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PAPER ABSTRACT

This article analyses the ongoing transformation and incremental growth of traditional housing in a rural area of Mexico. Architectural students and faculty in the department of Architecture (CYAD) in the Metropolitan University (UAM-X) partnered with Tosepan-Kalli for this academic and research exercise. During six months our students and faculty interacted with Tosepan Coop and the local community to learn about their ways of life and traditional houses. Tosepan-Kalli is a housing Coop encompassed within a larger one, located in Cuetzalan, Puebla, Mexico. The Coop has more than ten thousand associates, mostly Nahuatl people, whose main goals are preserving their traditions, strengthening their roots and keeping their land productive. This social organization was established some decades ago in order to obtain better prices for their coffee crops and to improve the surrounding community's living standards. Coffee is their main source of income. This article is divided in three parts. In the first, we define our conceptual approach to the problem, making a brief description of the region's environmental context and the social organization and main goals of Tosepan Coop. In the second part we make a summary of the community's everyday life, their cultural patterns and main characteristics of their housing. We also elaborate a conceptual framework of the different dwelling transformation possibilities through time to accommodate incremental growth. As an example two proposal are illustrated. Finally, as a conclusion, we venture some ideas, thoughts and possibilities for the ongoing transformation of their built environment.

KEYWORDS: Sustainable built environment, traditional housing transformation, incremental growth, sustainable rural housing .

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Jorge Andrade obtained a M.Arch degree at MIT with John Habraken as advisor (1981). He was advisor and coordinator of Architectural and Research Projects at the Operational Center for Housing (COPEVI from 1975-1992). There he designed housing projects applying participative design methods. He is full professor of architecture at Metropolitan University Xochimilco (UAM-X) where in 1986 he founded the "Housing Workshop" (TAVI). He's been visiting professor at: MIT (1987); McGill University (1988); Universidad de Cordoba (1985); Pretoria University (2007); and several Mexican universities. From 2002-2012 he was UAM-X representative for the National Housing Council (CONAVI).

Andrea Martin studied architecture at the National University of Mexico (UNAM). In 1981 she obtained a M.Sc. in Architectural Studies degree at MIT. Since then she has been involved full time in architectural design, both in academia and in private professional practice. She is full professor of architecture at UAM-X where she teaches architectural design studios and does research in low income housing design. She has published several articles and books in the field. In 2009 she spent a year as Visiting Professor at University of Washington, Seattle and in 2013 another as visiting scholar in UC Berkeley.

Alma Rodriguez is associate professor at UAM-X since 2014. She studied Pedagogy and Sociology and obtained a Master in Design Sciences and Arts at UAM-X. Since 2006 she has collaborated at TAVI developing projects to provide students with tools to deal with social issues emanating from housing processes in their academic field work. She participated 2012 Latin-American Architecture Seminar (SAL) in Brasil where she presented an article on the impact of everyday life on self-help produced housing. She has participated in several national forums and conferences.

1 Introduction

The case study we will discuss in this paper is set in a small rural town in Mexico, 2.7 km north of Cuetzalan[1], Puebla. It is an area inhabited mostly by indigenous peoples —a big proportion of them are nahuatl— who preserve most of their ancient traditions, have a natural relationship with their environment and the way they build their houses and, above all, have strong communal ties.

The story begins in the 1970's with a federal government initiative to appease this region —that was increasingly becoming violent because of the terrible living conditions of the farmers —with potential investments and technical advisors to strengthen coffee production in the area. The livelihood of the people living in this area, for decades, has been dependent on coffee crops. Coffee in this region is well known for its quality.

This particular community did not want the help that the government was offering: increasing coffee supply translated in lower retail prices for growers. That kind of top down approach was not well received. Instead, the community asked the government representatives for advise on how to solve their local problems: How to organize themselves to wholesale their crops —skip the middleman— and get better prices and to buy their basic staple food —beans, sugar and maize— in bulk to get discounts; How to diversify their crops as to not depend solely on coffee; How to improve their already sustainable agricultural practice. This petition was not well received at the top but, nonetheless, the young agricultural engineers decided to stay and help. This is how "Tosepan Titataniske" Coop —the word means "we shall overcome, united" in nahuatl— came to exist. What in 1977 was a organizing force, three years later, turned into a formal cooperative.

Since then the coop has been operating successfully, building bottom up capacity not only on the agricultural field —introducing new crops— but also on other fields that strengthen their "good living" way of life. Through time new offshoots from the original coop have emerged. The youngest being "Tosepan Kalli"[2], the housing Coop.

This is where our work started. Our research team was approached by Tosepan's director looking for advise on housing issues. One is the experimentation with bamboo as a new, sustainable building material —recently introduced into the local landscape— that has produced mixed results. The other is the ongoing transformation of their vernacular houses with the use of new —as is the case of bamboo— or industrialized materials —like cement blocks, tin sheets and polyurethane—.

To provide this advice, we asked to have access to a community where Tosepan has associates. In the next section we explain the methodology used for our study; we talk about the main research findings; we outline a conceptual design framework for potential transformation through time to accommodate incremental growth without compromising the community's food self-sufficiency; and at the end of the chapter we show a couple of examples of our student's proposals.

An important fact we detected was the lack of congruence between Tosepan main goals —sustainable housing; organic production and food self-sufficiency; and preserving their way of life— and the ongoing transformation of their dwellings. These findings will be discussed in depth in the final section.

1.1 Conceptual approach

For most of our research work we use the basic principles of two main approaches: Open Building[3] and Sustainable Development. We embrace ideas such as: the built environment is under constant change; design responsibility is distributed; we cannot avoid levels of intervention; housing is a human right; housing is a process; a dwelling is a complex and multidimensional process that happens in a point in time, a place and a specific social group. We recognize the dweller as the main force behind the majority of the housing processes that happen in Mexico, and thus, we as architects have to relate to the dweller and get to know how these

[1] Cuetzalan is classified as a 'Magical Town' by a program created by Mexico's Tourism Board to recognize unique places with symbolism, legends, history, important events, day-to-day life. The term "magic" referring to its social and cultural manifestations.

[2] Tosepan Kalli means 'everyones house' in Nahuatl.

[3] John Habraken's ideas about the making of the environment in www.habraken.com

processes happen to participate in them[4].

1.2 Environmental context

The community is located in Puebla's Sierra Norte. The weather in this region is warm at daytime —between 20 to 25.5C— and cold by night —between 2 and 10C— depending on the season of the year. The area captures the humidity coming from the Gulf of Mexico and rain is prevalent all year round, fostering agricultural diversity. The town is nested at 900 meters above sea level in a mountainous terrain that makes commuting to surrounding communities other than by foot difficult. There is scarce public transportation between towns and there is only one dirt road that goes through the town. The community center run by Tosepan, the church, the kindergarten, the primary school and the health clinic are scattered along the dirt road as well as a few houses and shops. The rest of the community homes are out of sight from the road and scattered on the landscape greenery.

1.3 Tosepan Coop

The Coop was born in 1980 and nowadays has more than 20,000 associates in 290 different communities. Most of the associates are from Nahuatl and Totonac origin. They have small parcels of land, around one hectare each. The strategic goals of the coop are: to strengthen local sustainable growth; to promote sustainable housing; to support productive enterprises; build capacity; recover their identity; gender equity; and to promote the rational use of their natural resources.

From these goals 8 different coops have been implemented: organic production; productive enterprises; banking services; storing and distribution; eco-tourism; health services; sustainable housing; and bamboo production, treatment and use.

2 Methodology

Our goal was to understand how this particular social group related to their everyday inhabited space in order to identify patterns of use. Once these patterns were identified we determined if there were any major conflicts and, if that was the case, anticipate trends. For that purpose, we used methods within the social sciences -anthropology and community work-.

We organized a week long field trip to Cuetzalan with our students. There, we met with Tosepan directives. They gave us several talks to get us acquainted with their organization, with their main problems and with the coop's achievements in the region. They took us to a site visit to the coops bamboo treatment plant and to visit some buildings built with non traditional materials. Then, they took us to the community, where they introduced us with some of the families willing to participate in the study. Our students were divided in eight groups and each group was assigned to a different family. Each group then interviewed and surveyed the home of one of the participating families. Finally, we made several field recognition hikes through the town. For the design concepts we used Open Building ideas.

2.1 Analysis

We classified and organized the observations, the surveys and interviews to identify patterns of use of the open and built space of each family dwelling. Some complementary readings were assigned to the students to acquire a broader understanding of Nahuatl and Totonac peoples that inhabit the region. These peoples cultures, as many other in Mexico, are a result of a hybridization process between the pre-hispanic and hispanic cultures through time. An important characteristic of the community is their religiousness, a syncretic result of their ancient beliefs with those of Catholicism. Their patron saint is San Isidro —he takes care of the crops— and most of their daily activities and social networking relate to religion. The majority speak nahuatl, preserve their uses and traditions and use their folk costumes. Many of them are associates of Tosepan.

Every family owns a large open space —about an acre— and a small built space —about 50 sq m—. From the

[4] Some of these housing ideas have been developed by Habitat International Coalition (HIC).

surveys and interviews we found some common characteristics of the open and built physical space and the use given to it.

The open space is used to grow coffee, fruit orchards and herbs. They keep some domestic animals -mostly chickens and turkeys- roaming free during daytime. Near or attached to the back of the built space they have chicken coops, water deposits and, usually, a latrine. They grow medicinal herbs and veggies for self consumption. Some shrubs between homes are used as fences. It is difficult to tell where one family dwelling starts and the other ends.

Each family built space consists of two attached rooms. The main room is large and rectangular -the long axis facing a front open courtyard- with an entrance door in the middle. A very much adorned altar is the main feature and focus of this room. Few pieces of furniture if any -wood boards used as beds or benches- are located to one side or corner of the room. At the back of this room a smaller one is attached. This is the kitchen. This space is virtually divided in two: to one side of the room there is a traditional wood stove and wood benches; in the other there are large water deposits and a wash bowl. This room communicates to the backyard where the coop is located. The large room is occasionally used for ceremonial, social or extended family gatherings. On a daily basis it is used to dry clothes, to feed the chickens and store clothes in boxes or bags. By night, the family gathers here to chat, to dine and to sleep. The other room, where the stove sits, is used by the mother to prepare food and to work embroidering textiles or making handcrafts. The children eat and do homework there too. On the other side of the room they wash dishes and bath.

Traditionally, local building materials such as reeds, mud and earthenware tiles are used. Gradually these ma-

FIG. 1
CLOCKWISE FROM TOP RIGHT: FAMILY INTERVIEWED. ALTAR IN THE LARGE ROOM. WASH/BATH. AND COOKING AREA IN SMALL ROOM. EXTERIOR VIEW OF A HOUSE.

terials are been substituted by bamboo, cement blocks and tin sheets (see fig. 1).

2.2 Diagnosis

While there, we could notice that much of the transformation of the dwellings we surveyed was influenced by a recent top down governmental initiative. This initiative —which consists on individual household loans to improve the dwellers housing— has worked well in urban settings. However, in rural areas as in this case, money from the loans has to be used to 'improve' housing complying with urban standards that have nothing

to do with the community's notion of well being or the traditional way they use their dwellings. 'Improved' houses usually means substituting the local original materials for industrialized ones and —to comply with government standards to have one private room at least— adding wall partitions to enclose a smaller area within the main room. Attaching the bathroom to the rest of the house is frequently another 'improvement'. As a consequence the original large space is subdivided into smaller rooms, sometimes lacking windows —they are not used to having windows at all— because the local craftsmen forget to leave the openings for them.

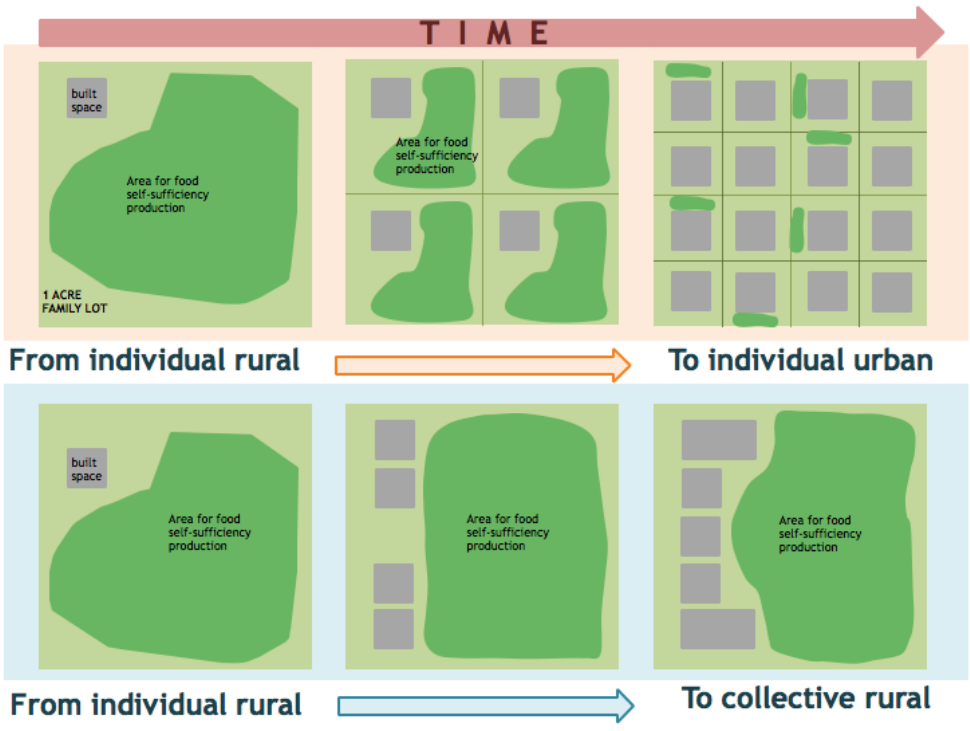
In this particular town, "man still lives in a natural relationship with his domicile"[5] and the introduction of industrialized materials is rapidly re-shaping local vernacular houses. On one hand, at the level of the built space, we found out that there is not a clear understanding of how the introduction of "new" construction materials impact the traditional way of living of the community. On the other hand, at the level of the open space, the tendency of coping with family growth —by subdividing the open space— is compromising the community's food self-sufficiency they have now.

From this findings, we elaborated some design concepts as guidelines for the students to make design proposals of incremental growth. The design guidelines had two variations for the built space: the spatial organization of the dwellings and the housing typology.

2.3 Design concepts

The design concepts that we worked with have two different approaches that complement themselves: spatial organization variations —to accommodate incremental growth— and housing typology variations —for dwelling type variety—. Both variations consider open/built transformation through time in two incremental cycles of 20 years each. These cycles take into account family members' mobility and life span, assuming that a nuclear family grows and unfolds into 4 families in a 20 year span, and in another 20 it duplicates into 8 families.

FIG. 2 SPATIAL ORGANIZATION VARIATIONS



2.3.1 Spatial organization variations

[5] See John Habraken's 'relations between man and dwelling' in three R's for housing

From the ongoing pattern of transformation that our analysis showed, we saw a tendency to subdivide the original family lot between the extended families. This trend is slowly transforming a large productive piece of land into several smaller semi-urban lots where the built space ends being equal or even less than the open space. Land use changes dramatically from sustainable agricultural use to non sustainable urban dwelling.

The design concept to accommodate family growth is to concentrate the built space in 25% of the original family lot. This way the remaining 75% open space would remain productive to support the extended families food self-sufficiency. By grouping the new dwellings they can grow incrementally —with variations in spatial organization— and allow different levels of privacy. The result being several extended family dwellings with shared open spaces and services in the original family lot (see figure 2).

2.3.2 Housing typology variations

There are two very different prototypes of rural housing in Mexico. One is the vernacular one, inhabited by the local peasants. The other is the *hacienda,* inhabited by landowners. The *hacienda* is the colonial version of the Italian countryside villas[6].

The starting point for the housing design was these two antithetic typologies. Students were given a matrix where the vernacular type was at one end of the horizontal axis, the semi-urban house in the middle, and the hacienda at the opposite end. In the vertical axis of the matrix from top down four spatial organization variations were given: 8 separate dwellings one for each family, 4 groups of two dwellings and two families per group, 2 groups of four dwellings for 4 families per group and finally one group of eight dwellings for 8 families per group. With these variations the design proposals could go from the top left option -the traditional spatial organization of vernacular housing- to the right bottom option that breaks with the traditional and tends to the *hacienda* typology.

FIG. 3 HOUSING TYPOLOGY VARIATIONS

Figure 3

[6] Ackerman, James

With these variations, each group of students developed a design for incremental growth starting with a proposal to improve the original dwelling with the flexibility to grow and unfold into 4 dwellings in a 20 year time span. The two examples we show correspond to individual family proposals twenty years after the original house improvement. This was the final academic work for our first year architectural students first term. In the next academic term, students worked on the 40 year incremental growth proposals developing a conceptual 'urban' model for the whole town, including all possible variations of spatial organization and housing typologies (see figure 3).

2.4 Proposal examples

Each group of students had to design a proposal for one of the families interviewed. This was the first time they had to deal with an architectural assignment. First drawings of the original house —floor plans, sections and elevations— were produced. Then they worked on the design proposals for housing improvement, taking into account the incremental growth for the next 20 years. They draw plans for two different moments in time —now and 20 years from now— The design had to foresee change and transformation to accommodate the original nuclear family growth into an extended family.

The dwelling in the first example (figure 4) was already transformed. The family had a government loan to improve the house. The 'main' room building materials had been substituted for new ones -a roof of concrete slab, walls of cement block and paved floor. The attached room in the back —kitchen and bath— was left with the traditional building materials. As for the layout, walls were added to the main room to accommodate a bedroom. The resulting small dark bedroom distorted the original shape of the main room. The proposal for the short run was to add another bedroom, make openings for windows and add a bathroom to the kitchen area. For the first stage of growth another 'main' room attached to the original dwelling would be a new dwelling with a kitchen and shared bathroom at the beginning. For further growth a second floor with terraces and open spaces was proposed.

FIG. 4 EXAMPLE 1: MODEL AND FLOOR PLANS OF THE DIFFERENT STAGES DWELLING OF GROWTH

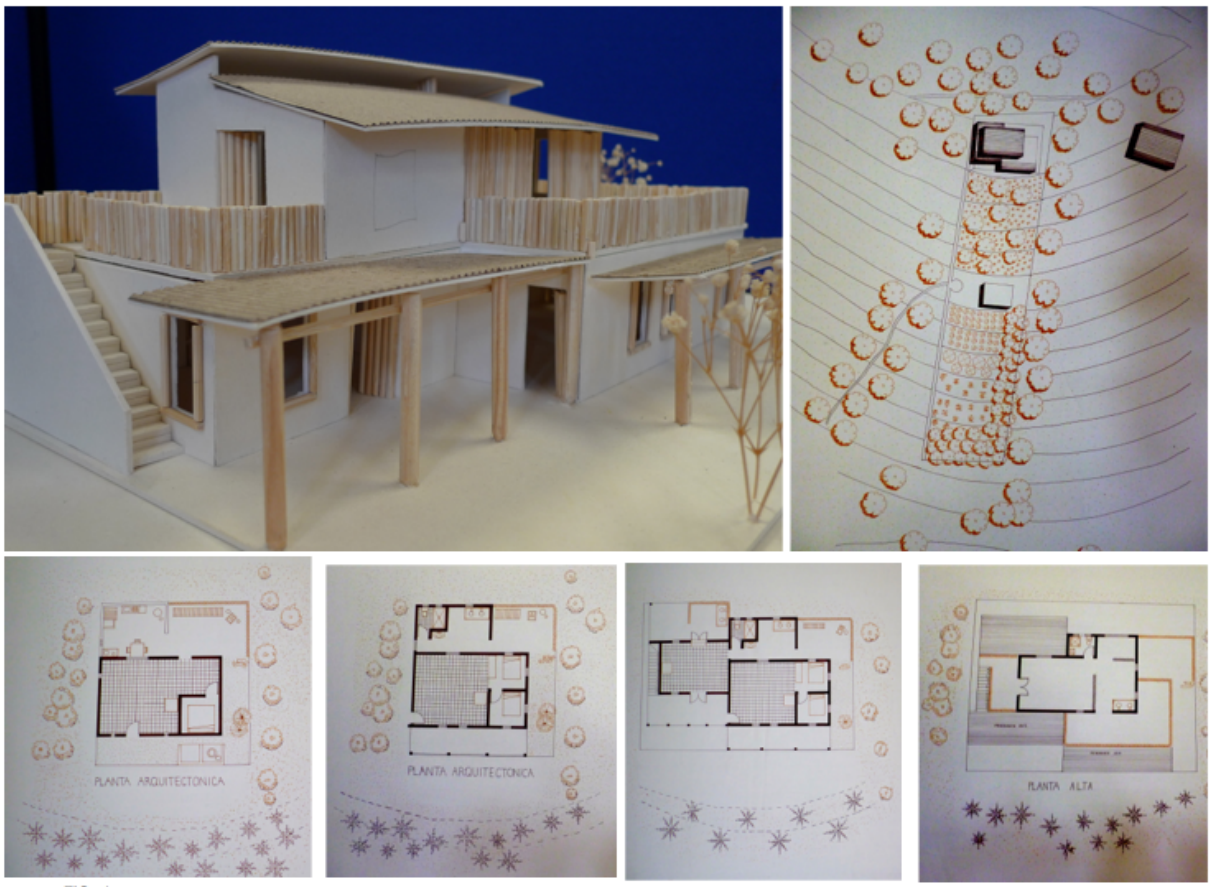


FIG. 4

The second proposal exemplifies another alternative of growth that adapts also to the site topography. In this case the original house at the right (see figure 5) grows into two more dwellings one half floor up, the other half floor down.

FIG. 5 MODEL OF SECOND EXAMPLE

3 Critical discussion

At the end of both academic terms we were invited back to Cuetzalan to show Tosepan directives and its community the students design proposals. The presentation was very successful and the discussion and feedback that followed it, was very enriching and stimulating for everyone involved -the community, directives, students and professors.

It was obvious from the diagnosis that the trend towards individual, ever smaller lots, is not sustainable in the long run. The competition for access to government housing credits has put the focus on quantity instead of quality. The discussion made the community aware of the need, not only to improve their housing, but also to find a more sustainable way to tackle the incremental growth of their dwellings and their built environment in general. The ideas we presented are examples, possible ways of coping with the ongoing transformation in an incremental and sustainable way. These ideas were drawn out from the knowledge and respect for the community's way of life. They were proposed with the intention to strengthen their values by offering variations in spatial organizations that can cope with incremental growth without compromising their ability to keep their ancestral attachment and dependance to their land.

Some of Tosepan-Kalli innovations, as is the case of the clay stove, have been very successful and quickly appropriated by the community. They have invested a lot introducing bamboo as a sustainable building material. Tosepan-Kalli headquarters and its lodging facilities are a great example of what can be done with bamboo. But the community has not embraced it yet, mostly because of the semi-industrial process that it requires and its complicated distribution —due to the difficulty of getting to the construction sites—. And the introduction of bamboo into their landscape has had the consequence of—slowly but steadily— starting to take over the native vegetation.

In the end it was a great opportunity to contribute to Tosepan's community ideas, on how to envision their future as a cooperative, in order to maintain a productive land while pursuing a sustainable balance between their open productive space and their inhabited built space.

FIG. 6 NATIVE LANDSCAPE IN THE FOREFRONT. IN THE BACK THE TALL VISIBLE PLUMES OF GROWING BAMBOO.

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