POST-DISASTER HOUSING IN RURAL AREAS OF TURKEY

Nese Dikmen * and Soofia Tahira Elias-Ozkan

Department of Architecture, Middle East Technical University, Ankara, Turkey

Abstract

Disasters, especially earthquakes, are an ongoing problem in Turkey. A developing country where disasters lead to dramatic loss of life and property and where their social effects continue for years to come. Particularly, in rural areas there exist some problems regarding the use of post-disaster housing, which are erected after a disaster strikes.

In Turkey the lives of people living in urban and in rural areas are very different from each other. Rural settlements are products of environmental, geographical, social, economic and cultural factors which are specific to these communities. Rural areas are developed organically according to the needs of individuals themselves, whereas, urban settlements are designed and built by professionals. In spite of this fact, post-disaster houses are produced as if they are going to be used by urban dwellers only.

Houses built so far in Turkey are not appropriate to the needs of the users in rural areas. Various post-disaster housing projects in rural areas of Turkey will be presented in this paper. The positive and negative aspects of such houses will be highlighted. This study aims to attract attention to the importance of the location and the life style of users in the design process of post-disaster housing.

Keywords: Post-disaster housing; earthquake; rural housing; Turkey

INTRODUCTION

For centuries Turkey has been the scene of many natural disasters such as earthquakes, floods, mud slides, avalanches etc. [1] On average the number of houses damaged by disasters in the country are 4.000 to 5.000 units per year [2]; 61% of which are damaged by earthquakes. Earthquakes are the most frequent and the most destructive amongst all disasters that strike the region. Turkey is located on the Mediterranean-Himalayan seismic belt; this is one of the most active earthquake prone areas on earth. It is known that 96% of the country lies within the earthquake zones and 98% of the population lives in these areas [3]. Figure 1 shows the earthquake zones in Turkey.

* Corresponding author; Department of Architecture, Middle East Technical University, Ankara, Turkey; nese@arch.metu.edu.tr

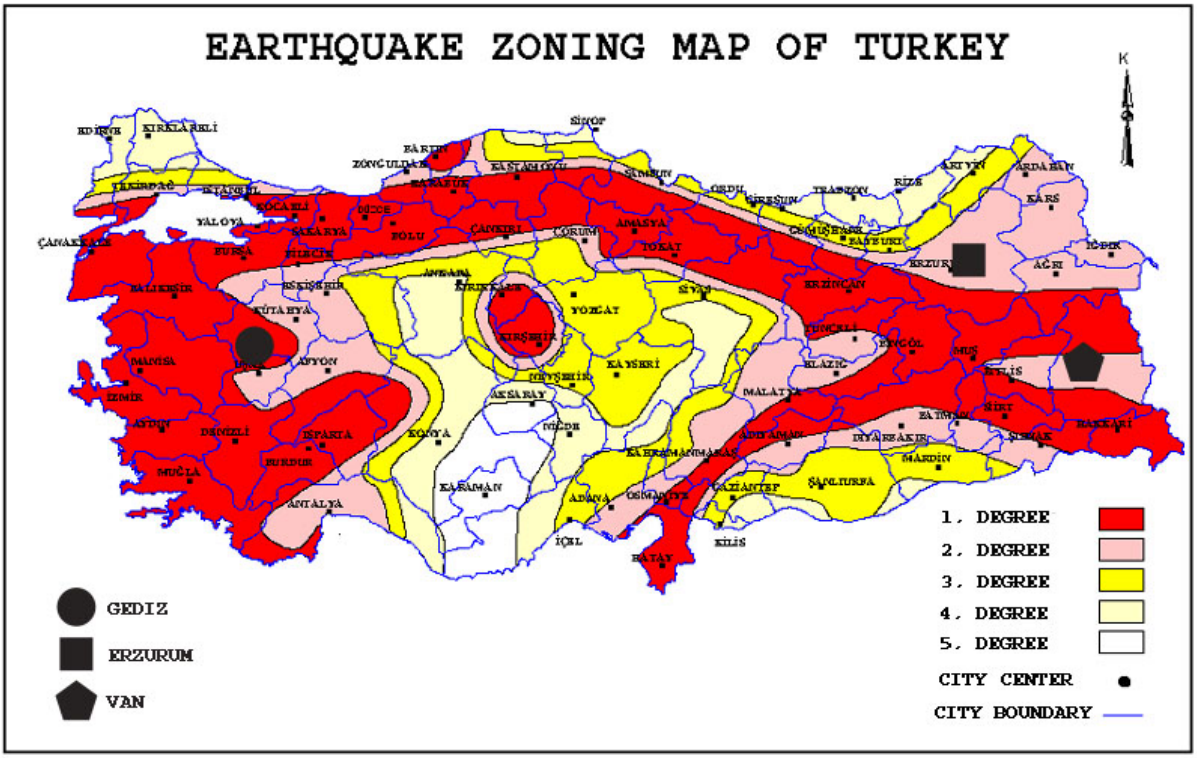

Figure 1. Earthquake Zoning Map of Turkey
Source: http://www.deprem.gov.tr

Whenever a disaster strikes and leaves people homeless shelter has to be provided immediately; at least on a temporary basis. Thereafter, post-disaster houses have to be built in the area to solve the housing problem. The Ministry of Public Works has prepared plans for different types of post disaster houses. Of these, two types are the most commonly used in disaster stricken rural areas, which are built without adaptations for local requirements. The post-disaster houses built in the case study areas of Gediz, Agri and Kirkdikme Village possess the same specifications but have different spatial arrangements. The main criterion of these designs was earthquake resistance of the buildings whereas local conditions were not taken into consideration in the design process. In the construction process only the slope of the roof is changed in accordance to the climatic requirements of the area. [4].

If the disaster victims have their own land and if they do not want to move to post-disaster houses constructed by the Ministry of Public Works, they can have their house designed and constructed with the help of the Ministry [4]. However this rarely happens, as the victims usually do not own land.

POST-DISASTER HOUSING PROBLEM IN RURAL AREAS

> "While discussing disasters, there is often a tendency to forget that disasters are more than events which cause death, injuries and destruction to property. In order to understand the problems that are involved, we must recognize that disasters are a human problem and that our study of disasters and their impact on housing must be viewed in the context of the society that builds and occupies the housing units" [5].

A house not only serves as a shelter but also permits to develop the daily life of a family, its beliefs and its culture. Therefore its design is affected by the socio-economic, socio-cultural and physical environmental conditions [2].
Demiroz (1996:7) claims that the cultural aspects of recovery after disasters have not been given the same consideration as the engineering and practical considerations. This is true especially for rural areas where housing is the product of environmental, geographical, social, economic and cultural factors, which are specific to communities. Furthermore Demiroz (1996) declares that resettlements are the end products of political decisions, governmental regulations and technological assessment, and are designed by outside agencies, which have none or very little knowledge about affected communities. Thus they do not really match with the local patterns and traditional needs. It is a fact that post-disaster houses act as agents of change in physical and social environments especially in rural areas [5].

So far, houses built after disasters have not been appropriate to the needs of the users in rural areas. Some of the homeless have even refused to move into these houses. It was precisely for this reason that quite a few of the houses were left empty. Some of the villagers have made changes in their houses to be able to use them: they have added spaces to the house, changed the location of windows and doors or the arrangements of the rooms by knocking down some walls. This can prove dangerous since removing the walls of a house, which was designed to resist earthquakes, might reduce its disaster resistance. Therefore it is vital to identify and consider the environmental, geographical, social, economic and cultural factors that form rural settlements in order to design and construct post-disaster houses, which are appropriate to the needs of the users.

RURAL SETTLEMENTS IN TURKEY

Human settlements are generally divided into rural and urban. The main differences between the two being their material and spatial specifications and their type of construction. In rural areas, agricultural production dominates the life style, whereas in urban settlements industrial production plays an important role [6]. Rapid population growth leads to rapid design and construction in urban centres. Teams of professionals often produce different types of designs for mass consumption thereby ignoring individual needs.

These differences in urban and rural life styles affect the layout and spatial requirements of the houses. Housing units in urban areas cater only to the daily life of the occupants, such as; cooking, eating, bathing, entertaining and sleeping etc. On the other hand, in rural areas production related activities are also catered for and so are the requirements of the animals owned by the occupants. Therefore, it can be said that the planning of the buildings is affected by the social and economic activities of the users. Rural houses are not only houses to the villagers but also operate as the management centres of their agricultural activities [7].

Environmental adequacy in rural settlements is mainly related to flexibility of spaces, cultural identity and the region's economic condition. Buildings in rural areas have the capacity of being added to, subtracted from and changed without losing their basic character. They are open-ended in nature; this makes them different from the closed final form of the urban style design [8].

Additionally, family size and structure, safety, privacy and religion also play important roles in the use of rural houses, which are generally occupied by extended families. For this reason the rooms in rural houses are arranged in such a way that each of them has the properties of a separate house, to be used by a unit family [9].

Moreover, there are physical factors that affect the formation of rural settlements; these include site, climate and geology as well as the abundance or shortage of specific building materials. Buildings in rural areas are not isolated units but part of their immediate surroundings [8]. Climatic variables such as wind, rain, radiation and light strongly influence the basic characteristics of the houses. Furthermore building materials are selected from the immediate environment.

There are four climatic regions in Turkey. Consequently, there are different typologies of rural houses that are specific to different climatic regions in the country. These differences may be seen in spatial organizations, building materials, type of construction, number of storeys etc.

Building Materials

Building materials used in rural settlements differ according to the location and climate of the area. Adobe is mostly used in plains while timber houses are more common in mountainous and rainy regions [10]. The stone used in the foundation and ground floor walls is abundantly available in every region. Infill materials can be stone, adobe, brick or wood. While mud and lime are usually used as mortar and plaster, clay tiles are widely used for cladding timber roofs. In some regions only cut stone is used while in others rubble stone with wooden lintels is more commonly used. Generally, in humid and windy coastal areas the exterior is cladded with timber siding while in others the buildings are finished with lime plaster. In forested areas the roof is cladded with wooden shingles while in most of the other regions convex clay roofing tiles are used. On the other hand, in dry areas where wood is scarce, flat earth roofs are often preferred [11]. The floors are mostly finished with compacted

earth or wooden planks but this differs according to the climatic characteristics of the region and whether there is a forest nearby [10].

Construction Systems

Construction systems of rural buildings in Turkey can be divided in three types, as masonry, framed and composite structures. Masonry structures built with are stone, adobe, brick and blocks. In rural areas of the country 58% of these masonry structures are of stone, 32% are of adobe, 7% are of brick and 3% are of other masonry units such as concrete block and aerated concrete. Framed structures can be divided in two: timber framed and reinforced concrete. Use of reinforced concrete in rural areas is very limited. 99.99% of framed structures are timber framed whereas only 0.01% of such structures are of reinforced concrete.

Timber framed structures can be divided into five types:

(i) Adobe filled brick filled,
(ii) Stone infill,
(iii) Mud infill,
(iv) Plastered (bagdadi), and
(v) Wood log structures.

Though not very commonly used, timber framed structures can be seen with twigs and mud infill in some regions. These types can be seen in the different regions of Turkey in accordance to the regions' environmental and geographical characteristics and economic conditions [12].

Spatial Organization of the Houses

The organisation of spaces in rural houses of Turkey is strictly related to the villager's life style and culture. The plan of houses is formed with the arrangement of the rooms around a "*sofa*". The room serves as a complete living unit. Its form, size and qualities do not show very significant differences. Conversely the sofa is variable and the house form is usually defined by its sofa. The three most characteristic plan types are those with inner, central and outer or open sofas, utilizing projections and "*eyvans*". Figure 2 presents the various sofa types.

As mentioned earlier, in rural houses, each room has the ability to meet the needs of a single family. It is possible to sit, rest, sleep, wash, eat and even cook in each room. The interior of the room is shaped in compliance with the dimensions, which human functions necessitate. There is very little movable furniture in the rooms. The bedding is kept in built-in closets during the day. "*Divans*" for sitting are placed along the walls, and the centre of the room is left unfurnished for different functions. Most houses have at least two storeys. The top floor is the living area. The ground floor generally has a high, solid stone wall and is usually used as the cattle shed [11].

Keeping animals on the ground floor enables people to benefit from their heat thus reducing their fuel needs for wintertime heating.

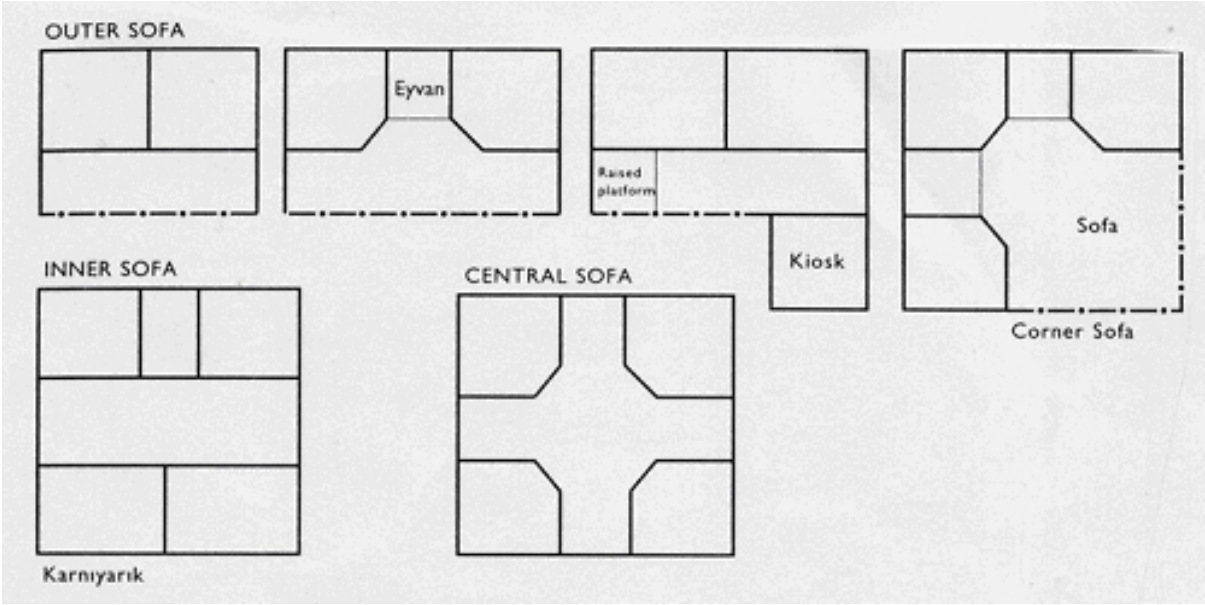

Figure 2. Plan types of sofas
Source: Gunay (1998:17)

POST-DISASTER HOUSING PROJECTS IN RURAL AREAS

In Turkey there are two types of post-disaster houses for rural areas designed by the Ministry of Public Works. Both of these types are single storey load bearing brick masonry structures. If there is shortage of load bearing brick, they are built with reinforced concrete skeleton frames. Sometimes, a cattle shed, which is a single storey building, is provided separately. In addition to the Ministry of Public Works some construction firms, have designed post-disaster houses for rural areas. These are also brick masonry structures and they are not very different from the afore mentioned plan types. None of these types have been created according to specific geographical and climatic conditions and life styles of the communities in a specific region.

In the context of this study various post-disaster houses that have been built so far have been compared. Studies about post-disaster houses were conducted by various researchers in different regions and at different times. These studies have been collected so as to compare their findings. Also, the properties of these post-disaster houses were compared to traditional ones to find out whether they answered the needs of the users or not. The projects chosen as the case studies in this paper belong to Gediz, Van and Erzurum (Figure 1).

Case of Gediz Villages

After the earthquake which occurred in 1970 in Gediz the village was relocated 7 km. south of the old city. The new residential houses, which were built after the earthquake, differ considerably from the traditional buildings. Figure 3 shows a traditional house from Gediz while Figure 4 shows the post-disaster houses built in the relocated village.

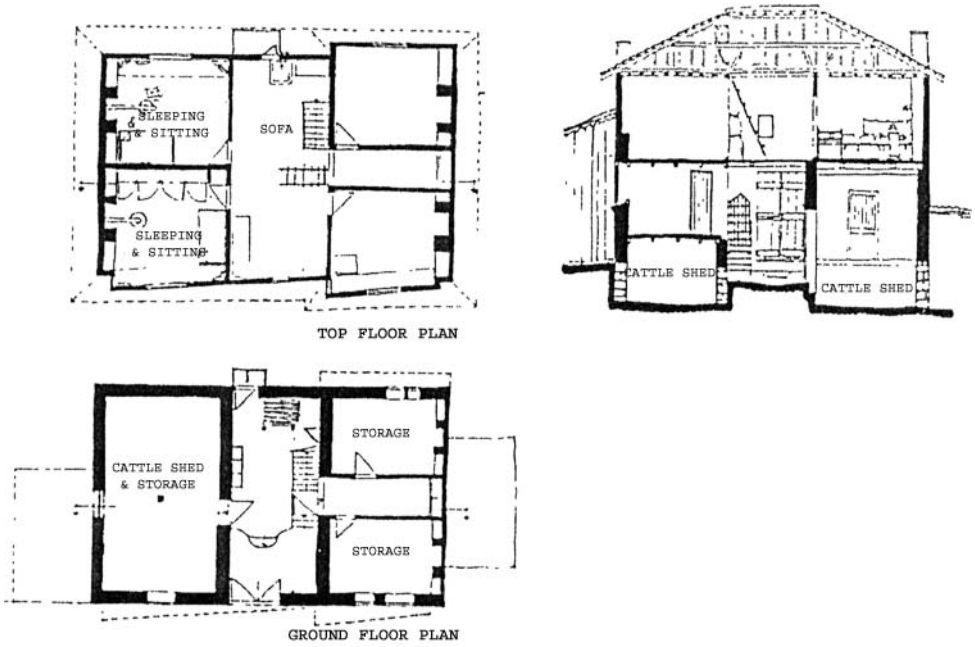

Figure 3. A Traditional House From Gediz
Source: Acerer (1999:164)

All of the post-disaster houses were single storied with two small bedrooms, a sitting room, a kitchen alcove and a bathroom (Figure 4). This division of space makes it impossible to organize family life according to traditional patterns. Also, as the floor space was limited, extended families were forced to break up. Traditionally, villagers keep their animals on the ground floor and live on the top floor. Since the new houses were single storied, there was no space for animals. As the people could not utilize the heat from animals living under the house the need for fuel went up radically [13]. Because of these inconveniences of the post-disaster houses the villagers made some alterations to them. Altered houses and additional buildings have transformed the neighbourhoods of some villages. This transformation can easily be seen in Figure 5.Moreover, the new houses had plumbing installed, in the kitchen and indoor toilets. Yet none of the villages had a serving water supply, so water had to be carried to each of these houses. Also, in most of the villages there is no functioning sewerage system. The drainpipes from toilets lead to septic tanks. Due to absence of running water the modern bathrooms do not function, as they

should. Thus making them less sanitary than the external bathrooms of traditional village houses [13].

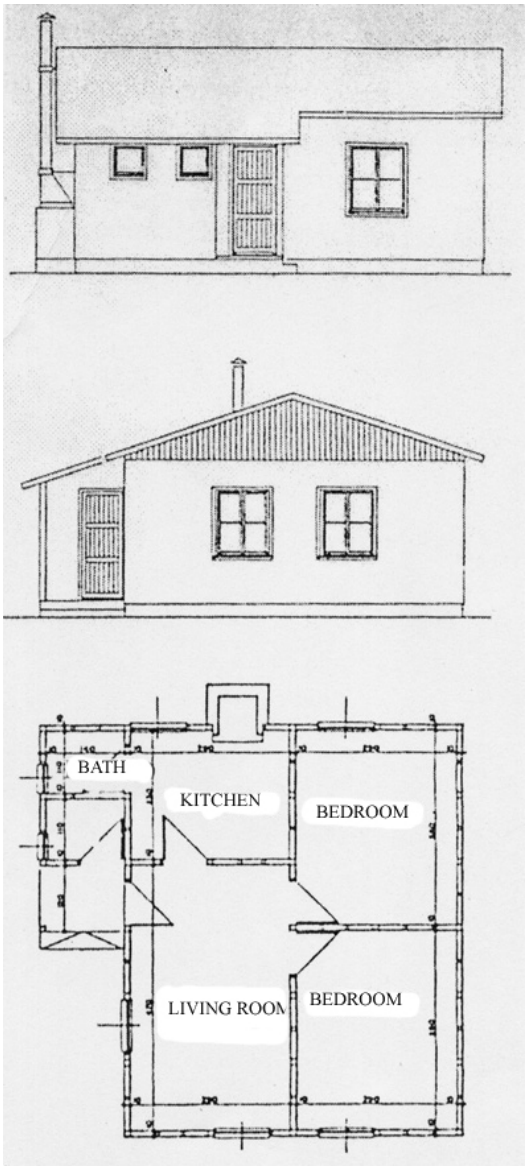

Figure 4. Project of post-disaster house project built in Gediz
Source: Acerer (1999: 163)

Apart from the inconvenience of inadequate space and inappropriate spatial arrangement there were also problems resulting from the use of inappropriate materials. The floor was of unfinished concrete. In a culture where people traditionally sit, eat and sleep on the floor this poses a major problem. The ground is usually damp and cold, since it is a direct contact with the ground. To protect themselves from the cold floor, some of the villagers have built wooden platforms over the concrete floor[13].

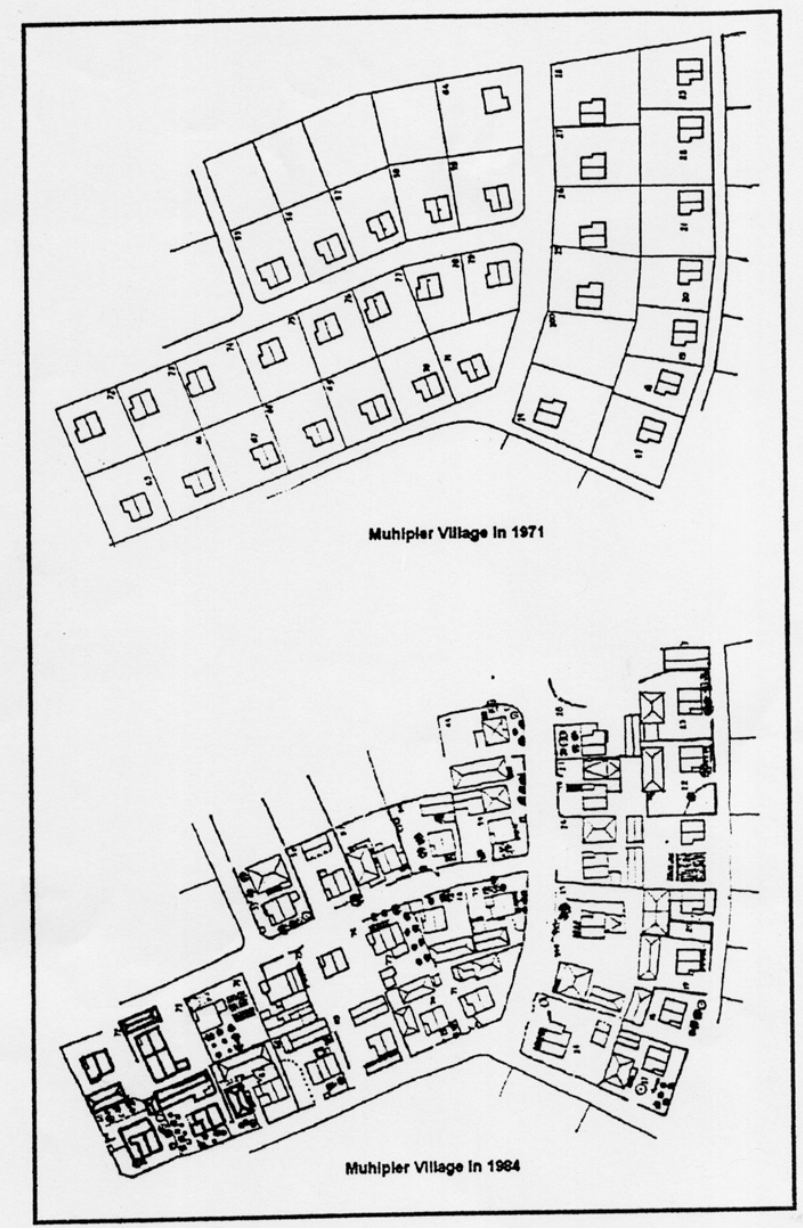

Figure 5. Transformation of a neighbourhood in the Muhipler village

a- Site plan of the post-disaster housing project, as built by the Ministry of Public Works

b- Site plan showing the additions and alterations made to the post-disaster housing

Source: Tercan (2001: 62)

Case of Van

Acerer (1999) declares that after the 1976 Van-Agri earthquake the post-disaster housing projects designed by the Ministry of Public Works were constructed. In the region the main means of existence was cattle farming, which meant every family possessed a large number of animals. The sheds in these projects were inadequate for the animals. Furthermore, it was impossible to build larger sheds because of the insufficient open spaces between the buildings and small plots.

Also, there were problems with the design of the houses. If the traditional houses in the region are examined, it can easily be seen that the houses consist of spaces like bedrooms, which are also the living rooms of the young couples of the extended family, traditional oven room and cattle sheds which come together around a courtyard. Sometimes houses of close relatives come together and form farming cooperatives in the region [3].

Post-disaster houses were designed only to provide proximity, while the economic relations of the families were not taken into consideration. In these projects the living rooms had a fireplace instead of the traditional oven, which is a very important element of the village houses. The villagers opposed the installation of these fireplaces, hence they were deleted from the plans during construction [3].

Case of Kirkdikme Village , Erzurum

After the 1983 Erzurum Kars earthquake there was settled the new village was relocated 4 km.away from its original location. Brick masonry houses were built in the new Kirkdikme Village (Figure 6).

Kose (1988) states that finances permitting the villagers made alterations to the houses according to their requirements. Some families only altered the functions of the spaces whereas, families who could afford to, added some spaces besides changing their functions. For instance the traditional oven inside the house was not used in almost all of the houses and the cattle shed was divided into two spaces. One of these spaces, in which there is a traditional oven, is used as store room and the other space is used as the kitchen. Bread was prepared in the traditional oven and meals were cooked in the kitchen. Absence of a proper kitchen in the house led people to use part of the space which was planned as the cattle shed, as their kitchen. Ahmet Oner Kose conducted a survey in 1988 to find out the level of satisfaction regarding the post-disaster houses amongst the villagers. The survey revealed that none of the respondents used the traditional oven inside the house and none used this space as the kitchen either. 60% of the respondents found the living room to be too small and all of the respondents complained about the dimensions of the windows. The occupants later enlarged the dimensions of the windows, which were inadequate for natural lighting.

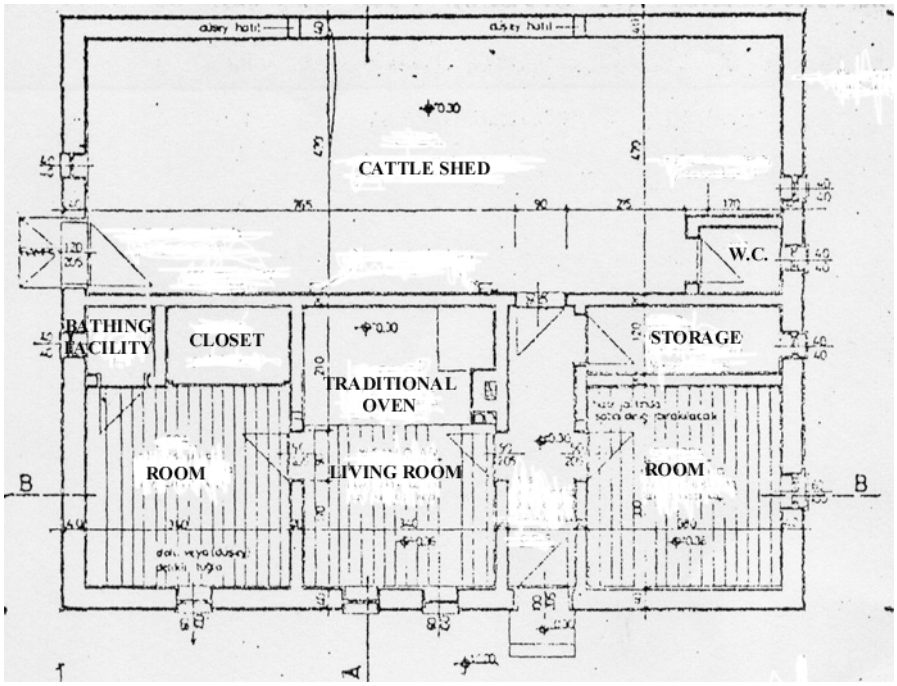

Figure 6. Plan of Post-Disaster House Erected in Kirkdikme Village

Source: Kose (1988:44)

The main means of existence is cattle farming in this region too. 80% of the users changed the cattle sheds and mostly constructed larger ones, which improved shelter and health conditions for the animals. 15% used cattle sheds as they were built it in its own function and 5% did not use them, as they did not own any animals. Furthermore, 60% of the respondents wanted the cattle sheds to be located on the ground floor of the houses.

93% of the respondents complained about the location of the W.C., which was in the cattle shed. Also because of an inadequate septic tank and absence of water supply, the occupants faced difficulties in using the W.C. The bathing facility in a niche in one of the rooms whose traditional name is "*kerhiz*" was used by the whole family. The villagers suffered from heating problems in post-disaster houses also, since the wrong orientation of the houses affected their thermal performance. The new village had a strict geometrical order and lacked flexibility. The villagers had difficulties in making alterations to the houses, in order to adapt them to their needs.

ANALYSIS OF THE CASE STUDIES

In order to compare and contrast the requirements of the occupants and the facilities provided in the post-disaster houses, a table has been prepared for the three case studies mentioned in this paper. Column 1 lists most important features of a rural house and the space requirements of a village household. Columns 2, 3 and 4 present the state of affairs vis-à-vis these requirements. Degree of appropriateness of post-disaster houses built in Gediz, Van and Erzurum has been evaluated on a Likert scale from 0 to 3. A level of 3 means that the requirement was fulfilled and it was adequate also. A level of 2 means that the requirement was fulfilled but it was inadequate. A level of 1 means that the facility was provided but it was inappropriate and a level of 0 means that requirement was not provided at all. Finally, "n.a" stands for those evaluations not made in the case studies by the researchers.

Table 1. Positive and Negative Aspects of Post-Disaster Houses in Rural Areas

Requirements	**Case 1 Gediz**	**Case 2 Van**	**Case 3 Erzurum**
Number of storeys	2	n.a	2
Family room (sofa)	n.a	n.a	2
Bed cum living rooms	n.a	n.a	n.a
Kitchen (cooking facilities)	n.a	n.a	0
Bathing facilities	n.a	n.a	3
W.C.	n.a	n.a	1
Animal Shed / Barn	0	2	2
Traditional oven	0	2	2
Spatial arrangement	2	2	2
Expandability / flexibility	0	0	0
Materials of construction	1	n.a	n.a
Infrastructure	2	n.a	2
Appropriateness to family size	2	n.a	n.a
Appropriateness to life style	1	1	2
Sum	**10**	**7**	**18**
No. of valid cases	**9**	**5**	**11**
Overall Appropriateness (mean value)	**1.11**	**1.4**	**1.63**

3=Adequate
2= Inadequate
1=Inappropriate
0=Not provided
n.a.=Not known

It is obvious that the results of the mean values standing for appropriateness of post-disaster houses lie below the satisfaction level of 2 points. Thus, it can be said that the design and construction of post-disaster houses in rural areas did not satisfy the needs of the village folk. At best these houses serve only to shelter the family but fail to meet the needs of the users.

CONCLUSION

There is no difference between a house and a post-disaster house except for its speed of production. The aim of the post-disaster house is to provide shelter for the homeless so that they can get back to their normal lives. In addition to sheltering, post-disaster houses have to provide an environment compatible with the life style, social and cultural values and economic and physical needs of the users [3].

From the evaluation of the case studies it is clear that the geographical and physical conditions of the region, traditional lives of people and way of production were not taken into consideration in the design and production of post-disaster houses in Turkey. Different climatic regions require different building materials, construction systems, orientations and sometimes different plan organizations. Ignoring location and life styles of the users may cause disruptions in the lives of people. In some examples it is seen that because of the inadequacy of the house, married children had to leave the extended family home. This is not in keeping with the life style of the people living in rural areas where parents, children and the family of married sons live and work together.

This problem can be resolved by conducting necessary research, obtaining the right input, reaching the appropriate solutions, preparing the plans and executing these plans without waiting for the occurrence of disasters [14].

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