



Fig. 1
Counter-mapping workshop with the 'Soldados' highland community in the southern Ecuadorian Andes. Adapted from a photograph by David Fajardo.

Co-design

Through Visualising Waterscapes

Catalina Rey-Hernández¹ The academic research field tends to conceptualise and categorise reality and detach it from its context to generate knowledge that is often accessible only to expert peers. Usually, these results do not return to the socio-political environment of the study object. However, knowledge production is a dynamic process where visual methodologies can play an essential role in generating specific data for research, co-creating new insights with the communities involved, and communicating findings to engage with a broader audience. In that sense, drawings can make knowledge more visible; therefore, a visual translation into a standard, understandable language can bring academia closer to society. In that context, the research work developed through the Circular Water Stories (CWS) lab aims to investigate complex traditional water systems and to translate them into understandable drawings that convey complex knowledge through a common language that different disciplines and audiences can relate to and easily understand. This essay is a personal reflection on using drawings in research as a graphic tool for conveying ideas and co-creating knowledge. Furthermore, through two concrete experiences, I explore how these visualisations can translate complex realities and information into an understandable language, returning knowledge from academia to society.

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In academic research, knowledge is often produced in ways that seem disconnected from everyday life, creating a separation between the research outcomes and the people they are meant to serve. This detachment, while necessary for academic analysis, makes knowledge inaccessible to the public, as it is often framed in technical languages and scholarly discourse. Such a gap can alienate those who can directly benefit from research insights. (Karlsson, 2007)

However, knowledge production is not a one-way process. It is dynamic and co-creative with researchers and subjects engaging in reciprocal relationships (Mitchell et al., 2011). Researchers are not detached observers and do not merely extract information; they shape their findings through continuous dialogue with their subjects and adjust their perspectives as they gather new insights (Mitchell et al., 2011). This dynamic process emphasises the importance of methodologies that bridge the gap between technical academic knowledge and the broader public, thus making research more accessible and meaningful to civil society (Karlsson, 2007).

Visual methods, mainly drawings, maps, diagrams, schemes, and sketches, have emerged as powerful tools that make complex knowledge visible and translate it into a more universally understood language (Vass et al., 2022). At the same time, visual methodologies play an essential role in the dynamic nature of knowledge production through collaboration and co-creation. Modern research practice increasingly emphasises interdisciplinary approaches and collaborative efforts, bringing diverse perspectives and expertise together. This collaborative environment fosters the dynamic exchange of ideas, leading to innovative solutions and new forms of knowledge. Co-creation through visual methods involves researchers, practitioners, policymakers, and communities shaping the research process (Galvaan, 2007).

OPENING THE RESEARCH

The approach to academic research often prioritises text-based outputs, which, while effective in specific contexts, can be limited in their ability to convey complex multidimensional realities. By contrast, visual methodologies offer alternative means of communication that can transcend linguistic and disciplinary boundaries. Drawings, schemes, diagrams, maps, etc. can clarify intricate concepts into more understandable frameworks, allowing for more inclusive communication during the research and better dissemination of the results to fellow researchers and the communities involved in the investigation process (De Lange et al., 2007).

At the same time, during the process of researching through visualisation, new questions arise in the investigation and incentivise us to delve deeper into case studies and start mapping other values that are usually not drawn or considered in this kind of practice. This visual method helps us make connections between spatial, social, and cultural aspects by mapping the intangible and dynamic aspects of each case. It is certainly a challenge to draw something that is sometimes difficult to grasp or that is constantly changing over time, such as social aspects, human actions, seasonal ecology, or the spiritual-symbolic aspect of a place. However, finding ways to diagram these aspects through systematic, in-depth research based on visualisation can create integrative images that people in the field can read and understand comprehensively (Bobbink et al., 2022).

As these aspects are difficult to uncover, their visualisations are based on consulting cultural and historical sources, often conducted by sociologists, anthropologists, or historians (Bobbink et al., 2022). Therefore, this visual translation is critical in interdisciplinary research, in which communication across different fields of expertise is crucial. By transforming abstract or complex information into visual formats, researchers can engage with a broader range of audiences, including those who may not have the specialised knowledge required to grasp traditional academic output (Mac Entee & Mitchell, 2011).

Therefore, making knowledge more visible is essential for effective communication and dissemination. This is crucial for ensuring that valuable insights and findings are not confined to academic circles but are shared and utilised by a wider audience. For instance, visualisations such as charts, graphs, and infographics can convey complex data in precise, digestible forms, making it easier for non-experts to grasp key concepts and trends.

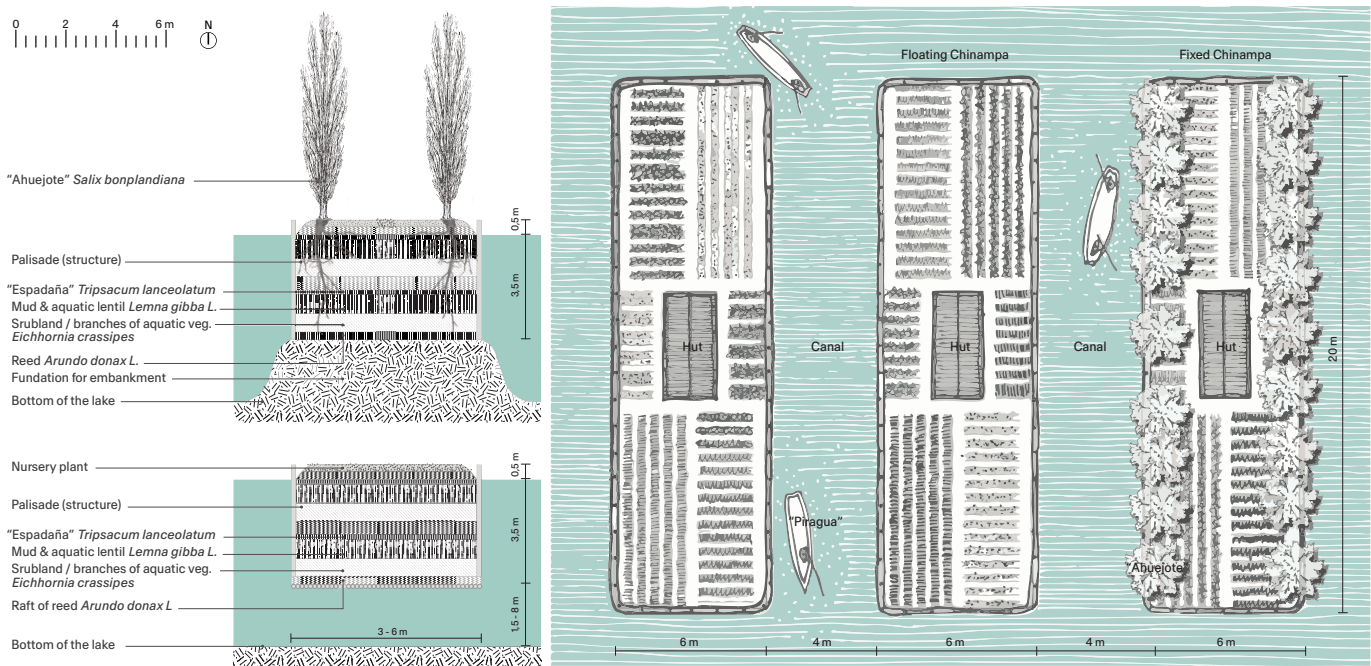


Fig. 2
Detailed plan and section of the Chinampas Farming System in Xochimilco, Mexico City, Mexico. Adapted from Bobbink and Rey-Hernández (2022).

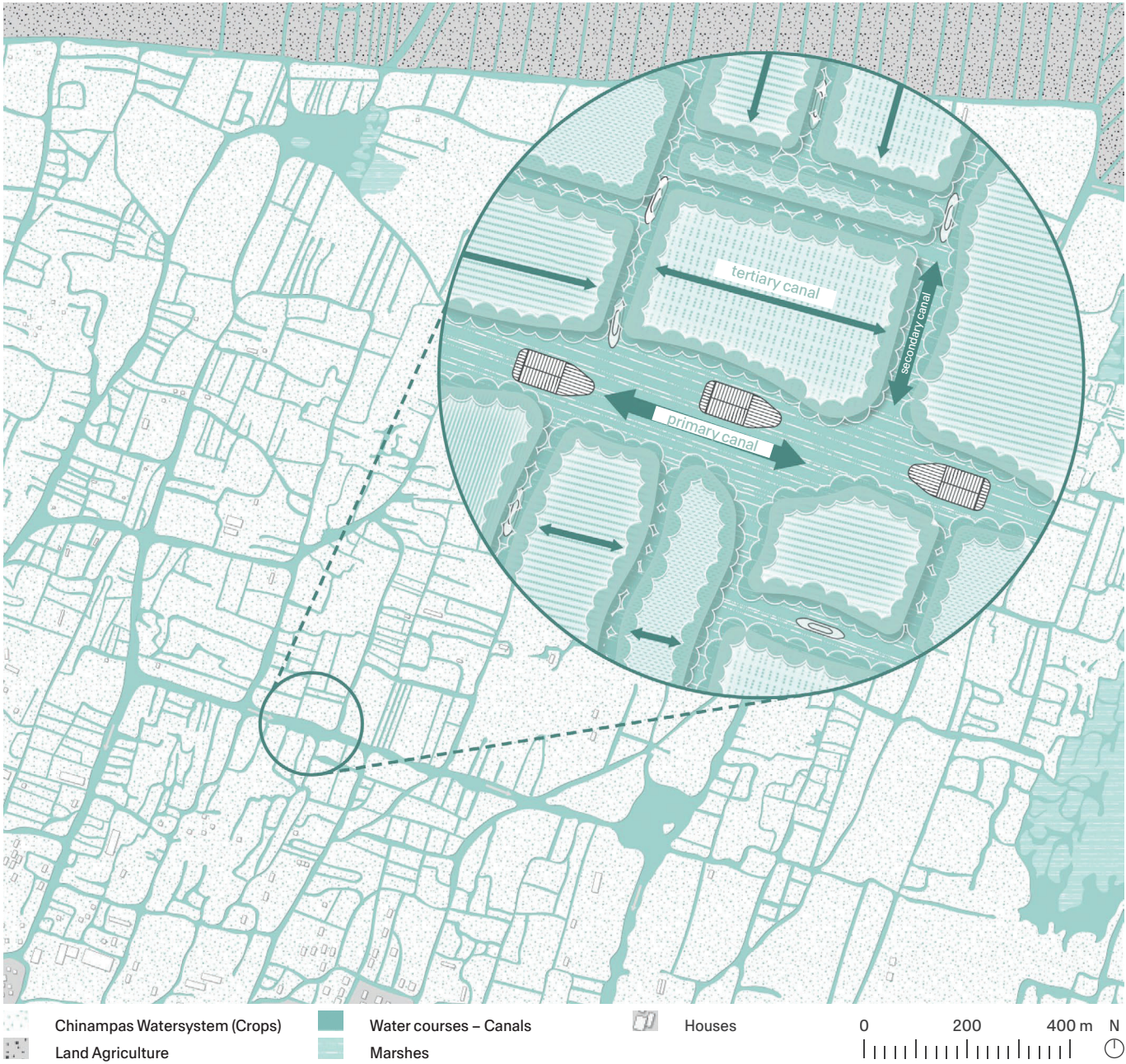
On the other hand, using visualisations to gather data for a specific research project opens up different ways of relating to the case environment. For instance, drawings help to initiate conversations more informally and dynamically when working with people. Thus, as researchers, we can uncover insights that are often unexpressed in traditional interviews or discussions. Working with visual methods in a careful manner can also foster more intimate interactions that enhance trust and commitment between the researcher and the socio-political context and the environment being investigated (Vass et al., 2022). In that sense, research becomes a co-creation among different actors rather than a one-way output that benefits only academia. This approach to collective research development creates an opportunity to consider other voices, worldviews, perspectives, and positionalities that enrich the discussion, and therefore, the research results.

Hence, when translated into visualisations, these research results bring academia closer to society through a common language. By doing so, drawings ultimately bring back the gathered knowledge to the communities

involved in the research process and to a broader audience of ‘non-academics’. Furthermore, in the case of the CWS lab, most students work with cases that are often in their hometowns, familiar to them, or closer to their own culture. In this way, they position themselves as subjects of research, generating insights from their own experiences rather than solely from the case study’s academic research. Thus, the resulting visualisation already contains the positionality and vision of a ‘non-expert’ who can tell a more intimate story about the research itself.

Beyond enhancing communication, drawings and visualisations possess significant persuasive power, particularly in shaping political narratives and influencing public opinion. Visual representations can simplify complex, abstract concepts into immediate, emotionally compelling images that can shape attitudes and drive action (Tufte, 2001). Beyond enhancing communication, drawings and visualisations possess significant persuasive power,

Fig. 3
Overall (current) plan of Chinampas Farming System. Adapted from Bobbink and Rey-Hernández (2022).



particularly in shaping political narratives and influencing public opinion. Visual representations can simplify complex, abstract concepts into immediate, emotionally compelling images that shape attitudes and drive actions (Bresciani & Eppler, 2010). This power makes visualisations not only tools for conveying information but also instruments of political persuasion. By framing social, environmental, or economic issues visually, researchers and activists can advocate for change, challenge dominant narratives, and mobilise collective action, often making them a potent force in shaping political discourse and public policy (Slocum, 2013).

VISUAL METHODS IN PRACTICE

The potential of visual methodologies to bridge the gap between academia and society has been illustrated in many examples. Here, I will dive into Traditional Water System research and reflect on my own investigation as a doctoral researcher.

CWS research investigates traditional water systems, which are often complex and deeply embedded in cultural, environmental, and technological contexts. Owing to their intricate networks and historical significance, these systems can be challenging to understand through text alone. However, by translating these complex systems into visual representations, this study aims to make this knowledge accessible to a broader audience. The drawings produced in this project serve as a common language, enabling people from different disciplines and backgrounds to meaningfully engage with the material. (Figure 1)

As part of the CWS lab at TU Delft, we recognise the significance of Traditional Water Systems¹ and seek to understand and document their beauty and wisdom. The research involved an extensive graphics-based analysis, developing a method for studying landscapes through systematic data collection, and the creation of comparative drawings, maps, and diagrams. This visual methodology aims to uncover the underlying logic of these water management practices and identify potential design and strategic principles that can be applied to modern landscapes and urban design. To achieve these objectives, we employed an Illustrative Method (Bobbink et al., 2022)², grounded in the form-layer method (Steenbergen et al., 2008), as an analytical tool to understand the relationship between the water system and its landscape. The layers reveal the topographical relationship between the structure and form of the interventions, their cultural expressions, spatial experiences, and the use, maintenance, and circularity of traditional human-made water systems (Bobbink, 2019).

Case studies were mapped using this method, which emphasises the spatial and visual elements of water systems. It presents them in a standardised format to help viewers gain a clearer understanding of the geomorphological and sociocultural contexts surrounding these systems (Bobbink et al., 2022). As the drawings evolved simultaneously, a set of thematic drawings and diagrams accompanied by a unified legend for all cases was developed (Figure 2). Throughout the process, it became more apparent which layers (such as soil, height, and relief maps) needed to be combined to capture the essence of the waterscape. Each set of drawings includes diagrams representing the climate zone, flow directions, regional water system, topographical and soil maps, and development of the water system over time. Additionally, technical drawings of the catchment area were created to illustrate the interactions between water elements, waterworks, ecology, and usage (Surajaras & Rey-Hernández, 2022) (Figure 3).

The visual analysis of Traditional Water Systems worldwide has provided valuable insights into landscape-based methods for water-related settlements. By understanding water and land management systems rooted in resource circularity, we can derive specific design strategies applicable to current urban-rural challenges concerning sustainability and resource consumption patterns. Visual learning from these landscape-based approaches enables us to redefine the role of landscapes as multifunctional providers, recognising natural entities such as wetlands and lakes as potential areas for multifunctional development that integrate cultural heritage with social, economic, and ecological values (Rey-Hernández & Bobbink, 2022).

As stated by Bobbink, the Illustrative Method is a site-social analysis that has the potential for further refinement; incorporating interviews and site surveys will enhance the method's precision and depth (Bobbink et al., 2022). The incorporation of this ethnographic aspect into the analysis and visualisation of research has been at the core of my own doctoral investigation, in which I work with counter-mappings and drawings based on interviews and workshops with the communities involved in my case studies.

Fig. 4
Process of co-creating the map for the PhD case study (Yanuncay River Highlands, Ecuador). The Soldados highland community discussed issues and challenges and subsequently translated into the visualisation of this map. By the author.



In this regard, as a trained architect and landscape designer, I communicate through drawings and visualisations. Recently, I further developed this ‘research by drawing’ a method through my doctoral investigation in which I am researching the politics of design in riverine landscapes. This study investigates how river management through landscape design and territorial planning has produced socio-material transformations that directly affect river communities and their livelihoods, prompting local confrontations with imposed designs. To do so, I have been working closely with communities living along a river in the Ecuadorian Andes to create visual narratives through counter-maps that support their struggles through visual argumentation (Figure 4). (Rey-Hernández et al., 2026b)

In this context, counter-design practices can be defined as 'constellations of co-resistance and liberation' that detach design from the 'professional hands' and open it to a broader audience of non-experts and civil society (Daigle and Ramirez, 2019). Counter-maps can manifest as acts of resistance that create alternative collective futures in opposition to top-down visualisations and materialisations (Latour, 2008). This form of counter-

design invites communities, civil society, and researchers to actively criticise the dominant narrative of space, place, and territory by powerful actors and provide alternative territorial representations (Oslender, 2021).

This process allowed me to co-create a visual tool that would remain within the communities to support their socio-political struggles against imposed extractivist projects (Figure 5) (Rey-Hernández et al., 2026a). At the same time, the maps provided me with the data necessary to develop my academic research. In this way, the collaboration in this project generates new insights into the socio-political territory of the river under study, bringing that knowledge back to the communities involved through the co-creation of the map. An essential point to highlight in these cases is the connection we have created between my research and work in Traditional Water Systems research. The interdisciplinary relationship between the two cases created the opportunity to present my doctoral research as a lecture in November 2023.

This essay highlights the potential of visual methodologies as essential tools for co-producing knowledge and bridging the gap between academic research and society. Through the integration of drawings, diagrams, and other visual representations, complex realities, such as Traditional Water Systems and territorial struggles, are transformed into accessible, understandable forms that can resonate across disciplines and with a broader public. However, the use of drawings, diagrams, and other visual representations goes beyond communication. It serves as a means of knowledge production and political persuasion, unveiling patterns, relationships, and insights that may not be immediately apparent through text-based analysis.

Visual methodologies not only simplify complex knowledge, but also facilitate deeper engagement and collaboration between researchers and communities, promoting a dynamic process of co-creation. By working alongside the communities involved in the research, these methodologies ensure that their voices, experiences, and perspectives are central to creating a more inclusive, ethical, and participatory research practice. Furthermore, these visual tools can influence political narratives and mobilise collective action, making them a potent force for social change.

Ultimately, visualisation not only enhances communication, but also democratises knowledge, bringing academic research closer to society and enabling its use as a tool for both understanding and transformation. The CWS lab and research presented here exemplify how the Illustrative Method and other visual tools can translate intricate systems into a common language, foster cross-disciplinary dialogue, and enhance public understanding. This approach represents a significant shift towards more inclusive and accessible forms of knowledge production with the potential to inspire future research practices grounded in collaboration, participation, and interdisciplinary approaches. As the academic landscape continues to evolve, the role of visual methodologies in research will become even more important, offering new ways to generate, communicate, and share knowledge that transcends traditional academic boundaries, and engages a wider audience in meaningful and impactful ways.



Fig. 5
First counter-mapping exploration
for the PhD case study (Yanuncay
River Highlands, Ecuador). Issues
and challenges were discussed
by different actors (riverine
communities, academics, artists,
farmers, activists, students, archi-
tects, territorial planners and local
authorities) and subsequently
translated into the visualisation of
this map. By the author.

NOTES

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1. <https://circularwaterstories.org/analysis/>
2. The Illustrative Method is developed by the CWS lab and uses mapping, visualisations, narratives, or simplified graphics to clarify complex water concepts.