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ARCHITECTURE AND KICHWA HABITATS: TOWARD A SUSTAINABLE HOUSING TYPOLOGY

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This study presents the collective development of a baseline for the design of housing typologies for Kichwa communities in the lower Napo region of the Ecuadorian Amazon. Based on five participatory workshops involving 60 families across diverse age and gender groups, the research identified prevalent family structures and associated dwelling practices, including daily routines, productive activities, and communal life. These findings will inform an architectural proposal grounded in Kichwa spatial logics while integrating technically viable construction strategies adapted to the region's hot and humid climate. Specifically, the found parameters aim for the integration of modular systems combining prefabricated components with local materials such as *guadua* and tropical hardwoods, as well as hybrid construction techniques that allow for flexibility and progressive expansion. The proposed baseline seeks to optimize the relationship between form, structure, and function, resulting in a replicable base model that can be formally included in MIDUVI's official housing typologies for the Amazon. By articulating local knowledge with technical design principles, this research contributes to the development of culturally embedded, environmentally sustainable, and socially inclusive housing solutions. Supported by Ecuador's Ministry of Urban Development and Housing, this work advances the conversation on appropriate housing in Indigenous territories, linking public policy with community-driven design.

Keywords: Indigenous housing, Community participation, Ecuadorian Amazon, Sustainable architecture.

1 INTRODUCTION

In Latin America—and particularly in the Amazon—housing design has historically been shaped by external models that neglect Indigenous knowledge systems, lifeways, and territorial practices. Yet housing, beyond its physical form, is foundational to the social, productive, and symbolic life of Indigenous peoples (Habraken 1972, Oliver 2006). Standardized models promoted by state institutions often reproduce urban logics that are ill-suited—or even harmful—to Amazonian realities (Barros-Esquivel 2024).

This research, conducted in partnership with Ecuador's Ministry of Urban Development and Housing (MIDUVI), contributes to the formulation of public policies that will allow the development of culturally appropriate housing typologies for Amazonian Kichwa communities. Aligned with the National Urban Policy (PUN), which now includes provisions for differentiated Indigenous housing (MIDUVI 2023), this project addresses the need for housing solutions that support well-being, sustainability, and household-based income generation.

The study is based in Tena, Napo Province, within Ecuador's Amazon region—a vast and diverse territory that faces socio-spatial fragmentation and urban inequality (Malizia *et al.* 2018,

Delgado Fernández *et al.* 2023). In this context, Kichwa communities in the lower area of Napo are under increasing pressure to formalize their habitats, often without policies that reflect their collective structures or ecological interdependence. At the same time, through participatory workshops, mapping of family structures and spatial analyses, this study co-developed the baseline for the definition of a housing typology rooted in Kichwa lifeways. Special emphasis was placed on adaptable design, climate responsiveness, and the integration of productive and communal spaces. The resulting parameters propose a replicable base model adapted to local construction systems and cultural practices.

This work supports ongoing efforts to embed participatory methodologies into housing policy and planning. As noted by Rojas *et al.* (2025), territorial co-design grounded in gender and ecological perspectives enhances governance and ensures more precise, community-driven outcomes. In this sense, the development of these design parameters offers not only a design strategy but a contribution to more inclusive, culturally relevant, and sustainable housing policy frameworks.

2 MATERIALS AND METHODS

This study employed a qualitative, ethnographic, and design-based methodology, using participatory workshops adapted to the territorial and cultural context of Kichwa communities in the lower Napo region. These workshops functioned as platforms for reciprocal knowledge exchange, where local spatial logics and lived experiences informed the co-creation of context-specific architectural proposals (Abarca Alpízar 2016). Beyond generating relevant design inputs, the process strengthened community agency and territorial ownership (Pérez Vega *et al.* 2024).

2.1 Community Selection and Participant Profile

The research was conducted in five Kichwa communities located in the peri-urban area of the city of Tena (Fig. 1). These communities were selected based on their geographic proximity, territorial continuity, and the active presence of community organizations. In each community, approximately twelve family groups participated, consisting primarily of heads of household and representative members of the family unit. The selection of participants was coordinated with community leaders and conducted with prior informed consent.

2.2 Workshop Design and Structure

Three participatory workshops were conducted in each community, structured as follows:

Workshop 1 focused on visualizing intra-household structures. Participants represented household members by age and gender, revealing diverse family arrangements—nuclear, extended, single-parent, and multigenerational—relevant for spatial planning.

Workshop 2 applied participatory mapping to identify spatial needs across domestic, productive, and communal spheres. Through icons, narratives, and reference visits, participants detailed the layout of interior spaces (bedrooms, kitchens, gathering areas) and exterior spaces (gardens, animal shelters, ritual areas), establishing minimum spatial requirements aligned with cultural practices.

Workshop 3 assessed construction systems and materials. Participants mapped local building practices—foundations, walls, roofing—and diagnosed structural limitations and material deficiencies affecting current housing, informing future design adaptations.

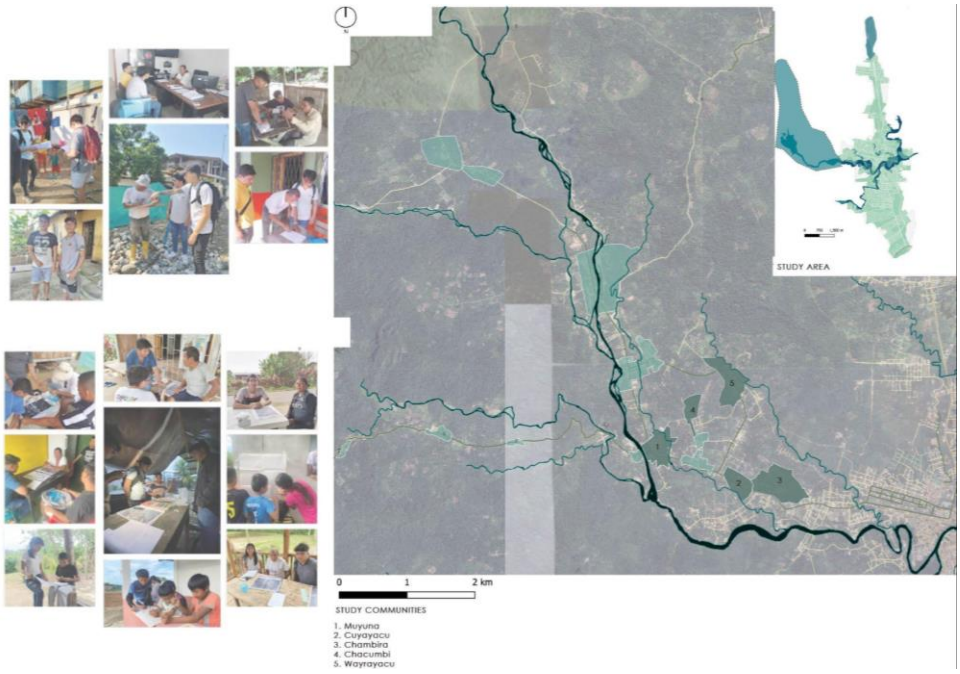

Fig. 1. Urban profile of Tena, study area, community distribution and workshop images.

3 RESULTS AND DISCUSSIONS

The participatory workshops enabled a comprehensive understanding of Kichwa habitats in the lower Napo region, ensuring that future housing typologies are context-specific and community-driven. The parameters defined with local communities move beyond generic Amazonian models that overlook indigenous ways of life, reinforcing sustainability and prioritizing improved living conditions through user perspectives (Fig. 2). Based on the workshop outcomes, the following results were found:

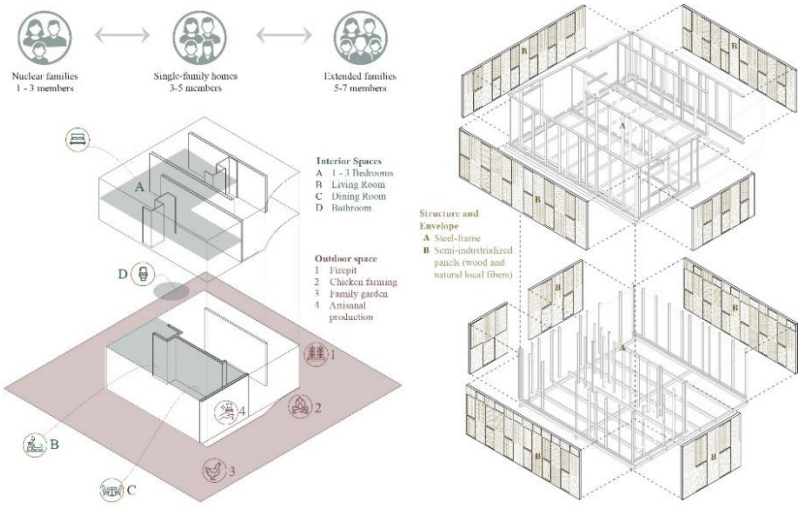

Fig. 2. Generic model of strategies for function, form, structure and materiality.

3.1 Function: Living Dynamics

Three distinct family configurations were identified as essential to accommodate within future typologies (Table 1). Recognizing that the current state housing model targets a standard family of four, new designs must adopt a progressive and flexible approach, capable of adapting to nuclear, single-parent, and extended families. This adjustment will allow better answers to the diversity of family structures observed in Kichwa communities.

Table 1. Findings on family structures in Kichwa communities.

Community	Nuclear	Single-family	Extended	Total Families	% Nuclear	% Single-family	% Extended
1. Muyuna	4	5	3	12	33.3%	41.7%	25.0%
2. Cuyayacu	3	6	3	12	25.0%	50.0%	25.0%
3. Chambira	5	4	3	12	41.7%	33.3%	25.0%
4. Chacumbi	3	6	3	12	25.0%	50.0%	25.0%
5. Wayrayacu	4	5	3	12	33.3%	41.7%	25.0%
Total	**19**	**26**	**15**	**60**	**31.7%**	**43.3%**	**25.0%**

A key finding of the study is the heterogeneity of family arrangements in Amazonian Kichwa communities. Housing, therefore, must not be conceptualized as a static functional unit but rather as a living structure that evolves with the family's life cycle. As shown in the table above, the study identifies a diversity of family structures—nuclear, single-family, and extended—each with distinct spatial needs. Nuclear households require compact, multifunctional spaces with basic safety and expansion potential; single-family units demand clear zoning and privacy; while extended families necessitate hierarchical layouts, shared areas, and flexibility for intergenerational living and domestic production.

These findings highlight the prevalence of multigenerational households and call for adaptable housing models. The proposed parameters for future housing typologies start with a core module for a nuclear family, designed for progressive expansion without compromising functionality. This contrasts with the state's standardized model (MIDUVI 2023), which overlooks future growth, leading to informal and precarious modifications. Reframing housing policy through the lenses of family diversity and cultural relevance is thus crucial for inclusive and sustainable Amazonian housing solutions.

Kichwa domestic space is closely linked to productive activities, mainly for self-consumption, with 15% of households generating income through crafts. These practices require fluid indoor–outdoor transitions, reinforcing autonomy and a land-based worldview. Consistent with Almeida (2019), the architectural design emphasizes flexibility, ventilation, and daylight through detached and peripheral layouts that align spatial organization with the cultural and productive logic revealed in participatory workshops.

3.2 Form: Domestic Spatial Relationships and Housing Form

The form of the dwelling is conditioned by the standard 13 × 15 m lot defined by the MIDUVI housing typology, which requires compliance with setback regulations. Within this framework, it was necessary to integrate users' domestic and productive activities with the constraints of the site in order to establish coherent formal strategies. A compact volume is proposed that contains the interior spaces while simultaneously opening toward exterior areas conceived as extensions of domestic life. The building envelope is envisioned as flexible, allowing walls to accommodate both visual and physical expansions into the immediate surroundings.

The identification of essential exterior spaces—traditional hearth, family garden (chakra), poultry-raising area, and artisanal production zone—guided the configuration of these relationships (Table 2), enabling strategic locations that strengthen the interior–exterior continuum. Finally, natural ventilation and climate responsiveness are key determinants of form. Accordingly, inclined roofs and generous eaves are considered, not only to facilitate rainwater drainage but also to provide shade and improve thermal comfort in the transitional outdoor areas connected to the dwelling.

Data from 60 households across five Kichwa communities underscore the relevance and necessity of these spatial components.

Table 2. Findings on the use of outdoor spaces in relation to Kichwa cultural practices.

Community	Traditional Secondary Kitchen (Fogón)	Poultry Area	Home Garden (Chakra)	Artisan Production Area
Muyuna	11	5	9	5
Cuyayacu	10	5	10	6
Chambira	10	4	9	4
Chacumbi	12	6	8	6
Wayrayacu	11	3	9	7
Total	**54**	**23**	**45**	**28**
% (n=60)	**90.0%**	**38.3%**	**75.0%**	**46.7%**

3.3 Structure and Materiality: Locally Rooted Technical Innovation

Field assessments identified various structural deficiencies in existing homes, particularly related to foundations and roofing (Table 3). These issues stem from inappropriate materials and construction methods that compromise stability, longevity, and indoor comfort.

Table 3. Structural integrity and community interest in local materials.

Community	% of houses with foundation issues	% of houses with roof issues	Interest in using local materials for cladding (Yes/No/%)
Muyuna	58%	42%	Yes (83%)
Cuyayacu	50%	33%	Yes (75%)
Chambira	42%	50%	Yes (67%)
Chacumbi	33%	58%	No (42%)
Wayrayacu	50%	50%	Yes (83%)
Total / Average	**47%**	**47%**	**Yes (70%)**

The proposal presents a semi-industrialized construction system combining modular technologies with local materials such as tropical hardwoods and guadua cane to improve efficiency, reduce costs, and involve the community. Lightweight prefabricated parts and adaptable walls (wood planks, cane weaving, earthen panels) provide ventilation and daylight, while a gabled roof with extended eaves and passive features improves climate performance. This hybrid, context-sensitive approach meets structural and environmental needs while strengthening cultural identity and sustainability in Kichwa housing.

4 CONCLUSIONS

This study stresses the need for a housing typology tailored to the Kichwa habitat in the lower Napo, moving beyond standardized state models. Using a participatory, territorial approach, it proposes flexible, progressive designs rooted in local ways of inhabiting. Findings reveal diverse family structures requiring adaptable housing; the importance of exterior spaces tied to production,

culture, and subsistence; and the value of semi-industrialized systems that integrate local materials and traditional knowledge. Adequate housing, therefore, must combine technical design with ancestral wisdom, ensuring sustainability, cultural relevance, and social inclusion. The study also calls for revising public housing policy with MIDUVI to better align with Indigenous needs and contexts.

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