

TEACHING PEASANTS HOW TO BUILD MORE ENERGY EFFICIENT HOUSES. The experience of organizing workshops in a rural area of Mendoza, Argentina.

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Introduction

In order to improve the quality of life of peasants in Third World countries, it is crucial to pay particular attention to their poorly-designed and energy-inefficient houses. Their traditional techniques of construction used to take into account the environment and the basic principles of orientation. Unfortunately, old rural houses were built in big mud sun bricks (the so-called adobones) which became under fire during this century as an insecure type of material in Mendoza, which is a seismic region. (see photo # 1)



In fact, from the beginning of this century onward, adobe construction has been banned in urban areas and discharged in rural ones. Therefore, this ancient technique that could have been kept on improving itself (as it was the case in other First World countries) was instead left to decay. The legislation, however, was far from effective. As a matter of fact,

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adobe houses are cheap and poor peasants had very little options when they were urged by necessity of shelter. Although adobe houses are prohibited, peasants build them as they can, without appropriate instructions. The last result is a very low quality of adobe house. (see photo #2 - Rural adobe house in Junín)



The government has a leading role both in controlling and funding social housing programs. From the 1950s onward, the tendency has been to provide the same design to everyone in the country, regardless location and local weather. Needless to say that the consequences were a low quality of thermal comfort in most of the houses built under government control and its financial assistance

The office in charge of funding social housing programs is FONAVI (Fondo Nacional de Vivienda - National Social Housing Fund). It administrates a budget of around U\$ 900,000,000 yearly. Mendoza receives 4% of that figure, but the province increases its budget with money coming from different taxes and levies and the installments monthly paid by previous FONAVI credit beneficiaries.³ According to our estimate, only 20% of the badly needed social housing (4,000 houses of 50 square meters each) can be built with that budget.

Although it is better to have a small house of 50 square meters than nothing at all, complaints about the limited space and the lack of thermal comfort proved to have a very negative impact on the rest of the society. Beneficiaries of FONAVI loans are not satisfied, and so does the rest of the society that sees those beneficiaries of social housing programs as unfair people. Authorities, for their part, have to make their best of the program without too many criticisms

Nevertheless, the actual fact is that FONAVI houses are energy inefficient and that

³ Law 24464 regulates the administration of FONAVI. It prohibits the use of the funds to build anything but social houses.

any attempt to improve them has to keep the overall cost to a low level. Another less evident fact to low-income people is that inefficient houses are expensive to heat and to cool. Poors, however, both in rural and in urban places, prefer to keep things just as they are, simply because they can not afford the costs of improving the thermal comfort of their houses ⁴.

Available data shows that houses built under the FONAVI programs are energy-inefficient in cities and that they usually become still more inefficient in rural areas. The following chart provides with some information about this point.

In Argentina, as in many other parts of Third World countries, national, provincial and even municipal governments have all provided an ever-increasing part of the society with social housing programs. From the 1980s, however, due to the adjustments in the government budget imposed by international financial institutions, most of the social programs have been cut off and the short amount of money for helping the poors has ended up in a sharp reduction of housing programs for rural areas. According to an official estimate, Junin, for example, can only help to build 90 houses yearly.

In 1998 the authors accepted to help peasants in Junin during the process of designing their houses before applying for a FONAVI and Municipality loan. The aim was to organize workshops as the first experience in Mendoza to transfer scientific knowledge to rural people who can not afford to pay an expert.

Junin is mostly a rural area with 28,418 inhabitants. Vineyards and small-size farms (6.6 ha) are devoted to the production of vegetables sold in the local market. Agro-businesses located in Junin are also close related to the limited agricultural production. Most of the population, therefore, make their livings either working on farms or at a factory. (see photo # 3)



Rural incomes are as low as U\$64 per capita for a family of 5 members. This was the family size of the rural families who went to our workshops and whose financial capacity is extremely low. To put figures into perspective, a FONAVI loan is U\$ 15,000 per family, and it just finances the building of 80% of a small house of 50 square meters. Also, according to FONAVI regulations, families have to own the plot. Some other restrictions dealing with material applied, increasing the overall cost of the house.

As the above data show, peasants and low-income workers earn around U\$ 300.00 or less per month. Not enough money so as to pay for an expert when they build their houses. Some of them, once they receive the loan, build their houses applying a few building techniques known by tradition. Others join a co-operative and let constructors to work according to their own plans.

To alleviate the financial constrains and at the same time, to improve the quality of their houses, peasants began to organize themselves into NGOs with the purpose of buying the land, the materials and even building their houses. The Municipality of Junin has been aware of the necessity of helping them, not only financially, but also with making some arrangements with experts at the local Center for Scientific Research (CRICYT). Jorge Mitchell and Margarita Gascon worked ad honorem into a project of transferring the state-of-the-art energy-efficient designs and teaching peasants the possibilities of using passive solar energy devices without increasing the costs of construction, or keeping them at the lowest possible level.

Workshops as an efficient tool for transferring thechnology to peasants

One of the basic question for social work has always been how to approach poor people without patronizing them. Paralelly, our question was how to encourage them to participate in the whole process of designing their own houses according to their needs. When we, the authors, met for the first time with the peasants of the NGO “Calle Caballero,” we could soon understand the challenges that we would face during the tranference of the state-of-the-art designs of energy -efficient houses.

Rural workers organized themselves into the NGO “Calle Caballero” to join both

⁴ For further information see J. Mitchell,

their efforts and their savings to buy a big track of land and to prepare the layouts for a rural neighbourhood. One neighbourhood, as they told us, where they could perform part of their rural activities properly.

To receive financial assistance from the municipality and FONAVI, this NGO needed to fulfill some requirements like the legal property of the land and the appropriate designs for the houses. At this point, they had the option of "copying" one of the standard FONAVI designs. Nevertheless, they knew what this meant in terms of comfort. Instead of the copy, they accepted the free help of the workshops where we would transfer the state-of-the-art knowledge of passive solar systems and they would be allowed to talk about their needs.

The Municipality of Junin had an open strategy because it had experienced that the transfer of money for social programs from the national government, including money for social housing programs, never arrived to the Municipality, simply because the municipality did not have all the requested paperwork ready.

As the Municipality of Junin could not help the NGO Calle Caballero with the designs for the houses that these people wanted (or needed), the Municipality instead accepted Jorge Mitchell's offer of organizing workshops to come across with the appropriate designs.

Jorge Mitchell and Margarita Gascón organized each workshop with the goal of transferring very simple concepts of passive solar houses to people who can hardly read since most of them only went to primary school. Therefore, no written material could be provided and all the information had to be transformed into graphics, maps, and the like.

Also, peasants do not have plenty of time as rural work is time-consuming and part of them had to walk or bike for kilometers just to arrive to a school or a house where the workshops were taking place. Moreover, workshops were carried out in late evenings in Fall. The evidence, however, that the ownership of a house is a long-lasting desire of any human being was parade for all to see when a mother with her small baby arrived all wet after biking under the rain for almost an hour. Examples of this kind have been abundant during the time we carried out the workshops. All the examples are imprinted in our minds as symbols of co-operative working among the poorest. Also, it has been noticeable how people became involved in the process of improving their quality of life by building better houses for themselves.

During the workshops we demonstrate the value of taking care with:

1. Local Weather
2. Orientation
2. Site layout
3. Devices
4. Insulation
5. Ventilation

The bottom line was to keep the costs at the lowest possible level. Any increase in the overall building costs would have been a serious obstacle for these people. The items above, however, can be included in the designs without a significant increase in the overall costs.

At the same time, before and after every workshop, we analyzed the approaches and techniques implemented in order to let peasants ask, interact, add personal opinions, debate with each other, and the like. In other words, we needed to be sure that peasants would not feel intimidated, insecure or discriminated. We needed to guarantee that they would become increasingly involved in the process of designing and that our role would be less and less important with the time.

We notice that grass-root strategies are crucial to enforce long-term behaviours. Such strategies can be successful in the long run only by surmounting the initial resistance of people to give us personal information about their daily lives. It was not a case of modesty. Most of the time, especially at the very beginning of the workshops, they rested in silent. They just listened. Basically, they were afraid of the possibility that we were political agents, tax inspectors, or so. The moment they starting talking about their personal experiences and the problems in their houses, they began more interested in the information that we wanted to show them.

At the same time, at the beginning of the first workshops, political authorities were also very curious (afraid?). It took some time for everyone to become comfortable and to start participating. We should say that those who became to participate the most were women. Although women were in silent while their husbands asked the first questions during the workshops, women soon participated and made keen comments about the designs. It was a clear signal that they performed almost all of their rural activities at home. The "size of the kitchen and the store room" was their most usual concern. By the way, it was also the most usual critique to the urban designs provided by FONAVI.

During the workshops, we pointed out to the idea that practically every design decision would affect the quality of their house, and obviously, would impact in the energy consumption. Once and again, the need to keep in mind this simple principle throughout the design process was our task.

As we know, in First World countries this principle faces the environmentally friendly policies that mainly seeks to reduce the CO₂ emissions. Nevertheless, in Third World countries we have to keep an eye on quality of life, for these people can hardly consumed fuel or gas as a person does in a First World country.

Both fuel and gas are expensive and beyond the budgets of the peasants. As poors can not spend money on fuel or gas during Winter months, the result is not only a permanent lack of thermal comfort for everyone at home, but a recurrent health problem, especially lung diseases in small children and old people. Infant mortality in Junin runs at the top 20% of the province.

Passive Solar Energy Education in the content of the workshops

The workshops' contents were organized according to the following schedule:

1. Climate in Mendoza: seasonal fluctuations in temperatures, rainfalls, winds, mid-day solar altitude during Summer and during Winter.
2. Bioclimatological designs: Principles. Worldwide examples. Passive solar energy houses. Heat gains. Cooling. Applicability of these principles in rural houses in Junin.
3. The weather in Junin during Summer and Winter through personal experiences. The official weather records for the area. Comparisons of the local weather with the rest of the province. Theoretical adjustments that they believe that their houses need to have to improve their performances during Summer and during Winter.
4. Orientation: This workshop can be considered the first one to properly transfer passive solar system designs. At this point, peasants were already aware of the possibilities of improving the energy efficiency of their houses without increasing the costs. They were also aware that the orientation is the first factor to consider once they have the plot. We

proceeded to show them quite a few of plans of urban neighbourhoods and we encouraged them to evaluate if those houses were properly orientated.

After the information of the previous three workshops, they knew that the best use of sun gains during Winter is possible when the house is orientated towards the North. They noticed that they did not need to compromise good orientation when they built their house in the assigned lot. According to their own words, a good orientation not only reduces energy costs in heating, but also provide amenity value for children and the older members of the family.

Also, we prepared the main components of a house (1:20 scale) and imitated the sun angle in Summer and in Winter. We invited peasants to start moving the pieces around and analyzing by themselves the good and the bad aspects of each design.

Building Form and Internal Planning

As part of our teaching, we make sure that peasants knew that building form would be influenced by planning regulations from FONAVI and the Municipality. Still, peasants could make their best if they became involved in the planning. They already knew (or perceived) that energy considerations related to overall surface. We also showed them how volume affects ventilation, heat lost and potential solar gains. At this point we encouraged them to imagine how internal planning would affect the potential to receive solar gain and determine the usefulness of this gain. Again, we made them aware that variations in built form and internal planning could enhance energy performance at little or no extra cost.

During the workshop devoted to internal planning, we considered the distribution of solar gain throughout the house. At the same time, we kept in mind that air movement was extremely important to ensure cross ventilation for cooling during our long and warm Summer.

At last, peasants designed very basic houses. They have an acceptable coherence that establishes zones for day and night activities. A corridor is the backbone of the designs and it joins a main access to the building to a second and lateral door to get into the laundry and the kitchen.

Designs have in common the following aspects:

- a big kitchen with a store room nearby. The kitchen is isolated from the rest of the house.

Women wanted to keep this space for themselves to carry out their daily activities without the need to keep it clean and neat all the time.

- three bedrooms. This was their most important concern due to the size of the family
- a living room
- the absence of a garage.
- laundry was also big and located close to the entrance because it would be used for personal cleaning after rural work. This room was connected to the bathroom where they can complete the appropriate personal cleaning before getting into the rest of the house. Rural workers could also leave at the laundry their dirty clothes.

Designs show that the transference of knowledge through workshops was useful. Peasants preferred a rectangular shape for future developments and for direct sun gains in most of the rooms. In the case of the bedrooms, the solar gains would be possible thanks to windows located at the top of the wall and to upper level roofs.

Peasants placed the windows properly to receive direct solar gains in Winter and for cross ventilation and cooling during Summer. Windows towards the North were bigger than those towards the South so heat losses would be reduced during Winter. They preferred vegetation for shadow during Summer months in those windows towards the North. A parral (a type of vineyard grown as a climber) was the preferred option. We should notice that this has been the traditional option in our region. Peasants used to grow parral in open corridors towards the North because they provide with dense foliage during Summer, but they lost all the leaves in Fall. Other devices as shadows and curtains were the means of protection suggested for Summer months.

Seismic engineering is compulsive in the region. FONAVI regulations are extremely clear in this respect and adobe houses are strictly prohibited. Therefore, the type of materials for walls are bricks. Fortunately, they have an acceptable thermal behaviour and insulation can be achieved following some instructions.

Peasants have some basic ideas about shape and materials due to their daily experience. In most of the cases, during the process of designing, peasants just ask us in order to confirm their experience of where to place a window in a room. Traditional adobe houses used to place a small or medium-size window just in the middle of the wall. We noticed that peasants tend to keep this design

and they always placed the window in the middle of the wall. For the most part, it is very noticeable that peasants keep themselves to the traditional perception of rectangular rooms and rectangular houses. They believe that rectangular is the most comfortable shape. See designs below.

Conclusion

In Argentina, low income families have to build their houses under FONAVI regulations, but available data demonstrate that houses built under FONAVI programs are energy-inefficient. Moreover, the FONAVI budget is far from being enough to fill the demand for social housing. According to our estimate, only 20% of the badly needed social housing (4,000 houses of 50 square meters each) can be built with the FONAVI budget. Junin, for example, can only help with the building of 90 houses per year.

Some rural workers in Junin organized the NGO "Calle Caballero" to join both their efforts and their savings. At the same time, Jorge Mitchell and Margarita Gascon worked ad honorem into a project of teaching peasants the possibilities of passive solar energy designs.

During the workshops carried out in late evening during Fall 1998, we demonstrate the value of taking care with the local weather, the orientation, site layout, devices, insulation and ventilation. During the last workshops, we encouraged peasants to imagine how internal planning would affect the potential to receive solar gain and determine the usefulness of this gain. They considered the distribution of solar gain throughout the house and they kept in mind that air movement was extremely important to ensure cross ventilation for cooling.

Their designs have in common a big kitchen with a store room, three bedrooms, a living room, and a laundry located close to the entrance because it would be used for personal cleaning after rural work. Among other things, peasants preferred a rectangular shape for future developments and for direct sun gains in most of the rooms. They placed windows properly to receive direct solar gains in Winter and for cross ventilation and cooling. Also, they preferred vegetation for shadow during Summer months in those windows towards the North. A parral (a type of vineyard grown as a climber) was the option and it has been the traditional option in our region.

Coherence and practicality in their designs proved that workshops have been an appropriate tool for transferring scientific

knowledge. Overall, peasants made a good use of the knowledge about bioclimatological construction. Then, workshops proved to be effective because peasants became active after a short while. The fact that they could talk about their needs and propose their designs resulted in better designs. At last, once the paperwork is ready, the NGO Calle Caballero will receive the FONAVI loan to start the building of more appropriate houses for these rural workers in Junin.

These workshops have been a pioneering experience in the province and it will surely help other Municipalities and NGO if they want to follow the lesson. Last but not least, for the authors, the experience of helping these people to improve their quality of life has been priceless.

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