REGENERATIVE RESPONSIBILITY IN ACTION: CO-CREATION OF KNOWLEDGE IN TIMBER COMMUNITIES OF QUERÉTARO

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ABSTRACT

This paper presents an exploratory qualitative case study framing the first stage of a pedagogical and design-based experience developed with timber communities in the Sierra Gorda Biosphere Reserve in Queretaro, Mexico. The project is grounded in the conceptual framework of Regenerative Responsibility (RR), presented in this study as a pedagogical framework developed by the authors, and explores how this framework can be implemented through a relational and participatory methodology focused on building mutual understanding between students and communities.

The process explored the early phases of a five-step methodology: Sensitise, Connect, Imagine, Co-create, and Strengthen. For this stage, the emphasis was placed on Sensitising participants through immersive field experiences and on Connecting + Imagining together with community members, exploring new relational and regenerative futures around the local use of wood as a raw material.

Data collection included reflective student journals, facilitator field observations, participatory mapping activities, dialogue sessions with community members, photographic documentation, and collective reflection exercises. An inductive thematic analysis was conducted to identify recurring themes related to students' understanding of materiality, responsibility, and relational design practice.

By activating a space of knowledge exchange, the project allowed for the recognition of traditional practices and ethical relationships with the forest. Students engaged in collective reflection and situated learning, understanding the socio-environmental complexities of the territory while envisioning possible futures that connect people, nature, and technology.

This approach reinforces design as an eco-social practice, and opens possibilities for innovation rooted in ethical awareness, cultural connection, and circular economic thinking. It also invites a shift in the designer's role, from creator to connector, highlighting the importance of reciprocity, listening, and learning with others. Rather than validating a fixed methodology, the study documents how implementation functioned as an adaptive and reflective pedagogical process that refined the RR framework through situated practice. The study contributes a transferable pedagogical model for embedding regenerative ethics into engineering and product design education through relational and situated implementation.

Keywords: Regenerative responsibility, regenerative design, participatory design, educational innovation

1 INTRODUCTION AND CONCEPTUAL CONTEXT

Design education is at a turning point. While sustainability has become a central discourse within design schools, many approaches remain focused on reducing harm rather than restoring systems. The urgency of socio-environmental crises requires a shift in how designers are formed and how they relate to the territories in which they intervene [1].

This paper presents an exploratory qualitative case study developed with timber communities in the Sierra Gorda Biosphere Reserve in Querétaro, Mexico. The project is grounded in the conceptual framework of Regenerative Responsibility (RR), developed as a strategy for design education, and explores how this framework can be implemented through a relational and participatory methodology. Rather than approaching the community with predefined solutions, the experience sought to build mutual understanding between students and local actors. The emphasis was placed on listening, mapping relationships with the forest, and collectively imagining regenerative futures around the local use of

wood. This paper contributes to the current discussion on regenerative education and design through five interrelated dimensions:

1. To articulate Regenerative Responsibility as a coherent pedagogical framework that integrates ethics, systemic thinking, and participatory practice.
2. Operationalise this framework through a structured five-moment methodology that is transferable and adaptable to other socio-ecological contexts.
3. Provide empirical insight derived from reflective journals, field observations, and participatory activities into how immersive, relational implementation can reshape students' understanding of materiality, professional responsibility, and design agency.
4. Bridge regenerative theory and situated pedagogical practice, the study advances current discussions on how design education can meaningfully respond to socio-environmental crises.
5. Scaffold the praxis of the project through the conceptual framework.

1.1 Regenerative Responsibility

Regenerative Responsibility emerges from the recognition that sustainability, while necessary, is insufficient. Sustainability often operates within a logic of mitigation: reducing impact, minimising waste, improving efficiency. Regeneration seeks to restore the adaptive capacity of socio-ecological systems through a systemic, relational, and place-based approach, rather than merely focusing on reducing harm [2]; Contemporary researchers emphasise reciprocity, living systems thinking, and long-term socio-ecological transitions [3] [4]. RR integrates regenerative design, professional responsibility, and design pedagogy into a unified framework. It positions designers not only as creators of objects, but as agents embedded within living systems whose decisions carry ethical and systemic consequences.

In educational contexts, RR is not presented as an isolated topic. It is conceived as a transversal stance that informs how projects are framed, how methodologies are chosen, and how relationships are built. It calls for designers in formation to recognise interdependence between ecological, social, cultural, and economic systems. The implementation described in this paper represents an attempt to translate this conceptual framework into situated practice.

1.2 Relational Design

Relational Design frames design as a process of cohabitation rather than intervention. Instead of positioning the designer as an external expert who introduces solutions, this approach understands design as a shared inquiry shaped by dialogue and mutual learning [5] rather than measuring predefined outcomes, the study examined shifts in perception, relational awareness, and systemic thinking that emerged through situated interaction, understanding learning as a reflective and relational process [6].

In the context of timber communities in Querétaro, Relational Design meant prioritising relationships over outputs. The workshop was not structured around rapid prototyping or product development in its initial stage. Instead, emphasis was placed on collective mapping, open conversations, and recognition of local knowledge. This perspective allowed students to understand that wood is not merely a raw material. It is part of a living network involving ecological cycles, economic practices, family histories, and territorial identity. Relational Design becomes the operational dimension of Regenerative Responsibility. It translates ethical intention into concrete modes of interaction. Relational Design becomes the operational dimension through which RR is implemented in practice.

1.3 Implementation as Investigation

Implementation is often understood as the execution phase of a previously defined plan. In this project, implementation was approached as a reflective form of investigation in action. The workshop functioned as a living laboratory where assumptions were tested through interaction. Theoretical principles of RR were not imposed; they were examined, adjusted, and sometimes questioned in response to what emerged in the field. This perspective challenges linear design models. Rather than designing first and applying later, the process unfolded iteratively. Implementation became an adaptive and dialogical practice where learning occurred for both students and facilitators [7]. In this sense, implementation is not validation but transformation.

2 THEORETICAL FRAMEWORKS

The theoretical framework integrates three complementary perspectives: ethics of responsibility, systemic and transition design, and participatory design. Together, they support the articulation of Regenerative Responsibility as a pedagogical and methodological approach.

2.1 Ethics of Responsibility

Design decisions are not neutral. They shape material realities, social relations, and ecological conditions. Professional responsibility therefore extends beyond functionality or aesthetic value [8].
Within RR, ethics is framed not only as avoiding harm but as actively contributing to collective well-being. This includes recognising asymmetries of power, respecting local knowledge systems, and fostering reciprocity in collaborative processes. Working with timber communities required acknowledging historical tensions related to resource extraction and economic vulnerability. Ethical responsibility meant avoiding extractive research practices and ensuring that participation was meaningful rather than symbolic. Responsibility becomes situated. It is exercised in the quality of relationships, in the transparency of intentions, and in the willingness to remain accountable beyond the duration of the workshop.

2.2 Systemic and Transition Design

Systemic and transition design perspectives inform the understanding that challenges related to timber use cannot be isolated from broader socio-ecological dynamics. Wood in the Sierra Gorda is embedded in ecological regulation, market structures, cultural heritage, and policy frameworks. Any design intervention that ignores these interconnections risks oversimplification. Systemic thinking encourages attention to feedback loops and long-term consequences [9]. Transition design, in turn, invites incremental pathways toward regenerative futures rather than abrupt disruptions. In the workshop, proposals were not treated as finished products but as nodes within larger transition processes [4]. Students were encouraged to consider how design ideas might contribute to ecological balance, economic resilience, and cultural continuity over time.

2.3 Participatory Design

Participatory Design provides the methodological grounding for the collaborative dimension of the project. Participation in this experience moved beyond consultation. Community members engaged in collective mapping exercises, storytelling sessions, and shared reflections about their relationship with the forest [10]. These activities revealed that the forest was perceived not as a resource but as a living presence. This reframing significantly impacted students' understanding of material use. Participation functioned as mutual learning. Students suspended assumptions, while community members explored future-oriented possibilities that integrate tradition and innovation. Design became a shared exploration of what regeneration could mean in a specific place, this perspective aligns with pluriversal design approaches that recognise the coexistence of multiple ways of knowing and inhabiting territory [11].

3 METHODOLOGIES: THE FIVE-MOMENT MODEL

This exploratory qualitative study examined situated learning and active participation through an immersive workshop conducted in Sierra Gorda, Querétaro, Mexico. The initiative involved 12 undergraduate design students, 4 facilitators, and community members during a multi-day immersive workshop. The analysis focused on identifying how engagement with the territory and community narratives influenced students' understanding of wood, relational practice, and professional responsibility within regenerative design contexts.
The methodology applied is structured around five moments and developed as part of the broader RR research process and refined through field implementation.

- Sensitise. Through territorial walks and open dialogues, students were invited to observe and listen without the pressure of immediate production. This stage aligned ethical perspectives and helped participants recognise the complexity of socio-ecological systems.
- Connect. Collective mapping allowed community members to represent daily interactions with the forest. Connection was understood as foundational for regeneration. Without relational depth, design risks remaining superficial.
- Imagine. These scenarios were grounded in previous dialogues rather than abstract speculation.

Imagination functioned as a bridge between present realities and desirable transitions.

- Co-Create. Emphasis was placed on experimentation rather than finalised outputs. Co-creation revealed complementarities between academic knowledge and local expertise.
- Strengthen. Reflection sessions and shared documentation ensured that the experience would not remain isolated. Strengthening implies consolidating relationships and supporting long-term collaboration.

Rather than measuring predefined outcomes, the study examined shifts in perception, relational awareness, and systemic thinking that emerged through situated interaction, understanding learning as a reflective and relational process.

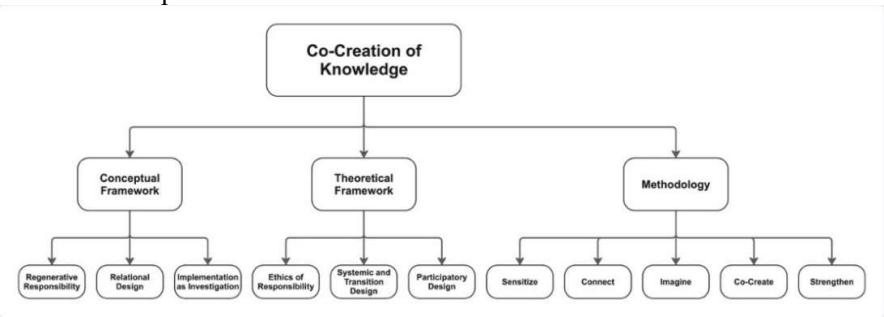

Figure 1. Regenerative Responsibility in Action

4 CASE STUDY: IMPLEMENTATION IN EL MADROÑO, SIERRA GORDA

The implementation took place in El Madroño, located within the Sierra Gorda Biosphere Reserve in Querétaro. The region is characterised by ecological richness and a strong cultural relationship with timber as both livelihood and identity.

This first stage of the project emphasised immersion and relational engagement over production outcomes. The case study is structured according to the methodological model of Regenerative Responsibility, specifically focusing on the first two moments: Sensitise and Connect. As illustrated in the five-moment framework, these initial phases aim to cultivate ethical awareness, recognition of people and their stories, and a deeper understanding of territory before moving toward collective imagination or co-creation.

By grounding the workshop in Sensitise and Connect, the implementation prioritised attentiveness, dialogue, and relational depth. Rather than advancing immediately toward design proposals, participants engaged in reflection about regenerative thinking, personal experience, and shared responsibility, while also recognising community narratives and territorial dynamics. This foundation was essential for framing any subsequent regenerative action within the lived realities of the community.

4.1 Context

The case study took place in El Madroño, a community located within the Sierra Gorda Biosphere Reserve in Querétaro. The region is characterised by ecological diversity and a strong historical relationship between its inhabitants and forest resources. Timber is not only an economic asset but also part of local identity, memory, and daily life. The workshop was developed within a collaborative academic framework involving design students and community members. Students entered the territory with a conceptual grounding in Regenerative Responsibility, yet most had limited direct experience with rural socio-ecological systems. The context presented both opportunity and responsibility. On one hand, the forest represents a material resource for design exploration. On the other, it embodies a living system that sustains livelihoods and cultural continuity. The objective was therefore not to “apply” design solutions, but to understand how design might operate within existing regenerative logics already present in the community. The case unfolded as an initial stage of a longer-term process, focusing primarily on relationship-building and shared understanding rather than on finalised product outcomes.

4.2 Field Immersions

Field immersion functioned as the methodological core of this first stage. Rather than beginning with structured design briefs, the process started with direct exposure to the territory.

Students participated in guided walks through the forest and surrounding areas. These walks were not technical inspections but opportunities to observe ecological cycles, discuss timber practices, and

understand how extraction and regeneration are balanced locally. Community members explained selection criteria for wood, seasonal rhythms, and informal rules that regulate responsible use.
This immersion slowed down the conventional pace of academic workshops. Students were encouraged to suspend the impulse to propose solutions and instead focus on attentive observation and listening.
The physical presence in the territory allowed participants to experience the forest beyond abstraction. Environmental conditions, spatial relationships, and the embodied knowledge of local actors became part of the learning process. Field immersion therefore operated as an ethical calibration. It aligned students' perception with the complexity of the system and prepared the ground for meaningful dialogue.

4.3 Community Narratives

Community narratives emerged through open conversations, collective mapping, and shared reflection sessions. Participants were invited to speak about their relationship with the forest: what it represents, how it has changed, and what concerns or hopes they associate with its future. These narratives revealed that the forest is not perceived merely as a resource. It is described as a living presence, something that gives and requires care. Stories referenced family histories, intergenerational transmission of knowledge, and experiences of environmental change.

Figure 2. Participatory activities fostering community narratives of place

For students, these narratives reframed the role of material in design. Wood ceased to be a neutral raw material and became embedded in a network of ecological, emotional, and cultural meanings.
The sharing of narratives also shifted power dynamics. Knowledge did not flow unidirectionally from university to community. Instead, the community's experiential knowledge became central to shaping the direction of imagination and subsequent design exploration. Through these conversations, the groundwork was laid for collective imagining of regenerative futures, informed by lived experience rather than external projection.

5 RESULTS AND REFLECTIONS

The first stage of implementation generated results that are primarily relational and pedagogical rather than material. While no finalised products were developed during this phase, significant shifts occurred in perception, positioning, and methodological clarity.
One of the most evident outcomes was the transformation in how students understood timber. Initially approached as a design material with functional potential, wood gradually became recognised as part of a living socio-ecological system embedded in cultural practices, economic realities, and intergenerational knowledge. Through field immersion and engagement with community narratives, students began to question extractive logics that often remain implicit in design education. The material was no longer neutral; it was relational.
The experience also reconfigured the perceived role of the designer. Students entered the workshop expecting to generate solutions. However, the emphasis on listening, mapping, and dialogue required them to reposition themselves as facilitators and learners. This shift was not immediate. Moments of uncertainty emerged, particularly when the absence of rapid deliverables created discomfort. Yet this tension proved productive. It exposed how strongly solution-oriented habits are embedded in academic training and highlighted the pedagogical value of slowing down the design process.
From a methodological perspective, the five-moment model demonstrated coherence in practice. The Sensitise and Connect phases effectively grounded ethical awareness and fostered meaningful dialogue. At the same time, implementation revealed areas requiring refinement, particularly in managing

transitions between collective imagination and early co-creation. The workshop confirmed that regenerative methodologies must remain adaptive rather than prescriptive.

Structural limitations also became visible. Academic calendars constrain continuity, and institutional assessment systems often prioritise tangible outputs over relational processes. These tensions underscore a broader challenge: regeneration in design education cannot be confined to isolated workshops. It requires institutional alignment and long-term commitment.

Students demonstrated an expanded understanding of timber as embedded within ecological cycles, economic dependencies, and cultural histories. Reflective journals revealed a shift from material-centred reasoning toward system-oriented thinking, recognising feedback loops and long-term implications of design decisions. Overall, the implementation functioned as investigation. Rather than validating a fixed framework, the implementation functioned as an adaptive investigation that refined and deepened the RR framework through situated practice.

6 CONCLUSIONS AND FUTURE WORK

Future work will focus on deepening the Co-create and Strengthen phases through sustained collaboration with the community. This includes developing pilot initiatives that integrate traditional timber practices with contemporary design tools while maintaining ecological balance and cultural integrity. Further research will also explore mechanisms for evaluating long-term pedagogical impact and for embedding Regenerative Responsibility more systematically within curricular structures.

Regenerative Responsibility should not be understood as a fixed methodology but as an evolving pedagogical stance. Its relevance lies in its capacity to reorient design education from isolated problem-solving toward collective capacity-building within living systems.

The project incorporated informed consent procedures aligned to institutional approval processes to ensure that participants clearly understood the scope, objectives, and potential dissemination of the work. This was not treated as a procedural requirement, but as an ethical commitment aligned with Regenerative Responsibility: participation must be voluntary, transparent, and based on mutual trust.

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