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CENTRE FOR HUMAN SETTLEMENTS (Habitat)
Settlements Rehabilitation Programme – Northern Iraq

Learning from tradition to improve housing design

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Homestead Typological Analysis Report

From 12.02.2001 to 11.04.2001
From 27.04.2001 to 13.10.2001

Index

1. Introduction

- **General observations**

Without a doubt the homesteads typological analysis is addressed to create a housing design more related to the reality and capable to satisfy the housing needs of the Habitat program target groups in accordance with their life style and culture.
As a consequence, the assumption of a new design will affect all the population of Northern Iraq in terms of development of income generation activities and technical and professional skills. In fact the local technical experts have not been that much exposed to new design procedures during the last decade. Therefore, the important and significant linkage between national and international sustainable technologies through the collaboration of joint teams of professional experts could have an interesting and profitable outcome.

By using modern design and techniques in combination with conventional and traditional design could result a sustainable and achievable outcome long-term sustainability of a design definitely suits to the local social structure.
There are different arrangements possible which need to be studied in a comparative way in order to make them applicable to the building construction system.

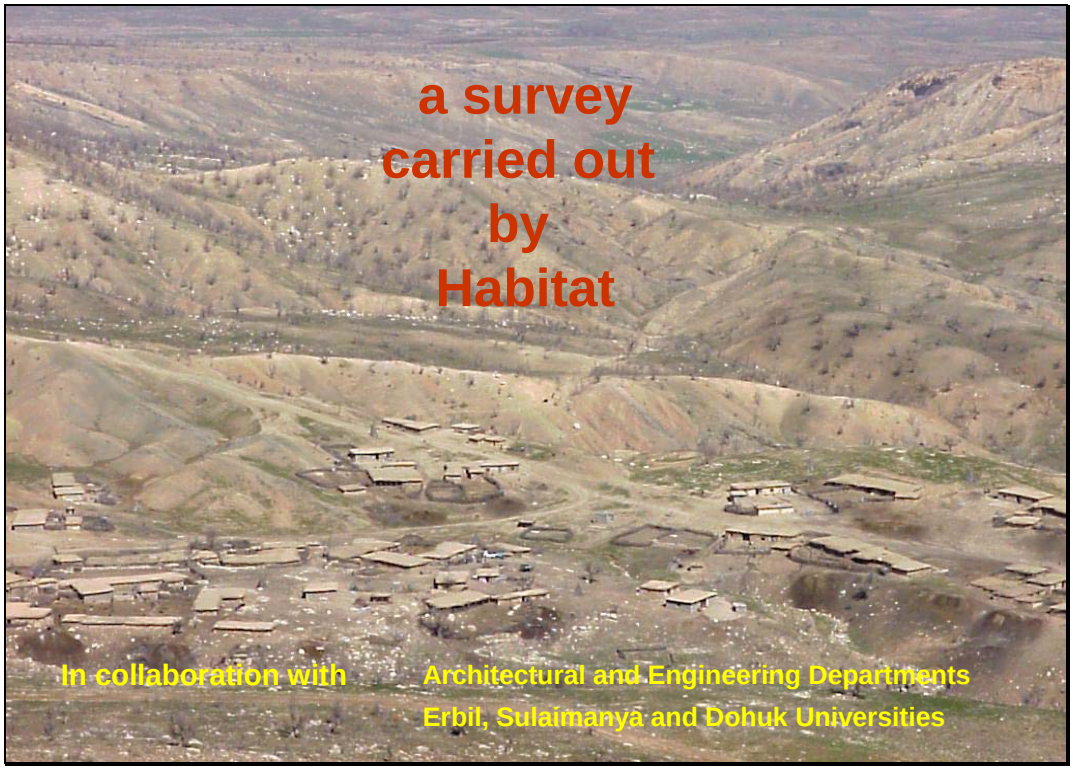
The lesson taught by traditional techniques should avoid creating a gap between the housing environments built by Habitat and the conventional habits of the population.
It is worth noting that in the construction process the human resource should be the center for the implementation of a sustainable project, therefore the house has to be a container with proper characteristics for equilibrium in daily life.
The homesteads typological analysis should be considered as the starting point for further development of a standardized design, fitting in the existing traditional design.
The awareness of the technical advantages and eventual disadvantages of the traditional techniques is meant to offer technical assistance in creating a general plan of action.

An “intermediate technology” in fact has to take into consideration not only the evolution of technical aspects, but also the socio economical impact on the entire population.

- **Background**
  Habitat Survey and Studies Sub-unit

In Habitat Core Team Erbil, a Survey and Studies Sub Unit has been created to make a comprehensive review of all sectors of Habitat activities in Northern Iraq.
All the surveys launched till now were focused on completing Habitat's knowledge of the target population characteristics and needs, their magnitude and their distribution.
The final survey is the Settlement and Household Survey, a quantitative analysis on the whole population in order to create a planning and programming mechanism that would enable Habitat Program resources to be allocated according to the national needs.
As part of the Settlement and Household Survey, the Homestead Typological Analysis was implemented from May 2001 to September 2001 in order to achieve a qualitative analysis of living conditions and typological structures in Northern Iraq.
The purpose of the Homestead Typologies Analysis is to improve housing design and strengthen recent quantitative surveys carried out.

This Analysis will be completed by the foreseen Construction Sector Review, which will make with technical recommendations on the production and use of improved local building materials and techniques.



2. Learning from tradition to improve housing design

It is expected that the analysis will add substantive value to the implementation of the settlement rehabilitation program, by suggesting possible alternatives and new solutions more related to constructive systems learned by tradition. One should not forget tradition, using it as a basis for concepts of design. Technology has to be considered as an instrument to create adequate solutions as suggested by tradition. Consequently we can expect better results in building construction. The analysis was conducted through a study on traditional typologies over the whole of Northern Iraq Region.

3. A study on traditional typologies and building materials in rural areas.

The importance of the study is to set up new criteria for housing projects along with possible improvements to the existing housing system.
The study of architectural history gives a framework that can be used as a sample and a base. The ancient solutions were supported by the necessity to solve in a simple way construction problem. The lack of technology is substituted by creativity and through trial and error in using available materials and basic building structures.

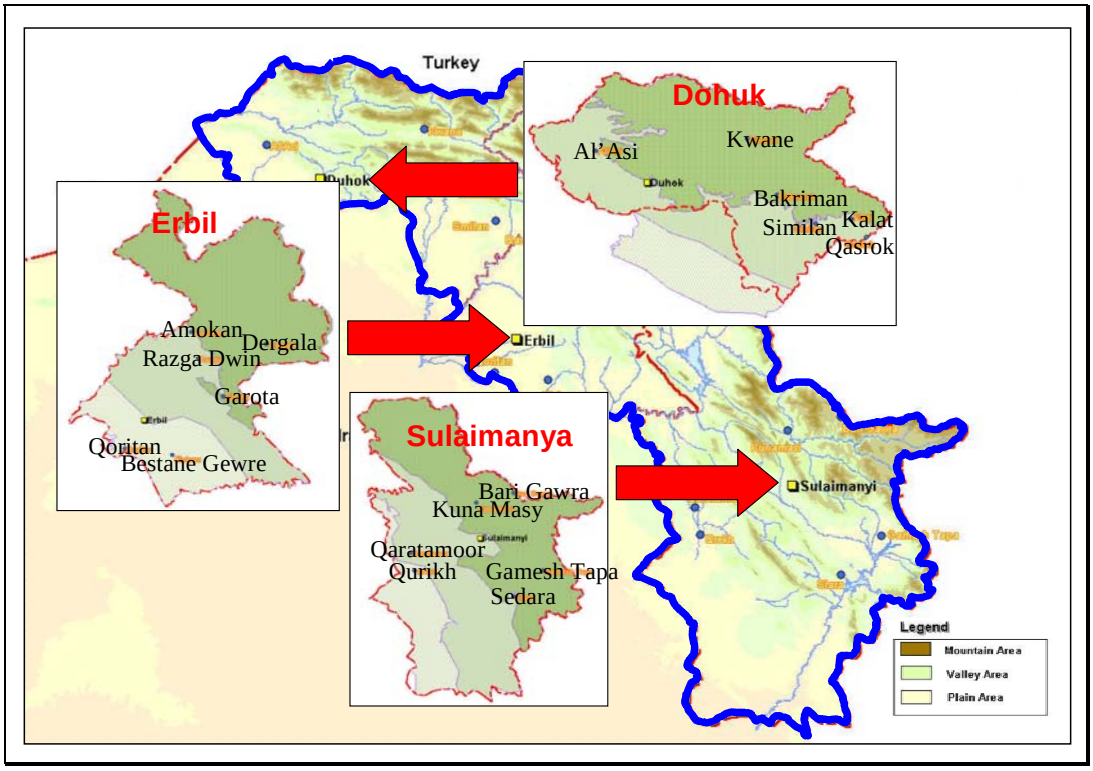
More specifically, the attention was focused on topographical, geographical, socio-economical, cultural, architectural factors in order to get a better understanding of the influences on building construction techniques.
The outcome will suggest how to get a better design through adapting local traditions, climate, environment, settlement layout and housing construction.
To achieve this, a survey was implemented in all three Governorates in Northern Iraq.

4. A survey carried out by Habitat

The survey was sponsored by Habitat in collaboration with the Architectural and Engineering Departments in Erbil, Suleymania and Dohuk Universities. A summer operation stage was organized with three teams of students used, under the guidance of architects/supervisors from the three Habitat Field Offices.
A questionnaire consisting of two forms was prepared as a tool used on the field by the students` teams.
The two forms were as follows:

1 rural settlement form
To provide a set of relevant information on:
geographical location, climate, plot distribution, historical background, social and traditional structure, services/facilities, economy.
2 dwelling form
To provide a set of relevant information on:
Dwelling dimensions, number of rooms and floors, dwelling facilities, orientation, technical details and building materials.

The data collection phase has been completed by a data entry phase in order to facilitate the outcomes identified. The results are recorded on several tables annexed to this report.
A part from the questionnaire the students were requested to produce sketches in order to provide plans, sections and technical details of the existing dwellings assessed.
The technical survey and the spatial organization analysis were integrated with the graphical representation of furniture distribution to get a comprehensive image of rural domestic habits, life style and household management schemes.



Northern Iraq Region – villages selected in the three Governorates

5. selection of traditional villages.

During a sensing assessment of different geographical areas in the three Governorates, the list of the most interesting traditional villages was drafted to target the analysis on peculiar examples of ancient typologies.
A comparison of relevant studies, previously produced, on the structure of rural settlements and the collection of information, carried out with experts from local institutions, helped identify the final selection.
The criteria used to organize the study were based on dividing the Northern Iraq Region into three different areas according the territorial conformation: plain area, valley area and mountain area.
For each area two villages were selected from each of the three Governorates giving a total of 18 rural settlements selected.

mountain area settlement

6. A short description of survey approach

The procedure adopted, started with an overall picture of the rural settlements which focused on the factors that influenced the settlement development and pattern.
Using the zoom of an imaginary camera, the aim was to get a detailed view of each settlements component.
Then, it focused on how the communities react to external factors to create a more sustainable life in order to satisfy their housing needs.

7. making reference to …

- environment

The most important factor in all the analysis is the territorial topography as a constraint in developing a settlement typology.
The contour layout is a restrictive condition in building construction.
It is necessary to follow the contour lines course in order to avoid difficulties in construction process. Therefore the settlement expanded according to a peculiar pattern related to territorial landscape: the dwellings were located according to the land corrugation.
Other factors related to the environment were also taken into consideration:

- the type of soil
- the fertility of land
- the vegetation.

They affect, at the sametime, the possibility to implement income generation activities with the subsequent desire to settle and build new constructions.

Taking into consideration the fact that life sustainability in the rural area is due mainly to the cattle breeding and farming practices, the soil type, the land fertility and vegetation encourage settlement development. On the other side environmental adequacy encourages housing construction activities.
It is worthwhile noting that site vegetation determines the settlements disposition and location. The presence of high trees and plants is a natural barrier for protection against strong winds and currents of the constructed areas. It is at the sometime a proper resource to get firewood and wooden material for use in construction and fencing.
Directly connected with the land fertility and the presence of vegetation is the availability of natural water sources. The water presence is the most important and affecting factor that encourages the community to settle: rivers, streams or natural springs are identified as the main reasons to provoke human aggregations.

- climate

Northern Iraq Region is exposed to climate extremes.
The geographical areas are differentiated by various climate conditions:
- Mountain areas

mild summer and rigid winter
- Plain areas

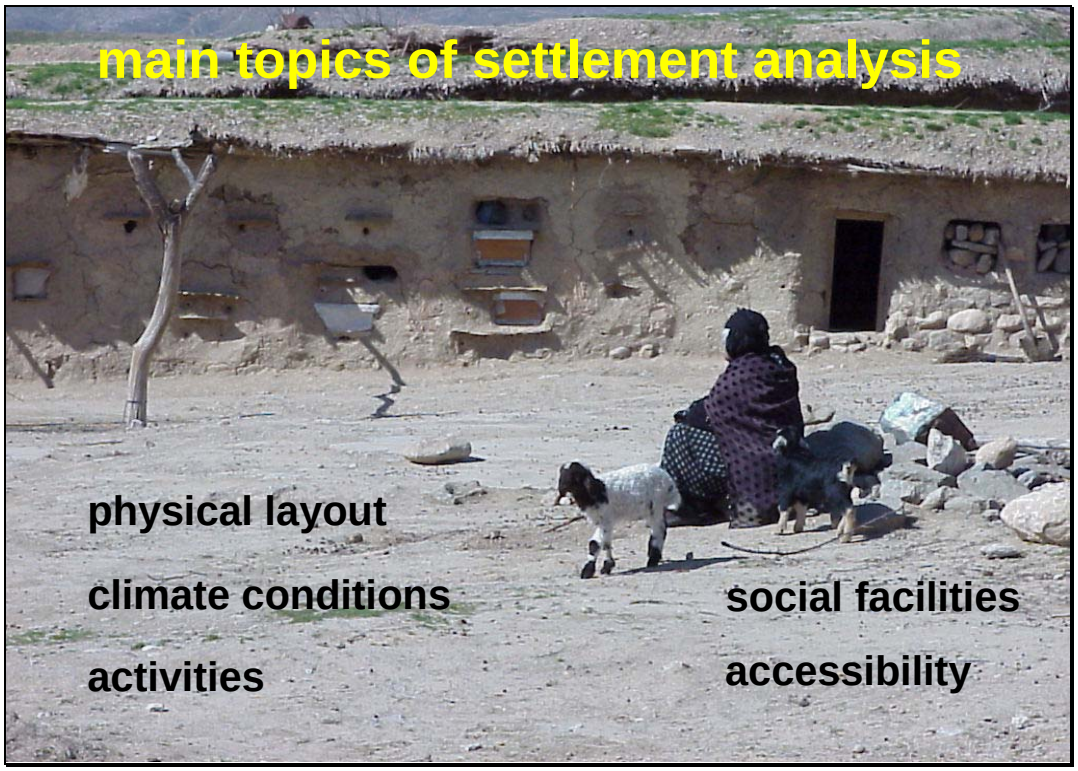
hot summer and mild winter
Therefore, in the mountain areas during the winter it is easy to have snow and low temperature. The rainy season is quite unpredictable and torrential.
Winds of variable strengths blow accompanied by dust and sand storm in the plain area.
Consequentially, adequate techniques were adopted to protect the settlements from temperature range and climatic factors.
The settlement pattern was developed according to environmental necessities:
- An aggregated pattern as prevention against strong cold winds and rigid temperatures
- A scattered pattern as a ventilation facilitator to create currents during hot season.

In both cases the most important factor is the settlement orientation.
With reference to the exposure to sun radiation, the settlement is oriented in order to get reasonable protection and an environmentally healthy indoor condition for the inhabitants. The optimization of the building orientation regulates the quantity of solar radiation received by different walls at different times of the day.
Apart from the pattern design, the climatic problems influence the building construction techniques to obtain a proper living comfort in the dwellings.
As a matter of fact, apart from the different construction methodologies, the diverse use of local materials, stones, timber or mud bricks, provides the advantage to reduce temperature constraints.

- socio economical pattern

The spatial distribution of a settlement is in general influenced by the development of the economic activities. In the rural areas the most important sources of income are the agricultural practices and the livestock production, less important but nevertheless practiced is the food production.

Therefore communities generally attempt to settle in specific and appropriate areas in order to guarantee their economical autonomy. Vice versa the functional organization and spatial distribution have been arranged according to the activity needs.
The settlement economy is directly connected to the area's accessibility and in providing good communications. Even though in the past road networks have not been largely developed the community settled in accessible places in order to have a easy contact with other communities, adequate support town structures to provide good health or education services.

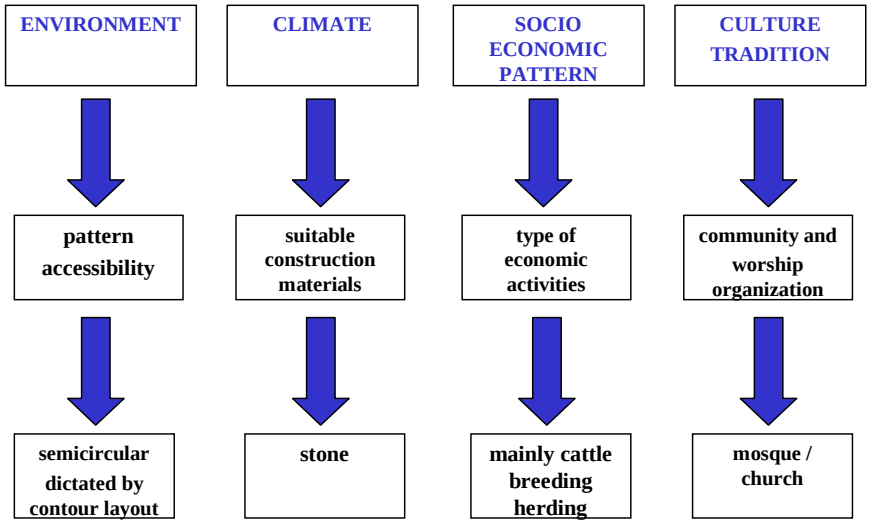


- culture/tradition

It is a fact that the culture and the tradition have a strong correlation with the settlement pattern: the design provides an answer to the administrative, civic and religious organization of the community.
The villages were structured through committees lead by religious representatives who held the administrative power. Therefore the worship center (mosque) was located in a strategic position. It became the focal point of the village:
the mosque being a place for prayer, meeting, perform personal hygiene activities ("hammam") and to participate in Koran lectures.
Therefore the housing building process adequately provided for community social habits and life style.
Apart from the mosque in the rural settlements, few public services and facilities exist, the schools and health centers were built later, referring to the settlements construction date. They were located on the outskirts of the settlements center.

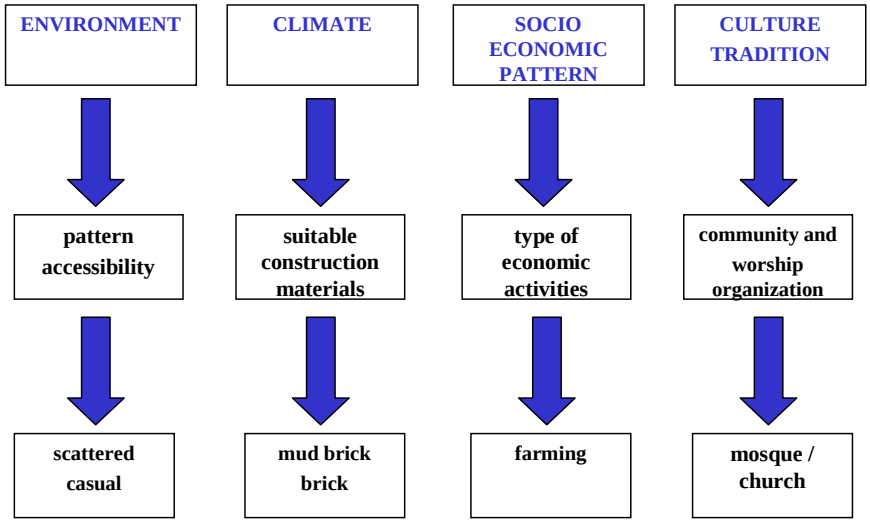
mountain area settlement

how to cope with



plain area settlement

how to cope with



communities feed back to environmental factors

8. main topics of settlement analysis

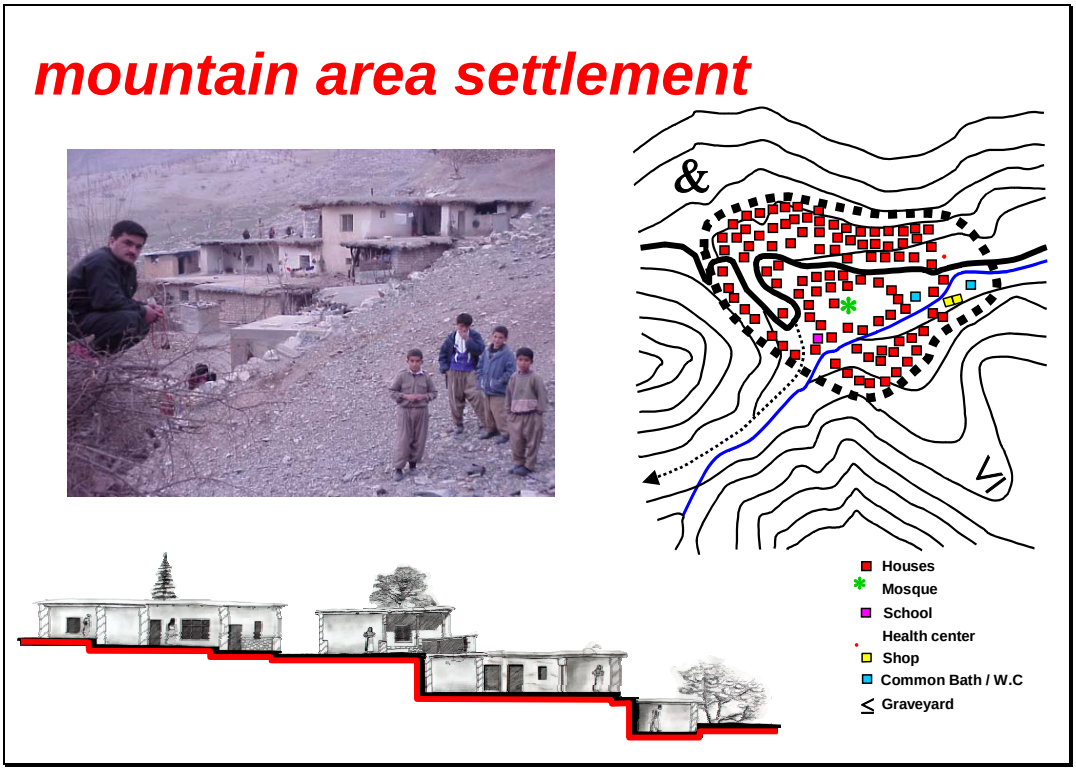
With reference to the environmental factors the analysis was focused on main topics to get a better understanding of the rural settlement.

- Pattern layout
- Climate conditions
- Activities
- Social facilities
- Accessibility

Therefore a methodology based on the comparison between the villages located in the mountain areas and the plain areas was established to define an evaluation frame of variables.

9. mountain area settlements

The aggregation of the human groups has been influenced by the above-mentioned environmental factors. The correlation between these factors as indicators of a building construction strategy has been conducted through the analysis of the technical documents produced during the survey phase.



Settlement pattern design

Settlement pattern design

The contour lines dictate the mountain settlements pattern: therefore the housing construction has been adjusted according the land layout.
The drawing of the settlements section shows how the houses were disposed along the ground steps design. Each house could exploit the roof of the house built on the level below as a courtyard. The result was a “terrace” design.

The primary outcome of the analysis indicates clearly that settlements in mountain areas assume the aggregated pattern. The factors, which generate the housing distribution in aggregated groups, are correlated to the geographical elements and to proper land use. The villages grow along the mountainside attempting to use all the adequate and available space.
Obviously the housing aggregation was also a strategy to facilitate the defense of the villages: in the past it guaranteed the protection from eventual attacks conducted by other communities or countries.
Moreover the mountain versants not exposed to wind effects and oriented towards the sun have been chosen in order to facilitate the housing thermal comfort.
The houses main elevation, were oriented towards the south in order to have sunlight all day long and to keep the temperature in the dwelling as warm as possible during the rigid winter.
It is worth noting that the aggregated settlements pattern assumes an almost defined design due to the importance placed on the center of worship as the focal point for community meeting.
This creates a semicircular design in the house aggregations: the settlement became a sort of amphitheatre developed around the mosque and follows the mountain layout.

House plots and design

As a consequence of the aggregated settlement pattern, the availability of space around the dwelling was limited: the plots assumed irregular shape and followed the ground layout.
The plots are not fenced and the open spaces are used mainly to facilitate human and animal movements in the settlement itself.
The yard in front of each dwelling facilitated the community social contacts: it emphasizes how in the mountain settlement the houses were used mainly for sleeping and cooking while all the other activities take place in the common spaces.
For instance the laundry activity take place at the village water trough, the common prayer in the mosque and for baking of bread in the public oven.
The social attitude was based on sharing spaces to benefit the community.

Table N.1 - Settlements

The indicators reported in the following tables make reference to the data collected in the survey database

1- Mountain Area

	Village Name	Land ownership	plot M^2 D1	dwelling M^2 D1	animal shed M^2 D1	Plot M^2 D2	dwelling M^2 D2	animal shed M^2 D2
Erbil	Dargala	Right to use,Private	84.93	84.93	0	289.26	97.34	86.60
	Garota	Right to use,Pritate	440.00	92.66	60.00	150.00	77.64	24.05
Suly.	Kuna Masy	Inheritance	230.00	79.02	57.00	179.00	72.60	31.95
	Bari Gawra	Inheritance	Open	259.83	277.63	422.04	67.50	94.01
Duhok	Bakirman	Inheritance	285.60	97.78	18.00	474.00	155.40	0
	Kwane	Inheritance	203.94	129.38	93.10	499.80	172.36	50.00

2- Plain Area

	Village Name	Land ownership	plot M^2 D1	dwelling M^2 D1	animal shed M^2 D1	plot M^2 D2	dwelling M^2 D 2	animal shed M^2 D 2
Erbil	Qoritan	Right to use,Private	248.07	70.78	27.15	466.68	111.31	19.14
	Bestana Q.	Right to use,Private	503.00	82.86	86.40	91.50	30.98	2.90
Suly.	Qurikh	Inheritance	207.81	54.59	64.33	347.00	78.00	69.94
	Gamesh T.	Inheritance	2430.00	104.30	5.70	958.20	126.72	33.90
Duhok	Similan	Inheritance	276.00	150.84	0	627.04	194.50	12.00
	Al' Asi	Inheritance	728.00	96.34	148.16	779.78	153.24	93.12

3- Valley Area

	Village Name	Land ownership	Plot M^2 D1	Dwelling M^2 D1	animal shed M^2 D1	plot M^2 D2	dwelling M^2 D2	animal shed M^2 D2
Erbil	Razg Dwin	Right to use,Private	549.11	130.00	81.00	300.90	84.17	38.06
	Amokan	Private	398.14	172.27	284.96	326.92	69.16	48.31
Suly.	Qaratamoor	Inheritance	652.84	76.30	171.48	351.60	70.00	93.75
	Sedara	Inheritance	748.80	91.84	178.30	416.96	155.50	24.36
Duhok	Kalat	Inheritance	415.28	123.22	26.56	775.00	128.74	0
	Qasrok	Inheritance	349.75	50.90	0	444.35	115.10	0

D1 = dwelling number 1
D2 = dwelling number 2

It is evident that the square meters are meant to be the total area

Water

One of the most important factors that dictated the settlement development is the water source location and its characteristics.

In the mountain area the water is mainly supplied through:

- natural springs
- rivers or streams

The natural spring generally is a trough built in the center of the village. Its accessibility facilitated the human activities and supported the animals keeping.

In some other cases the settlement spread out along a river or a stream. The water presence ensures not only the domestic use but also the land fertility and as a consequence the economical activities.

It is also important to note that the housing location and pattern designed to avoid landslides and to facilitate drainage in case the water source overflows during an extensive rain period.

Table N.2 - Dwellings

The indicators reported in the following tables make reference to the data collected in the survey database

1- Mountain Area

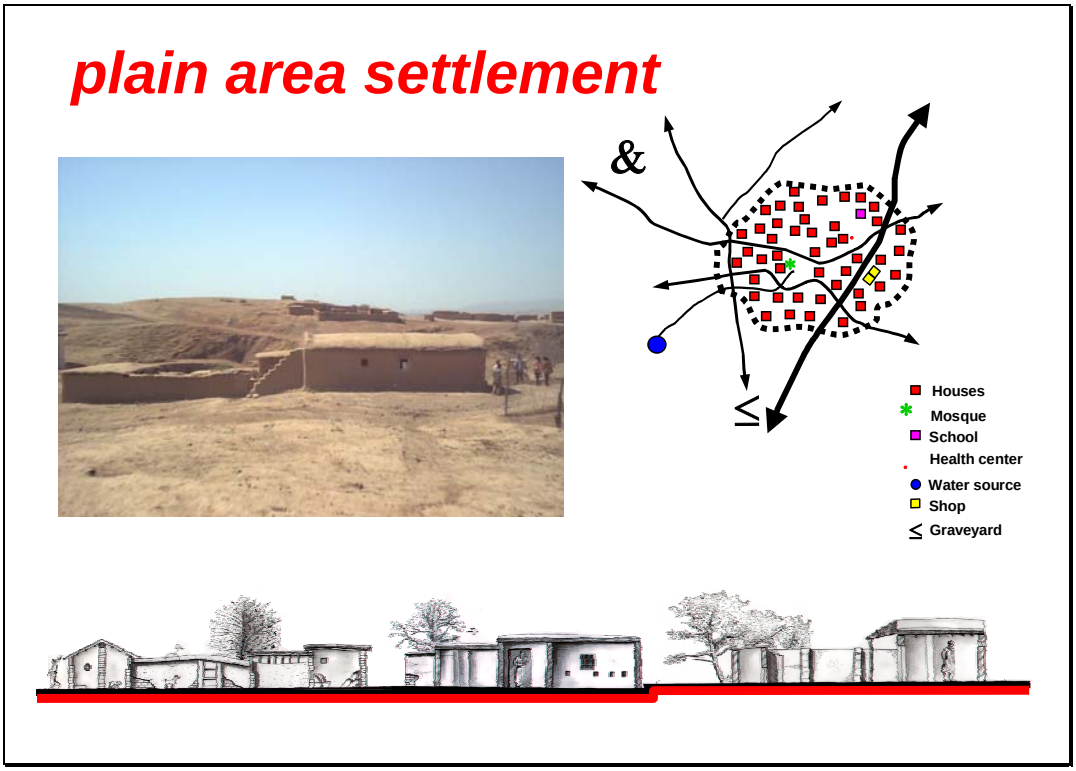
	Village Name	Total number of Dwellings in the village	dwelling total M^2 D1	dwelling rooms number D1	dwelling total M^2 D2	dwelling rooms number D2
Erbil	Dargala	113	84.93	2	97.34	2
	Garota	35	92.66	2	77.64	2
Suly.	Kuna Masy	20	79.02	2	72.60	2
	Bari Gawra	0	259.83	2	67.50	6
Duhok	Bakirman	250	97.78	3	155.40	4
	Kwane	70	129.38	2	172.36	4

2- Plain Area

	Village Name	Total number of Dwellings in the village	dwelling total M^2 D1	dwelling rooms number D1	dwelling total M^2 D2	dwelling rooms number D2
Erbil	Qoritan	37	70.78	3	111.31	4
	Bestana Q.	27	82.86	6	30.98	1
Suly.	Qurikh	50	54.59	6	78.00	2
	Gamesh T.	108	104.30	2	126.72	3
Duhok	Similan	50	150.84	3	194.50	3
	Al' Asi	28	96.34	3	153.24	3

3- Valley Area

	Village Name	Total number of Dwellings in the village	dwelling total M^2 D1	dwelling rooms number D1	dwelling total M^2 D2	dwelling rooms number D2
Erbil	Razg Dwin	45	130.00	5	84.17	3
	Amokan	220	172.27	6	69.16	2
Suly.	Qaratamoor	50	76.30	2	70.00	2
	Sedara	18	91.84	2	155.50	4
Duhok	Kalat	250	123.22	3	128.74	3
	Qasrok	20	50.90	2	115.10	2



settlement pattern design

10. plain area settlements

Settlement pattern design

In the valley area and in the plain area the settlement followed a scattered pattern. The areas are completely flat without any relevant land depressions or subsistence therefore in the absence of natural constraints the housing building process was not influenced by topographical layout. Even though the settlement pattern was scattered it kept a building construction methodology related to cultural and traditional factors.
The worship center: the mosque remains the settlement's focal point and the scattered location of the dwellings continued to have a logical centralized design.

House plots and design

The plot dimensions in the plain areas are definitely larger than the mountain dwellings as a consequence of space availability. The distance between the plots generally is larger and each plot is fenced.
The communities therefore developed a stronger sense of self-sufficiency and each family became a micro community.
All the activities take place inside the plot: domestic, recreational and livestock. Therefore the families did not develop an attitude for common activities: except from the praying and shopping of essential food products (in the markets), all the other activities take place in the homestead.

water

In plain areas the water sources are seldom rivers or steams, the water is mainly pumped from ground wells. In a few cases, natural springs provide the water sources
.

Generally the houses have a water tap in the courtyard connected to the village well. This affects the social living aspect of the village community: the trough is a meeting place especially for women. The water collection introduces a social ritual of meeting opportunities (in mountain areas).
As a consequence the family in the plain areas is more self-sustainable and autonomous.

Table N.3 - Social structure

1- Mountain Area

	Village Name	village head	village commette	main activity
Erbil	Dargala	Mukhtar	No	Farming
	Garota	Mughtar	No	Cattle breeding
Suly.	Kuna Masy	Village committee	Yes	Cattle breeding
	Bari Gawra	Village committee	Yes	Cattle breeding
Duhok	Bakirman	Mukhtar	Yes	Cattle breeding
	Kwane	Mukhtar	Yes	Cattle breeding

2- Flat Area

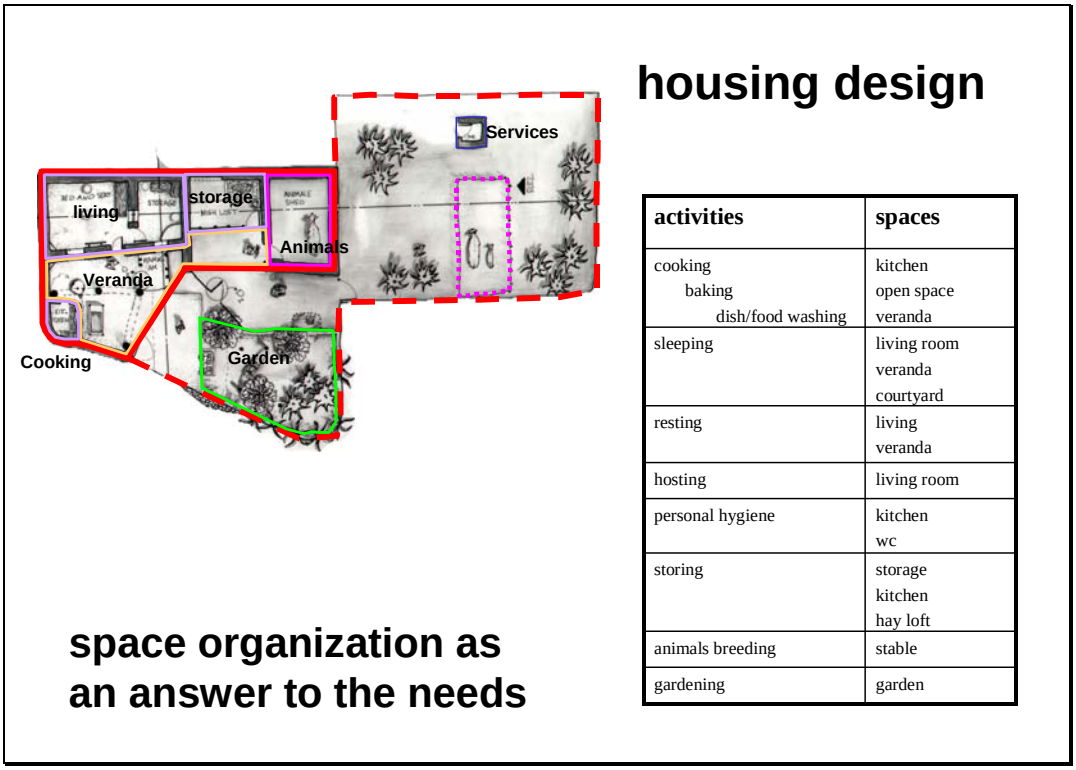
	Village Name	village head	village commette	main activity
Erbil	Qoritan	Mukhtar	Yes	Farming
	Bestana Q.	Mukhtar	Yes	Farming
Suly.	Qurikh	Village committee	Yes	Farming
	Gamesh T.	Non	Yes	Farming
Duhok	Similan	Mukhtar	Yes	Farming
	Al' Asi	Mukhtar	No	Farming

3- Valley Area

	Village Name	village head	village commette	main activity
Erbil	Razg Dwin	Mukhtar	Yes	Farming
	Amokan	Mukhtar	Yes	Cattle breeding
Suly.	Qaratamoor	Village committee	Yes	Cattle breeding
	Sedara	The chief of committee	Yes	Food production
Duhok	Kalat	Mukhtar	Yes	Cattle breeding
	Qasrok	Mukhtar	Yes	Farming

11. Homestead
spatial structures and functional distributions

Starting from the settlement analysis and using a hypothetical camera, the homestead has been extracted from the context. The zoom of the ”camera” was focused in order to have a complete and detailed picture of the traditional typologies.
Therefore, it is worth understanding the spatial structures and the functional distributions developed in the tradition to satisfy the domestic needs and compare them with the techniques adopted.
All the drawings, plans, sections and elevations, produced during the survey were used to carry out a comprehensive analysis on elements affecting the homestead typologies.
The information that has been collected through the field inspection, was crosschecked with the survey outcome.
Particularly the graphical analysis of activity/space/techniques link brought out interesting observations, which matched with the survey indicators providing a more precise image of the traditional homesteads.



activities	spaces
cooking baking dish/food washing	kitchen open space veranda
sleeping	living room veranda courtyard
resting	living veranda
hosting	living room
personal hygiene	kitchen wc
storing	storage kitchen hay loft
animals breeding	stable
gardening	garden

12. Housing design – space organization as an answer to the needs. Mountain area

The homestead in mountain areas was built mainly according to the families’ domestic activities and sources of income.
As it was already mentioned, normally, the plot is small and without any fence, the area around the dwelling is open and almost all activities take place outdoor (see chapter 9 - mountain area settlements).

Outside

- Veranda

The most important space in terms of spatial organization is the veranda. During the summer it is the favorite domestic area where almost all the activities take place, it is a common space used by all the family: cooking, resting, sleeping and entertaining even if the dimensions are limited. During the wintertime the attitude is to close the semi open space with curtains, plastic sheets or straw mats in order to gain a more useful area for the dwelling and retain the heat.

- Personal hygiene

In rural settlements, generally the sewage system does not exist. The toilets are minimal latrines without septic tanks, separated from the dwelling and far from the living space. The toilet is a small construction without light and ventilation; the only opening is the entrance door.

Personal hygiene takes place in common spaces (mosque for men) or in the natural water source (river/steam for women). A bathroom or indoor shower does not exist inside the dwelling.

Obviously this situation causes a lot of health problems and difficulties in arranging the hygiene activities, especially during the winter season.

- Storing

It is an activity located in different spaces: sometimes it takes place indoors especially when the kitchen is a separate room

In other cases storage can be utilized in an outdoor space: the veranda or other small constructions, such as haylofts, built in the dwelling's plot.

- Gardening

Even if the climate is rigid, particularly in wintertime, it is easy to find a small area in front of the dwelling such as a garden. The family normally plants vegetables in order to satisfy domestic needs

Inside

- Cooking, resting and sleeping

The dwelling in general consists of two rooms with one small window and one door each. Due to the tiny dimensions the space indoor is multipurpose: mainly only one room is used as the living space. Therefore cooking, resting and sleeping take place indoor only during the winter season, in the summer season those are all indoor activities.

Taking in to consideration that families are often large (8/9 family members minimum) the space is optimized: there is little furniture and the floor surface is strategically used. The beds are mattresses that should be folded at daytime and disposed in a corner in order to have enough useful surface for the daily activities.

In fact usually the furnishing is minimal and almost all the activities take place on the floor, covered with carpets.

- Animal keeping

Generally there is shear living between the family life and animal keeping: the main reason is the lack of space.

The other reason is to preserve the heat formerly produced by indoor animal keeping. Therefore often the animals are kept in stables attached to the living room.

It should be noted that sometimes the animals have a separate room in a lower level than the dwelling, using the peculiar layout of the ground.

Following the land pattern the dwelling (in this case one living room and a kitchen/storage) was constructed in order to exploit the roof of the stable itself as a yard. It was a type of terrace building.

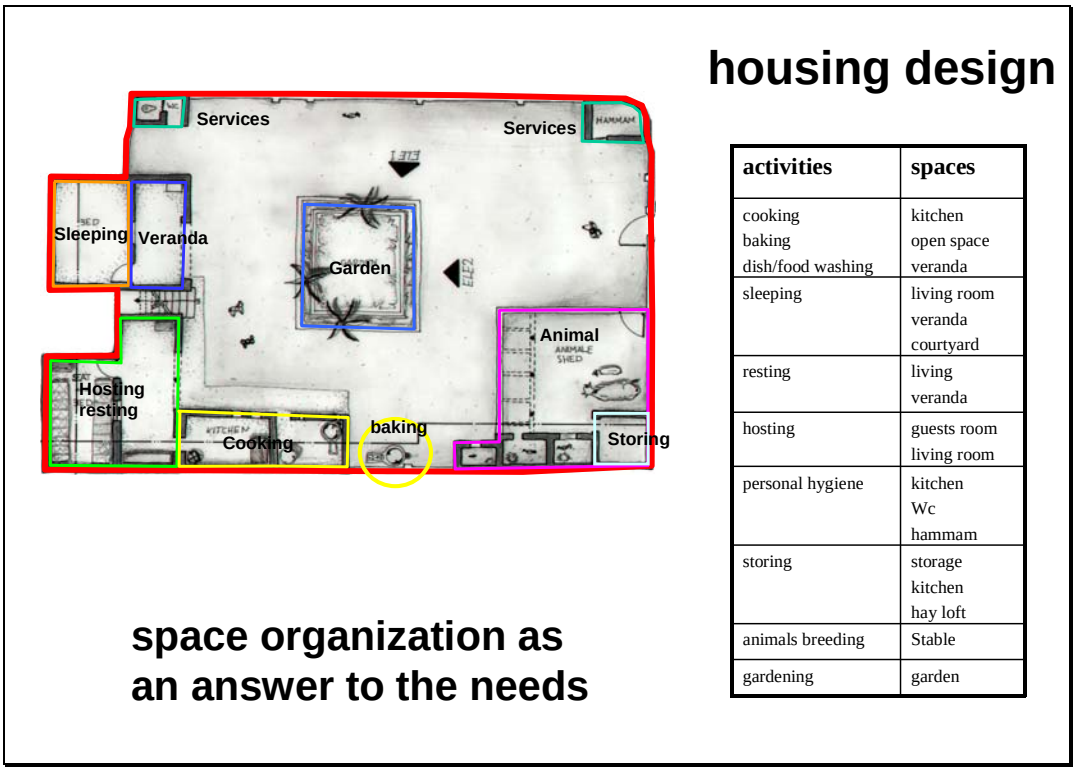
- Heating and cooking

The heating system is mainly a firewood stove located in the center of the room and connected to a pipe used as a chimney. Ingenious apparatus combine heating/cooking devices (stoves) indoor heat and provide both heat and cooking facilities from the same energy source.

- Spatial circulation

Essentially the indoor circulation is basic and easy, using separate partitioning. There is an entrance for each room opening directly to the yard.

Traditionally the spatial circulation was kept outdoors: wooden stairs being used to have access to the roof in order to maintain it, compacted soil paths with the stables especially if they were located on different levels.



activities	spaces
cooking baking dish/food washing	kitchen open space veranda
sleeping	living room veranda courtyard
resting	living veranda
hosting	guests room living room
personal hygiene	kitchen Wc hammam
storing	storage kitchen hay loft
animals breeding	Stable
gardening	garden

13. Housing design – space organization as an answer to the needs. Plain area

In the plain area the total plot surface is bigger than in the mountain area. (See chapter 10 – housing plot and design)

Generally a fence made with different materials, such as straw, wood, iron surrounds the plot and protects the homestead from external contacts.

The family's life is structured in a sort of microcosm: the plot dimensions are sufficient to satisfy the daily domestic needs and functions. The exchanges and the sharing of activities with the village community is limited.

Outside

- Veranda

The veranda is a multipurpose space used during the summer season for entertaining guests and for resting during the hottest part of the day. It is a meeting place for the family: women usually do the baking and children play or sleep. During the wintertime it is need for storage and/or farming tools or food products.

- Personal hygiene

As a consequence of the wide dimensions of the plot the toilet is generally built inside the fenced plot, but far from the main dwelling area.

Originally the bush or the nearest rivers were used as a toilet. Nowadays it is built inside the homestead plot, but still a latrine without connection to communal sewage system.

- Storing

Generally storage takes place in small mud constructions built in the courtyard in order to keep the food and farming products. The haylofts and tools stores are attached to the fence on the extreme plot corners.

- Multipurpose activities space – the courtyard

The courtyard is a multipurpose space used for several activities. As the climate is mild in valley and flat area than in mountain areas it becomes an ideal space to prepare the bread or for small clay ovens. The courtyard is also used as a crib area for babies or to let them play in the shade of trees. Sometimes it is used as a barn for small animals such as chickens. Even in hot summer nights the same space is used as a sleeping “room” for the family: sometimes the beds are arranged in the yard or also a large clay platform is built to create a sort of sleeping common area. The same platform is used during the day for drying the farming products.

Most of the activities are facilitated by the presence of a water tap.

Therefore is easier for the women to wash and to dry the clothes in the open air, especially in summertime.

- Bread baking

Generally women do the baking in mud ovens: small constructions with a circular shape where special metal plates are placed to bake the bread. Sometimes they are contained in small houses with enough space to store the flower to protect it from the humidity.

- Sleeping

During summertime, the families like to sleep outside to exploit the fresh night air. Therefore, as it was already mentioned, they use the yard space arranging beds or clay platforms. But more often the sleeping activity takes place on the house roof: infect, as it is a quite wide and flat surface, suites perfectly to be used as a “bedroom”.

- Animal keeping

The animals are kept and feed in the yard itself: small cages for chickens are made with mud; long mangers are allocated in the center of the yard to feed the geese and small mud construction handmade for bees.

However the animals are separated from the human dwelling with no overlapping of functions. In fact the goats and sheep live in mud stables with a fenced yard. Sometimes even the entrance for animals is different from that of the homestead main entrance.

- Gardening

A part of the yard is generally cultivated for vegetables or flowers, most families like to have a green area with grass and plants to adorn and decorate their houses. The children can play and the babies can sleep in wooden cradles in open air space.

Inside

- Personal hygiene

It is a well established fact that in the plain areas the conditions for personal hygiene activity are better than in the mountain area. Infect frequently there is a room in the dwelling used as bath (hammam), furnished with compacted soil platform, buckets, taps and water tank in order to create a proper shower.

- Cooking

The kitchen is a separate room used not only to cook but sometime also to store food, farming products and to keep tools. It is furnished with metal or wooden shelves and low supports for gas ovens.

- Sleeping

Usually the sleeping room is one room for all the family members even numbers can be so much as 8/10 persons.

In a few cases the dwelling is big enough to contain two bedrooms. The furnishing is minimal, in fact there are mattresses and blankets folded and piled in a corner of the room. The remaining part of the room is empty. Only the richest families can afford to buy beds.

- Living/Hosting

The living room is a space mainly used for the television and for eating, sometimes for entertaining guests. The furnishing is minimal and almost all the activities take place on the floor generally covered with carpets.

Table N.4 - Housing standards

Dwelling n.1

1- Mountain Area

	Village Name	floors number	rooms number	families number	number of family members	useful floor area	internal total high
Erbil	Dargala	1	2	2	8	52.360	2.40
	Garota	1	2	2	6	50.120	2.08
Suly.	Kuna Masy	1	2	1	2	38.640	2.25
	Bari Gawra	1	2	1	4	90.050	2.05
Duhok	Bakirman	1	3	2	12	89.250	2.60
	Kwane	2	2	1	2	88.725	2.55

2- Plain Area

	Village Name	floors number	rooms number	families number	number of family members	useful floor s area	Internal total high
Erbil	Qoritan	1	3	3	8	35.84	2.55
	Bestana Q.	1	6	1	10	16.76	2.78
Suly.	Qurikh	2	6	1	8	94.87	2.05
	Gamesh T.	1	2	1	11	186.00	2.45
Duhok	Similan	1	3	1	10	124.12	2.60
	Al' Asi	1	3	2	10	78.00	2.50

3- Valley Area

	Village Name	floors number	rooms number	families number	number of family members	useful floor area	Internal total high
Erbil	Razg Dwin	2	5	3	17	133.37	2.34
	Amokan	3	6	2	5	175.02	2.50
Suly.	Qaratamoor	1	2	1	12	146.81	2.25
	Sedara	1	2	1	11	173.30	2.20
Duhok	Kalat	1	3	1	15	61.44	2.40
	Qasrok	1	2	1	6	80.82	2.40

Dwelling n.2

1- Mountain Area

	Village Name	floors number	rooms number	families number	number of family members	useful floor area	internal total high
Erbil	Dargala	1	2	1	7	87.42	2.70
	Garota	1	2	1	2	48.00	2.25
Suly.	Kuna Masy	2	2	1	4	176.80	2.10
	Bari Gawra	2	6	3	10	232.41	2.20
Duhok	Bakirman	1	4	3	12	137.00	2.80
	Kwane	1	4	1	9	133.00	2.80

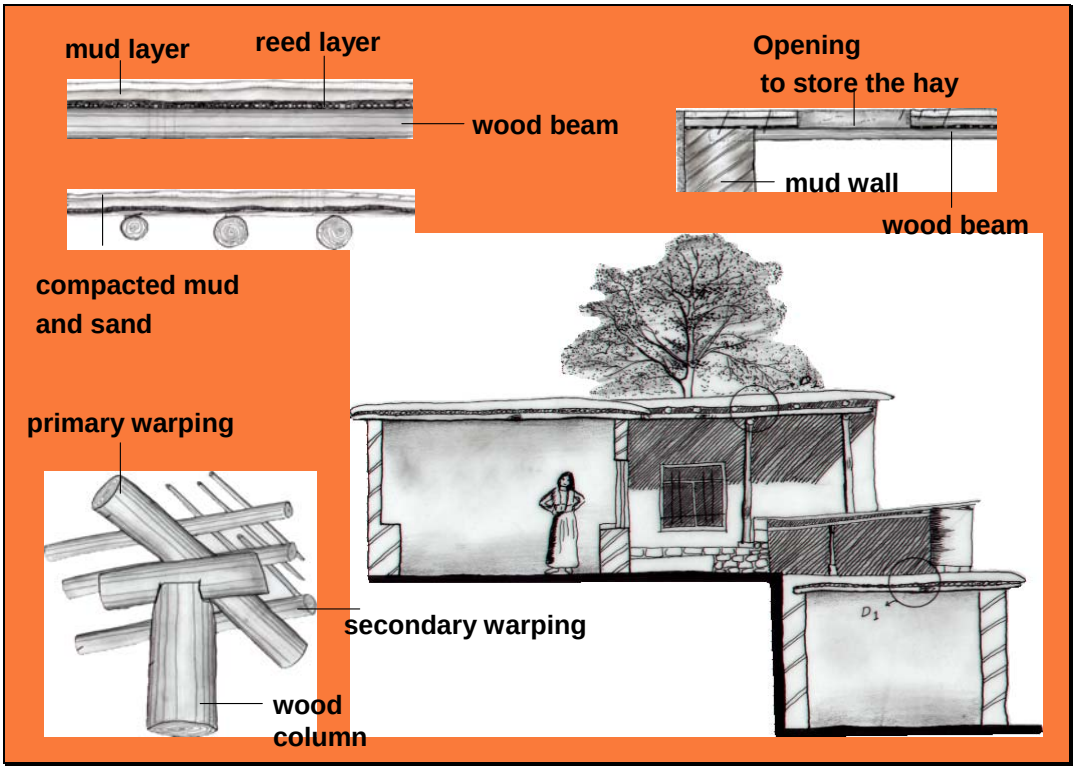
2- Plain Area

	Village Name	floors number	rooms number	families number	number of family members	useful floor arae	internal total high
Erbil	Qoritan	1	4	2	10	410.85	2.40
	Bestana Q.	1	1	1	6	33.84	2.40
Suly.	Qurikh	1	2	1	9	111.93	3.30
	Gamesh T.	1	3	1	1	202.00	2.80
Duhok	Similan	1	3	2	12	110.00	2.40
	Al' Asi	1	3	2	9	102.00	2.50

3- Valley Area

	Village Name	floors number	rooms number	families number	number of family members	useful floor area	internal total high
Erbil	Razg Dwin	1	3	2	10	64.81	2.57
	Amokan	1	2	1	8	45.34	2.50
Suly.	Qaratamoor	1	2	1	6	178.25	2.55
	Sedara	1	4	0	1	70.00	2.35
Duhok	Kalat	1	3	2	7	73.00	2.40
	Qasrok	1	2	2	10	75.00	2.40

14. Building components
mountain area / plain area



Consequentially the research of the correlations between activities and spaces is important. Study of the significant factors affecting the spatial distributions and functional structures must be analyzed by means of a qualitative and technical evaluation of the different building components in the traditional homesteads.
The outcome is meant to give an image of the technical solutions used in the building construction methodology in the different geographical areas so far studied.
Two indicators should be considered:

1. technical building constructions solutions according the traditional knowledge.
2. the availability and technical property of building constructions materials.

Starting from these two indicators, it is possible to attempt a classification of the different traditional typologies and identify specific aspects of the traditional techniques.
Therefore, through the technical drawings and the data base tables, the following main points were assumed for the building components.

In general it is worth noting that the traditional dwellings had no foundations: they were built on a maximum excavation of 10-cm. without any protection from the ground water and humidity. Therefore the room floor is normally raised with a step of at least 10/15 cm.

The internal height of the dwelling is normally 2.40/2.50 m in order to keep the heat in the internal space especially in the mountain area.

		mountain area		plain area	
items		**size**	**material**	**size**	**material**
walls		50/70 cm	stone	25/40 cm	mud brick
mortar			mud		mud
plastering		5 cm	mud / gypsum	5 cm	mud
opening	**door**	70/180	wood	80/200	wood
	wind.	40/100	wood	40/150	wood
	hole	40/40	wood	40/40	wood
roof		40 cm	compacted mud	40 cm	compacted mud
floor		10/20 cm	compacted mud	10/20 cm	compacted mud/cement
fence		20/30 cm	stone/vegetation	25/40 cm	mud brick vegetation

The wall

- Mountain areas

Both the external and the partition walls are traditionally built with stones. The result is a very irregular bonding technique; in fact it is dependent upon the stones cut.
Mainly the different stone layers were disposed without mortar: in some cases the lime or small pieces of stones were used to reinforce the structure.
The stone dimensions dictate the walls thickness: 50/70 cm. It is dependent upon the type of stones used and from the cutting technique.
The result is quite good thermal insulation as the stone structure keeps the heat during the wintertime and maintains the environment temperature in summertime. The major problem is the stability of the walls; in fact the lack of mortar weakens the wall structures making movements and subsequent fissures.
Sometimes the stones layer were substitute by wooden beams in order to consolidate the static structure of the dwelling.

- Plain area

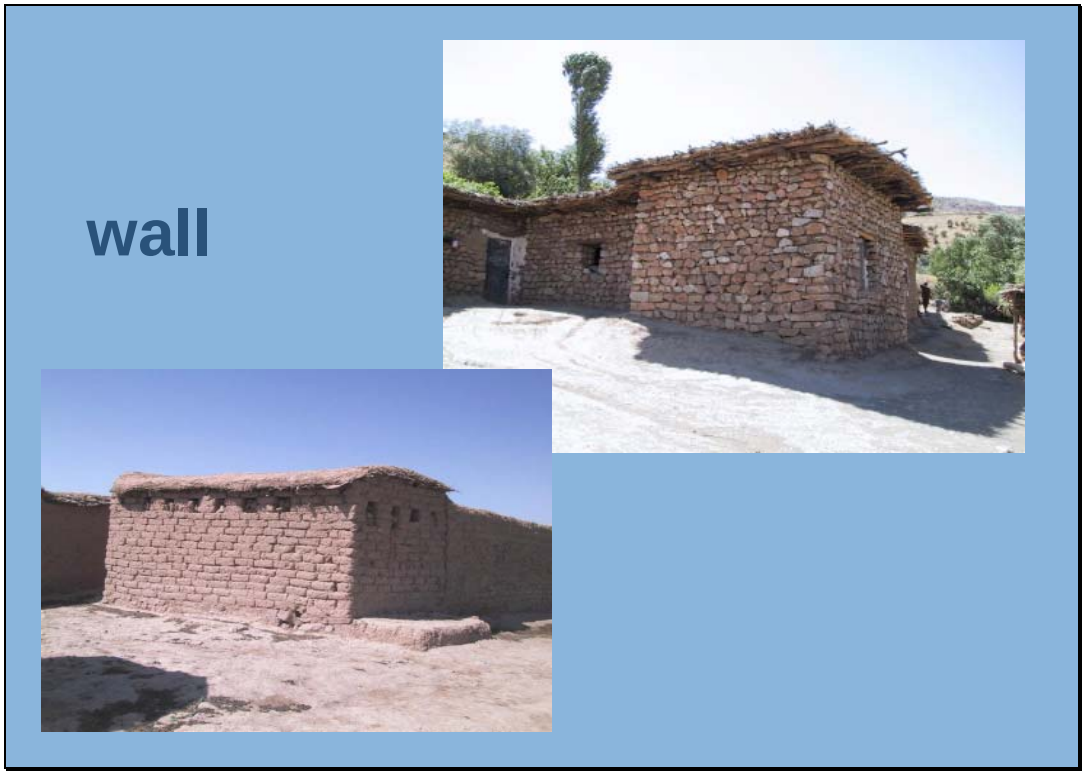
In the plain area both external and partition walls were built with mud/soil bricks hand – moulded. In order to build a stable wall, which is strong enough to provide lateral stability and resistance to side thrust. The mud bricks wall is bonded with adequate lap: the bonding technique used is the stretcher. All bricks lay to keep the half bond. The wall dimensions are dependent on the bricks mold sizes of bricks: normally this being 40x24x12 cm.
The mortar used for laying the bricks is mud. In order to give enough resistance to the wall the quantity of the mortar controlled so as not to affect the joint strength. This technique prevented the bricks from cracking.

Floor

The floors in the traditional building were mainly done with compacted soil or with stones. In recent years the compacted soil is covered with a concrete slab providing easier and less frequent maintenance. Also it creates an healthier indoor space, discouraging the presence of cockroaches and snakes, for example.
The concrete slab is nowadays used both in mountain and plain areas.

Opening

As a solution to the thermal problems inside the dwelling the openings are few and small: it was used to avoid heat dispersion during the winter. In the summer it has the advantage of maintaining air circulation and of keeping the interiors fresh and cool.
Traditional dwellings are not well illuminated: the natural light cannot filtrate indoors.
Another reason for such small dimensions was the wooden made lintel: its length determined the windows and doors wide.
All the openings were oriented towards south in order to heat the house during wintertime. The north dwellings façades generally were without openings.
The doors were mainly wooden or iron doors while the windows were not glazed and wooden or iron framed.
In some cases it is worth noting that few regular holes existed in the higher part of the walls: their function was to facilitate the internal ventilation. The presence of ventilation holes guarantees the air circulation in the rooms.



Ventilation

The lack of appropriate technological construction methods to optimize the internal ventilation was substituted with technical solutions in order to minimize the adverse effects of climatic extremes.

Therefore to produce reasonable comfort in the houses, the opening position plays a major role to gain sufficient natural ventilation.

The cross ventilation was facilitated through the rooms and the veranda.

In some dwellings the ventilation was improved by additional openings created in the upper part of the walls: small rectangular or circular holes without frames.

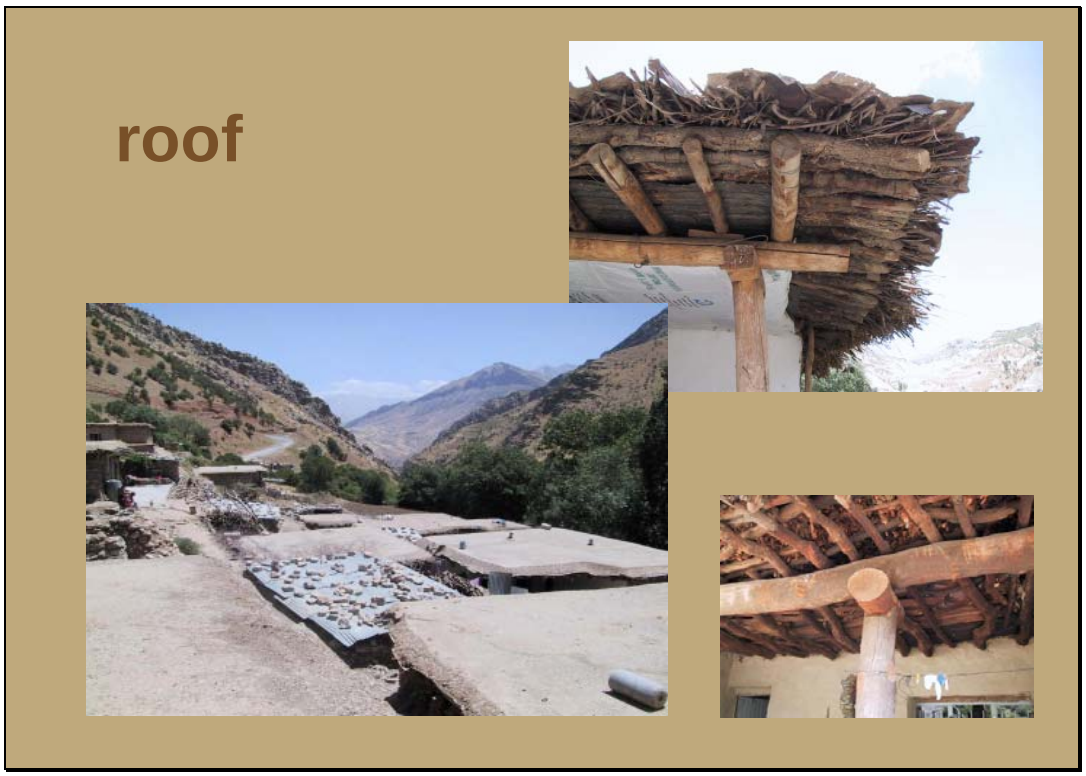
Roof

The roof type adopted was mainly the same in both mountain and plain area dwellings: the flat roof.

The primary and secondary warping was done with wooden beams of different dimensions. In fact the traditions the wood was the most available and adequate material used in roof construction. The beams had a section of 15/20 cm. and its length determined the rooms' dimensions; as the wall structure had no pillars the roof structure was built so as to lean on the perimeter's walls without any other support. Therefore the pole length of the beam was the maximum width of the room.

On the double wooden warping a layer (7/10 cm) of straw or reed had been disposed in order to prevent external and internal temperature exchanges. As these materials are not waterproof it was necessary to create water resistance through a further layer of mud (10 cm.) over the reeds and straw.

The last layer of the roof construction was done with compacted soil. It was very thick and soft: it requires continuous rolling as it is easily affected by rain, snow and wind.



Veranda – construction techniques

The semi open space is generally covered, a wooden structure protected with dry leaves and branches attached as an annex to the main fixed roof. Sometime it is easy to find handmade straw mats to create shade as a protection from the sun. The floor is a compacted mud slab constructed higher than the yard level in order to protect it from ground humidity infiltrations.

The veranda is a premise that creates few advantages not only from the functional point of view but also for the technical solutions it offers.

It is used during the different seasons infect in winter when the climate is too rigid the families usually enclose the veranda with a plastic sheet or a curtain. This facilitates the heating of the entire dwelling.

During the hotter seasons the veranda acts as a ventilation system for the dwelling, enabling more effective air circulation in and around the structure.

15. Building materials

items	type	area	use
limestone	Sedimentary and stratified	Erbil_ Kore, Haybat Sultan, Spilk mountain Dohuk Amedi, Zakho Suleymania Dokan, Kewa Resh, Azmar	dwelling walls fence
mud		valley and plain area	Mortar / plastering
mud brick		valley and plain area	dwelling walls fence /
gypsum	carbonate stone	Suleymania Kifri / Kalar	internal plastering
wood	“aspindar”	valley area, Erbil_Khalifan	ceiling / roof / fence window frame / lintel
straw	wheat	valley and plain area	ceiling / fence
reed		Zakho, Amedi, Serwan, Koja, Tak Tak, Rezan	Ceiling / fence

It is worth emphasizing that the type of materials used in the building system influenced the traditional typologies. In fact the houses have been designed according to the material properties and their specific characteristics. Different technical solutions were created and developed in order to maintain the relative costs/benefit in terms of satisfying values.

It should be stressed here the importance placed in the relationship between the availability of materials and their primary use.

In fact, due to a lack of transportation and road, villagers were forced to build their houses with the materials available in the surrounding area.

stone

As limestone (calcium/ magnesium carbonate) is available in all the Northern Iraq Region it was traditionally the favorite material used in building construction. In the mountain areas the sedimentary limestone was chosen as the building material for the external and internal walls, while the metamorphic rock was selected for decorative purposes. The sedimentary is formed either by deposition of limestone rocks fragments or by chemical precipitations. Sometime it is contaminated by the deposition of sand and clay which are the sources of impurities found.
The color is mainly gray due to the presence of carbonate impurities. All the lime stones are crystalline.
The limestone properties of durability and resistance combined with the physical characteristics of stratified stone define the traditional design of the houses.
In fact the texture of the stone facilitates the breaking and crushing of huge pieces into workable/manageable parts.
The stone has adequate compression strength enabling the walls to have load –bearing elements, without the need of additional pillars.
Due to the easy accessibility the limestone was even used for fencing the animals shed: in these cases they were dry stonewalls.

A part from the technical requirements of the material it is worth noting that it has several and significant advantages in maintaining thermal conditions of the house: the indoor environment remains fresh in the summer months while in winter retains the heat and diminishing the need for a heating system
The proposal to reuse the limestone in new construction could be supported in the case of planned quarrying based on a strategy of income generation activities implemented to develop the economical system of the region.

mud brick

The technique of mud bricks is one of the oldest building techniques: it was mainly used in plain and valley settlements
The moulded sun-dried mud bricks, called ”adobe”, were prepared on the site by the villagers themselves. Due to the soil availability they were the cheapest material to be used in constructions.
The earth was dropped into handmade wooden molds and let dry to the sunrays in open space. The quantity produced was quite high and allows satisfying building construction needs.
The essential property of mud bricks is the plasticity combined with the high resistance to both climates: rigid and hot.

It is worth noting that mud bricks remain one of the best solutions in building houses construction. What is needed is the quantum leap from traditional small-scale production to larger scale manufacturing on the application of need. The procedure of compression can be adopted in order to exploit the basic property of mud bricks.

- Durability. The high compressive strength makes them resistant to impact and abrasion.
- Porosity. It permits movements, without significant dimensional changes. The mud bricks can “breath”
- Thermal capacity. It create environmental health in the house

- Fire resistance.

It should be taken into consideration that several problems might be faced in the realization of mud bricks: frequently there are difficulties in removing them from molds, in having perfect shaped bricks, in having a proper drying process. Although all these problems can be solved with expertise and technique, it is necessary to underline the necessity to change the homemade system in a suitable production system.

Processing consistent implementation of the compressed mud bricks requires high-scale production. To be effective the proposal should be supported by a long-term strategy capable of satisfying the quantitative and qualitative needs of the building materials. It is possible to commercialize the mud use bricks if a strong productive structure would be created.
Consequently it makes sense to encourage the development of small companies with appropriate funds, equipment and trained personnel in order to have high scale accessibility to the production.

gypsum

The gypsum, in origin, was mainly used mixed with soil to create an appropriate mortar for the walls. In fact the mixture created an appropriate and adequate compressive strength with resistance to the fire. It is also highly resistant to the temperature range.
Varying from this usage prevailing in the region the gypsum could be exploited to plaster the walls in order to level their surface and to preserve their quality.

wood

Basically the main use of wood was the roof construction: in fact in the past the entire region had a high availability of trees and plants adequate for the building construction sector. Therefore the primary and secondary warping was done with “aspindar” available everywhere.
Nowadays, in several areas, the primary raw material is not available due to the effects of deforestation: the vegetation cycle is quite slow and the possibility of obtaining wood’s supply is decreasing.

In these circumstances it is worth noting that alternative solutions should be adopted in order to combine the use of wood with other new materials (iron, concrete).
It becomes important and significant that flexibility in the building construction system incorporating suggestions and practice suitable to environment sustainability.
The co-presence of different materials is sustainable thus exists low natural impact and persists pertinent reliable technical result.

Straw / reed

It is frequently used in building construction. Mainly it is a roof material deposited upon the wooden beams to insulate against heat
In other cases straw/reed mats are used to close the veranda, to separate the internal space in a room or as a cover for wooden structures in the yard.

As a matter of fact it can be a material re-usable in a secondary role for construction. It would be interesting in fact, to exploit its thermal characteristics and its lightness.
Obviously it would be interesting to revisit its traditional role with a new production method in order to improve its quality, strength and durability. In some instances straw/reed could be mixed with other stronger materials to give a more resistant texture.

16. Survey outcomes
How to improve livelihood conditions

The interpretation of the rural settlements classification obtained and of the technical information collected has been drawn though logical and technical considerations related to the existing reality.
The traditional typologies read on the emerging and prevalent outcomes of the analysis, underline the importance of a building construction strategy related to the environment and family living style.
It is enough to take note from the samples profile the peculiar characteristics of each settlement group.
The presence of significant technical elements in each group should be taken into consideration as a starting point for the technical suggestions.
The relevant differences between mountain and plain type of constructions show how to define the prevalent components in a settlement/dwelling project and plan.
Several points emerged to answer the initial question

What technical solutions and techniques should be improved in order to offer better results in housing design and which of them should be kept?

Let us take a quick glance back to a general overview on the whole rural settlement in order to define the main and significant connections with housing design improvement. To some extent the assumption of a traditional planning system in the rural settlements raises few points for discussion:

1. re use of the traditional pattern as a starting point for a future development
2. necessary implementation of infrastructure system
3. influence of the settlement design into housing design (*plots distribution*)

1 settlement planning

The logical strategy identified in the basic design of the traditional rural settlements should be considered as a starting point to develop a planning and design methodology.
In principle it is possible to create a new rural settlement following the main frame dictated by an old one, avoiding distortions of environmental, cultural and traditional factors. It is necessary to maintain continuity with the existing in order to avoid empty containers: the settlements should be a place where the population feels the will to return, to live and to work. The environment should create the conditions for a style of life close to the culture, it should receive not reject, and it is meant to reach a physiological living satisfaction and an adequate welfare.
The designer has to take into consideration in settlement planning the necessity to adopt different models that can fit in the environment. To create and propose a unique sample as a general solution could affect the adequacy and sustainability of the project. Each reality should be studied and analyzed in order to find elements and indicators useful for appropriate design.

Therefore it makes sense to proceed in a settlements classification over several groups. For each group the assumption of a prototype settlement project with slightly modifications for the different cases. It facilitates the costs minimization and the time optimization in planning, a part from the relevant results in human living conditions.

2 infrastructures

The planning and housing design optimization is directly related to the development of a full set of services that characterize the human settlement attitudes.
An intensive development of the primary and secondary infrastructures should prevail in order to support the desire of families to settle. In fact the presence of standard facilities strengthens the settlement quality of life and the economical development of the area.
The present system is not sufficient to respond to population needs and demands. Therefore a technical response should be planned in order to facilitate the social community aggregation: schools, health centers, commercial centers, water/electricity/sewage system, create an easier living environment

3.1 plot design

A rational contribution in improving the homestead design is the natural consequence of appropriate and sustainable settlement design. The intersection between the two patterns is inevitable: the settlement pattern is made by the logical organization of several plots. Following the suggestions coming out from the tradition, the settlement assumes a reliable profile that determines the aggregation of plots.
It appears reasonable that a detailed and specific study of the plot characteristics optimize the housing design. It is worth noting that the flexibility in plot sizes allows the extensions in housing core unit dimensions. In case of households increasing changes to the main living unit could be transformed in a more suitable and organized space.
At the same time the plot dimensions and shape could satisfy the household needs related to traditional and cultural use of the outdoor space.

It is worth noting that the main practice, both in mountainous and plain areas, is still the bovine/ovine breeding. As a component of a family' daily activities, it affects the space distribution and organization.
Consequently the plot dimensions should be adequate in order to facilitate the practice: in fact even if the shared living space of animal and human life has to be avoided the housing design should take into consideration a space for animal sheds and stables.
Especially in mountain area it makes nonsense to have the animals space far from the main dwelling: the winter climate rigidity role is relevant to justify solutions reducing long distance movement.

3.2 housing design

Generally the status aspiration of villagers is underlined by the desire to change the traditional self built structures with the 'modern" design houses.
Designers should weigh carefully the pros and cons of both technologies in order to get a better quality in building construction sector.
The re use of traditional typologies should be handled on the basis of clear criteria.

An active sensitization “campaign” should be carried out in order to enlighten the most significant aspects of the strategy.
It is worth understanding that the “intermediate” technology is an improvement in construction, not exclusively a return to ancient systems. The population has to have a feed back of quality, improvement of life style and healthy conditions in order to accept and share the result of a new policy.
Starting from the

a) spatial distributions and the functional structures
significant traditional aspects have to be considered in order to confirm them in the new projects. Other important points emerging from the analysis are mainly related to the

b) traditional technical solutions for each building components of the housing design.
In fact a part from the spatial distributions and functional structures, it is worth understanding the techniques adopted in the construction.
In fact the analysis indicated that it is non-sense to propose exclusively the ancient construction system. It should be improved with a combination of old and new technologies, a matching of elements that will create an intermediate technique.

a)

- ***veranda***

Already from the outcomes described in the previous paragraphs it is evident that in the traditional design the veranda played a fundamental role.
It was a multipurpose space directly connected with the families’ cultural habits. Generally the current life style and the behavior in sharing common house premises does not change the housing design and should cope with the family need to have a veranda.
The house organization structures should prevent a distortion of rural common family life: for instance making bread will remain a relevant activity taking place in a semi-closed space. A new solution will affect the use of the space: often the reaction to a quick change produces the improper result. Or at least the identification of the baking space prerogatives should be analyzed in order to relocate the activity elsewhere: the characteristics of a new making bread space should fit and respect cultural, social and psychological factors.
In concomitance with the functional use another characteristic of the veranda should be taken into consideration: this being the traditional technical solution to ventilation and heating comfort problems.
To investigate the possibility to solve them through new building construction technologies (roof and walls insulation, thermal opening) will create an insulation system for the house. Nevertheless the veranda could still remain a space that facilitates the necessary circulation of hot/fresh air supporting the heating comfort achievement.

- ***cooking***

Cooking mainly took place either in little spaces properly furnished or in a room used both for cooking and storing. Therefore it is worth noting that for the kitchen design it is not possible to adopt the European sample. The kitchen could not serve as an entrance to the house or as the circulation space to all other room: it should be independent and private. It is a minimal and essential space mainly used to cook rather than to eat.

Beginning from the kitchen's physical use and its location, the designer should meanwhile improve the technical aspects. The heating and the cooking systems have fundamental importance: an appropriate ventilation system should prevent from eventual health problems. The presence of specific devices such as ovens and stoves properly connected to air vents in order to guarantee oxygen circulation should optimize the medical health of the families.
Another factor that should be taken into consideration is the use of energy: appropriate solutions to consume less energy using the cooking/heating system as a common source of living comfort. The result will be subsequent energy saving and the optimizing the use of kitchen facilities.

- ***storage***

At present the storing activities has a significant relevance in the rural society. The possibility to keep farming products and food reserves affects and enforces the families' "safety" willingness.
The presence in the house of storage is therefore essential: a dry space prevented by humidity affects and climate constraints.

- ***personal hygiene***

As a matter of fact the personal hygiene component in daily life has significant importance.
The analysis enlightened how the performance of this activity has been characterized, traditionally by the presence of common bathroom attached to the mosque and mainly used by male community members. All the solutions which came out later in order to facilitate the satisfaction of personal needs did not achieve a more acceptable comfort.
Therefore the new design should be focused in creating an indoor space for a bathroom, supplied with taps and water.
A second important contribution of technology is to provide the houses with indoor toilets. It is worth noting that in accordance traditional style and cultural habits the sanitary facilities should be separated from the bath/shower area.
The designer should consider the possibility to create two different rooms attached in order to facilitate the circulation activities and to solve technical problems in the water supply system.

- ***Sleeping/living***

In the traditional typologies the rooms' size are definitely small and minimal due to technical structure solutions (wooden beams length used in the roofing system – 2.50 / 3.00 m.) but it is evident that the families usually need more space in order to satisfy the continuous growth of family members numbers.
The lack of space encouraged the single living space: all the family generally used one single bedroom. A space optimization therefore should be taken into consideration in order to avoid over crowded rooms and provide better life conditions.
In fact with reference to the handbook "Housing technical standards for Iraq" the minimum useful total floor surface for a bedroom in rural areas should be 18 meters squares. The exiting dwellings sampled in Habitat survey have a total useful surface average of 15 meters squares.
An additional suggestion comes out by the families' birth rage increasing continuously. The housing design should foresee the possibility to adapt the indoor space: the expansion of inhabitants' numbers satisfied by larger rooms that can be split with eventual temporary or permanent partition walls in the future.
As a consequence of the internal space necessity, the designer could even consider a horizontal expansion of the basic house core unit in order to accommodate larger household space needs.

b)

- ***Insulation system***

A significant aspect that could be improved in the traditional typologies is the building insulation system.
In fact in order to minimize the adverse effects of climate extremes is of particular focus the necessity of appropriate and technological construction methods. It should be applied mainly to walls and roof construction techniques.
Walls and roof need sufficient thermal insulation to protect the internal space from the summer heat and the winter cold.
The lack of an insulation system has several and relevant implications: health diseases, loss of heath and waste of thermal energy. Therefore the improvement should achieve a higher quality of livelihood, especially the households' medical health conditions.

Several technical strategies could be adopted to obtain a more effective roof construction system, using the circulation of air in between the wooden wrappings structures. It allows the improvement of thermal insulation and it is more suitable to solve the house ventilation problems.
Obviously the covering system should be changed in a more adequate and proper one: the mud compacted layer is not a sustainable solution. It requires a constant and continuous maintenance and affects the housing cost repair.
Therefore the designer should propose and introduce the use of a more sophisticated technique (ex. tile covering)

Wall construction procedure should be improved and optimized in order to avoid heat dispersion and to prevent the house from humidity effects.
The building construction materials have significant effectiveness in creating strong and durable building structures, but obviously should use more adequate techniques. The creation of a cavity between the external and internal layer of bricks or stones would guarantee a proper thermal insulation, in particular with the interposition of an insulating sheet.
Therefore it should be taken into consideration the re-use of bricks and stones with few technical adjustments in order to bring out the building construction system profit.

- ***humidity***

Another important and relevant factor in the housing construction system is the prevention from effects of humidity. Often the building's lack of protection from the ground contact can create dangerous consequences to the walls and floors: it generates absorption of the soil water. The results are the presence of moisture stain and wet environment.
Therefore it is necessary to insulate the construction from at ground level in order to avoid dangerous consequences that could affect even the health of the household.

- ***Illumination***

The comparison of traditional typologies surveyed demonstrated that generally the ancient buildings are characterized by small openings oriented southwards. It is not surprising that the north façade has no opening, in fact it is the coldest and most exposed to rigid wind currents during the winter month.

The solution to design small openings has been adopted in the tradition for two main reasons:

- Advantage in facilitating the house thermal comfort
- Advantage in building construction system

The first one is due to the fact that small openings keep the thermal dispersion in a reasonable range; the second one is due to the use of wooden lintels. The lintels length dictates the width of the opening.

As a consequence the rooms' illumination factor in the traditional typologies is very low and does not guarantee a sufficient light inside the house.

As a matter of fact the housing technical standards fix peculiar rules in order to maintain the proportion between the total useful surface and the total illumination surface. The formula, illumination surface = 1/12 useful floor surface, assumes the minimum value of the illumination necessary to have health and proper housing life conditions.

It has to be taken into consideration that there exists a direct relation between the opening dimensions and the indoor thermal comfort achievement (ventilation, heating, illumination), but nevertheless it is not mainly connected to the opening dimensions.

Definitely it is the openings quality and technology to create the climate balance in the house. The insulation capacity of the frames and glasses is the main technical factors that could avoid the heath dispersion. To apply a thermal insulation method in the openings technique can guarantee a balanced ventilation/circulation system.

Therefore the joinery technologies have to be improved in order to achieve the indoor comfort.

- ***Water drainage***

The main and significant problem in the traditional typologies is the lack of any system to remove the rain and subsoil water. It is in fact necessary to convey surface water in order to avoid infiltrations in the building structures that could provoke dangerous effects. The walls humidity or the roof moisture is affecting the old houses with significant consequences in the indoor environmental health. Cold and wet houses create respiratory diseases, bronchitis, pneumonia, asthma, and rheumatic pains.

In order to avoid such relevant aspects a drainage system should be designed: the rainwater has to be collected through gutters disposed on the roof sides while the surface soil water should be convoyed into ditches parallels to the house sides.

The drainage installation should be self-cleaning and function with minimum of maintenance while collecting and discharging water without causing any heath dangers.

Therefore it is a consequence to create a slope to the house roof in order to facilitate the water collection into the gutters.

At the mean time the housing structure should be protected by the surface and ground water: the ground floor level must be a minimum 20 cm. higher than the external level in order to avoid stagnant water effects.

- ***Building materials***

As it was already mentioned in chapter 15, the potential and the characteristics of the local materials available are relevant, but not appropriately exploited.
It is worth noting that the negative characteristics could create a difficult impact to maintain the use of the local materials especially for the "user's" psychological barriers: problems of unhealthy conditions, maintenance needs, esthetic limitations and design difficulties are usually provided as motivations to avoid the use of traditional materials.
Definitely it can be of significant importance to promote a sensitization campaign in order to overcome the lack of information on "natural" materials and to underline how new technological systems could improve even the negative characteristics and strengthen the positive one.
It should be taken into consideration that using the improved materials in the appropriate place would reduce the need for maintenance; using chemical treatments would reduce the presence of insects and dust, using technological finishing of materials would assure appropriate resistance and flexibility.

Therefore it is worth noting that the criteria used to upgrade design quality should be found both in the application of new technological systems and in proper use of building materials.
It can play a significant role to find a methodology to maintain the use of raw materials present on the site and develop an alternative new technological system to improve the housing design quality.
As a consequence to this approach it is possible to define new income-generation activities, adequate economical results and optimization of the housing comfort.

TABLES and ANNEXES

Table 5.1 - materials

1- Mountain Area

	Village Name	Available materials	Fencing	External plastering	Internal plastering	Ceiling	Roofing	Flooring	Windows
Erbil	Dargala	Stone,Wood,Clay	Non	Mud	Mud	Corrugated iron sheeting,Wood, Mud	Mud Compacted	Cement	Iron
	Garota	Stone,Wood,Oak	Recycled materials (mixed structure)	Mud	Mud	Wood, Mud, oak	Mud Compacted	Cement	Wood
Suly.	Kuna Masy	Stone,Wood,Clay,Straw	Stone	Gypsum	Gypsum,	Straw,	Mud Compacted	Cement	Iron
	Bari Gawra	Stone,Wood,Clay,Straw	Stone	Mud	Gypsum,(Beed Room)	Straw,Wooden Beams	Mud Compacted	Cement	Iron
Duhok	Bakirman	Stone,Wood,Clay,Straw	Non	Clay	Sand-cement,Clay for Kitchen, storage	Wood beam, Wood panel	Mud Compacted,Straw	Cement	Wood, Iron
	Kwane	Stone,Wood,Clay,Straw	Concrete blocks	Clay	Clay	Reed/mud,Wood beam	Mud Compacted,Mud bricks	Compacted Mud,Cement	Iron

2- Plain Area

	Village Name	Available materials	Fencing	External plastering	Internal plastering	Ceiling	Roofing	Flooring	Windows
Erbil	Qoritan	Clay,Brick	Mud bricks	Mud	Mud	Garton, Wood, Mud	Mud Compacted	Cement	Iron
	Bestana Q.	Wood,Clay,Straw,Constructe gravel	Recycled materials (mixed structure)	None	Mud	Reed/mud, Straw,	Mud Compacted	Compacted Mud,Brick,Cement	Wood
Suly.	Qurikh	Stone,Wood,Clay,Straw	Mud bricks	Mud	Mud	Reed/mud,	Mud Compacted	Compacted Mud	Iron
	Gamesh T.	Clay,Straw	Clay bricks	Mud	Gypsum,	Straw, Wooden beam	Mud Compacted, Straw	Compacted Mud,Cement	Iron
Duhok	Similan	Stone,Wood,Clay,Straw		Caly	Clay	Reed/mud, Wood beam	Mud Compacted, Straw	Cement	Iron
	Al' Asi	Stone,Clay,Straw	Stone	Sand-cement	Sand-cement,	Reed/mud, Straw, Wood beam	Mud Compacted, Straw	Cement	Iron

3- Valley Area

	Village Name	Available materials	Fencing	External plastering	Internal plastering	Ceiling	Roofing	Flooring	Windows
Erbil	Razg Dwin	Stone,Wood,Clay,Oak	Tough wire	Mud	Mud	Reed/mud,	Mud Compacted	Compacted Mud	Wood
	Amokan	Stone,Clay	Stone	Mud painted	Mud Painted	Corrugated iron sheeting	Mud Compacted	Cement	Iron
Suly.	Qaratamoor	Stone,Wood,Clay,Straw	Mud bricks	Mud	Mud	Reed/mud, Straw, Wood	Mud Compacted	Cement	Iron
	Sedara	Clay,Straw	Stone	None	Clay	Reed/mud, Wood	Mud Compacted	Compacted Mud	Iron
Duhok	Kalat	Stone,Wood,Clay,Straw	Non	Clay	Clay	Reed/mud, Wood beam, mat, metal plate	Mud Compacted, Straw	Cement	Wood, Iron
	Qasrok	Stone,Wood,Clay,Straw	Panrialy (from oneside)	Clay	Clay	Straw, Wood beam, mud	Mud Compacted, Metal Plates for W.C	Cement	Iron

Table 5.2- materials

1- Mountain Area

	Village Name	Available materials	Fencing	External plastering	Internal plastering	Ceiling	Roofing	Flooring	Windows
Erbil	Dargala	Stone,Wood,Clay,	Non	Mud	Lime,Mud	Plastic sheet,	Mud Compacted,	Cement,	Iron
	Garota	Stone,Wood,oak	oak	None	Mud	Wood, Mud, oak	Mud Compacted,	Cement,	Iron
Suly.	Kuna Masy	Stone,Wood,Clay,Straw,	Stone	Sand-cement	Gypsum	Reed/mud,	Mud Compacted,	Cement,	Iron
	Bari Gawra	Stone,Wood,Clay,Straw,	Stone	None	Mud	Iron sheeting,	Mud Compacted,	Cement,	Iron
Duhok	Bakirman	Stone,Wood,Clay,Straw,	Stone	Sand-cement	Sand-cement	Reed/mud,	Mud Compacted,	Cement,	Iron
	Kwane	Stone,Wood,Clay,Straw,	Stone	None	None	Reed/mud,	Straw,	Cement,	Iron

2- Plain Area

	Village Name	Available materials	Fencing	External plastering	Internal plastering	Ceiling	Roofing	Flooring	Windows
Erbil	Qoritan	Clay,Brick	Clay bricks	Mud	Mud	Reed/mud,	Mud Compacted,	Compacted Mud,	Iron
	Bestana Q.	Wood,Clay,Straw,Constructe gravel	Mud bricks	Mud	Mud	Reed/mud,Straw,	Mud Compacted,	Brick,Cement,Mud Compac	Wood
Suly.	Qurikh	Stone,Wood,Clay,Straw,	Mud bricks	Mud mixed with straw	Mud mixed with straw	Straw,	Mud Compacted,Straw,	Cement,	They built has no windows
	Gamesh T.	Clay,Straw,	Stone		Gypsum	Iron sheeting,Reed/mud,Plastic sheet,Cement slab,Straw,	Mud Compacted,	Cement,	Iron
Duhok	Similan	Stone,Wood,Clay,Straw,	None	Mud mixed with straw	Mud mixed with straw	Reed/mud,	Mud Compacted,	Cement,	Iron
	Al' Asi	Stone,Clay,Straw,	Stone	Mud mixed with straw	Mud mixed with straw	Reed/mud,Wood beam	Mud Compacted,Straw,	Cement,	Iron

3- Valley Area

	Village Name	Available materials	Fencing	External plastering	Internal plastering	Ceiling	Roofing	Flooring	Windows
Erbil	Razg Dwin	Stone,Wood,Clay,Oak	Wood	Mud	Mud	Reed/mud,	Mud Compacted,	Compacted Mud,	Iron
	Amokan	Stone,Clay,	Stone	None	Mud	Wood, Straw, Sted bar	Mud Compacted,	Cement,	Wood
Suly.	Qaratamoor	Stone,Wood,Clay,Straw,	Mud bricks	Mud	Mud	Straw with wood beams	Mud Compacted,	Compacted Mud,Cement,	Iron
	Sedara	Clay,Straw,	Stone	Mud	Mud	Reed/mud,Wood	Mud Compacted,Wood,	Compacted Mud,	Wood
Duhok	Kalat	Stone,Wood,Clay,Straw,	"BRC" texture	Mud mixed with straw	Mud mixed with straw	Reed/mud,	Mud Compacted,	Cement,	Wood
	Qasrok	Stone,Wood,Clay,Straw,	Mud bricks	Mud mixed with straw	Mud mixed with straw	Reed/mud,	Mud Compacted,Straw,	Cement,	Iron

Table 6 - Orientation

1- Mountain Area

	Village Name	dwelling total meters square D1	illumination surface D1	dwelling total meter square D2	illumination surface D2
Erbil	Dargala	84.93	15.970	97.34	25.28
	Garota	92.66	8.580	77.64	14,10
Suly.	Kuna Masy	79.02	9.545	72.60	6.60
	Bari Gawra	259.83	15.320	67.50	8.22
Duhok	Bakirman	97.78	10.480	155.40	5.05
	Kwane	129.38	19.440	172.36	11.46

2- Plain Area

	Village Name	dwelling total meters square D1	illumination surface D1	dwelling total meter square D2	illumination surface D2
Erbil	Qoritan	70.78	15.170	111.31	17.680
	Bestana Q.	82.86	12.060	30.98	1.220
Suly.	Qurikh	54.59	8.820	78.00	8.290
	Gamesh T.	104.30	6.955	126.72	11.300
Duhok	Similan	150.84	19.000	194.50	24.185
	Al' Asi	96.34	11.125	153.24	11.364

3- Valley Area

	Village Name	dwelling total meters square D1	illumination surface D1	dwelling total meter square D2	illumination surface D2
Erbil	Razg Dwin	130.00	16.750	84.17	11.305
	Amokan	172.27	31.625	69.16	12.950
Suly.	Qaratamoor	76.30	9.510	70.00	6.615
	Sedara	91.84	21.710	155.50	20.055
Duhok	Kalat	123.22	15.720	128.74	13.920
	Qasrok	50.90	1.660	115.10	37.460

D1 = dwelling number 1

D2 = dwelling number 2

Table 7.1 – water-electr-sanitation (1)

1- Mountain Area

	Village Name	heating source	cooling system	electricity source	Water Source	water supply	type of toilet	sewage
Erbil	Dargala	Wood	No	No	Natural Spring,There are two water spring in the village	Natural Spring	Pit latrines	Yes
	Garota	Wood	No	No	deep well (drilled)	Tap outside	Pit latrines	Yes
Suly.	Kuna Masy	Wood	No	No	Project of water resourse	Hand pump	Pit latrines	Yes
	Bari Gawra	Wood	No	No	Natural Spring	Hand pump	Pit latrines	Yes
Duhok	Bakirman	Kerosene	Yes	No	Natural Spring	Tap inside	Pit latrines	Yes
	Kwane	Kerosene	Yes	No	Natural Spring	Tap inside	Pit latrines	Yes

2- Plain Area

	Village Name	heating source	cooling system	electricity source	Water Source	water supply	type of toilet	sewage
Erbil	Qoritan	Kerosene	Yes	No	Artesian well	Tap outside	Pit latrines	Yes
	Bestana Q.	Kerosene	No	No	Natural Spring,Artesian well	*	Pit latrines	Yes
Suly.	Qurikh	Wood	No	No	Natural Spring	*	Pit latrines	Yes
	Gamesh T.	Wood,dung	Yes	No	deep well (drilled)	Private well	Pit latrines	Yes
Duhok	Similan	Wood	Yes	No	Artesian well	Tap inside	Pit latrines	Yes
	Al' Asi	Kerosene	No	No	Natural Spring,deep well (drilled),	Tap inside	Pit latrines	Yes

3- Valley Area

	Village Name	heating source	cooling system	electricity source	Water Source	water supply	type of toilet	sewage
Erbil	Razg Dwin	Wood	*	No	(river/stream/lake),	Tap outside	Pit latrines	Yes
	Amokan	Wood	*	No	Natural Spring,Artesian well,	Tap outside	Pit latrines	Yes
Suly.	Qaratamoor	Dung	*	No	Natural Spring,	Project by buble	Pit latrines	Yes
	Sedara	Wood	*	No	Artesian well,	Tap outside	Pit latrines	Yes
Duhok	Kalat	Wood	*	No	Natural Spring,	Tap outside	Pit latrines	Yes
	Qasrok	Kerosene	*	No	(river/stream/lake),Artesian well,	Tap inside	Pit latrines	Yes

* Does not exist

Table 7.2 – water-electr-sanitation (1)

1- Mountain Area

	Village Name	heating source	cooling system	electricity source	Water Source	water supply	type of toilet	sewage
Erbil	Dargala	Wood	No	No	Natural Spring,There are two water spring in the village	Tap outside	Pit latrines	Yes
	Garota	Wood	No	No	deep well (drilled),	Tap outside	Pit latrines	Yes
Suly.	Kuna Masy	Wood	No	No	Project of water resourse	Project of water resource	Pit latrines	Yes
	Bari Gawra	Wood	No	No	Natural Spring,	*	Pit latrines	Yes
Duhok	Bakirman	Wood	Yes	No	Natural Spring,	Tap inside	Pit latrines	Yes
	Kwane	Wood	Yes	No	Natural Spring,	Tap inside	Pit latrines	Yes

2- Plain Area

	Village Name	heating source	cooling system	electricity source	Water Source	water supply	type of toilet	sewage
Erbil	Qoritan	Kerosene	Yes	No	Artesian well,	Tap outside	Pit latrines	Yes
	Bestana Q.	Kerosene	No	No	Natural Spring,Artesian well,	Tap outside	Pit latrines	Yes
Suly.	Qurikh	Dung	No	No	Natural Spring,	Hand pump	Pit latrines	Yes
	Gamesh T.	Kerosene	Yes	No	deep well (drilled),	Private well	Pit latrines	Yes
Duhok	Similan	Kerosene	Yes	No	Artesian well,	*	Pit latrines	Yes
	Al' Asi	Kerosene	Yes	No	Natural Spring,deep well (drilled),	Tap inside	Pit latrines	Yes

3- Valley Area

	Village Name	heating source	cooling system	electricity source	Water Source	water supply	type of toilet	sewage
Erbil	Razg Dwin	Wood	No	No	(river/stream/lake),	*	Pit latrines	Yes
	Amokan	Wood	No	No	Natural Spring,Artesian well,	Tap outside	Pit latrines	Yes
Suly.	Qaratamoor	Dung	No	No	Natural Spring,	Tap outside	Pit latrines	Yes
	Sedara	Wood	Yes	No	Artesian well,	Tap outside	Pit latrines	Yes
Duhok	Kalat	Kerosene	No	No	Natural Spring,	*	Pit latrines	Yes
	Qasrok	Kerosene	Yes	No	(river/stream/lake),Artesian well,	Tap inside	Pit latrines	Yes

* Does not exist

Table 8 - services

1- Mountain Area

	Village Name	school	health center	village focal point	market	shop	treshing area	graveyard
Erbil	Dargala	Outskirts	*	Spring/fountain	*	Central	*	Outskirts
	Garota	Outskirts	Outskirts	Spring/fountain	*	Outskirts	Distant	Distant
Suly.	Kuna Masy	Outskirts	Outskirts	Mosque	*	Outskirts	*	OutskirtsDistant
	Bari Gawra	Outskirts	Central	Mosque	*	Central	*	Outskirts,Distant
Duhok	Bakirman	Outskirts	*	Mosque	*	Central	*	Distant
	Kwane	Outskirts	Outskirts	Church	Central	Outskirts	Outskirts	Outskirts

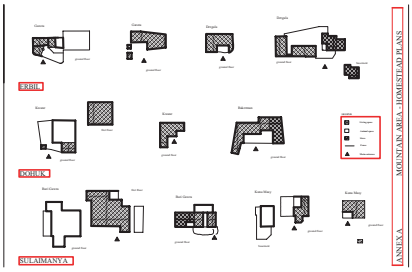
2- Plan Area

	Village Name	school	health center	village focal point	market	shop	treshing area	graveyard
Erbil	Qoritan	Outskirts	Outskirts	Spring/fountain	*	Outskirts	*	Distant
	Bestana Q.	Outskirts	Outskirts	Other (specify)	*	Outskirts	*	Distant
Suly.	Qurikh	Outskirts	*	Mosque	*	Central,Outskirts	*	Distant
	Gamesh T.	Outskirts	*	Mosque	*	Central	*	*
Duhok	Similan	Outskirts	*	Mosque	*	Central	*	Distant
	Al' Asi	Outskirts	*	Mosque	*	*	*	Distant

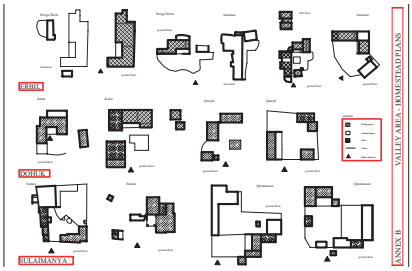
3- Valley Area

	Village Name	school	health center	village focal point	market	shop	treshing area	graveyard
Erbil	Razg Dwin	Outskirts	*	Spring/fountain	*	Outskirts	Distant	Distant
	Amokan	Outskirts	Outskirts	Spring/fountain	*	Central	Distant	Distant
Suly.	Qaratamoor	Outskirts	*	Mosque	*	Central	*	Distant
	Sedara	Distant	*	Mosque	*	*	*	Outskirts,Distant
Duhok	Kalat	Distant	*	Mosque	*	Distant	*	Outskirts
	Qasrok	Distant	Distant	Mosque	*	Central	*	Distant

* Does not exist



Mountain



Valley

Plain

ANNEX D

An intensive 2 days workshop

Dates
16 –17 September 2001

Promoted by Habitat in collaboration with
the Architecture and Engineering Departments of
Erbil, Dohuk and Suleimanya Universities.

BACKGROUND

Understanding from the Homestead Typological Analysis Survey outcomes the spatial structures and functional distributions for improving livelihood in terms of rural settlement planning, housing planning, use of traditional building materials.

At the very end of the Typological Homestead Analysis Survey activities, Habitat organized a two days intensive workshop in order to promote a participation process based on sharing information, perceptions and potential of the participants on the issue.
It was held by Habitat in collaboration with the Architecture and Engineering Departments of Erbil, Dohuk and Suleimanya Universities: Local Authorities Representatives, Habitat staff Representatives, Universities Representatives and the Students were invited to a common critical reflection.
The primary objective of the workshop was to develop a common view among the various participants and to establish a general framework for a construction design more related to local tradition.

The workshop was divided into three sessions:
- The plenary session consisted of a presentation of the operation and methodology, followed by an open discussion on key issues and priorities.
- The following session was based on working group's activities. The students were organized in 3 different groups to suggest solutions and to formulate strategies starting from the study of the existing situation.
Each group has been supported by a facilitator (Habitat staff) that was responsible for conducting each session and for the preparation of the summary conclusions of the same.
- The final wrap up plenary session summarized the conclusions of the three working groups.

Plenary Session

The workshop has been created as a moment of participation and sharing of information of the parties involved in Habitat Rehabilitation Programme.
Therefore the aim of the plenary session was to present and introduce the work implemented and finalized during the H.T.A. Survey.
All the details were explained through a "power point" presentation with projection of images, tables and drawing collected so far. The visualization was used as an instrument to stimulate and encourage the participants to reflect and discuss different and various aspects of the traditional building construction system adopted in all Northern Iraq area.

The conclusion of the plenary session was conducted through an open discussion and debate on the possibility to find new housing design solutions based on the use of traditional architecture. The proposal to have "intermediate technology" strengthened not only by the evolution of technical aspects but also by the socio economical impact on the entire population.

Second Session

During the second phase of the workshop the students were divided in 3 different groups to suggest solutions and to formulate strategies for a concrete plan of action.
Therefore a theme was assigned to each group in order to take into consideration three different subjects:

1 settlement design
2 housing design
3 building materials

For each group were selected the leading figures: one facilitator (Habitat Staff), one rapporteur (Habitat Survey Supervisors) and one presenter (student).
Their task was to encourage the discussion, to ensure that the group activities were participatory and interactive to achieve more outcomes and results.
The activities of each group were conducted trough different exercises and techniques: images, drawings, panels, graphs were used to facilitate the identification of priorities in the matters of analysis.
The facilitators` role was to guide the group to get a common and agreed conclusion as a result of different opinions.

Group 1 settlement design

The students designed a new settlement, following a predefined framework, figuring out methodologies in planning.
The facilitator supported them, to work cooperatively and focused their different potentials into a common approach to the theme.
A specific strategy was drawn in order to follow a logical sequence for discussion: starting from the environmental analysis the group was lead to proceed into the active planning. The working activity was based on the practical survey experience; therefore the first step in the reflection was:

- the site study
- climate conditions
- physical layout,
- activities,
- social facilities and accessibility.

The group participants discussed and reflected on the information they had in order to proceed to a more consolidated design phase: how to answer properly to the external factors in getting an accurate planning procedure.
The final result in fact should be seen as a response to potential problems: a cause – effect analysis based on problems identification and prioritization.
The group worked as a planner group, designing plans, sketches and tables helpful for the final discussion with other working groups. A new settlement was defined and created finding out criteria based on the observation of the reality and on the analysis of different alternatives possible. Each planning solution should be motivated as the most sustainable and effective: the students learned how to justify properly the answers to each technical problem.

Group 2 Housing design

The activity of the group was focused on the analysis of the survey results. All the drawings of the surveyed dwellings, produced by the student teams were copied and used as working material.
The plans of each dwelling were studied and organized in different series according their technical characteristics. The facilitator coordinated the students in finding out the most important items for discussion: the internal distribution of the rooms, the functional solutions, the access to the dwelling, the division between animal space and living space were analyzed and used as elements to organize into groups all the dwelling plans.
The technical drawings became the base for the reflection of the students: which was the traditional approach to solve housing problems, which solutions were adopted in order to fit the cultural habits and the traditional life style into the living space and how the architectural technique was created to satisfy human needs.
The importance of this activity was the comparison between different building construction solutions found out in mountain, valley and plain areas: the outcome created a standardization of technical answers helpful to prioritize what could be kept from tradition and what should be improved with new technology.
The observations were collected into a summary that illustrated and facilitated the final discussion.
The group did not come out with a practical strategy, but was simply encouraged to explore and discover the most important themes of the traditional design.

Group 3 Building materials

The facilitator visualized the work through panels indicating the brainstorm procedure. It facilitated the students to discuss and share their learning.
In fact the practice helped them to become more familiar with the theme: a general reflection on the materials used in the tradition was chosen as a starting point.
The analysis of the reality developed a discussion related to the advantages and disadvantages of using mud bricks, stone and wood in the building process.
The facilitator illustrated, with the support of technical books, the characteristics of each material and the way their use could be improved. (See attached facilitator’s report)

Final wrap up

The final wrap up plenary session summarized the conclusions of the three working groups.

Each group presented its own activity to the others: all the documentation prepared was displayed on the walls for evaluation and discussion. The participants were involved in a more active phase that renewed and refreshed their interest. In sharing their learning process they became more aware of the traditional typologies and building construction systems.

The de-briefing activity was quite successful as the working groups developed their sensibility on the issue and their willingness to understand better in detail the historical influence of technical building construction systems on modern architecture.

The debate was active and participatory: a critical phase based on the technique of learning from errors, of expressing doubts to improve knowledge, of having confidence that the traditional solutions play an important role in the present housing design.

Definitely the questions/doubts created the opportunities to go further in detail on the motivations to propose an “intermediate technology” and leaded directly to key issues.

The workshop ended with the awareness that these educational phases are necessary and important in order to enforce the training power of university lessons: the students participated actively in a learning process starting from a field experience and ending with a reflective analysis and study on the consequences which architectural design and projects can have on human livelihood.

AGENDA

Sunday 16.09.2001

10.00 – 10.30	Habitat Policy, Planning and Programming Presentation – Chantal Laurent
10.30 – 11.00	Introduction to the workshop/ Analysis Presentation Monica Noro
11.00 – 11.30	Introduction on traditional building materials Mr. Faris Saadi
11.30 – 12.00	Operational Activities Support Students Teams Supervisors
12.00 – 13.00	Open discussion – End of introductory sessions
13.00 – 14.00	Lunch Break
14.00 – 14.30	organization of working groups
14.30 – 15.00	working groups guidelines
15.00 – 17.30	working sessions

Monday 17.09.2001

8.30 – 10.00	Working sessions (continued)
10.00 – 10.30	Tea break
10.30 – 13.00	Working sessions (continued)
13.00 – 14.00	Lunch Break
14.00 – 15.00	Working groups activities summary and wrap up
15.00 – 16.30	Open discussion
16.30 – 17.30	Conclusions

Facilitator's Report
Concise report on the proceedings in the Building Materials Work Group

Group session started in the afternoon of 16 September with an inventory of students' opinion on traditional/locally available building materials.
Not a single student expressed a positive attitude to traditional building materials but each student could mention some negative characteristics of traditional materials which are summarized below:

- Health: traditional materials create unhealthy conditions through dust and insects
- Maintenance: houses build with traditional materials need too much maintenance, sometimes even after each rain.
- Traditional materials are difficult to combine with other materials due too excessive shrinking and swelling, causing cracks.
- Esthetics: it is almost impossible to design something beautiful with these materials due to the dull features (colors) of the materials
- Limitation in design: no multi story buildings possible.

The outcomes of the inventory were discussed in details and for many of the problems mentioned some solutions were identified and most of the identified solutions were illustrated with documentation:

- The improvement of the traditional materials, especially improved mud-bricks, would solve many of the problems mentioned in the inventory, such as low compression strength which limits greatly the design options.
- Using the right (improved) materials in the appropriate place will reduce the need for maintenance.
- Chemical treatment and compaction of earth would reduce the susceptibility to insects and dust
- Finishing materials can be developed with comparable flexibility/plasticity as the construction materials of the walls, thus avoiding cracks through shrinkage and swelling
- Different colors of earth can be combined and pigments can be added to the materials to improve the esthetics

The discussions on improved materials and the numerous illustrations of buildings made with traditional building materials were an eye opener to the students and at the end of the discussions, the students opinions on traditional materials were more positive. A number of positive characteristics of traditional materials had been tabled, such as:

- Better insulation properties of earth and stone as compared to concrete
- Appropriateness of the material, low cost and general availability

The members of the Work Group then asked themselves why people in general are moving away from traditional materials in favor of concrete. The group came to the conclusion that traditional building materials have a very poor image in Iraq due to:

- No use has been made of improved materials

- People associate earth as a building material with poor rural houses, whoever has the means to build with cement does not want to be associated with poor rural housing.

To overcome the problem of poor image some high quality public buildings should be created to show the possibilities of the (improved) traditional materials. The group agreed to do some design exercises for a Public Library to become familiarized with the qualities of the materials and the typical techniques involved (arcs, domes, design of windows etc.)

During the morning of the 17 September the students worked individually and in small groups on designs, supported by facilitator and resource-person.

In the afternoon, before the presentation of the groups conclusions to the plenary meeting, the seminar was evaluated in the group.
All members were more positive regarding the use of traditional material:

- They all expressed their satisfaction that they learned more about these "natural" materials
- Improved materials offer sufficient design options and can be applied in a wide range of buildings
- Student feel the need for more design practice. Some students asked Habitat to help organize special courses in the University

The final presentation to the plenary meeting concentrated on the process the group had gone through, not on the outcomes of the design exercise. Group members are now convinced of the fact that traditional materials could still play a role of importance in Kurdistan, provided that the materials are improved, new techniques and ideas are developed and the psychological barriers against the use of these materials are overcome.

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