCES:

North American Hub STEPS Centre https://steps-centre.org/global/north-america/

North America Hub Blogs:

How rethinking local people's agency could help navigate Xochimilco's troubled waters https://steps-centre.org/blog/new-forms-agency-help-navigate-xochimilcos-troubled-waters/

A day in the chinampas https://steps-centre.org/blog/a-day-in-the-chinampas/

What 'Agency' do researchers have in transformative research projects? https://steps-centre.org/blog/agency-researchers-transformative-research-projects/

Creating bridges in Xochimilco through the "Pathways to Sustainability Game" https://steps-centre.org/blog/creating-bridges-through-the-pathways-tosustainability-game/

Xochimilco and its chinampas: Lessons from the earthquake of September 19, 2017 http://web.ecologia.unam.mx/oikos3.0/index.php/todos-los-numeros/ articulos-anteriores/363-xochimilco-sostenible

LANCIS-IE-UNAM webpage

http://lancis.ecologia.unam.mx/

Transformative pathways to sustainability: learning across disciplines, contexts and cultures (PATHWAYS Network). Principal Investigators: Adrian Ely, SPRU/ ESRC STEPS Centre; Anabel Marin, CONICET.

http://steps-centre.org/project/tkn/

Promoting transformative pathways to sustainability: The Transformation-lab in the Xochimilco social-ecological system. Principal Investigators: Hallie Eakin, SOS-ASU; Co-Principal Investigator: Lakshmi Charli-Joseph.

https://github.com/sostenibilidad-unam/tlabs

Charli-Joseph L, Siqueiros-Garcia J, Eakin H, Manuel-Navarrete D, and Shelton R. 2018. Promoting agency for social-ecological transformation: a transformation-lab in the Xochimilco social-ecological system. Ecology and Society 23(2):46.

https://www.ecologyandsociety.org/vol23/iss2/art46/

Pathways Network (2018) T-Labs: A Practical Guide - Using Transformation Labs (T-Labs) for innovation in social-ecological systems, Brighton, UK: STEPS Centre ISBN: 978-1-78118-478-3

https://steps-centre.org/publication/t-labs-practical-guide/



Documentation of Workshop on participatory methodologies, Xochimilco Wetland, February 3, 2019 by Ingrid Estrada [INANA AC, COBIJA]

Xochimilco is flat-bottomed canoe, camomile, a child's story, a seashell, food, important people, beer, carnations, flowers, vestigies, axolote, memories, feathers, fertile soil, corn of many colors, roots.

It is a meaningful place that has changed my life, and that of the grandfather of my grandfather and what I want it to be for my children, is the relationship that the people who live here have with their environment, in spite of the fact that it has many problems now and is fragmented, we are also part of the solution. The soil is fertile because the plants transform it.

And from here we can learn, from living, experiencing, unlearning/ reflecting, never alone, alway in dialogue. It's cyclical, it's not just about acquiring knowledge.

And we're here, we all are looking for someone else to solve our problems, there are those that pull us in different directions and people who struggle to maintain the essense of this place.

What is it that we want: Support for one another, community, hoes, work, equity, water, ciento, planting. Without wanting to we all look in one direction, maybe it won't resolve our problems, but we always go about solving them as a community.



