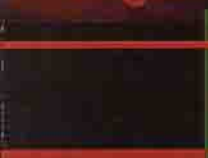


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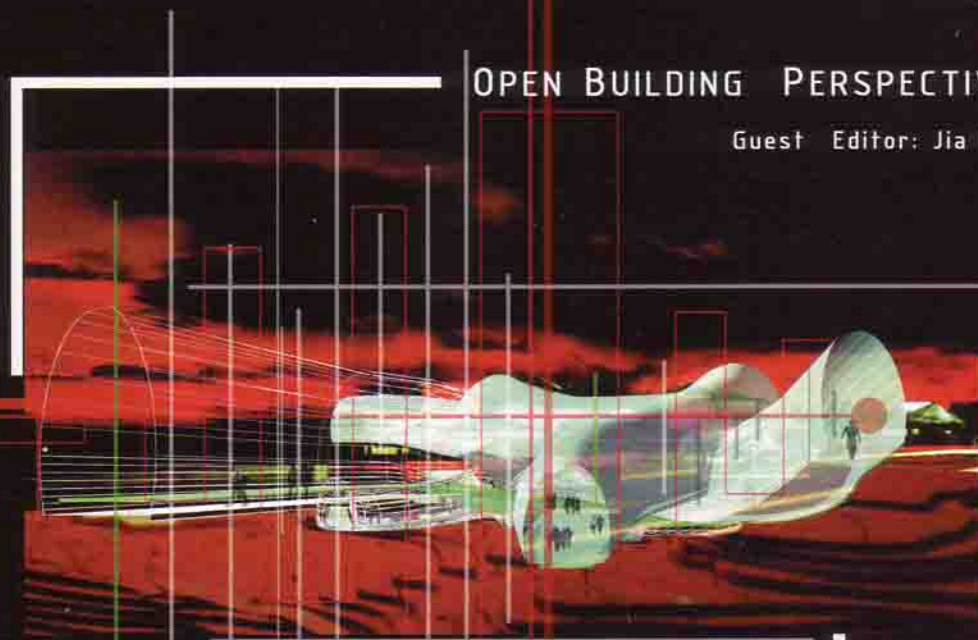
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SOCIAL HOUSING IN NICARAGUA - Simplicity With Style

Kurt Rhyner

Abstract

Social Housing in third world countries almost invariably means uninspired structures lined up in straight rows, creating monotonous neighborhoods. Only when the inhabitants paint their house and make some enlargements, this begins to change. It is remarkable that such steps towards creating a more varied, more lively, often more beautiful and, ultimately, more humane neighborhood is done without architects, not to say in spite of, or even against the plans of the original designer.

When we started to plan the rural village of Malacatoya in Nicaragua, a resettlement for 135 families who had lost their dwellings in Hurricane Mitch in late 1998, the task given to the designers was different. On top of having to minimize disaster risk, they were told to design an attractive, but very low cost village. Given the fact that the houses were to be built by unskilled agricultural workers, most often by their spouses, and that the masons to guide this task have rather limited skills, the floor plan had to be identical for all houses and kept very simple. However, the houses should look different!

The design architect decided on a very simple concept that would allow for a systematic change of the roof shapes, thereby allowing all walls to be built identically up to the collar beam, and only then the builders had to decide which of the different roof combinations to put on every house. The only rule given to them was, to be creative!

The houses were designed in an elaborate process together with the future beneficiaries; in several sessions the space requirements and their relation to each other was discussed and finally drawn up in a plan in accordance with the available budget. The technology chosen for the walls and floors was based on the local availability of rocks, sand and gravel, partially using locally produced puzzolana cement to replace some of the ordinary Portland cement, while the roofs were clad with locally produced micro concrete tiles (MCR).

Keywords : Sustainable housing, participatory planning, EcoMaterials, Micro Concrete Tiles (MCR), Puzzolana Cement

RESETTLING HOMELESS FARM WORKERS

When the German NGO "Pan y Arte" ("Bread and Art", directed by the well-known Austrian actor Dietmar Schönherr) decided to finance the resettlement of poor Nicaraguan farmers who had lost their huts in Hurricane Mitch (1998) they contacted "Grupo Sofonias", a work team with a history of 25 years of sustainable construction in Central America. The parameters for the task in this remote area were clear: sustainability in its three classic dimensions "Economy, Ecology, Social aspects". This translated into the practical terms "very low cost, disaster prevention, local technologies and materials, popular integration in all stages of the project." (picture 1)

The local partner of "Pan y Arte" is the "Casa de los 3 Mundos" (House of the Three Worlds), an institution that promotes culture in Granada and is



Picture 1.

famous for its music and art classes with children. Together with Grupo Sofonias they called meetings with people affected from Mitch. After a first round of

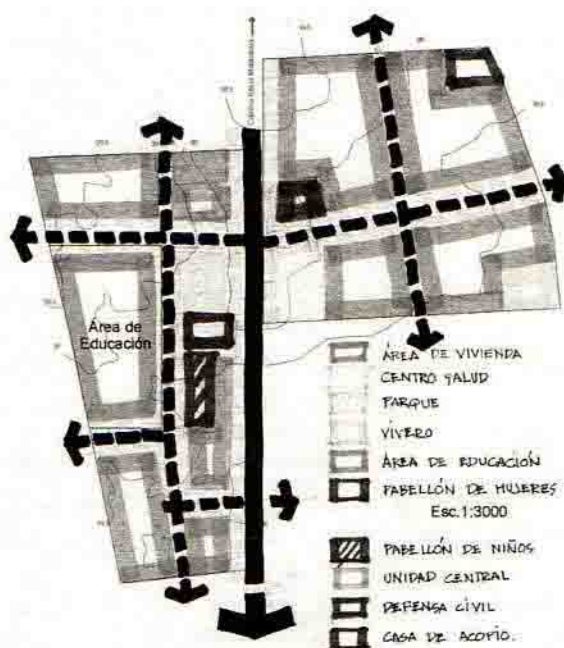
discussions with the potential beneficiaries it became clear which part of this apparently level land, surrounded by Lake Nicaragua, two rivers and a swamp, was the least likely to be inundated in any future hurricane, and efforts began to buy a sizeable plot. In discussions with inhabitants of the area the Sofonias team was able to find out what potential construction materials could be found nearby. They located sand, gravel and stones in one of the rivers and this pointed towards the age-old technology of building foundations and walls with rocks and mortar. For the roof a wooden structure seemed to be the most appropriate, to be covered with micro concrete tiles that could be produced locally. A major goal of Grupo Sofonias is the use of so-called "EcoMaterials" and "EcoTechnologies", where "Eco" stands for economy as well as ecology. It was in 1995 during a session to prepare the first International Conference on "EcoMaterials" in Havana when this term was coined and it has become a trademark in Sofonias and their partners in the "EcoSouth Network" (www.ecosur.org)

For the actual design of the settlement, Grupo Sofonias drew upon the talents of two Cuban members of the network, Civil Engineer Nolasco Ruiz and Architect Eduardo Camero, both investigators and lecturers at the University in Santa Clara. The "disaster specialist" Ruiz made a thorough analysis of the area and the plot and sought to devise a system that would channel the rainwater from the practically flat piece of land, but at the same time provide conditions for adequate distribution of the plots of land. The few existent trees has to be incorporated into the urban design, important for shade in the extremely hot environment. Martin Melendez, the director of Grupo Sofonias Nicaragua, communicated a clear message to the architect: (picture 2)

"We want a very simple design as our masons do not understand plans and the workforce is going to be the beneficiaries themselves. It has to be cost saving on all levels. The houses have to be cool and safe. They all have to be identical in size and cost, but they have to look different. We want an attractive neighborhood that does not "smell of poverty"

PARTICIPATORY DESIGN

This set of tasks seemed contradictory. "Identical in size and cost but look different" being the toughest requirement. Camero decided to go back to basics and asked himself which part of the house creates the major visual impact? The answer was a surprise: "In small buildings it is the roof that makes the decisive impact!" He began to think about different roofs



ESQUEMA DE ORGANIZACIÓN FUNCIONAL.

GRUPO SOFONIAS		
Arq. Eduardo Ing. Nolasco	Nuevo asentamiento Los Angeles.	1:3000
	Replanteo Topográfico	27/7/99

Picture 2.

on top of identical houses. Through observation of traditional Nicaraguan houses he knew that roof shapes were far from monotonous. A standard in popular rural dwellings is a double-pitched roof over the main part of the house, and then a single pitched roof added on to cover the kitchen. Camero realized that this was an element that should be incorporated into the design and eventually it led him to the final result.

This theoretical analysis occurred parallel to the "participative design meetings" with the potential beneficiaries of the project. In seven different locations in the jurisdiction of Malacatoya the families living next to the river had lost their huts and a process of selecting the beneficiaries began. Melendez has longstanding experience in this field and he instructed a team of social workers to organize separate meetings in each village. They discussed the way a house could be built and then divided into small groups to define their choice of a house. With the help of a social worker or an architect they drew up plans and schemes, which afterwards were discussed by the whole group. Of course, the underlying point was that the house should not be too big, as they had to build it themselves in unpaid labor, and also because they were aware of the tight finances. This led to

most interesting discussions about whether to build many small houses or fewer large ones. Finally all groups settled to a proposal made by Melendez to build many relatively big houses, but leave the finishing jobs to the owners, which meant a solid house with walls, roof and floor, but no doors or windows. For all potential beneficiaries this seemed to be a good solution, as it guarantees a solid durable structure for a relatively large group of families. At this point they did not know who would be included in the project, and everybody's concern was to benefit as many as possible.

Meanwhile Camero had been developing his ideas and the team of Grupo Sofonias spent many hours discussing, criticizing and changing designs. It was this intense interaction among project managers, social workers and builders that lead Camero to arrive at a concept that everybody felt was a breakthrough:

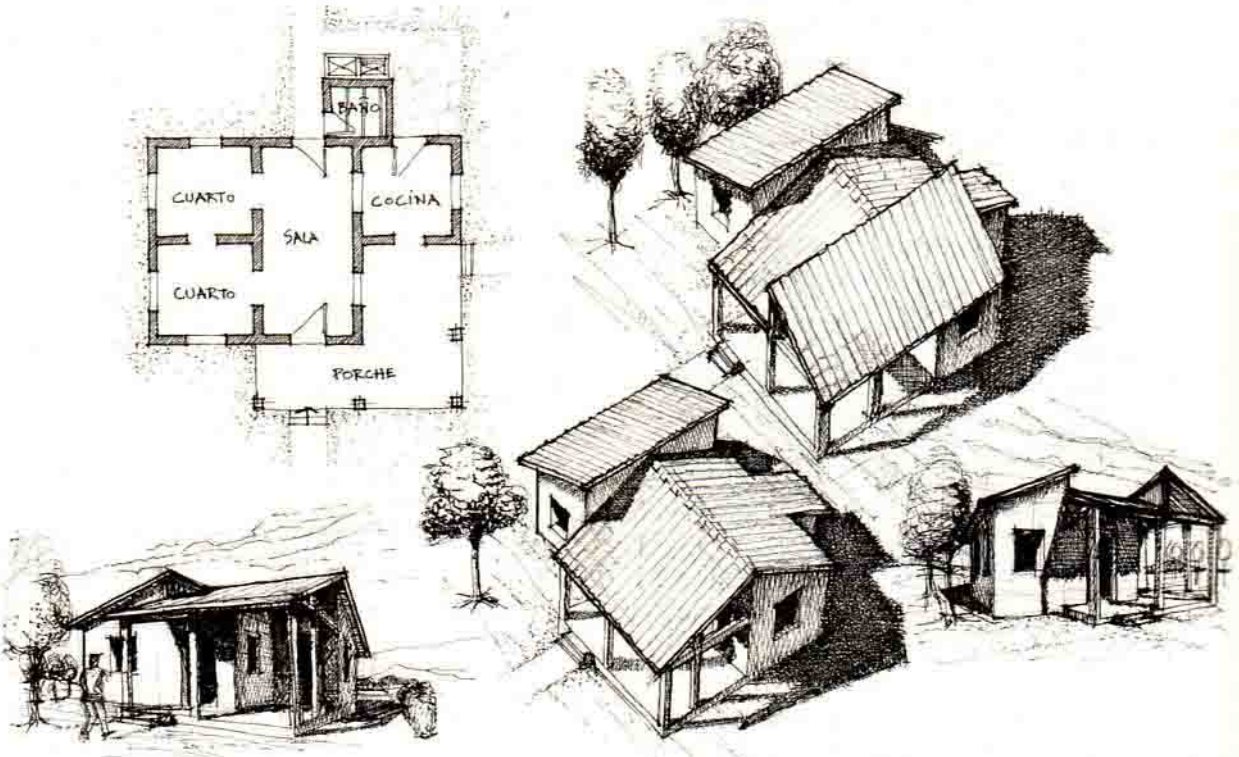
A module of 3 x 3 meters would be the basic unit, and each one of these units would be covered with a single pitched roof. There are several ways to combine the different units and it creates a variety of roofs. If a house consists of 6 such units, theoretically there would be more than 1000 different roofs, always on top of the same floor plan! Of course most of those shapes are impractical from a technical point of view, but plenty of room remains for creativity.

It was during the third round of meetings that Camero showed them three different floor plans, each with several roof options. In this round of discussions two of the models were chosen, which were almost identical and in practical terms they became one. (picture 3)

ORGANIZATION OF CONSTRUCTION

Meanwhile, all candidates had been surveyed by a group of students from the sociology faculty at the university, and the data of all families was tabulated according to different parameters. A commission consisting of representatives from the seven villages, the municipality, and the project team then started to reduce the 257 applications to 135, the number of houses that could be built on the available land. For this procedure the identity of the candidates had been removed from the lists and a "neutral" selection was possible, which was accepted by the communities with no or little remorse.

The construction task was divided into three phases and took some two years to complete. Every work group consisted of about 24 families, each of which had to contribute four working days per week. This assured a presence of some 16 helpers every day who worked under the guidance of two masons.



Picture 3.

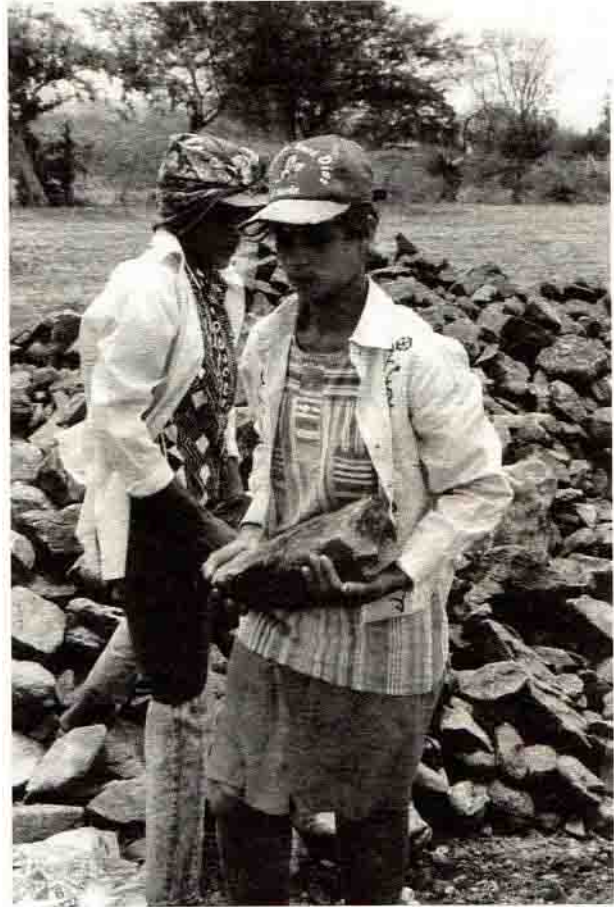


Picture 4-5.

This high ratio of unskilled labor was possible because of the technology chosen. Only the placement of the casings was a somewhat skilled task, which a large portion of the volunteers quickly learned. Transporting rocks and cleaning casings kept others busy, and in the afternoons everybody gathered to fill the casings with mortar and rocks.

Each family had to contribute a total of 185 workdays and as an average every group finished two houses in 23 working days. At the beginning it was not easy to settle into a work discipline, but the rules approved in the meetings established that any family would be removed from the project if they failed three working days. After the first exclusions discipline increased quickly and 31% of the families finished their commitment without even one single day of absence. The participation of women was outstanding; in some groups they constituted the majority on any workday. (pictures 4 and 5)

A young architect managed the project onsite and guided the technical part with the help of a master mason, while the social aspects were in the hands of two social workers. They all lived on site during the week and established a close relationship among themselves as well as with the beneficiaries. Once a month there was a general meeting where the team informed about the progress and answered criticism and demands of the beneficiaries. These meetings became a decisive instrument for popular participation in the decision making process. One of the major problems that emerged was the influence of different religions, whereby some members of evangelical fundamentalist groups had been pressured by their preachers to not fraternize with families from other churches. It took much sensitivity from the project



team and the evolving community leaders to resolve this situation.

The walls built from rocks gathered locally and with mortar made of local aggregates have a comparably good energy balance, and the consumption of Portland cement was only 129kg per square meter of floor space, including foundation, walls and a polished concrete floor. The engineering design included vertical and horizontal steel reinforcement for earthquake safety and the 15cm thick walls can be expected to have a long life expectancy. The houses have a net area of 54m² and the monetary cost per square meter was \$US 46, which is considered extremely low in Nicaragua. (pictures 6 and 7)

The project also set up a facility to produce micro concrete roofing tiles. They are an alternative considered "to be sustainable when timber for the support structure is locally available"; no other commonly available cladding material in Nicaragua qualified as sustainable in a survey (RHYNER, 1999). MCR tiles are produced on a vibrating table and placed on special airtight moulds to set for 24 hours, after which they are moved into a water tank. The technology of MCR, which was perfected and promoted in the nineties by Grupo Sofonias and its partners, is being



Picture 6-7.



Picture 8.

used in more than 650 workshops in Latin America that produce almost 3,000,000m² of roof per year (GRUPO SOFONIAS, 2001). Three people in Malacatoya were trained and with leased equipment produced most of the 141,500 tiles on site, and afterwards one set of equipment was transferred to them and they are now producing for the market. (picture 8)

After the completion of each phase, the houses built were allotted to the self-builders in a simple ceremony by drawing lots. The first families moved in immediately, while others first tried to buy or build doors and windows, but almost all set out to plant trees and flowers on their plot.



The neighborhood, "Los Angeles", is situated at the edge of the central village of Malacatoya, and because of its improved preparedness against disasters it is becoming the village center. The public buildings, school, community center and clinic are grouped around the park, where the local partner "Pan y Arte" is currently building replicas of pre-Colombian artifacts in ferrocement. The project has built a multi-purpose community center that served as a school until the government built a school, and now serves as a kindergarten in the morning, a craft center in the afternoon, and place for meetings in the evening. A rural clinic with living quarters for a doctor and nurses has rounded out the public buildings surrounding of the park. The infrastructure to be provided by the government is developing slowly. Drinking water is pumped to the area but individual connections have only been installed recently, an activity also involving the participation of the inhabitants, and the electricity board has promised to serve individual households in the near future. The gravel road from Malacatoya to "Los Angeles" is in acceptable shape, compared with the 30km main access road that links Malacatoya to the outside world; however, the internal roads are not

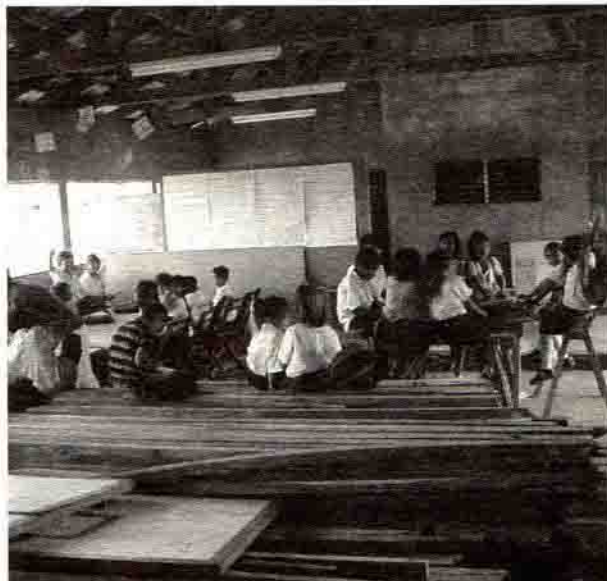
yet graded. (pictures 9, 10, 11)

In March 2003 the project underwent an internal evaluation and one of the parameters was to grade it according to accepted "sustainability measuring tools". Two were chosen, a user-friendly but rudimentary system developed by the BASIN network (SKAT, 2002) and a more complex and in-depth system developed by the University of Santa Clara (Velazquez, 2002). In both cases the group of experts had to analyze a series of questions and in both cases the results were clear: The project qualifies as sustainable according to the standards set by those evaluation tools.

DOES "LOW COST HOUSING" MEAN "UGLY HOUSING"?

Why is architectural design for social housing in the third world almost always boring, uninspired and monotonous, potentially denigrating to its inhabitants? The most ordinary of designs multiplied by the dozens, and even by the hundreds, arranged in straight lines without taking into account the natural surroundings, result in urban plans that often resemble chicken farms. Is it the decision makers in the institutions who fail, or are architects unable to deal with the "simple"?

Do architects simply not care about the poor, or are they unable to combine simplicity with beauty and creativity in their designs, or do they really just prefer to concentrate on works for the "rich and beautiful". It is obvious that this is not only a problem in developing countries where housing schemes often



Picture 9,10,11.

are funded by NGO's or by governments. Driving through suburbia in many developed countries or through neighborhoods with monotonous apartment buildings one gets the impression that this holds true in many places.

Eduardo Camero says: "Let us treat the residents of low-income communities like they were normal clients with money in their pockets" (CAMERO, 2002) (picture 12)

CONCLUSION

"Los Angeles" is a serious attempt to comply with the ominous word "sustainable". The technologies used conform to a positive life cycle analysis, they are economical, and the social integration has been achieved to an unusually high degree. However, the overriding feature that places this project in a category rarely seen in social development is its architecture.

The designer has been able to conceptualize a way that allows an extremely high degree of flexibility for popular architectural expression while keeping to an extremely simple design. He has designed a



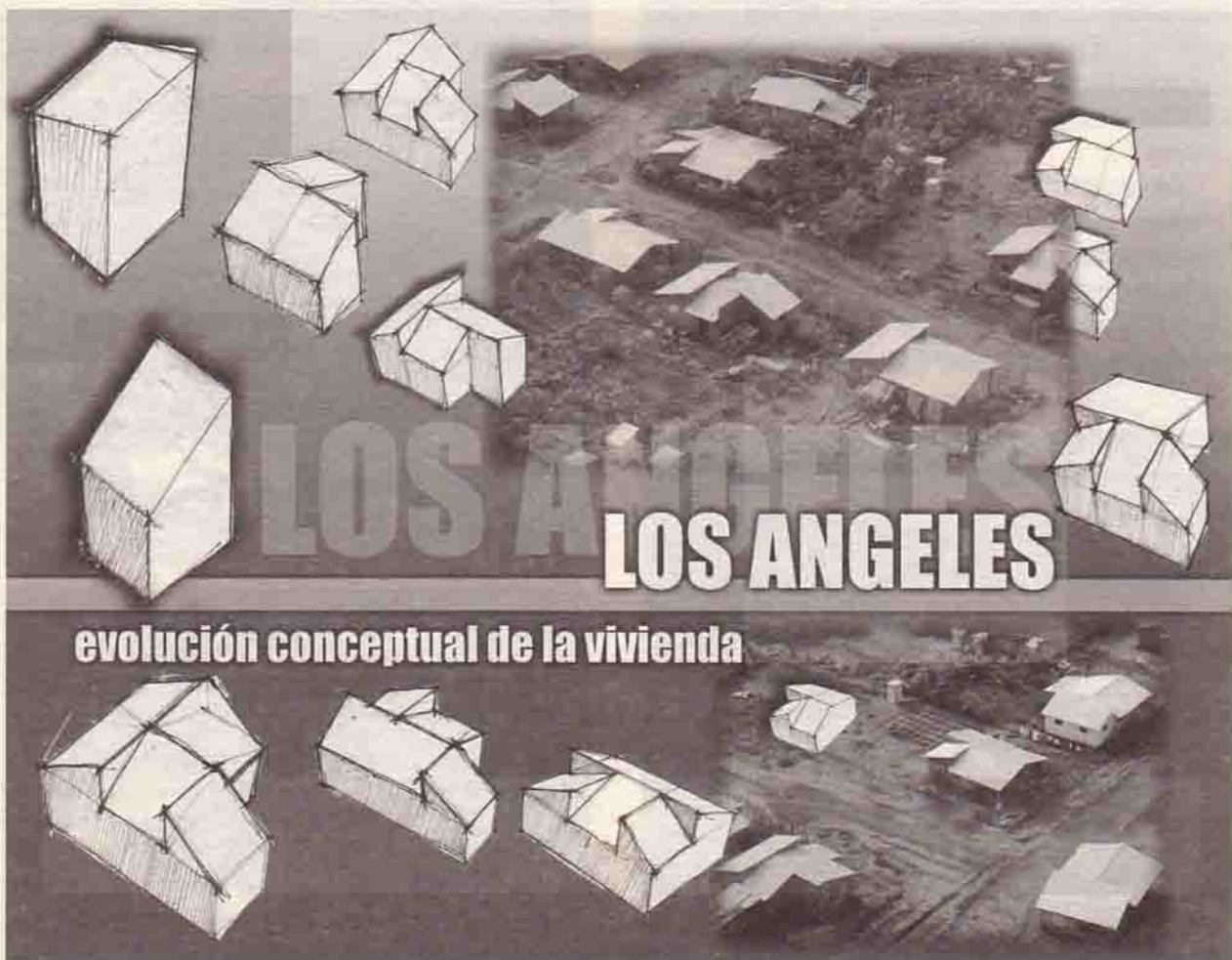
system in which the users are invited to be creative, following a pre-established pattern without being aware of it. It was the workers and beneficiaries who decided together with the project team what roof to put on each house, creating an interesting but well structured neighborhood. (picture 13)

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Picture 12.



Picture 13.