ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE ENGINEERING AND TECHNOLOGY

A COMPARISON STUDY OF VERNACULAR SETTLEMNETS IN IRAN; CASE OF MASOULEH AND ABYANEH VILLAGES

M.Sc. THESIS

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İRAN'DA YEREL YERLEŞİM KARŞILAŞTIRMA ARAŞTIRMASI; MASOULEH VE ABYANEH KOYU

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FOREWORD

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SUMMARY

Gradually understanding the fact that sustainable buildings potentially have significant impact on environmental issues puts vernacular architecture on the table for urban architects and all designers in order to preserve and restore the ancient heritages, as well as to learn and apply sustainable considerations and instructions to contemporary buildings.

Indeed, in vernacular settlements, advent and progress of houses relates to local, micro climatic and historical background of the region as well as cultural and philosophical context. Most of the dwellings are made by local inhabitant through the time.

Hence, study and verification of the built environment's transition will apparently be fruitful for detecting effective rules and factors in order to keeping, guarding and enhancing the quality of the built environment in terms of identity and socio-cultural backgrounds.

Thus, this dissertation tries to figure out the features of vernacular architecture correlating to ecological and environmental perspective with cultural considerations in a framework based on aim, limitation, methodology and the historic reputation of different vernacular settlements.

For this study two vernacular settlement from Iran is selected and featured for its special characteristics that guaranteed the settlements surviving through the time. Case studies have been chosen with similar geography and historical background to restrict the variables of study in order to do a more precious analysis and comparison.

The methodology is a qualitative exploration of physical and spatial expansion in environmental context according to observation and structured analysis by sketching, maps, visual assessment that will indicate in charts and tables. Prior the research starts with literature review and also the review of different cases with similar environmental features. The dissertation explores and analyses the case studies based on spatial organization, environmental and socio cultural context of chosen areas with more focus on natural and man-made environmental features.

Eventually, some instructions and recommendations are represented to be applied for preservation and restoration goals in the case studies as well as the other vernacular settlements with similar characteristics in mountainous region of Iran.

İRAN'DA YEREL YERLEŞİM KARŞILAŞTIRMA ARAŞTIRMASI; MASOULEH VE ABYANEH KOYU

ÖZET

Sürdürülebilir binaların çevresel konular üzerinde potansiyel olarak önemli bir etkiye sahip olduğu gerçeğini aşamalı olarak anlamak, eski mirasları korumak ve eski haline getirmek, aynı zamanda çağdaş binalara sürdürülebilir düşünceleri ve talimatları öğrenmek ve uygulamak için kentsel mimarları ve tüm tasarımcıları masaya yerleştirir. Aslında, yerel yerleşim yerlerinde, evlerin gelişmesi ve ilerlemesi, bölgenin yerel, mikro iklimsel ve tarihi arka planı ile kültürel ve felsefi bağlamla ilgilidir. Konutların çoğu zaman içinde yerel halk tarafından yapılır. Başka bir deyişle, yeni evler çoğunlukla çevresel ve çağdaş değerler, kültür ve sosyal gelişim, bağlamsal tasarım, bina tasarımında çevre dostu düşüncelerden ve kültürel kalıplara saygı duymaktan yoksundur. Son zamanlarda, neredeyse bu yapımların işlevsel ve semantik değerleri görmezden gelen binaların hızlı ve seri yapımı konusunda endişeleri var. Yerel malzeme ve üretim yöntemleri, betonarme ve tünel formlarının yerini almıştır. Geleneksel yöntemler kaldırılır ve doğal malzemeler kullanılmaz, bunun yerine iklimlendirme ve iklimlendirme sorunları yapay olarak çözdü.
Modern mimarinin benimsenmesine karşı eleştirel bir eğilim eğilimi olduğu ve hem pratikte hem de mimarlık eğitiminde felsefî fikirlerin, yalnızca Orta Doğu'daki mimarlık eleştirmenleri arasında değil, aynı zamanda mimarlık eleştirmenleri arasında da açıkça görülmektedir. dünyadaki çeşitli bilim adamları tarafından yazılmış mimarlık edebiyatı (Bandini, 1987; Herfe, 1984; Jencks, 1995; Serageldin, 1995). Genel olarak, bu faktörlerin tümü mimaride bir çeşit "kimlik krizi" belirler ve tasarımcıların ve mimarların eski mimari mirasların tasarım yaklaşımları ve ıslahı hakkında yeniden düşünmelerini ve çağdaş mimaride uygulamalarını sağlar.
Modern mimarlığın eleştirmenleri, çağdaş mimarlık eserlerinin sosyo-kültürel ve çevresel ortamına saygı duyan alternatif tasarım çözümlerini genişletmenin şart olduğunu iddia ediyor (Able, 1986). Mimari tasarımda "bölgeselcilik" olarak yeni yaratılan konsept, dikkatleri çekti ve büyük destek aldı (Full, 1981; Spence, 1985).

Bu nedenle, yapılı çevrenin geçişini incelemek ve doğrulamak, yapılı çevrenin kalitesini kimlik ve sosyo-kültürel geçmiş açısından korumak, korumak ve geliştirmek için etkili kural ve faktörleri tespit etmede verimli olacaktır.
İran'daki yerel yerleşimlere dikkat edilmemesi nedeniyle, konutlar köylerde kademeli olarak tahrip olmuştur. Tesislerin olmaması, ekonomik durumun kötü olması ve konutların uygun olmayan şekilde bakımı, sakinler için zorlu yaşam koşullarına yol açmakta ve şehirlere göç etmek zorunda kalmaktadır. Ayrıca, çok eşsiz mimari özelliklere sahip dağlık bölgelerdeki yerel yerleşimler, koruma ve restorasyon için göz önünde bulundurulması gereken bazı doğal ve doğal olmayan tehditlere karşı çıkıyor. Bir taraftan çığ, erozyon ve deprem gibi doğal faktörler ve diğer taraftan turizm ve aşırı yetiştirme gibi diğer faktörler bölgedeki hem ekolojiyi hem de kültürel mirası tehlikeye atar.

Bu nedenle araştırmanın amacı, eski sakinlerin uyguladığı çözüm ve yaklaşımları araştırmak ve keşfetmek ve bölgenin iklim, toprak, bitki örtüsü ve topografyası gibi çevresel faktörlerle başa çıkmak için evlerini nasıl inşa ettiklerini ve doğal kaynakları nasıl kullandıklarını bulmaktır. doğaya zarar vermeden.
Ayrıca, baskın mimarlık türlerini karşılaştırmak ve açıklamak için farklı yerleşim yerlerinde geleneksel yerleşimleri ve köy düzenini incelemeye ve bu köylerde ve benzer köylerde yakın tarihte yaşanan evrak sorunlarını gidermek için merdiven desen gelişimi ile ilgili ilkeleri çıkarmaya çalışılmıştır. .

Köylerde yeni inşa edilen binalarda geleneksel teknikleri yeniden kullanmak veya eskilerini korumak için, bazı bölgeleri vaka çalışmaları olarak incelemek ve araştırmak için temel bir ihtiyaç vardır; potansiyellerini keşfedebilir, çalışmaların sonuçlarını sıraya koyabilir, kategorize edilmiş bir şekilde sunabilirsiniz. Sonuç olarak, eski yerleşim alanlarının korunmasında ve aynı zamanda modern ve çağdaş mimaride uygulanacak ilkeler olarak önerin. Bu nedenle, bu tez ekolojik ve çevresel perspektiften korelasyon gösteren yerel mimarinin özelliklerini, sınırlamaları, metodolojileri ve farklı yerel yerleşimlerin tarihi itibarını temel alan bir çerçevede kültürel düşüncelerle özdeşleştirmeye çalışır.
İran, iklim ve coğrafi özelliklerdeki farklılıklar nedeniyle çok eski bir tarihe sahip, çok çeşitli yerel yerleşimlerle dolu geniş bir ülke. Bu antik köyler arasında dağlık bölgelerde bulunanlar eşsiz ve çok farklı mimari özelliklere sahiptir ve erişilebilirlikteki sertliği nedeniyle, zaman içinde daha az değişiklikle bozulmadan kalmıştır. Sonuç olarak, vadiler ve dağlık bölgelerdeki köyler, mevcut yerel mimariden öğrenilebilecek birçok yararlı düşünce ve ders türetmek için bu çalışmada daha fazla odaklanmıştır.
Bu çalışma için İran'dan iki yerel yerleşim seçildi ve zaman içinde hayatta kalan yerleşimleri garanti eden özel özellikleri nedeniyle öne çıktı. Daha değerli bir analiz ve karşılaştırma yapmak için çalışma değişkenlerini sınırlandırmak amacıyla benzer coğrafya ve tarihsel geçmişe sahip vaka çalışmaları seçilmiştir.

Metodoloji, tablo ve tablolarda gösterecek eskiz, harita, görsel değerlendirme ile gözlem ve yapılandırılmış analizlere göre çevresel bağlamda fiziksel ve mekansal genişlemenin kalitatif bir araştırmasıdır. Araştırma, literatür taraması ve benzer çevresel özelliklere sahip farklı vakaların incelenmesi ile başlar. Tez alanı, doğal ve insan yapımı çevre özelliklerine daha fazla odaklanan mekansal organizasyon, seçilen alanların çevresel ve sosyo kültürel bağlamına dayanan vaka çalışmalarını araştırıyor ve analiz ediyor.
Yerel mimarlık çalışması, köy düzenindeki gömülü örüntü ve ilkeleri bulmak için sistematik ve dikkatli bir araştırma ile ilerlemelidir. İstisnai nitelikteki bireysel binaların analizine önem verilen akademik mimari çalışmalarının aksine, yerel formların incelenmesi, tekrarlayan ve ortak yerlerin tanınmasına bağlıdır. Bir ankette çok az sayıda bina genel resmi bozabilir.
Çalışmalar, kırsal alanlardan seçilen her iki vakanın da sürdürülebilirlik ilkesine göre inşa edildiğini açıkça ortaya koymaktadır ve bu, zaman içinde en az değişiklikle hayatta kalabilmelerinin nedenidir. Yüzyıllar boyunca deneme yanılma temeline dayanarak inşa edilen konutların fiziki yapıları ve örüntüleri geleneksel mimari örnekleridir. Bu yerel yerleşimleri incelemeye değer kılan şey, yerleşim yerlerinin çevre ile uyumu, yerel malzemelerin adapte edilmesi ve konutların bu köylerin sadece birkaç harika özelliği olan sert iklim koşullarında zorlu koşullarda kullanılmasıdır. Her ne kadar vaka çalışmaları başlatılmış ve farklı bağlamlarda araştırılmış olsa da, vaka

çalışmaları arasında iyi bir karşılaştırma yapabilmek için yukarıda belirtilen sürdürülebilirlik ilkeleri; bölgenin fiziksel özelliklerine uyum, ekolojik özelliklere dayalı konut yerleşimi, su, rüzgar ve güneş gibi doğal kaynakları kullanmaya yönelik yöntemler, binada kullanılan malzemeler ve onarımlar.
Seçilen vaka çalışmaları sürdürülebilir ilkelere cevap vermede bazı benzerlikleri paylaşsa da, köyler farklı iklim koşullarına, topografyaya ve kültürel özelliklere sahip oldukları için farklar göze çarpmaktadır. Bununla birlikte, her iki köy de dağların eteklerinde yer almakta ve ayrıca topoğrafya özelliklerine göre ve bölgelerin kontur çizgilerine paralel olarak biçimlendirilmiş ve genişletilmiştir, ancak doğal ortamlarının farklılaşması nedeniyle farklı köy desenlerine sahiptir. Masouleh köyünde görülebildiği gibi, merdivenler, doğal engellerle sınırlanan çok kompakt bir yapıya sahip evler. sonuç olarak, tarım için ve ayrıca inşaat için uygun arazi bulunmamasından dolayı, her birim aşağıda diğer evin çatısına döşenmiştir. Dahası, Abyaneh köyü yoğunlaştırılmış bir yapıya sahiptir ancak Masouleh köyü kadar değil. Abyaneh'teki birimler dar sokaklarla ayrılır ve birincisinin ana cadde boyunca genişlediği, ikincisi ise köyü iki parçaya bölen nehir boyunca genişleyen doğrusal biçimde gelişmiştir. Günümüzde, kompakt form kullanmak, enerji tasarrufu stratejileri ve birçok savunucusu olan ekolojik açıdan sürdürülebilir yöntemler olarak çözümlerden biridir.
Ayrıca, konutların, iklim koşullarına ve topografyasına göre konumlandırılması ve yönlendirilmesi, hangi birimlerin soğuk havalarda güneş ışığını doğal ışıklandırmaya ve ısıtmaya ne kadar absorbe edebileceğini, ayrıca ılık havada doğal havalandırma olarak rüzgarı nasıl evin içine geçirdiğini belirler. çevre özelliklerine göre bina ünitelerinin yalnızca birkaçıdır. Sonuç olarak, doğal enerji tüketim oranı, doğaya göre optimal seviyeye düşmektedir.
Sonuç olarak, her iki adım biçiminde desen ve dışa dönük mimariye sahip örnek olay incelemelerinin, sıcak yaz günlerinde konfor ve istenen havalandırma sağladığı ve soğuk hava koşullarında köylerin kompakt formu nedeniyle daha az doğal enerji kaynakları gerektirdiği söylenebilir. . Her iki örnek de iskelet, farklı alanların mekansal düzenlenmesi, havalandırma ve ayrıca daha ayrıntılı elemanlar için alt malzemeler gibi tüm inşaat sürecinde doğal malzemelerle doğanın benzersiz özelliklerine göre inşa edilmiştir.
Çalışmanın sonuçlarina göre, vaka çalışmalarında koruma ve restorasyon hedefleri için uygulanacak bazı talimatlar ve tavsiyeler keşfedilmiştir ve İran'ın dağlık bölgesinde benzer özelliklere sahip diğer yerel yerleşimlerde de uygulanabilir.

1. INTRODUCTION

Architecture is an interdisciplinary field with a vast definition which is directly in relation with different aspect of people's life. The relation between built environment and human beings life style has been effected by different items such as; cultural, economic, political, social aspects. According to Glancy's idea the duty of modern architecture is to find a "radically new ways of shaping the four walls that surround us of looking at old ways" (Glancey, 2000). Hence, investigation of old buildings can be a helpful approach to discover the principles and methods for preserving, fostering and repairing of vulnerable vernacular dwellings.

In another word, new houses mostly lack the environmental and contemporary values, culture and social development, contextual design, environment friendly considerations in building design and respect to the cultural patterns. Recently there has been concerns about mass and rapid construction of buildings which almost these productions ignore the functional and semantic values. Local material and production methods has replaced into reinforced concrete and tunnel forms. Traditional methods are abolished and native materials are not used, instead air conditioning and acclimatization has solved the problems artificially.

It is apparent that there is an up going trend of criticism against the adoption of modern architecture and its philosophical ideas, both in practice and in the teaching of architecture is apparent, not only amongst critics of architecture in the Middle East, but also in the literature of architecture written by various scholars around the world (Bandini, 1987; Herfe, 1984; Jencks, 1995; Serageldin, 1995). Critics of modern architecture claim that It is essential to expand alternative design solutions that respect the socio-cultural and environmental setting of the contemporary works of architecture (Able, 1986). Newly created concept as "regionalism" in architecture design attracted attentions and received considerable support (Full, 1981; Spence, 1985).

All of these factors overall, determines a kind of "identity crisis" in architecture and make the designers and architects rethink about the design approaches and reclamation of the old heritages of architecture from previous generations and apply them into the contemporary architecture.

There is an essential need to research and analyze some regions as case studies, in order to benefit from the traditional architectural system in contemporary architecture; acquire their potentials, put the result of studies in order, present them in a categorized way. And as a result, learning from them and propose them as instructions to be applied in modern and contemporary architecture.

On the other hand, vernacular architecture is assumed as significant approach for responding present urban accommodation problems and demands (Oliver, 1999), therefore in order to enable design professional, it is important to collect and analyze the information about the features and principles. Applying local material, construction detail and style and also design by considering topography according to the culture and climate and context are very important.

It should be noted that there are many type of vernacular housing in the whole world like Italy, Germany, and Japan, which were built in response to human's needs according to same topographical land situation. Nevertheless, the design approaches and strategies are different according to the variation of each cultural and traditional characteristic. The way the local people of different regions build and expanded their villages by pondering climatic and geographical issues triggers the housing and architecture remains unique with their local richness and diversity on these regions.

Not only designers and urban planners can benefit of vernacular settlements but also they need to restore and preserve vernacular heritage. Unfortunately, because of some reasons, the persistence of the vernacular architecture is under threat in recent years.

1.1 Purpose of Thesis

Due to the lack of attention to vernacular settlements in Iran, the dwellings have been destroying gradually in villages. Lack of facilities, poor economic condition and inappropriate maintenance of dwellings resulting in difficult life condition for residents and oblige them to migrate to cities. Furthermore, vernacular settlements in mountainous regions that share a very unique architectural characteristics, oppose some natural and unnatural threats which need to take under consideration in order to

preservation and restoration. Natural factors such as avalanches, erosion and earthquakes from one side and other factors like tourism and overcultivation from the other side jeopardize both the ecology and the cultural heritage in the region.

Hence, the purpose of the research is to investigate and discover the solutions and approaches applied by ancient inhabitants and find out how they built their houses to cope with environmental factors like climate, soil, vegetation and topography of the region and how they used natural resources with no harm to nature.

Moreover, it has been tried to examine the traditional settlements and village pattern in different settlements to make comparison and explain dominant type of architecture and also to extract applicable principles in order to solve the recent housing problems in these villages and similar villages with staircase pattern development.

The following research questions will comprise the focus for the study:

1. What is the principles and strategies in vernacular architecture and settlement pattern? Why was it an applicable solution to the environmental and functional needs of the local people? The house type will be analyzed in terms of its spatial arrangement and use, culture-specific features and climate moderation.
2. How can the principles and rules of vernacular settlements be functional in environmental context in similar villages?

1.2 Methodology

In order to re-use of the traditional techniques in newly built buildings in villages or preserving the old ones, there is an essential need to study and investigate some regions as case studies; discover their potentials, put the result of studies in order, present them in a categorized way. And consequently, propose them as principles to be applied in preserving the old settlements and also in modern and contemporary architecture.

Iran is a vast country with a very old history and full of variety kind of vernacular settlement due to the variation in climate and geographical features. Among these ancient villages, the ones in mountainous regions share unique and much different architectural characteristics and stayed intact with less alteration during the time, due to the hard hipness in accessibility. As a result villages in valleys and mountainous regions are more of a focus in this study to derive many useful thought and lessons, which can be learnt from the existing vernacular architecture.

Data collection method in this research is based on observations from the area and also literature survey from existing resource books and already published information in periodicals and internet websites. Thus, fundamental theoretical information (including qualitative and quantitative data) is applied in this study. In the following, some kind of analytic and comparative results are going to be presented in order to clarify the topic and a series of suggestions.

The research will be carried out through survey of two cases in Iran. Photographs and sketches will also be drawn of the patterns and buildings. The samples will then be analyzed in terms of their design and spatial layout, as well as construction approaches and materials. In larger scale the integrity of village pattern with the environment around will be picturesque and revealed by different kinds of maps. The way the dwellings expanded through the time and how much it is ecologically designed will be discussed.

The study of vernacular architecture must progress with a systematic and careful investigation to find out the embedded pattern and principles in village layout. Unlike the study of academic architecture where emphasis is placed on the analysis of individual buildings of exceptional character, the study of vernacular forms depends on the recognition of the repetitive and commonplace. Too few buildings in a survey may distort the overall picture.

1.3 Limitation of Study

It is very difficult to investigate all the steep vernacular settlements in the Iran by details, because it would be really time consuming and the scope of study does not allow it in this level. Furthermore, most of the dwellings occupied by residents and it is not possible to visit so many of them due to security and privacy issues. Moreover, whole the settlements do not follow their original patterns and instructions and have altered the original form and function. In some places buildings are abolishing due to lack of preservation. Hence, just some of the villages worth to study. However, lack of sufficient information about history or maps of old and even existence situation is the other barriers in researching process.

2. THEORETICAL PERSPECTIVE

The first time the word used, it was borrowed from linguists who used the term "vernacular" to mention to language limited to a specific region (Haase 1992, 11). Therefore, words, phrases and grammatical constructions in English was found only in Cornwall, for example, constitute the Cornwall vernacular language (i.e. its version of the more widely spoken Standard English language).

The ethnic social structure, revolving around kinship, affected the built form and space organization of dwellings. Ever since the thematic study of constructions as "the transmission of culture by artifacts" in the 1960s (Rodovsky, 1964; Oliver, ed., 1969; Rapoport, 1969; Mead, 1966), there has been meaningful investigation on vernacular built forms and patterns in distinctive part of world. Different methods in analyzing the built form that have been examined in the literature of vernacular architecture as the source of culture, the question is, in what specific criteria should a research look at built form in order to explore its imbedded thought and systematic purpose of built environment? It seems farfetched that the physical aspects and technological elements of buildings exclusively can take the burden to describe how culture is transmitted and society is developed. Moreover, ornamental languages or decorative details of constructions cannot give an account of this issue. However, it is crystal clear that social and cultural aspects of dwellings is shown in some exterior object such as structural features, ornamental elements, aesthetics and other formal characteristics.

Consistent with the limitations it is important why it is not rational to start evaluating just based on physical features and structural elements. Considering that outward properties are the total expression of social and cultural aspect of houses, this would change building to an ordinary physical object just like physical artifacts and sculptures and paintings that social meanings are attached to the body of building.

It has been debated that physical object properties are not only purpose for making building, because the aim of human construction is to make place for social or functional purposes through collecting elements into a physical object, not the physical object itself (Hillier & Hanson, 1984, pp.1-2). Actually manifestation of human

relations in space defines the way society enters into built environments, and built environments turns to a natural part of transmission of cultures (Hillier, 1996, pp.24-45; Hillier & Hanson, 1984, pp.1-2).

Considering that space is the main point from which systematic intent underlying vernacular arrangements should be inspected, then the question is to conduct a way to study how the constructed form is structured as spatial patterns or relations, that are organized by various social and cultural elements of form. This is merely because, as having been debated earlier, the origin of architectural intent is generally non-discursive in the evolutionary and primitive process of the vernacular. In other words, the particular ways cultural ideas are transmitted in the vernacular constructions seem to a large extent embedded in the different ways such ideas are organized as spatial patterns, rather than solely as some formal artifacts on space, with respect to the patterning of other components of social forces in the construction and evolution of vernacular built forms and patterns.

2.1 Describing Vernacular in Architectural Context

"Vernacular Architecture is derived from the Latin word "Vernaculus" means native", which has good reason to be remembered as "the architecture of the people" (Oliver, 1997, p. xxi).

Thus, this term refers to belonging of people to the regions where they are from and the places where they express their original nationality or hometown. Both the words hometown and nationality associate with some implications and concepts such as identity, belonging and the cultures from the previous generations.

By means of attaining helpful outcome through investigation on „Vernacular Architecture" drafting a framework based on some key questions such as; What, how, and why is strongly recommended. With answering these fundamental questions, it is feasible to achieve different intent from vernacular architecture (Rapoport, 1969).

Due to this, Hubka (1986) implies; "Information related with the design method of these kinds of buildings is shared by word of mouth, observation, replication, and apprenticeship whereas methods of design of them are stored in the minds of the builders" (Hubka, 1986).

On the other hand, Vernacular is also described by the greater importance and implication of relationships between elements, and also the manner of the elements

(Rapoport, 1969, p. 8). In more detailed clarification, Rapoport divided the category of building type in three group.

First group includes primitive very few building type, a model with few individual differences, built by all locals. Second group, pre industrial vernacular. A greater, though still limited number of building types, more individual differences of the model, built by craftsman. Third group comprises of high-style, modern and more specialized building types, while building being original creation, this might be changing, designed and built by groups of specialists (Rapoport, 1969).

Vernacular architecture is a term widely used in the United Kingdom, and less so in North America (Ennals and Holdsworth 1998, 241f). Paul Oliver (1969, 10–11) state that the term was commonly used as long ago as 1858. Archeologists tried to expand the term to describe dwellings that are built according to local tradition to encounter the personal requirements of the individuals for whom they are supposed (Carson 1974, 185). Brunskill (1997) cited, the definition of vernacular architecture, used from 1839 by architects, archeologists, historians and critics when they used to describe a small dwelling of town and countryside (Brunskill, 1997).

Its diversity from the designation "formal architecture" is highlighted by "the study of vernacular architecture is not the study of intellectualized styles and modes as they are revealed in grand buildings. likely, it is the study of how skilled sketch of a tooth notch. This and other complex notches are found throughout the Baltic Sea basin. In North America, they are most often seen in Fenno-Scandinavian areas." In a more extended discourse, the outstanding Irish cultural geographer F.H.A. Aalen (1973, 27) expands the definition and also its application by noting, within areas there is marked and voluntary loyalty by the majority of society to a particular model or ideal pattern of dwelling form. Even though professional builders may be working, the basic model is not extremely questioned by builder or rustic. The model is not designed by a designer but is formed based on anonymous folk tradition and tends to be sustainable through the time.

Geographer Martha Henderson (1992, 15) offers the observation that "vernacular architecture is an historical and geographical record of a culture group's relationship to physical and social environment." Additionally, As Makbule Oktay mentioned in her unpublished master thesis (2006), Definition of „vernacular architecture" indicates cultural attributes, environmental factors and economic statuses. According to this,

climate, topography of site, available resource, time, locality, existing technology, culture, way of life can be classified as the primarily used key words while describing the term (Oktay, 2006).

Gwyn Meirion-Jones (1982, 166) further implies that vernacular architecture is an outgrowth and modification of very early building, which is labeled "primitive." The author also wrote, "There can be no clear divide between the 'primitive' and the 'vernacular' in architecture. The one merges into the other as skill improves and the tradesman, be he carpenter or mason, is increasingly brought into the construction process."

The most precise meaning of the term refers to different types of buildings created in a restricted area.

The term "vernacular architecture" has been given many definition and interpretations. Some explain it as only old, rural, and handmade agricultural or residential structures built in conservative forms using traditional resources (Wells 1986:1). Others define it as the typical architecture of a given place and time, include those of mass-produced and/or handmade materials (Carter and Cromley 2005:13). Camille Wells stated in the mid-1980s that it is "generally adequate to define vernacular architecture as common buildings of any kind" (Wells 1986:3). Builders of vernacular dwellings are not academically qualified in architecture; while, the architectural forms they create are self-confessed through past experience or practice in a building sector (Quiney 1990). In the introduction part of their edited volume, Common Places, Upton and Vlach (1986) imply many definitions of vernacular architecture, one being "the architecture that groups of people make or have made for their daily use."

The buildings in this study are supposed vernacular, because they are common buildings, built by people who don't educate in architectural design, just for their own use. The notion of vernacular architecture has been in presence since the 1800s, with the definite term "vernacular architecture" is used in the English language as early as 1818. Interest in the study of vernacular architecture, however, did not become noticeable until the 1960s. A significant exhibit at the New York Museum of Modern Art in 1964, by title of "Architecture Without Architects," coordinated by Bernard Rudofsky, display photographs of vernacular architecture (Arboleda 2006).

Possibly the most well-known scholar of vernacular architecture is Henry Glassie, whose book Folk Housing in Middle Virginia (1975) brought about the study of vernacular architecture to explain continuous cultural alteration. Glassie in his thesis

state that all houses are built of geometric components, which are connected and integrated according to confirmed rules and principles of architectural "grammar." Thus, both similarity and diversity among dwellings of a specific time and region can be described. In his book, Glassie admired those people who try to generate a "more human history," including researchers in oral history, historical geography, and historical archaeology.

Explanation and analysis then go on with function. The authors disagree with the willing to put one's own belief as a single simple reason for a complex architectural characteristic. Description and analysis continue with the category of history. Vernacular buildings are constantly changing and are substance to historical context. Finally, description and analysis focus on design and intention of construction.

This category changes the focus to classifying buildings to a assessment of the mental procedure of making a building.

Since vernacular builders have some reason for building, it is vital to explore the idea of purpose. Upton and Vlach consider the study of vernacular architecture as a humanistic study, declaring that the study of objective is the most important part in the study of vernacular architecture (1986: xxiii).

2.2 Characteristics of Vernacular Building

Vernacular settlement is a house built using local materials by local inhabitants who integrated tradition, utility and individuality to produce a graceful house. (Heather Davidson ,1988: 250)

The description of scholars on the characteristics of vernacular building can be summed up as: lack of theoretical or aesthetic pretensions; working within the site (e.g. fitting in micro-climate); respect for other people and their houses and hence for the total environment; man-made as well as natural; and working within an idiom with variations within a given order. There are many individual variations within a framework which can be adapted in various ways. Although a vernacular always has limitations in the range of expression possible, at the same time it can fit many different situations, and create a place at each. It is, of course, precisely this limitation of expression which makes any communication impossible. To communicate, one must be prepared to learn as well as use the language- which implies the acceptance of authority, trust, and a shared vocabulary.

Another characteristic of vernacular is its additive quality, its un-specialized, open-ended nature, so different from the closed, final form, typical of most high-style design. It is this quality which enables vernacular buildings to accept changes and additions which would visually and conceptually destroy a high-style design (Bruno Taut,1958).Vernacular is also characterized by the greater importance and significance of relationships between elements, and the manner in which these relationships are achieved, rather than by the nature of the elements themselves. This, however, leads us into the realm of urban design.

Vernacular houses are the results of the collaboration of many people over many generations as well as the collaboration between makers and users of buildings and other artifacts. Since knowledge of the traditional model is shared by all, there is no need for drawings or designers. A house is meant to be like all the well built houses in a given area. The construction is simple, clear, and easy to grasp. Since everyone knows the rules, the craftsman is called in only because he has a more detailed knowledge of these rules. Size, layout, relation to bite, and other variables can be decided by discussion and, if necessary, set down in a written contract. The aesthetic quality is not specially created for each house – it is traditional and handed down through the generations. As we shall see below in our discussion of Abyaneh and Masouleh vernacular houses, tradition has the force of a law honored by everyone through collective assent. It is thus accepted and obeyed, since respect for tradition gives collective control, which acts as a discipline.

This traditional approach works because there is a shared image of life, an accepted model of buildings, a small number of building types, and, finally, an accepted hierarchy and hence an accepted settlement pattern. As long as the tradition is alive, this shared and accepted image operates. When tradition wanes, the picture changes. Without tradition, there can no longer be reliance on the accepted norms, and there is a beginning of institutionalization.

2.3 General Overview on the Characteristics of Vernacular Settlements

One of the constant strengths of vernacular settlements is their close relationship with their environment. As James Ayres (1981, 17) implies, “Before houses were ‘designed’ they evolved, with a sensitivity towards their environment that may be seen as truly organic. It is such values that we have lost today and thus it is, that we so cherish them.” Hence, built to meet cultural standards, not typically physically standardized, exposes inhabitants', and often the builders' own needs, and is not usually the product of designers or construction workers who have no purpose of occupying their handicraft (David and Kramer 2001: 28).

Furthermore, the construction method of vernacular dwellings, visually and experimentally transferred from previous generations. Consequently, construction techniques are not liable on any style or written structural drawings and calculation. Besides, crafts men are the occupant of these regions and they have sufficient information about environmental factors, lifestyle and inhabitant needs and also cultural issues. In other word, vernacular buildings developed as the essential solution to the routine needs of the local people.

Furthermore, according to Kerken’s attitude it is known that human’s house is not merely the matter of being a shelter. It also has the deep relationship with the human as an occupant. As he indicates in his ideology, house is a place for fulfillment of the personal identity of human (Poespowardojo, 1982).

From this point of view based on his explanation of house, it is a place for expressing personal identity, knowing each other and sequence of daily activities within the order of space. Moreover, the form of dwelling in term of physical structure, is not only built by physical forces or any single accidental factors, but it is certainly resulted of social and cultural features in their broadest terms.

Forms are in turn adapted by climatic condition and by construction methods, plentiful and available material, and the technology, socio-cultural factors and the other secondary or modifying forces (Rapoport, 1969).

Besides, house as one form of culture is then also strongly being induced by all of factors above. There is a relationship between form and behavior in two ways; first, in the sense that an understanding over behavioral patterns, like desires, feelings and motivations, is vital to the understanding of built form because the built form is the

physical expression of these patterns; second when the form is generated, affect the way of life and behavior system. According to this, in traditional building, destroying the physical setting meaning that the culture is also abolished (Rapoport, 1969). The tangible part of culture in nature and social environment affects both houses and tradition. Another issue as a part of human behavior is habit which has great consequence both for affecting and being affected by the environment. The culture and the demands is generated where the variety of human, belief and the environment come together. Furthermore, vernacular buildings manifested that people still live, work and worship in it and also vernacular architecture is still as the most places that exist. Considering 800 million dwellings ranging from simple shelters to many-storied tower house expose a mostly hidden fact that the physical environment has not been totally designed and developed by designers so far. Nowadays, there has been an increasing shift in considering buildings exclusively as places, tombs and temples as a form of a culture. The attention goes even further to the whole city that has been ignored most of the time. It is considerable that there is much more pace and progress in technology than architecture (Rapoport, 1969).

Investigation and more research in different traditional building and architectural practice illustrates that all these dwellings and architectural shapes are built based on culture (Norberg-Schulz, 1979; Grabar, 1976; Rapoport, 1989; Mitchell, 1990; A1-Hathloul, 1981; Kuban, 1983). Architectural tradition actually is the tradition of design and construction based on socio-cultural issues, and each tradition is different because of diversity of culture imbedded in the design process and in the hierarchy of values in design process. Architecture is a language for expressing culture. (Rudofsky, 1964, 1977; Able, 1982; Rapoport, 1969; Norberg- Schulz, 1985). One of the methods for the members of the society means to express society and its ethics in the form of physical structures (Lawrence, 1980), which it is in all the arts, the one most firmly linked to society in all of its aspects: socio-cultural, political, economic, institutional and/or religious. In another word, vernacular architecture is the art of people who apply effective factors such as their requirement and environmental factors, social condition and materials under consideration.

Additionally, Henry Glassie mentioned:" Buildings like poem and ritualize culture" (Glassie, 2000). Their designers justify their action in a different way. Some implies that, they do design and build correspondingly because it is the long-lasting method from ancestors. Others believes that the buildings have been built commonly based on

valid and explored scientific lows by that time. Yet, it is completely clear that they built dwellings according to knowledge and experience gained from ancestors and considering local identity even when the industrial revolution occurred and increased after that. Ignoring urban pattern and existing natural texture in process of design causes some problems in the structure of the architectural identity and built environment and also separation of human from nature.

Unfortunately, by developing modernity, gradually designers and planners started to relinquish some fundamental factors such as friendly environment consideration, respect to contextual culture and contextual design.

Eventually, all of these changes resulted in a kind of "identity crisis" in architecture and forced whole planners and designers to pay more attention to the design tactics and have a holistic vision toward reclamation of the ancient inheritance of architecture gained by previous generations and try to use them in in contemporary design approaches and architecture (Glassie, 2000).

So, intellectual growth of society's history can be argued and analyzed through investigating its vernacular dwellings and through a systematic analysis. The shape of the man-made dwellings and structures and built environment is the shape of societies culture and that shape is the consequence of thousands of actions done by their ancestors. (Johnson, 1977; Duncan, 1981; Rapoport, 1980; Moore et al., 1983).

2.3.1 Vernacular settlement in social, cultural and economic context

In cultural context, architecture is like any understanding of potential and similar to any projection of learned thoughts. The things of the world produced and preexisted themselves in human mind like plans gained from memory, hence they can be revealed in analysis. Things turn into plans, plans turn onto sets of decisions, and decisions derived from intention. All things evolve their creators and reveal active images of their creators' wishes in period of their existence. In this vision, the buildings are like other cultural elements, and there are no differences between various kind of building. Various form of building as Vernacular, non -vernacular, neo-vernacular are cultural materials to create, hierarchy of experience, like poems, like traditions.

The precise, detailed and passive study of different traditions of architectural study shows that all architectural theories are fundamentally cultural. All involve actions beyond design and construction. It means every architectural custom is also a custom

of attitudes toward nature and environment. By considering this fact, we can back to our own architectural tradition to realize totally its complexity, its cultural context, its ultimate arbitrariness. When we have a chance to consider technology as nonpolitical issue or describe houses as shelter or speak of the human need for providing privacy, we will distinguish that we are not really considering universal principles, but only of conventions fitting an unusual culture that adopt class distinctions as the natural result of inherent distinctions among people, that disappear concern for nature in itself as an unrealistic environmentalism, that developed some self-centered activities among people. Occasionally, some strange beliefs are considered natural and turn into human universals, because humans are cultural beings.

Moreover, considering McGuire and Schiffer's theory, reveals that expected use life is the vital factor that integrate social and adaptive factors in the decision making procedure. Expecting longer use life, obtaining more benefits from a greater investment in production process. The more the groups are moving and also having less social inequality, so that they need no effort to express social inequality or social differentiation in architectural structures. Consequently, because they do not have to maintain them for long time, so their maintenance costs decrease. Following this fact, it is logical to extend the theory to describe special groups that operate within even a society with no mobility. Moreover, some special groups will have the same Features as highly mobile architecture share, egalitarian societies. For instance, a party rely on hunting or a group of warriors tend to highly mobility, the use life of their structures is anticipated to be short, hence their maintenance costs are low or even disappears.

Adaptive and situational theories, such as presented by McGuire, Schiffer, and Skibo, share the existence problems of oversimplification and the separation of the artifact's characteristics from the larger social construct of the ancient groups being studied. This does not mean that culture has been totally ignored but there is an emphasis on the practical functionality of vernacular architecture contrasting to its symbolic function. The concept of the term "vernacular architecture" shows that the structures are so usual that they share little meaning related to their utilitarian function.

Considering the attitudes by Preucel and Hodder (1996:300-301), to have a holistic view it is more accurate to address both the utilitarian function of a structure in terms of exchanges of built environment and energy, as well as the social function, i.e., analyzing a structure as an exchange of information. In the first place, it is doubtful that the two can be separated by any but artificial means.

2.3.2 Environmental compatibility of vernacular settlements

According to the creation of vernacular houses, **climate** is one of the most significant factors in whole the world. Hence, in all generations, locals created their houses by considering climatic conditions in order to attain comfortable living style. As Oliver.P (1997) highlight; “Climate is the most determine environmental factor in the development of human –life” (Oliver, 1997).

Consequently, it is noticeable that in vernacular houses, considering the climatic characters is one of the important factors in expanding the livable space. Besides, as O.H. Koenigsberger implies that, climatic analysis and interpretations and also importing results to construction process are the duty of the designers and also they are evaluating, which factors are helpful or harmful for the future occupants of their buildings (Koenigsberger, O.H).

Thus, it is clear that differentiation in architectural characteristics arises because each part of the world has different climate. Subsequently, for attainment to the accurate solution, classification of those different climates in the world is significant.

The most critical reason for the continuation of vernacular architectures that are specific to different regions in the world is their formation according to the climatic properties of the region in which they exist.

In our era, an architectural process that denies vernacular conditions, features and principles has overcome. This trend, which gets its capability from technology progress and materials, develop another architectural approaches around the world, which do not reflect the vernacular characteristics, while answer atmospheric and geographical circumstances with technology and materials in opposite to natural forms In the past, when technology and materials were more restricted, climate was the main aspect forming architecture.

Buildings that have the most economic, most suitable and most effective solution that are based on climatic conditions of the region they exist and using lowest supplementary energy are best samples of vernacular architecture. Vernacular buildings are the architectural handicrafts that have been developed as a response to the requirements of inhabitants before the industrial period and to the limitations created by the climate and region, and consequently of the particular and constant

interaction between human mind and experience collected by perceiving natural phenomena.

As it described before, various factors such as socio-cultural features, material, economy, climate and technology are the most effective items in building architecture and its sustainability.

Due to differences of climate in different geographical regions, most compatible architectural approaches for the built environment is according to region set up. Built environment designed and constructed by local people which reflects their requirements and socio-cultural ethics. Considering the limitation caused by the climate and using of plenty of locally available materials are the features of vernacular settlements.

While, there are various issues affects architectural design, climatically design approach is in priorities of design process for insuring the comfortable circumstance inside the dwellings.

Correspondingly, some concepts started to being more focused when the importance of it discovered. Bioclimatism is a term used to describe the concept of considering the architecture and micro-climate with individual thermal comfort conditions. Many research on vernacular architecture clarifies that for ensuring the sustainability in modern architecture it is vital to take into account the critical effect of bioclimatism concept.

This concept, consider the micro-climatic condition and solar passive techniques to improve the thermal comfort circumstances and artificial energy efficiency of the building in the built environment. Vernacular architecture is dividing construction technique by as response to local demands based on locally accessible resources. These kinds of building evolve through time to disclose the socio-cultural, historical and environmental context in which they originated. Ecological site planning methods allows appropriate amount of natural daylight and solar radiation into each unit. Each dwelling unit will need a relatively direct southern exposure, and the building design itself will need to ensure that winter sun can enter inside the unit to warm the interior space whilst higher-angle summer sun is expected to keep the unit cool.

On the other hand, the buildings should be considered in relation to the site and their relationship with other buildings on the site at the same time. Aspects such as aesthetics, climatic variations, over-shading, self-shading, pollution and vegetation should also be studied to prevent negative effects on existing and also new buildings.

At an early stage, overall site scheme for energy use and the possibility for providing an integrated energy approaches for the buildings, the use of waste heat, the potential to generate electricity on site, renewable energy, using a combined heat and power scheme should be assessed. In other words, the site should be considered holistically and not each building in isolation.

In this context, the designer may start designing before a large building is formed on a specific site, or the site may not yet have been cleared of old buildings. Even when conditions on and nearby the site offer no such difficulties, it is rarely possible to obtain even one year's analysis. It necessitates, therefore, to use those methods and rules which allow to extract the predicted conditions based on achieved principles according to behavior of the microclimate and the general climatic conditions of the location.

Energy efficient building has the ability in reduction of carbon emission by 60% or more, which it approximately equals to 1.35 billion tones of carbon. It is important to take climate responsive building design into consideration rather than an option for carbon emission reduction and energy saving. To accomplish sustainable goals, both tradition and environment are not merely supplementary to each other but also prerequisites and essential. In another word, vernacular architecture is the design developed based on harmony between dwellers, dwelling and physical environment.

Different ancient societies have started making their special traditional architecture according to local condition. Through the time they have created their own architectural style without using of artificial energy producing elements, various levels of comfort have been produced inside the dwellings.

A solar passive dwelling is designed and built such that it makes effective use of solar radiation to warm up in winter and to prevent this radiation in summer. The design of solar houses or structures needs a precise understanding of the relationship between architectural patterns, culture, human behavior and climatic factors. Solar radiation and wind direction and velocity also have a direct impact in the building structures and orientation.

In most of the dwellings, locally available materials like stone, bamboo, wood, cane, cane leaves and etc are used. Since these materials are from the same climatic zone, they are suitable into the local environment totally. Use of locally available material has some environmental benefits such as: first, causes significant decrease in energy involved in transportation and material processing. Second, creates the structure light,

adaptable and with good anti-seismic features. Third, creates low environmental effect on their production, renewability and also natural dissolution.

The building knowledge and experiences in this type of architecture is frequently transported by rituals and is thus more based on the knowledge gained by trial and error and often passed on from the generations. Furthermore, this kind of architecture is greatly influenced by culture and geographical set up but the most fascinating aspect is that these architectures and strategies reveal identical architectural solutions in similar climates but totally different and very faraway geographical locations.

There are diverse approaches and tactics toward various climate conditions. According to Helena Coch, the climate can be classified into four main and more dominant such as: **cold**, **hot and dry climate**, **hot and humid climates** and **windy**.

In cold regions the main factor for the habitability of the buildings is not allowing the heat to get out. This cause a tendency for having compact built forms with fewer surfaces exposed to the outside as much as possible to lessening heat loss in the most severe case the forms of architecture become semispherical to make the maximum volume for the minimum shell surface whereas in other cases the building is set underground searching the greatest possible protection. It is clear that these solutions decrease the abilities of ventilation and lighting in the interior space but once again the most significant condition of the architecture takes priority over the others in the meaning of dwelling units common volumetric.

From another aspect preferred architecture in these climates tries to access the maximum possible isolating power of the enclosure walls and as a high level of air ventilation to avoid dryness. Because in primitive technologies it is not easy to find insulating materials and airtight openings the result tends to be buildings in which the number of openings are few and small so increase the darkness inside further. As it is not easy to access good insulation with less transparency wall faces complex and sometimes very smart strategies are used to defend better against the cold.

In the regions having type of hot dry climate, an effort is usually made to take advantage of the great temperature variation through the day- night cycle delay the penetration of heat as much as possible so that it creates the interior warmer at night when it is least disturbing. For this reason, materials of great thermal inertia are applied such as clay in the form of mud walls thick stone and adobe bricks and all the probable combinations of these plan.

Moreover, in some specific samples that thermal inertia cannot be supported, such as the nomadic sunshade in the desert, this independence of the internal air from the outside air is deprived and direct radiation is restricted by redirecting and reopening the air through artificial barriers with fabrics that occasionally have dark colors and cooling under the sun by the method of the speed up flow of air that happen within the fabric, leads to prevent the re-emission of sun radiation toward the interior.

Moreover, as she describes, in hot humid climates as a different type of climate, the thermal inertia of the buildings offers no advantage because the temperature changing in the outside are very small in the daily and annual cycle.

Moreover, because the radiation is really strong it is necessary to get the maximum possible control of its effects by trying to stop both direct and diffuse radiation which are very important in these climates.

To let more air flow and reach the all part of interior space in these type of climates opening locating and occupying the whole wall surface are used to let the air to circulate with avoiding radiation and spectators by means of lattices curtain etc. Despite of these strategies this solution rationally engages with the problems of privacy and completely absence of keeping from noise.

In ordinary dwellings in these regions the roof is an important element, because it has to act as a sunshade and umbrella simultaneously. In some kinds the roofs have been broken down into a number of overlapping roofs, one shading the other one, thus air can circulate among the space created and prevent overheating.

Also it is normal in these zones that roofs have steep slope to drain of the constant rains. They conduct the thermal layers of hotter air above the ceiling, where openings make it possible the air go out. The very accentuated eaves provide protection from the rain and sun radiation. Furthermore, they make ventilation and occasionally form porches or produce open galleries that creating shady inter-current spaces during day time and also creating spaces protected from the cool humid air during night, so that it affords possibility to rest and sleep on very hot days.

In windy climate, air flow influences the sensation of heat, so considers as a positive and effective factor for providing comfort in warm and wet climates and also in a clearly negative one in cold climates.

However, it is not desirable in any type of climate opposing to very strong winds. It can be in severe cases the main effective part of developing popular architecture forms.

One of the most primitive and simple system of conducting and controlling the impact of wind is found in the very simple windbreaks, has been built with branches, grass or straw, that are found as a early model in all cultures that started a forward steps towards civilization.

Another significant factor in vernacular settlement development is **topography** and **geology** features. P. Oliver's investigations of Vernacular Architecture classifies the types of topographies based on the physical incidence. According to Oliver's classification topography were classified to riparian, marine, lowland, below-ground, coastal, desert, lacustrine, forest, grassland, valley, upland and slope (Oliver, 1997). Furthermore "Undulation" effects on the framework of the village as one of the fundamental features of land. Some Natural elements like rivers and mountains, according to topography and land position has more dominant impact (Zargar, 2003, p. 37). Zargar asserted that there are two significant concerns that should be considered in the settlements developing on the foothills of mountains. Firstly, the risk of abrupt natural disasters for houses built on the sloppy topography. The inhabitants of villages when first settled in these places was not aware of place character which is in the route of avalanches. Secondly, they were generally developed in hilly side, due to some special reason such as hard accessibility for strangers or attack, so that they always considered provisions and conducted some solutions to risk of falling rock or defeating avalanches. For instance, they reap and collect the plants and vegetation in adjacent area to control the natural disaster and being safe, because plant coverage leads to temperature raise that in turn cause to avalanches occurrence.

2.4 Review of Staircase Vernacular settlements in Iran

Iran is a widespread country with area of 1,648,000-kilometer square, situated in the middle east. Persian Gulf in south and Caspian sea in north determine the boundaries of the country. Due to the vast expansion of Iran, various climate region is recognizable and also there are vast range of cultural, social and political differences from west to east (Shajarian, 2000). three major area can be mentioned such as mountainous area, semi-desert lands and agriculture planes. However, more than three climate region has been recognized which is revealed in below map (Figure 2.1). with a little surveying in vernacular settlements in Iran, the variety among t he settlements would be clear.

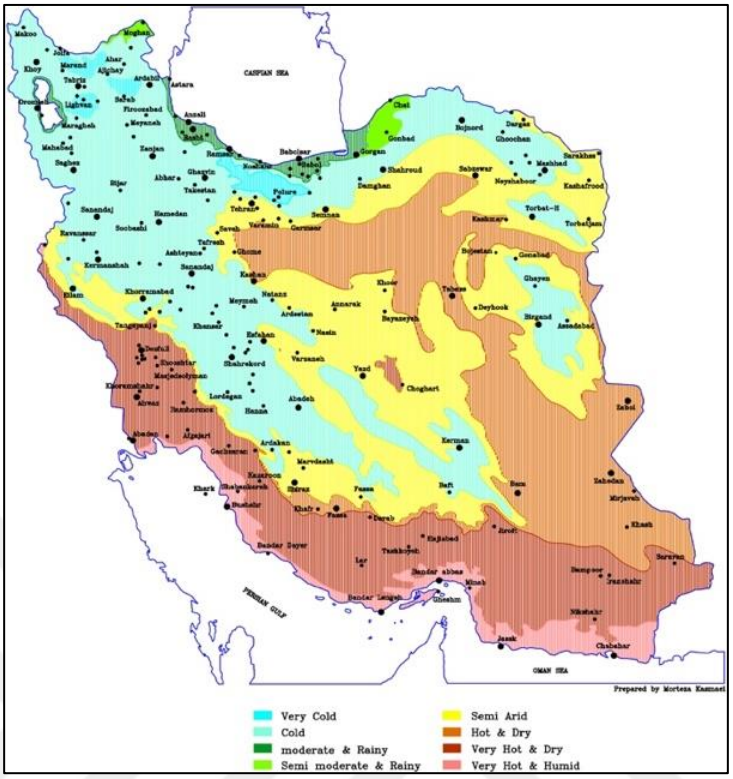

Figure 2.1 : Different climatic regions of Iran

This investigation is developed based on the climatic analysis of Ghobadian. As he asserted, Iran is mostly classified as a dry country, in fact it has divers type of climates and it can be mainly divided into four distinct climatic regions: temperate climate (the northern coastal region), hot and dry climate (the central plateau region, cold climate (the mountainous and high plateau region), hot and humid climate (the southern coastal region), (figure: 2.2) (Ghobadian, 2006).

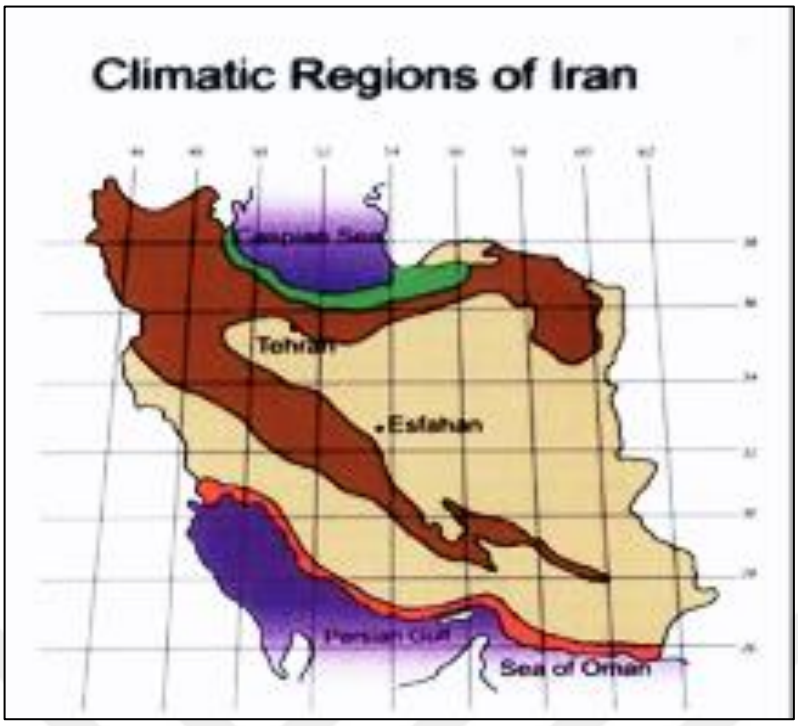

Figure 2.2 : Climatic map of Iran (Ghobadian.V ,p:25)

Inhabitants in vernacular settlements of Iran has devised sophisticated solutions in order to response to environmental features of the region. Climate as one of the most important features of environment has taken the first priority during creating the dwellings by ancient people. For example in hot and arid climate, cooling system has been most of a concern by locals in terms of ecological considerations. Hence, it was required to build the dwellings in a way to create the maximum shade and control the sun radiation coming inside the houses to provide comfortable condition during the hot days. However the main concern in coastal region of Caspian sea in northern part of Iran is too much moisture and rain and creating the proper ventilation. On the other hand in central part pf Iran which arid and dry weather is dominant and sandy lands occupied a large portion of land, building dwellings with mud-bricks instead of wood and stone which is rare in this region is a good solution to cope with its climatic condition. Actually, vernacular settlements have been built not only by considering the climatic factors but also according to historical and cultural heritage. There are so many heritages of ancient traditions in central plateau in rural areas which people considers them as common places, but the fact is that each vernacular settlement represent a set of artistic, sophisticated solutions and history of people who used to live there and need more attention in terms of ecological and architectural aspect.

According to Gholam Hossein Memarian, the settlements in Iran can be categorized into two different types of inward and outward oriented patterns. This survey is focused on settlements located in sloppy areas in Iran (Memarian, 1991).

As the purpose of the study is to investigate settlements in mountainous region, more detailed information about the characteristics of dwellings in sleepy topography is given in following. In steep and sloppy topography, villages complex and distinctive patterns is observable which Abyaneh in central plane and Masouleh in north of Iran are good samples to be investigated precisely.

Generally, villages in mountainous regions are located on lower part of valley where the slope is not harsh and there is the chance for inhabitants to build their dwellings on top of each other. That is how the staircase houses have been created according to topography of the area. All buildings are interconnected and outward architecture is common in most staircase villages. The roof of the lower level dwelling is the yard of the other dwelling in upper level and this pattern starts from up to down the slope. Over 20 staircase settlements exists in different part of Iran, which the most important of them is listed in (Table: 2.1) with some basic information about them and the location of villages has been shown in the map below to give a better understanding of topographical situation of the villages (Figure: 2.3).

Village's name (numbers refer to Figure 1)	Location (province)	Population	Number of residential buildings	Coordinate
1-Abyaneh	Isfahan	300	173	33°35′11″N–51°35′27″E
2-Doorak		992	182	32°41′21″N–49°54′31″E
3-Keloseh		770	188	32°43′15″N–49°53′35″E
4-Vastegan		227	57	32°42′44″N–49°54′17″E
5-Sar-agha-Seyed	Charmahaal-va-Bakhtiyari	1230	275	32°39′33″N–49°51′50″E
6-Sar-Saleh-Kootaah		443	90	32°43′16″N–49°45′42″E
7-Birahgan		218	55	32°39′12″N–49°54′38″E
8-Zenozagh	East Azarbaijan	1290	406	38°35′31″N–45°51′6″E
9-Ushtobin		603	150	38°51′27″N–46°29′9″E
10-Paalangan	Kordestan	850	223	35°4′3″N–46°36′15″E
11-Owraman		2760	711	35°15′8″N–46°15′40″E
12-Rooein	North Khorasan	2340	801	37°12′11″N–57°29′9″E
13-Esfidaan		1710	544	37°19′36″N–57°34′23″E
14-Hahjeej	Kermanshah	570	170	35°9′45″N–46°20′3″E
15-Kang	Khorasan-e-Razavi	800	270	36°19′11″N–59°13′32″E
16-Boujhan		727	265	36°14′38″N–58°58′9″E
17-Masouleh	Gilan	1200	350	37°9′19″N–48°59′24″E

Table 2.1 : Information about some staircase villages

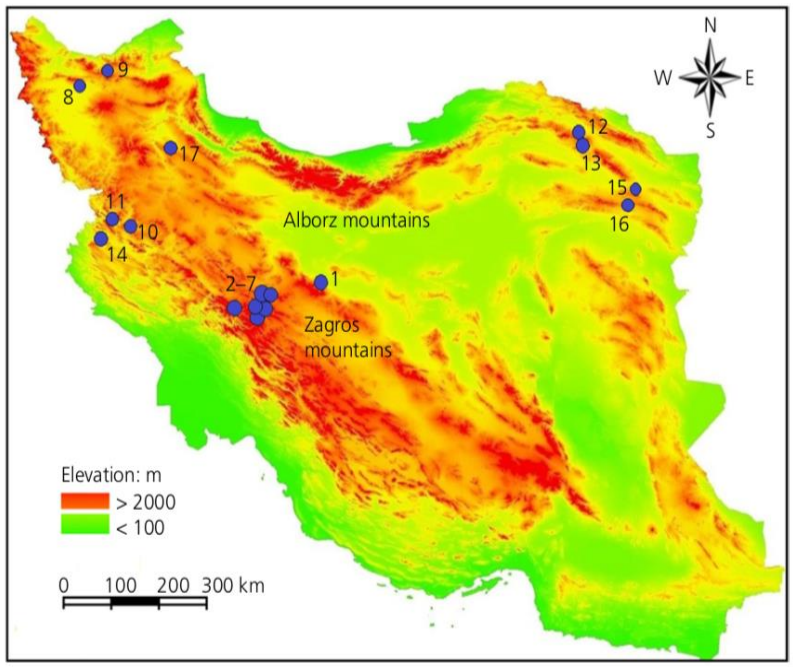

Figure 2.3 : Location of the villages in the topographical

There are photos and satellite pictures of some important staircase villages in following to give a more clear view toward the form and pattern of the villages (Figure: 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11).

Figure 2.4 : Photo and satellite picture of Keloseh village

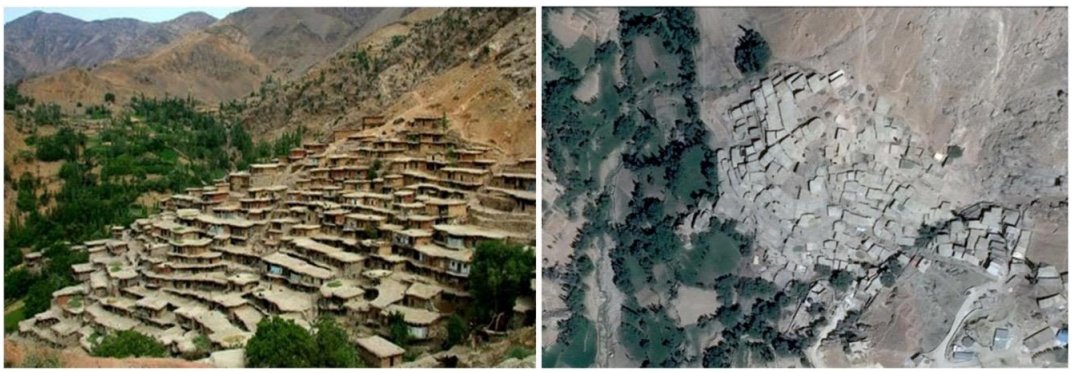

Figure 2.5 : Photo and satellite picture of Sar-agha-Seyed village

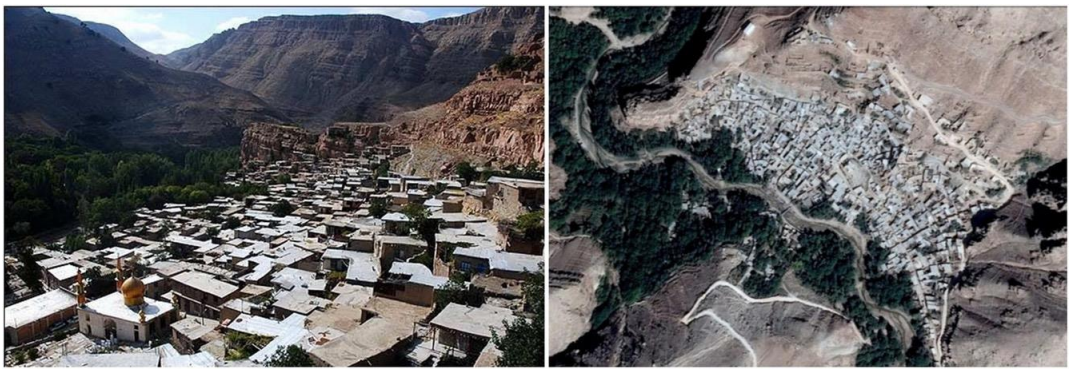

Figure 2.6 : Photo and satellite picture of Esfidaan village

Figure 2.7 : Photo and satellite picture of Paalangan village

Figure 2.8 : Photo and satellite picture of Kang village

Figure 2.9 : Photo and satellite picture of Zenozagh village

Figure 2.10 : Photo and satellite picture of Abyaneh village

Figure 2.11 : Photo and satellite picture of Masouleh village

In previous studies done by others, architectural characteristics of Masouleh and Abyaneh has been presented by Reza (2011) and likewise Azami et al. (2012) investigated the Ushotbin village with focus on physical structure of settlements. According to these studies and another investigation done by other scholars and also observation of different villages shows that they share the same characteristics in urban layout, form of development, building techniques and also materials. All of the villages have been developed in southern part of the valley to benefit the most of sun radiation in cold weather of mountainous region. According to the rout pattern of villages, two different kind of staircase villages can be recognized. The first group are the ones with less slope that allows the pathways to expand in two side of the houses, so narrow lanes provides the entrance for each dwelling. The combination of stairs and narrow passageways that go around the buildings in the dense structure of the settlements and form the network system in the villages. The examples of this classification are Abyaneh and Zenozagh villages (Figure: 2.12).

Figure 2.12 : First type sloppy settlements with narrow passageways (left photo: Masouleh, right photo: Ushtobin)

On the other hand, the second group are the settlements that have been built on slope more than fourty percent, so the roof of the house in lower level is used as both the courtyard and the passageway for the house in upper level like Sar-agha-Seyed village (Figure: 2.13). In both type of villages it is almost impossible for motor vehicles to enter the villages. Also, in some villages like Masouleh, it is forbidden by government authority for vehicles to enter the village by means of preserving the original pattern of the village.

Figure 2.13 : Second type sloppy settlement of Sar-agha-Seyed village

The structure of each building in second type completely rely on the building underneath because they are integrated completely to each other. As a result completely outward architecture pattern is formed despite the second type that have access to narrow pathways counts as semi outward type of architecture. Generally buildings are two stories which the upper floor is used as living room and the spaces in lower floor are mostly used as store or cold closet.

Hence, the structure of each house directly impacts the stability of structure of upper and lower buildings. Sar-agha-Seyed, Keloseh and Vastegan are some of the examples. In these buildings the skeleton of each house plays a significant role in supporting the stability of the interwoven dwellings. Hence, load bearing system in these villages consist of thick walls which supported by horizontal and vertical wooden beams.

Usage of materials such as wood and clay are common in mountainous climate regions because they are heat resistance and it takes a longer time to conduct the heat through them. These non-conductive materials are the best material available to get along the cold and long winter in the region. Furthermore, the other material that is plentiful in mountainous region is stone which is applied for foundation and even for ground floor walls to prevent the moisture penetration to upper level where the inhabitants spend most of their time. Other materials like adobe blocks and bricks are used for upper floor in most of the settlements as it can be seen in Keloseh village (Figure: 2.14). Likewise, in new buildings fired bricks with mortar (combination of lime, clay and soil) are used.

Figure 2.14 : Stone made construction in Keloseh village

Windows and doors generally located in the wall faced to sun. buildings mostly expanded in south or south eastern direction. In all introduced villages less or more there is a uniform elevation in each row of the buildings because they are built in harmony with topography. Some villages such as Abyaneh and Zenozagh have the facades in red colour due to the natural colour of soil.

Based on the way the space is used and according to elements and components which is observable in each village, it is possible to recognize the socio- economic status of

edwellers and also the occupation they have. For instance, considering special space for keeping animals or agricultural products, or existence of a room for weaving carpet clarifies the lifestyle of residents of the settlement.

3. MAIN ANALYSIS

In the following section the study focuses on two selected case studies among different staircase villages that are introduced in literature review section, in order to get more detailed and useful instructions in environmental context for preservation and renovation purposes. Abyaneh and Masouleh with unique architectural and environmental features has preserved their own architecture not only in rural layout but also in construction method and housing layout with less alteration. More detailed investigation has been done in following.

3.1 Masouleh Village

Masouleh is an ancient village which is built in 1006 AD somewhere near the current village which called "Kohne Masouleh" which means old Masouleh. Local people moved from old Masouleh to the current village because of neighbor attack and deadly diseases (Pestilence) which has 150,000 msq areas. This village has 500 meter eastern-western and 300 meter northern-southern length. Current village with 150,000 meter square area, 300 m width and 500 m length, with altitude of 1050 meters and geographical latitude ◌́ 13 ◌́ 09 north latitude ◌̊14 ◌́59 ◌̊48 East (Figure: 3.1). Its area is about 16 hectares and there is more than 120 meters of elevation between its highest and lowest points. To cope with geography of the region, each unit built on top of the other unit's roof, so the pathways created just in edge of each staircase house. This pattern of village created a unique architecture (Figure: 3.2).

The history of the ancient village of Masouleh can be traced back to a site located in six kilometers northwest of Masouleh today. Masouleh in local language was named Khoortab Khani (Xortāb Xāni), Bishatol Baghar (Biša-tol-baqar) and Masalar (Māsālār). Because Gilan province located in the Silk Road route, the village (formerly known as Khourab or Masalar) developed around an iron mine and soon became a thriving commercial area. According to recorded history, the relocation of the village site has been a gradual process that has followed several unfortunate events such as a

deadly epidemic plague and a massive earthquake. The ancient site, known as "Old Masouleh" or "Kohneh-Masouleh", nowadays is a barren rocky land, while the new village is just in a short distance away. Masuleh has been listed as a National Heritage Site in 1974, as well as in 2004 by UNESCO's World Heritage List, due to its natural and historical attractions and also the unique architecture in favourable mountain climate. This village is under the protection of Cultural Heritage Department and also Natural Resources Department for preservation of both natural and physical aspects of the village.

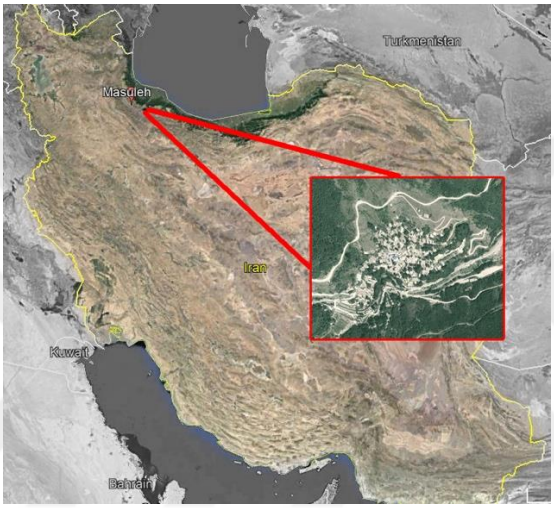

Figure 3.1 : Location of Abyaneh

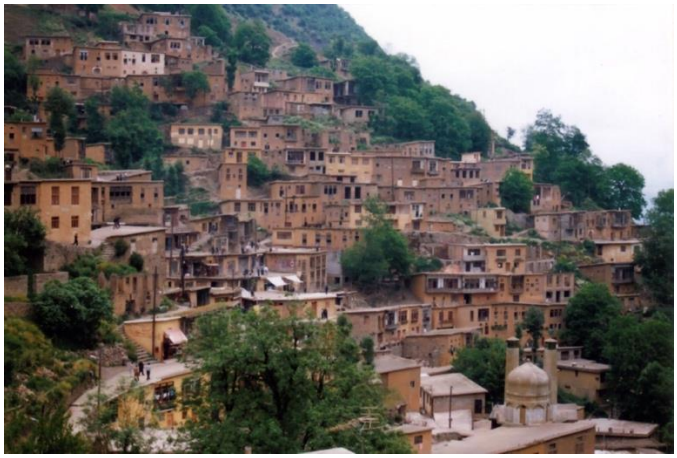

Figure 3.2 : Abyaneh village scenery

3.1.1 Socio-cultural aspect in Masouleh

This ancient village counts as a national artifact because it manifests the historical

accustoms of human. The influence of nature from one side and culture from other side, resulted in creation of a specific village texture and construction methods which finally counts as vernacular architecture. Thus, in a continuous interaction of culture and nature, it has created wonderful dynamism in historic lifetime of Masouleh. Local language in the region is "Taleshi", that nearly one million people talk the same language in west and south part of Caspian sea.

It goes without saying that Masouleh architecture is not merely physical element, but expression of history and culture of the ancient inhabitants (Daneshyar,2009). Special structure of settlements which interlinked provide the chance for each inhabitant to interact and communicate with the occupant in neighborhood. There are so many units with a shared wall between units which interconnected by doors of internal walls.

This architecture with its special characteristics manifest civil and social integration of Iranian in historical context (Falamaki,2012). As the matter of fact, socio-cultural aspects of any community is changing due to population and ethical system and it is also true for Masouleh. However, boundaries of neighboring and public spaces cannot be altered too much because the settlements are built very unique in pattern and not flexible to changes. These kind of spaces that defined based on social agreement and respecting each other rights play a significant role in locals' life. Accordingly, Mahala as a perfect unit for social interaction is a publicly visible and accessible space (Habibi, 2003), which is known as the fundamental components of urban structure (Madani pour,2008). One of the main reasons of shaping Mahala is based on collective identity of inhabitant who have the sense of mutual relationship and sense of unity as they have communication in this place (Abdollahi and...,2010). So, it becomes more clear why Mahala is full of ethnical, cultural and religious classifications (Habibi, 2003,48). Moreover, Lynch describes in his book "image of city" that accessibility is one of the important components in creating the images of cities (lynch, 1385). Four main districts or Mahala by names of, Asad, Khanebar, Masjedbar and keshesar, with its six subsidiary regions has formed the Masouleh village. For each district there is a mosque and the formation of routs follows the naturally formed channels (Figure 3.3).

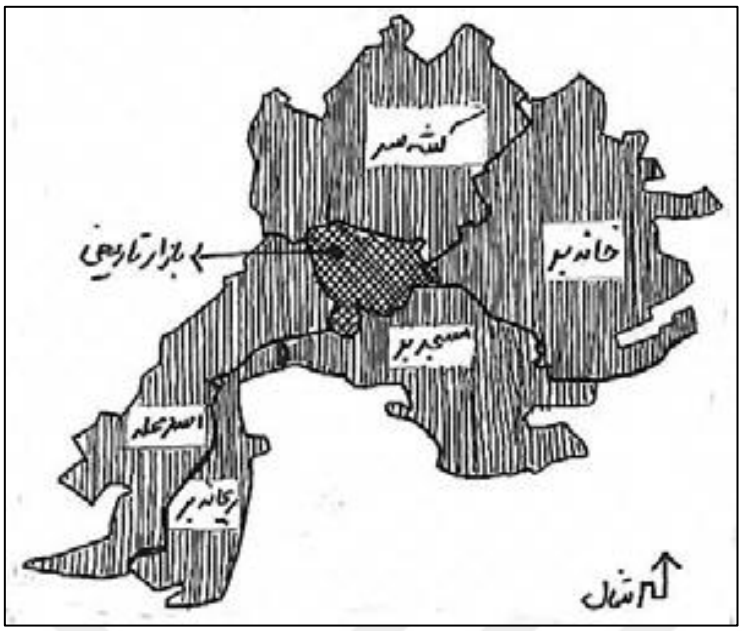

Figure 3.3 : Location of different districts in Masouleh village

Accessibility is the vital factor in creating the images of cities (lynch, 1385,94). It is by help of some elements like pathways that humans can recognize the identity of a place and while they choose or make these pathways, the structure of their existential space can be shaped (Shoulz,2002). Accordingly, specific form of path ways in Masouleh create identity and entity for locals. These pathways that connect settlements to outdoor space, perform like a buffer space which afford access for people come or go to bazaar, mosque, graveyard and tomb.

In fact, the roofs not only used as pathways in different ceremonies but also considers as social yards for neighbors' gatherings. Because of the lack of enough space for construction of settlements and alleys, residents have not allowed to interfere or enlarge their units in front or back, where is adjacent to pavement with common landlords in order to obey social agreement. Any attempt to increase the space for benefit of the landlord even it be thirty centimeters in any direction of the building leads residents to protest, hence the landlord has to undo any change according to an unwritten rule (Karbalaee, 2011).

If anyone do alteration or interference in the boundary of the building or path, considering the earlier experiences and also diachronic and synchronic pattern of historical traits, natural traits, movement and man-made spaces, all the alteration should redo (Habibi, 2003). However, socio-cultural impacts on the formation,

alteration and direction of the routes or some buildings that is not avoidable and which is not undeniable in case of Masouleh as well (widlok,1997).

Due to the compact form of buildings, each unit frequently two or three story is completely adjacent to other unit next to it form a neighboring space which share the same characteristics like same visual scene through the openings or mutual indirect or direct accessibilities. This boundary is formed in three level; lower and upper buildings and more important is the same floor level because social contractions happen there. Men can do walking along these paths and women sit and talk with others specially with neighbors in this space (Maraashi, 1968). Although the upper space of any unit is the roof but it does not belong to the landlord, because of the multi functionality character of this space that is partially used as pavement and also social interactions (Shokoohi Raad, 2005). Accordingly, inhabitants cannot do any change in height of the units or even the material of roof by themselves, but by consulting and considering the previous materials (Pirnia, 2003).

This kind of consensus between inhabitants in neighboring level, and considering the neighbor's views about personal belongings counts as a unique characteristic of this ancient village that guarantee the sustainability of the region.

The religious traces are also visible in spatial order of units and the way of affording privacy in rural pattern. There are 5 shrines and 18 mosques in the village, which shows the importance of religious attitudes in formation and development of the village. Some of the important mosques are named as: Khaneh Barber Mosque, Bar Mosque, Asadah Mosque, Lower Kache Mosque, Upper Kache Mosque, Reyhaneh Bar Mosque, Ghanbarabad Mosque, Dakhaleh Mosque, Jame Mosque and Saheb Al-Zaman Mosque. The Masul Mosque also includes the monument of "Aoun ibn Ali Ali" or "Aun ibn Muhammad Hanifah ibn Ali," which is considered to be the main axis of the region and the main center of the religious gatherings of the residents. This monument is located next to the mosque and is also known as the "Qalandaraneh". Inside the shrine room is a box with an inscription on the manuscript of Qur'an. Several tombstones inside and the porches of the tomb and the adjacent mosque are related to Qajar times. Imamzadeh "Ain Ali" and "Zein Ali" is another monument located 2 meters east of Masouleh. This shrine has inscriptions and lattice windows which indicates the date of its construction back to 500 years ago. "Imamzadeh Ibrahim" is

located at the top of Masouleh and on the Khalkhal road and has a long history. “Imamzadeh Hashem” is located in the west of Masouleh under the rocky fortress of Bonn Castle. This imamzadeh has a monument and is located on the road to Tarom.

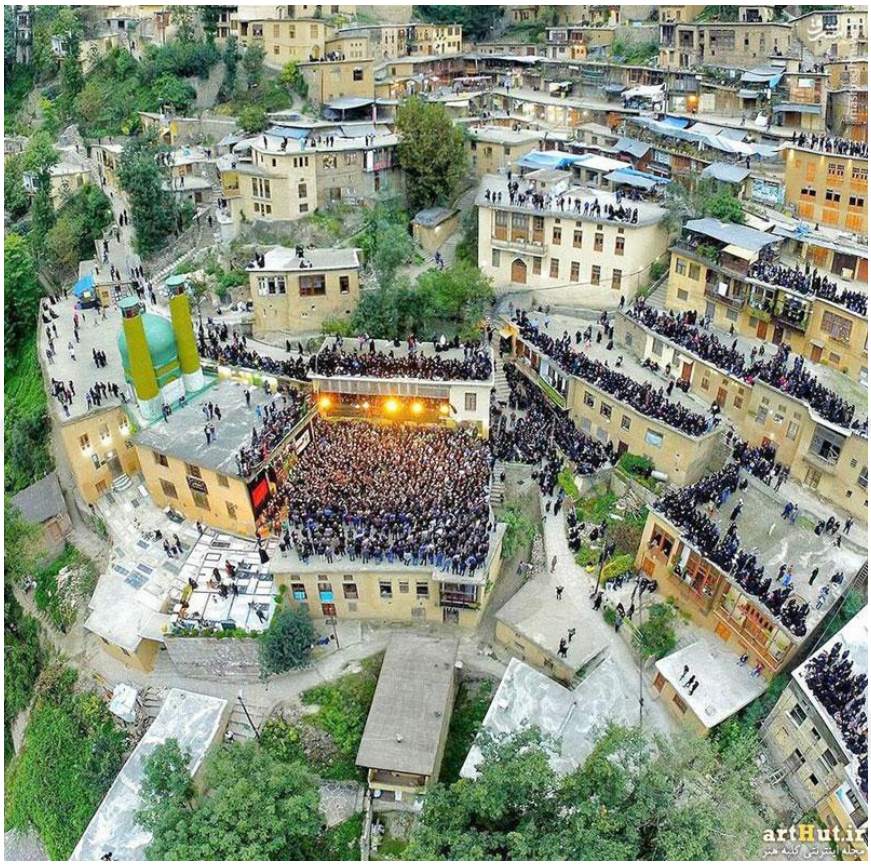

Figure 3.4 : Mourning ceremony in Imamzadeh Aoun bin Muhammad

URL: http://tabnakbato.ir/fa/news/51684

Imamzadeh Aoun bin Muhammad is one of these pilgrimage sites dating to the second or third century AH, an octagonal tomb with an engraved inscription on its tomb dating back to 969 AH. Also the documents obtained from this tomb show that this Imam is the grandson of first imam of shiie, son of Muhammad Hanifah, son of Imam Ali (AS).

Jame mosque is the biggest mosque and the place where locals gather to do religious activities. Another popular mosque is Saheb-az-Zaman which has been built in 12th century AD (Figure: 3.4).

It needs to mention that dwellings experiences some alteration and change in physical pattern and traditions because of new technology, media and urban culture. Reduction

trend in population from 3500 to 900 is another important issue that threaten the history process of this beautiful settlement.

3.1.2 Economy and family type in Masouleh

Currently, there are approximately 350 residential buildings in Masouleh which mostly are two-story buildings. Families in Masouleh generally are nuclear family consist of couples without or with children who live in separate room which is detached space in Masouleh units. Between the fifth and eighth century AH, Masuleh village had been one of the most important centers of metalworking. Also, colorful glazed pottery belongs to Seljuk period was discovered in the area and was listed in the National Archives because of its historical importance and prestige.

Figure 3.5 : The location of Bazar in Masouleh

"Bazar" is the most important architectural element in Masouleh which is located in the heart of the village and is adjacent to most of districts and does not belong to a specific region (Figure: 3.5). Bazar in Masouleh is an outdoor space in seven story that

has no roof so that locals can benefit more from the nature (Figure: 3.6). The bazaar consists of seven parts which is: 1. Kafi Bazaar 2. Lower Bazaar 3.Devil Part 4.Tailoring part 5. Knife making parts 6. Blacksmith‟s part 7. Charcoal selling part (Memarian, 1997). Actually, once this Bazar was on the Silk Road of the region and many people used to come to this area to buy or sell their products, whereas there is still some signs of the young and old selling dolls and traditional socks. Later, the locals had to change the trade center because they could not trade and gain enough income. Nowadays, products sold in bazar are carpets with different material like goat's hair that is called "Kilim", carpet made of cotton or wool that is called "Jajim", colorful socks, knives and clothes. In brief, Masouleh's Bazar is the heart of the village and the most important element of identity, that whole activities affected by it.

Figure 3.6 : Bazar in Masouleh village (photo taken by author)

There are a few mines in the mountains of this district such as zinc, China root, Quartz, Galena and Iron which was extracted and used for producing cannons and artillery in the dominance era of Fathali Qajar.

The people of Masouleh, unlike many people in Guilan, have not been farmers, occupation of locals is generally trading and animal husbandry. On the other hand, bazar with 120 shops, is the center of marketing due to tourists. In Masouleh there are small handicrafts such as hand tools, knitwear and woolen weaving (Figure 3.7). The Masoule market is a place of business and selling the hand made products for the

Masoule people but it can afford just 10 percent of residents expenses. Currently, catering to travelers is the most important business activity of Masuleh residents. The continued economic progress has been one of the most important factors for the prosperity and social growth of the people of the historic city of Masouleh.

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Figure 3.7 : Handcrafts produced by locals for selling

Communication between three regions of Gilan, Khalkhal and Zanjan through product exchange, has formed the basis of the Masuleh economy. Gilkas from the East, Turks from the West mountains and Turks from the South Plateau were always on the market of the village selling and buying the products by each community. The presence of these perennial travelers and traders in Masouleh shaped a particular culture among the inhabitants of this region. However, the construction of new car routes between neighboring cities gradually diminished the Masuleh market-based economy. This recession has led to the termination of economic activity for the last 60 years and inevitably left a large number of people unemployed. The migration of people to big cities has been so rapid that, 3500 fixed population in 1335 decreased to 811 in 1382. More than a third of these people came from the surrounding jungle who joined to the urban societies. Currently, tourism is the basis of the local economy and the only source of income for the population (Figure 3.8).

Figure 3.8 : Tourists visit and buy **local** products

3.1.3 Environmental aspects of Masouleh

Appropriate weather condition, topographical characteristics, vegetation coverage and existence of water resources are main components of the mountainous regions, which should be in balance with inhabitants and construction to avoid interfering and altering the nature.

3.1.3.1 Natural environment

Climatic Characteristics: Gilan located in high altitude northern part of Iran and south of Caspian Sea, where it restricted by Alborz mountain in south part and a plain in east (Ghobadian, 2006., Farajollahi, 2008., Memarian, 1992). This situation created a very specific weather condition in this zone the combination of heavy rain and high

humid weather, while the summers are hot and winters are cold. Because of the heavy is 87% in this region (Ramezani, 2011). There is more than 35 days of frigid weather and more than 100 days with foggy weather (Figure 3.9). Masouleh possess a snowy-rainy weather causing seasonal flood in the region. The probability of flood increases in April by amount of 76.9 million cubic meters and the lowest amount of depletion can occur in August by 65.1 million cubic meters. Mountains with forests beside created a beautiful scene in Masouleh for all seasons.

Figure 3.9 : Scenery of Masouleh village

Geography and geology features of Masouleh village: Geomorphology sciences emphasizes on the significance role of mountains as one the essential components of the earth. Forces from tectonic volcanism form the surface of the earth and cause to develop mountains. Hence, mountains which grow mostly vertically have generally steep slope which host variety of biodiversity both flora and fauna spread from peak to down of the mountain where the surface is flat (Yavari, 2001).

Nowadays, there has been a big shift in mountainous zone of the earth which leads to lack of stability because of human interference to nature and their act of destroying the vegetation coverage in jungles and plains. Hence, by means of preserving stability in these regions, it is essential to consider the environmental and ecological attributes (Majnounian, 1995).

Figure 3.10 : Location of Masouleh village between mountains

Masouleh villages expanded and developed in mountainous region, in steep incline of Alborz mountain (Figure: 3.10). There is approximately 100 m differences between highest level up to lowest point of the village (Golboo, 2009). Figure 3.11 is a sematic section of the region which shows the village situation in the mountain and the river flow in the valley. As it described before, avalanches pose the inhabitants to danger in mountainous regions. There is the risk of falling rubble or large piece of stone from the higher point of the region, threaten the inhabitants life. For example, earthquake in 1990 occurred and the movement of large rocks from above killed so many people and ruined many houses (Zargar, 2003).

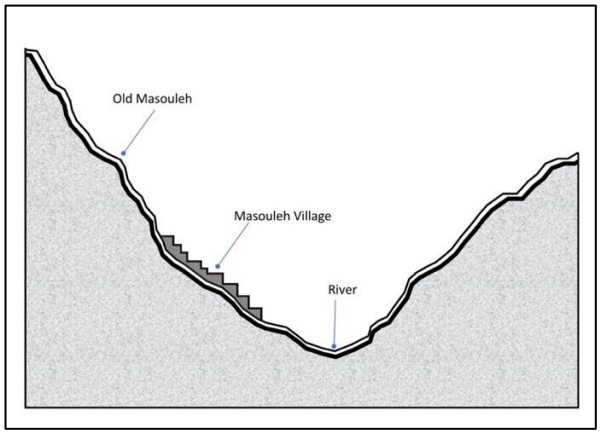


Figure 3.11 : Location of the Masouleh village in the valley

The soils of this region are brown lithocell forest type and iodolytic soils. Masouleh is located in an earthquake-zone. Accordingly, the most recent earthquake occurred in 1989 in Rudbar, which was a major earthquake, caused severe damage to homes.

Water resources: According to Dr.Zargar, existence of water is one of the important issues in creation of any village, and rivers always play a key role as the resources of water (Zargar, 2003). The river "Masouleh Rood Khan" which passes along the village Masouleh in the valley, has the spring source in 200 km distance from the village (Figure: 3.12). As the river goes further, it gets pour and less volume in water when it reaches to Anzali pond (Golboo, 2009).

Figure 3.12 : Masouleh Rood Khan (left top), Larcheshmeh (right top), Kushem (left bottom) Terishoom (right bottom)

Use of natural resources such as natural springs supplies citizens needs of water. Locals benefited natural mountain grooves as urban sewage disposal channels. Koshim waterfall is located in the Masuleh Valley 30 meters away along the river and surrounded by lush trees. Other Masouleh waterfalls include Masouleh Roudkhan waterfall and Khorram Bo waterfall. The Larcheshmah waterfall is the name of another natural water resourc along the Fouman Road to Masouleh, which is located among dense forests. The waterfall is located near the city of Masouleh and is supplied by the Larcheshmeh spring that comes out the mountain. Larcheshmeh Waterfall is two

meters above sea level and is estimated to be about five meters high. The Trishum or Trushum waterfall is on the slope of the Trishum mountains and is about 1 to 1.5 hours away from Masouleh. The waterfall is cold and has two ponds, one of which is deeper than the other is used for swimming by locals.

As it mentioned before the village experiences flood regularly due to the river overflow in high precipitation seasons or as due to melting snow in Spring. Several factors are involved in the occurrence of Masouleh floods, including area topography, slope of the region, concentration time, rainfall intensity, vegetation and riverside erosion, river bed and construction activities.

Riverside erosion is an important source of sediment production during floods that increases the destructive power of floods. Another natural disasters that occurred in Masouleh is the flooding of the river in 1997 which destroyed many constructions and caused so many people die.

Figure 3.13 : River passing through the vally in south side of the village Masouleh

Vegetation (Flora): Forests, meadows and mountains can be observed from the village (Figure: 3.13). The forests of the area are covered by beech, oak, alder, alder and sparrow; however, oak trees have been much higher in the past. Wild ferns grow

abundantly in Masouleh. Also, native and medicinal herbs including Angelica, Thalassa, Chamomile are other plants growing in this region (Figure: 3.14).

Figure 3.14 : Photo of plant coverage around Masouleh village

Masuleh Forest Park is one of the most beautiful forest parks in the north of Iran and even in the Middle East. There is a great variety of plants in the park, including beech, alder, wild oak, hornbeam and hazelnut trees, as well as medicinal and herbal plants such as chamomile an angelica. These herbal plants also help soil stabilization and prevent erosion in the upstream Masuleh area. Green patches around the village indicated in Figure: 3.15, which reveals the large area covered by plants in this region. In the natural context of the village of Masouleh, we see trees that appear to be incompatible with the existing natural texture. The trees are likely to be planted to stabilize the soil, but this unprofessional and inappropriate selection is not a good solution, because it requires trees to be planted with deep and vast roots and closer foliage to the ground. In addition, these non-native trees, which are incompatible with the existing climate and ecosystem, have also caused a visual disturbance to the village landscape.

Vegetation plays an important role in the absorption and storage of precipitations by trapping large amounts of water in the roots or conduct water deep in the soil. However overgrazing, deforestation and over-cultivation specially in upstream area increases the risk of water runoff.

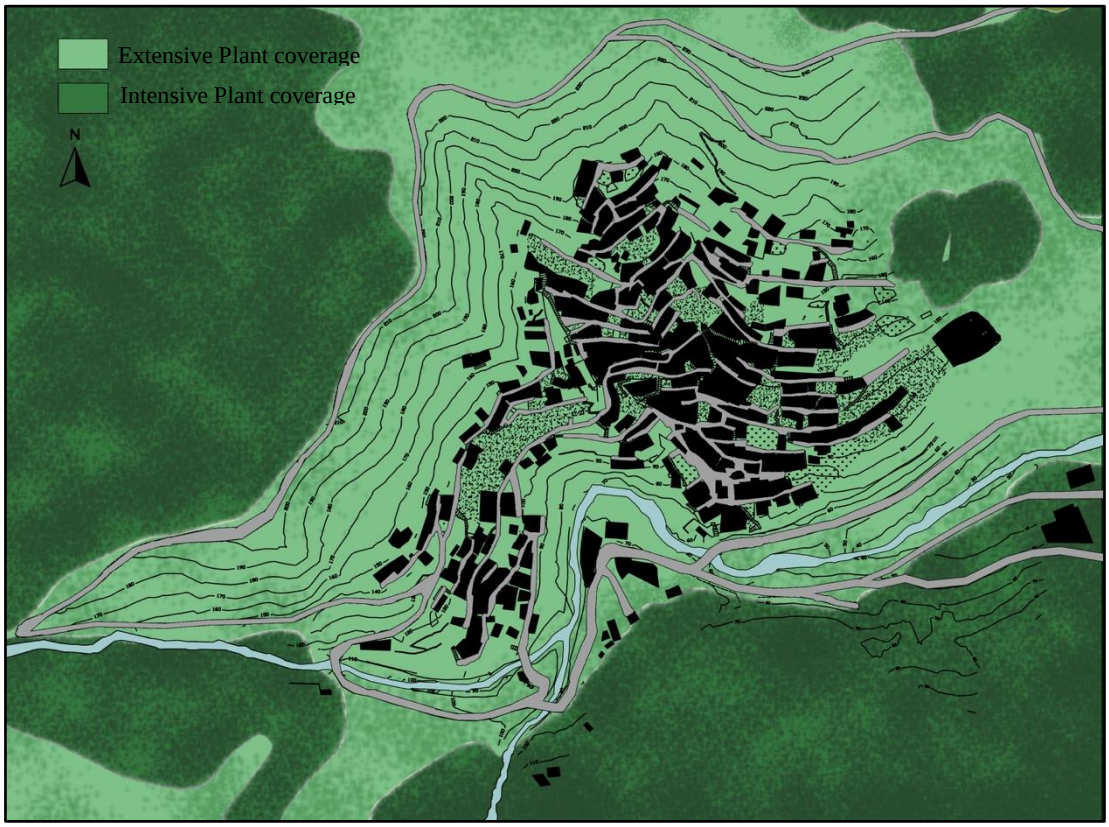


Figure 3.15 : Green patches in Masouleh village

Native animals (fauna): Different wild life exist in this area such as brown bear, leopard and bird species such as; black crow, eagle, white hornbeam. There is also some migratory birds such as; duck, wild goose and swallow.

3.1.3.2 Man-made environment

The environment made by inhabitants need to be investigated separately from the natural elements of environment in order to discover the traits of human beings on nature and to find out the way ancient residents cope with the nature surrounded them. Masouleh village in this level, has been analyzed in two different scale of urban layout

and housing layout in order to give a chance for more detailed analysis and to make a more precise comparison between the cases of Masouleh and Abyaneh villages.

Urban layout

Rural pattern and spatial relation in Masouleh: As it explained the weather condition affects the formation of settlements. Accordingly, locals of Masouleh had to cope with the condition which brought about by nature. Having supplied the necessary requirements and also taking into consideration the ecological and environmental condition, inhabitants built their units in order to provide comfortable living environment.

Figure 3.16 : Location of Masouleh village in the valley

There are mainly two factors of climatically aspect that have been considered in settlements developing and the form and orientation of units such as high amount of humidity and high amount of precipitation. It is important to cope with these factors, hence the outward orientation has been developed more in settlements to moderate the humid rate and benefit the wind flow in the best way (Ramezaanpour, 2010). Consequently, locals could control humidity and produce natural air ventilation to provide living condition. Furthermore, the village has been expanded properly in east-west direction to cope with the slope of the region and also with the same direction of

contour lines to benefit from sun and is in an appropriate distance from the river which in s located in south of Masouleh village (Ghobadian, 2006).

Moreover, the settlements are not in bottom part of valley and not very near to river to avoid from flood at nights and to escape from very cold weather in winters, because the cold weather is heavy and use to go lower part of the valley and cause flood or make the weather very cold.

It needs to say that locals preferred to live in southern side of the mountain and in the middle part, because the north part is frequently very cold and shadow. According to what explained before, approximately 700 units dating back to 500 years ago, mostly extended toward east and south direction in foothill of mountains.

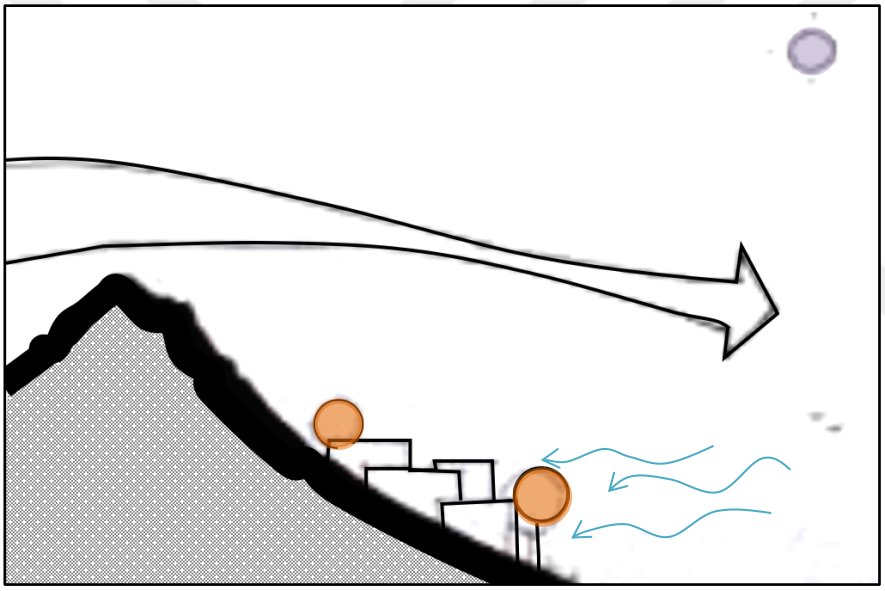


Figure 3.17 : Wind direction in Masouleh village

As a result of fact, there are special architectural characteristics directly related to climatically features such as weather condition, material and spatial arrangements.

To provide an appropriate ventilation for the houses in this region, the units made with right orientation and suitable height. Inhabitants benefit the **sun** in maximum by extending their units and using big windows in facade and also benefit **wind flow** by making balconies around the houses. Balconies are actually architectural elements that combine interior with exterior space and also prevent the penetration of rain into the settlements and not allowing rain to hit the main body of the buildings (Figure: 3.17). Cold weather in winters is a significant factor affecting the way ancient people built

their houses in order to providing the comfortable zone for living and doing activities. That's why the openings located in Sothern and eastern façade to get the most sun radiation and also a good ventilation (Figure: 3.18).

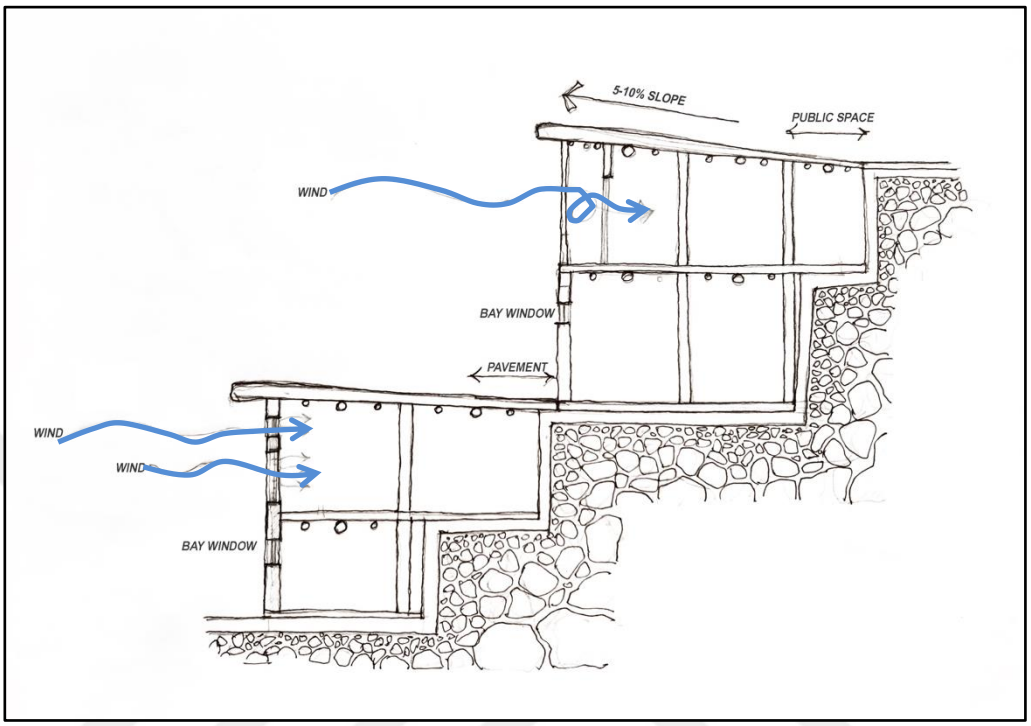


Figure 3.18 : Green patches in Masouleh village

Existence of big windows in façade indicates extroversion architecture in this village. As a solution to decrease humidity is to make buildings at least two stories to prevent land moisture penetration from base floor into the house. According to rate of humidity the foundation height and material varies in different parts of Gilan, which can be wood or stone. In more humid places where the water surface is closer and soil is stickier the foundation is made 100-150 cm distance from ground surface, while in forest region the height is approximately 80-120 cm from the land surface. Moreover, sewage system consists of four main branches of the urban pattern, which are connected by subdivisions to municipal sewage disposal and downstream.

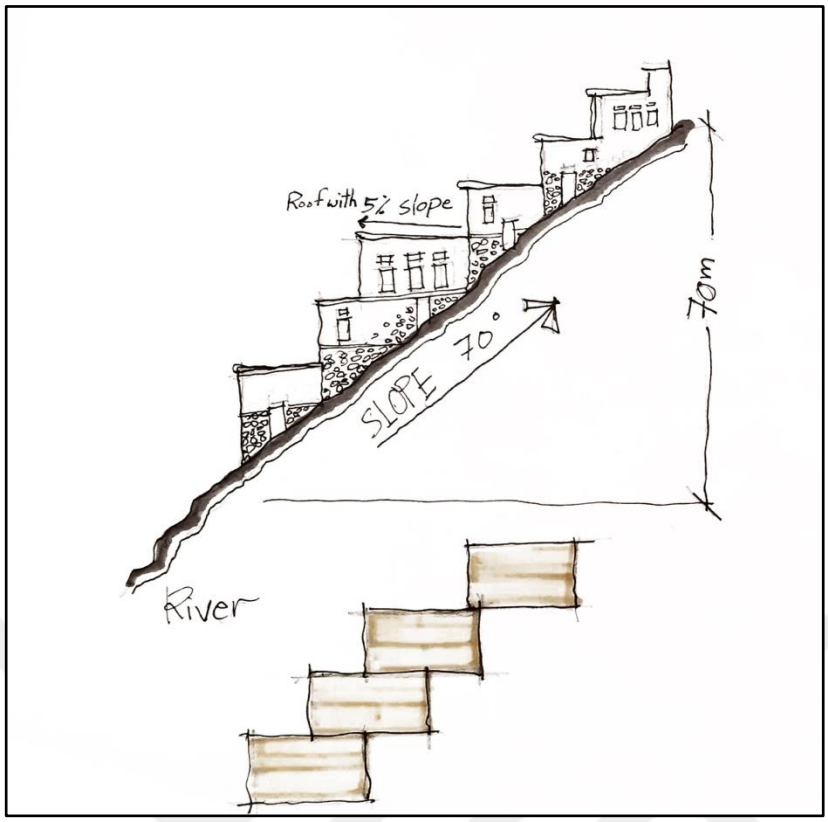


Figure 3.19 : Green patches in Masouleh village

Although most of the houses in Gilan have sloped roof with two or more slope to cope with high humidity and severe rain but there is completely different architectural typology when it comes to mountainous region like Masouleh village. The village pattern is compact form with staircase units. Other example of this kind is Roodbar and Deylaman with less or more the same typology. Despite the other typology in this region with sloped roof, the roofs of houses are flat and generally made with wood. The main body of buildings made with stone, adobe and mud. It is observable there is a harmony between life style and dwelling style with nature that guarantee the sustainability of the village through the time (Figure: 3.19).

Pass ways has been created according to contour line of the topography of region. Hence, there is just a few parallel and long passages (Figure: 3.20). Most of the times there is need for perpendicular passages to connect the routs in different levels, that mostly have moderate slop but in some conjunctions using stairs is unavoidable (Figure: 3.21).

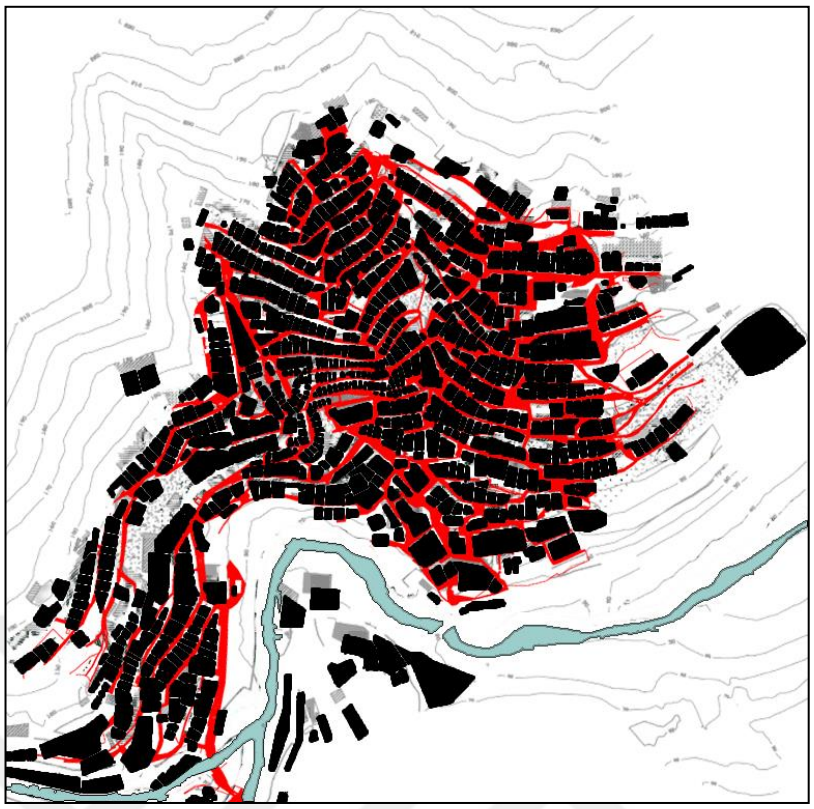


Figure 3.20 : Rout map of Masouleh village

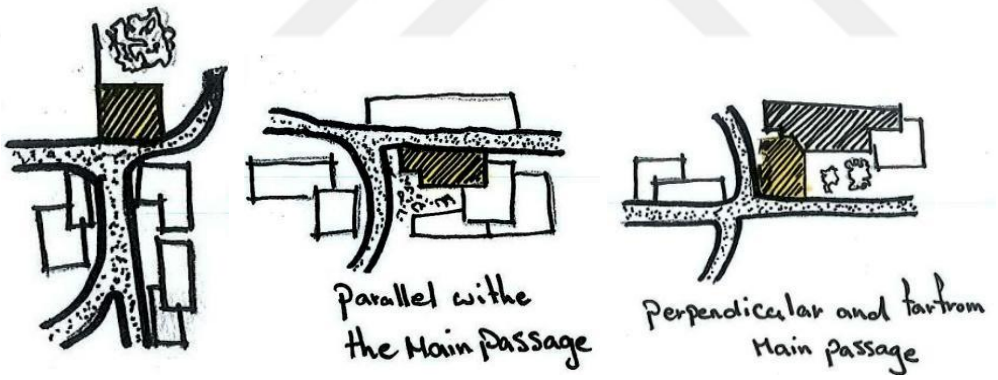


Figure 3.21 : Conjunction of Masouleh Alleys

Lack of enough space in this mountainous region caused houses built in a compact form and staircase model to use the environmental benefits. Every house on top of the other one restricts the height of units mostly two or three stories buildings (Figure: 3.22). However, according to the slope of each region there are a few one story or four stories units in some places that is observable in the map below (Figure: 3.23).

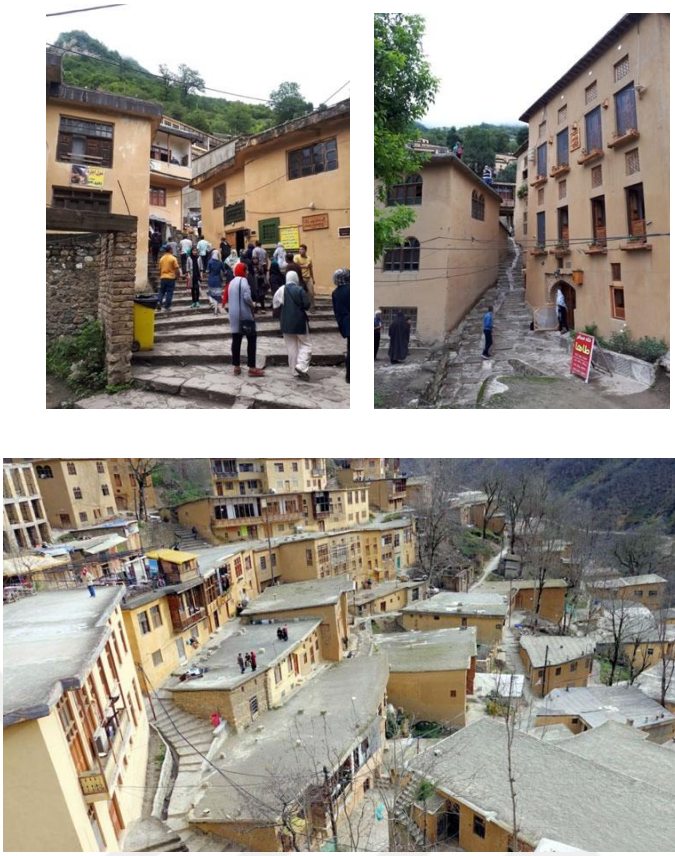


Figure 3.22 : Photo of passageways in the village Masouleh

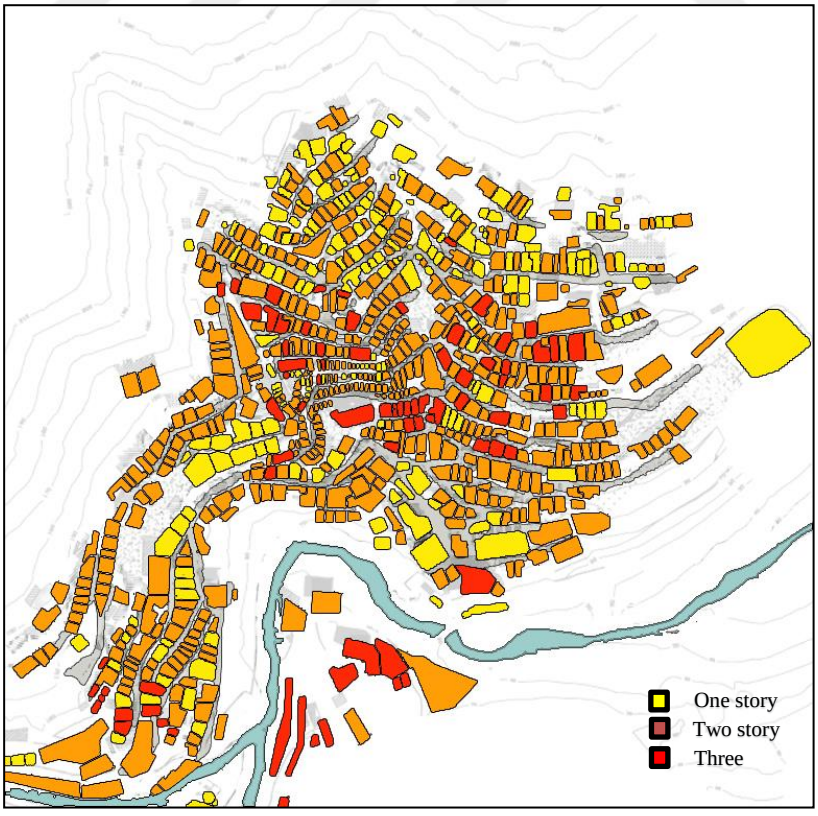


Figure 3.23 : Height of buildings in Masoule villages

According to land use map, the buildings are mostly residential, however the role of religious buildings and main market in the village is undeniable (Figure: 3.24).

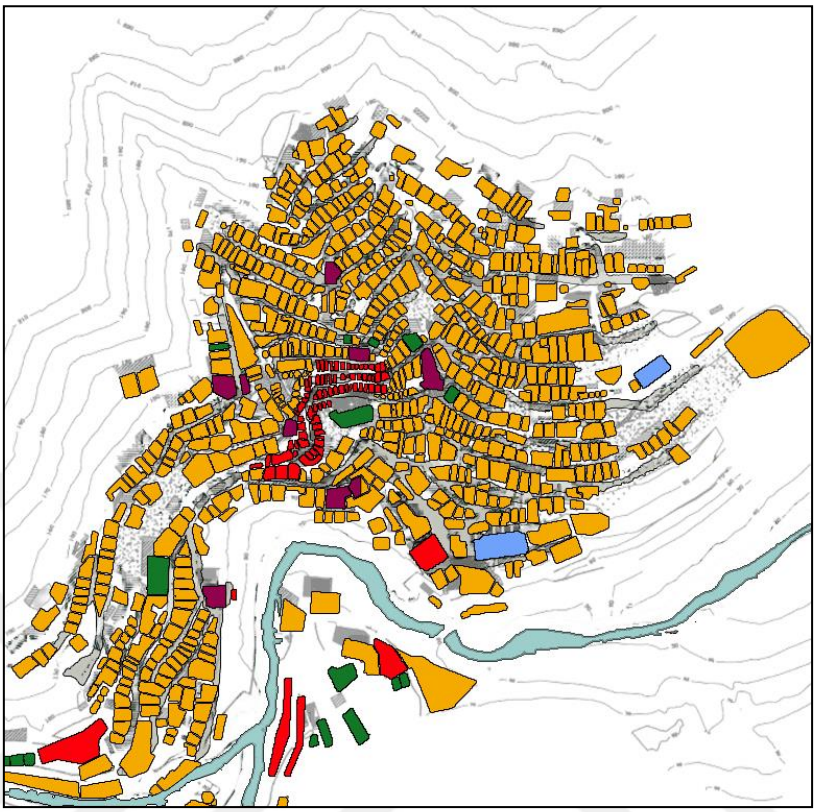


Figure 3.24 : Land use map of Masoule villages

The main market (Bazaar) of Masouleh and also the main mosque by name of "O-ne-ben-ne Ali" (Awn Ibn Mohammad Ibn Ali Ibn. Abi Taleb) dating back to 969 AD, are located in down town (Figure: 3.25). This historical mosque has been built in octagonal form and a beautiful curved design can be seen on the door made with ebony. There is some old inscription from Qur'an inside the shrine dates back to 1200 years ago.

Figure 3.25 : Main market in Masouleh village

The only open space in the village is in places which the slope has allowed locals to build a much bigger flat space like Bazaar or the space beside the main mosque in heart of the village. Other open places can be seen in some roofs or pass ways which the width is more than 3 meters (figure 3.26).

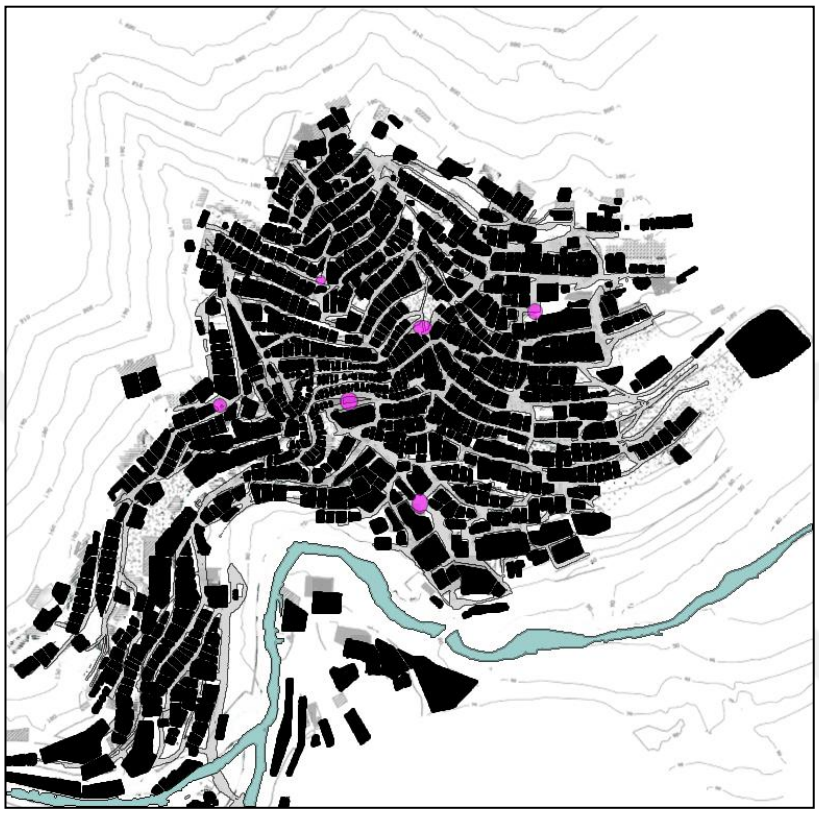


Figure 3.26 : Open space map of Masoule villages

Housing layout

In this level housing layout analysed to discover the dominant architectural type in smaller scale and the way the inhabitants cope with natural elements to create their living area more functional and comfortable for living.

Plan organization in Masouleh Architecture : Spatial arrangement in Masouleh houses: One of the most important factors in building dwellings is the way the habitants divided the inner space and design the exterior to be more functional by respect to cultural and environmental aspects. Houses have been built in a way to benefit the most of sun and efficient use of sun radiation, and to restore rain water in order to be consumed by residents instantly, also conducting wind to have a proper ventilation. These are some of the sophisticated solutions proposed by ancient

residents. Plan organization indicates how people designed their space with deep root in their culture that has been survived with less change through the years. In most of the houses with more than one story, upper floor is more suitable for habitation for having less moisture than ground floor. Dimension of dwellings varies between 60 m2 for the smallest nd 300 m2 for the greatest building. Different components that forms the typical plan in Masouleh are: 1) Rooms, 2)Enterance, 3) Chogham, 4) Someh, 5) Corridor, 6)Staircase, 7)Warehouse.

1) Room: Mostly rooms located in upper levels which have different names according to their location, function, dimension and the number of windows they have. According to climatically consideration there is two type of summer rooms and winter rooms that have seasonal function. The summer rooms usually have some shelves which is decorated with cooper staffs and mirror frames hanged on the wall. There is also wooden windows with colorful glasses that opens vertically. Winter quarter of the house in the room in the back part of the house named Someh(Khakpour, 2005). On the other hand, rooms can be divided into two group in terms of typology of the houses in Masouleh by names of "Berie keh" and "Talarakeh". Barie Keh refers to rooms with only windows in their façade and Talarkeh is a semi-open space in frontage of building which has been originated since Qajar era. This element that increase the exteriority is one of the specific features of ancient dwellings. Talar keh is a big and pleasant space allocated for guests, that's why people are eager to create it in their facades (Pourali, 2013).

2) Main entrance of the house: The entrance of building depends on the location of the building. If there be only one side adjacent to the main rout the entrance exist there in front facade, but in some cases the entrance located in the side adjacent to the by-way. In some cases if the building is two or three story building there is the chance for having two entrance, one in ground floor and the other in upper floor which there is access to upper level alley by towers. The room which connect the tower to upper alley named "Borjkeh".

3) Chogham: The space that connect different spaces to eachother is "Chogham" which located beside a space called "someh" and always opens to entrance. Chogum can be different in shape, it can be like a small room or a corridor.

4) Someh: Some is a 4m by 2m room which is located in south part behind the rooms of the house uses as winter room. Hence there is no access to sun light except the roof. There is a fireplace in the middle of the room for cooking and keeping the space warm for household and other inhabitants.

5) Corridor: This is the functional space to connect different rooms to each other. If the building is one story the corridor is called Choghum, but if the building is two or three story the corridor locates in ground floor beside the staircase and other spaces such as, restroom, foodstuff storage places, bathroom and toilet. Existence of a window in corridor prevents the cold air to come into upper floors in winter.

6) Staircase: Staircase built by wood which mostly opens to "Chogham" and sometimes to a room. This structure creates access from one floor to an others.

7) Saloon: This space is actually the place for gathering and interacting of family with each other specially in summer time and counts as living room. There is a balcony in front of saloon which can be extended partially or totally in the façade. Balcony is a semi-open space and is open in two or three side and there some decorative and structural pillars in front of it.

According to observation of Masouleh village and also research done by other scholars different type of plans and elevations is recognized (Figure: 3.27, 3.28). However they share similar characteristics in plan organization and using the same pattern of space division. Furthermore, by adjoining the someh to one of the rooms, the general housing type of this village will appear. In some of them, the small room, corridors and toilets place in ground floor. choghom and someh are locating behind the rooms in first floor and both of them connecting to the small room. From the other hand by extending the size of building, the number of entrances will be increase from the sides (Table 3.1, 3.2, 3.3).

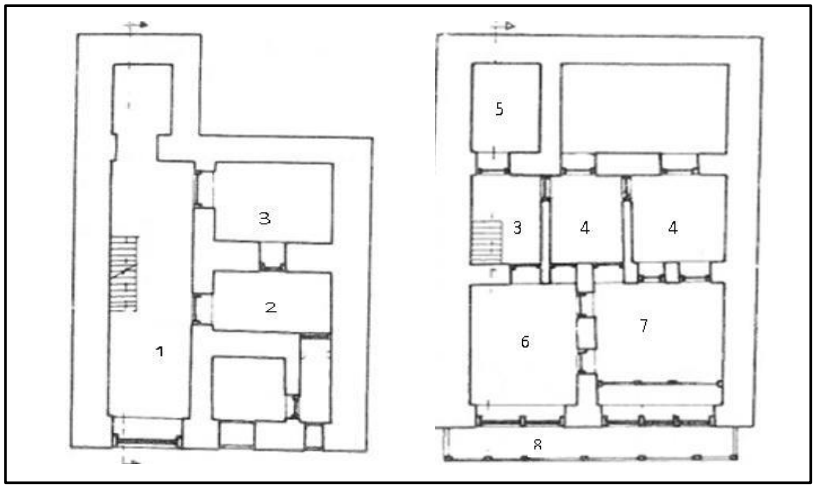


Figure 3.27 : left): Ground floor plan: 1) Corridor, 2) Store Fig.17 (right): First floor plan: 3) Chogham, 4) Someh, 5)Toilet, 6)Rookeke 7)Talara 8)Talarpish

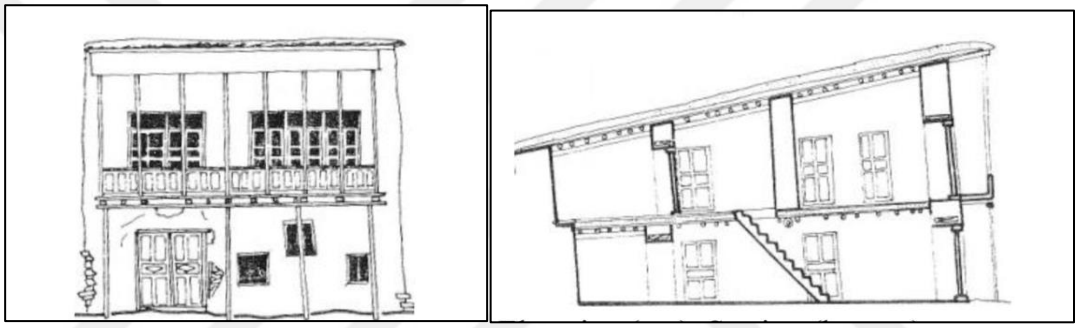


Figure 3.28 : Elevation (left), Section (right)

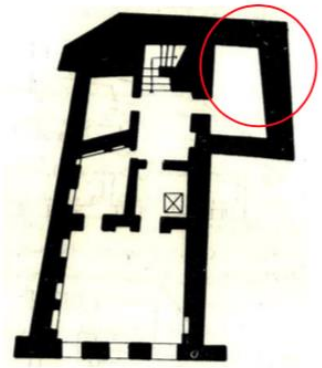
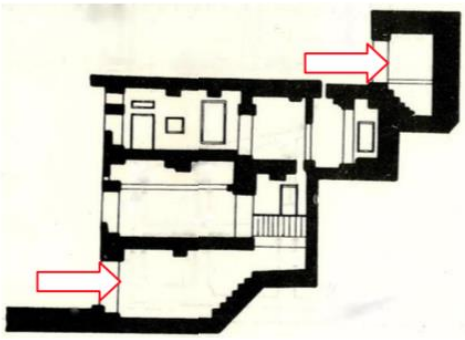
	
First Floor	Section

Table 3.1 : 1.Corridor 2.Storage 3.Choghom 4.Someh 5.Big room, (by Mazini)

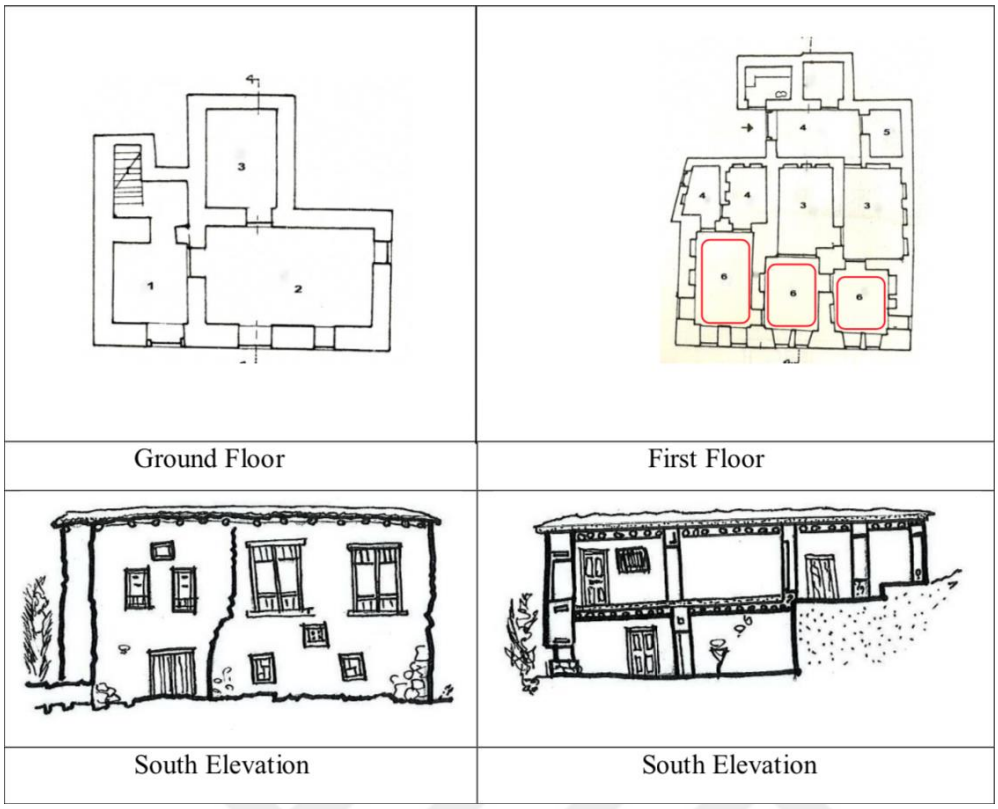


Table 3.2 : Shabani house, Masouleh 1.Corridor 2.Big Room 3. Someh 4.Choghom 5.Storage 6. Room, (by Rahimian, Hojat)

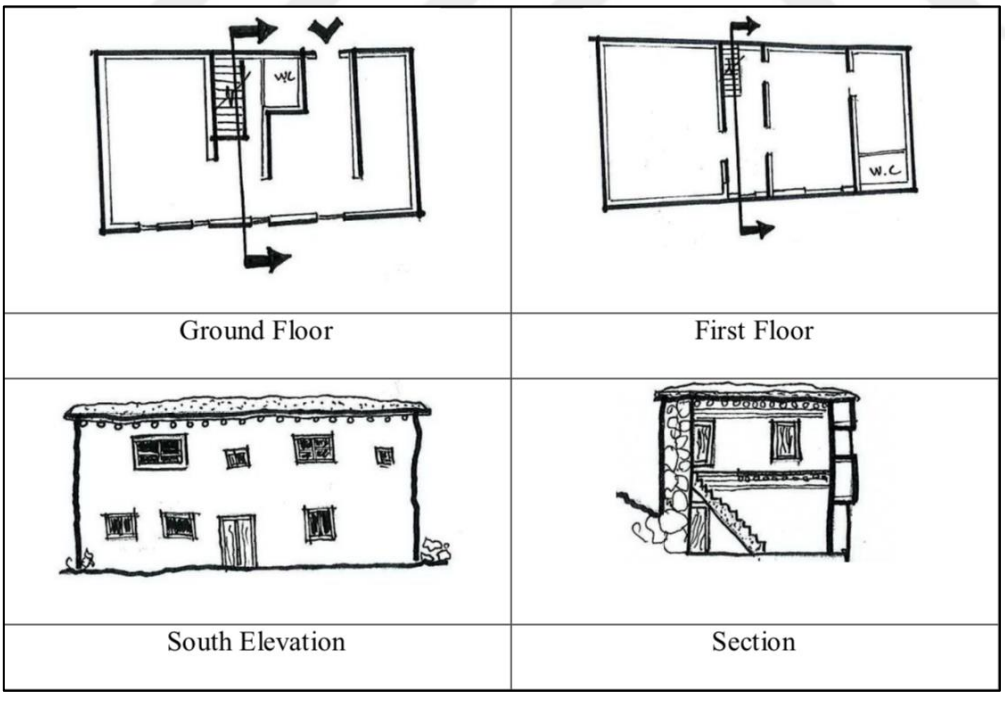


Table 3.3 : Example of Masouleh House with Corridor in the Middle. (By Author)

Façade design: For better visibility in foggy air buildings have been coated with yellow clay which is available in the region. Balconies with big windows and wooden

doors decorated with lattice wooden components, create a unique typology of façade in the village. Based on the economic level of inhabitants, more complex design or a simple pattern has been in balconies or parapets (figure 3.29).

Figure 3.29 : Different form of windows in Masouleh building's facade

Regularly, three pair of elements exist in façade, which all do not have structural function and are only used as a decorative element (Memarian, 1992).

There are different form of doors in the village, it can be single-leaf or double-leaf(figure 3.30). The size of the doors varies according to their functions, the width of doors for human use is 70 which reaches to 170 at most for domestic animals transition.

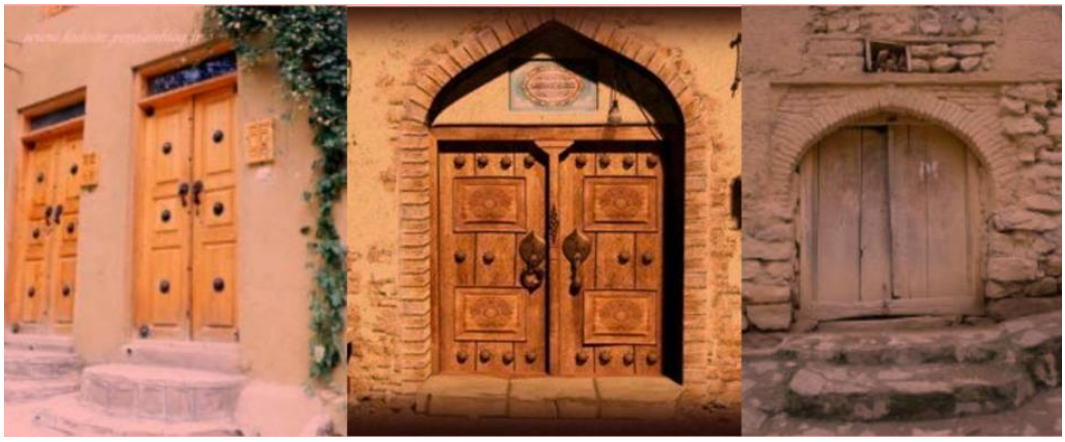


Figure 3.30 : Different type of doors in Masouleh village

There is also different type of windows applied in façade, three-leaf (Se Baria), two-leaf (Doo Baria) and single-leaf (Ie Baria). For beautification purposes geometric and flower pattern have been used in windows as it can be seen in figure 3.31 (Pirnia, 2003).

Figure 3.31 : Masouleh buildings with bay windows or Talarpish in front

Materials: As it mentioned before native people made their houses on natural stone foundation of the region with no interference on the earth because they know the earth acts as insolation to keep natural source of water in it. Moreover, there is a special soil belongs to this region is called “Foosh” and is used in roofs as thermal and humidity isolation. The roofs used as public passages cause the soil be under pressure and gets more compact and more strong so it can act better **(**Memarian, 1997).

Wooden column applied vertically on the foundation and in cooperation with the upper vertical beam forms a framework for wall (figure 3.32). Furthermore, walls in houses are made by pieces of stone in the first floor to prevent moisture penetration to upper floors and also stone have high durability and high compressive power.

For upper floors mud bricks used which are made by local materials in size of 80x30x30 blocks. Moreover, wooden scaffold (Oak wood) is used to help the load bearing from ceiling to walls and finally to the foundation. The wooden beams in the

ceiling skeleton which called Kalile are placed every 20 or 30 centimeters to support the ceiling weight equally. Wild fern, is a plant grows plentiful everywhere in Masouleh which is used in combination with cob and Fal-gel with almost 10% slope, for covering the space between timbers of the floor. Fal-gel is a common material for covering, consist of shattered rice steem shorter than 10 centimeters, clay and water.

Another local material which is used in elevation is yellow mud brick, that gives identity to the village and creates a beautiful harmony between village image and the nature surrounded it.

Figure 3.32 : Use of wooden beam

Oak, Aspic, Zelkova Carpinifolia, Elm, Maple, Linden, Alder and Walnut are commonly in use for doors and windows or bricks; because, they have enough resistance against humidity and thermal penetrations. Another thing should be mentioned is that all the joints in window structures are connected very precisely and no nails or other metal pieces are used to install the components of the structure. In other words, the only factor that connects the components is their own weight.

It can be said that the materials used for building the houses in Masouleh village include mud- bricks, stones, timber and a layer of clay (figure 3.33).

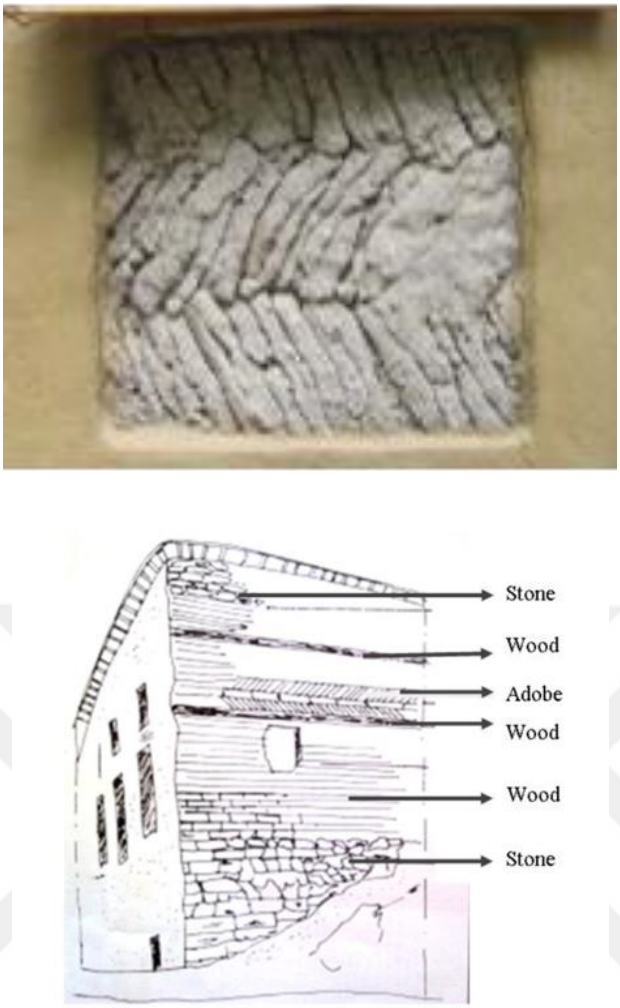


Figure 3.33 : Materials used in walls in Masouleh buildi

Table 3.4 : Table of environmental features of Masouleh village

Architectural Aspect of Masouleh	Sustainable characteristic	The Obtained Result
climate	high humid weather, while the summers are hot and winters are cold	
Location of Village	Northern part of Iran, Gilan-Fuman	To get more sunshine
Village Texture	Compact, stair-like	Reduction of the total exposure surface area. Reduction of heat exchange between outside and inside of the house.
Building Form	Extrovert building form	Masouleh is surrounded by hills So from climatic view point, Buildings are in good position and are extrovert to receive the most amount of sun radiation. They are extended east-west
Village Alleys	Narrow, walkable, forbidden for motor vehicles	Over the days, this structure makes shade and prevent sunlight and also protect peoples from the cold wind in the winter
Light and Ventilation	Skylight and use of Eyvan	Openings are on one side of building, for vertical and bidirectional ventilation they use skylight
Materials	stone, adobe, and wood	There are abundant of these materials which are compatible with the environment and need less energy to apply it because of ease of access
Roof	Flat roofs	Because the roof is used as streets at the same time
Buildings' Façade	use of balcony and big windows, yellow color used in Façade	Balcony insulate against rain and humidity
Walls	Walls insulated from moisture	Thick walls reserving heat during every day and discharging it during every night

3.2 Abyaneh Village

Abyaneh is an old village with specific architectural characters situated in the path of the Kashan-Isfahan road in the central plains, located in the Barzrood valley, 2,220 m overhead sea level. Furthermore, the left side of the valley covered with the large number of homes and settlements, leaning on the slope of the mountains, which built on top of one another. This village surrounded by several mountains such as: Kolajar to the northwest, Domilan to the southwest and Mount Himand to the northeast. (Qorbani-Zadeh, 2008). Furthermore, a path goes through the village extended to the eastern gate of the village, where the castle Nezatoon located and surrounded by hills. Obviously, it is the place that old Abyaneh settlement initiated (Qorbani-Zadeh, 2008).

The word "Abyaneh" derived from the word "viona" which means willow grove. Abyaneh village have been listed on Iran's National Heritage List since 1975 dating back to a very old history probably more than 2000 years ago, however it is controversial to predict the exact date of village initiation because there is not enough proof about background of the village. Considering Sialk origin (a city near Kashan) that is dating back to 6000 years ago, it can be predicted that Abyaneh has been established by one of those old communities, due to similar extant clay pots discovered in excavations from these two ancient civilizations. Native language spoken by locals is Parthian Pahlavi. Most of the local people of this village settled in this village since Safavid emperor and they changed to Shiite Islam after that time. Native people try to preserve their historical identity while honoring their ancient traditions.

Abyaneh village is a historical and cultural heritage placed in Karkas mountains of Zagros Mountain Range, at distance of 40 kilometers northwest of Natanz, 70 km to the southeast of Kashan that is located 2300 meters above the sea level,. Abyaneh is placed on a steep slope of the northern feet of a valley which is formed by the erosion of "Barzrood" River. It is located in Barzrood valley between two climatically different plateau, one has hot and dry climate and the other has cold climate. But the village is not affected by hot weather because it is located in the valley. The village is restricted by mountains in north and farm lands in south. The difference between the highest point and lowest point of the village is about 70 meters and it is extended from east to west direction (Abdali, 2008). In addition, houses of Abyaneh have been built

1500 years ago, and they are examples of the oldest human residences built by adobe on the rocks.

3.2.1 Social-cultural and historical background in Abyaneh

Abyaneh Village, with its historical monuments, pretty red houses, and hospitable residents is like a unique museum of anthropology.

Locals of Abyaneh, who changed their religion directly from Zoroastrianism to Shiite Islam, date back to thousand years ago and the evidence which prooves it, is sanctuary built in the Mosque. During the Safavid are more people turned to Shiite Islam and also made more dwellings in Abyaneh. This trend stopped after the invasion of Sunni Afghans to Iran (Qorbani-Zadeh, 2008). At the 2006 survey of estimating population size, Abyaneh was the habitat to about 305 people, Just over 160 families.

according to the 1982 census, Abyaneh had about 500 residentials which were developed on the steep slope of this region and there has never been a wall to make this village bounded during its existence.

The fire temples counts as heritages that prove that the people of Abyaneh were perhaps Zoroastrians before they change their religion to Islam almost a millennium ago. Moreover, all residents share the same belief because it counts as an isolated society. For example, residents do not allow the marriage of the locals with non-Zoroastrians. Thus, the unison between the people of the society in different issues, such as unison in house structures, clothes and so on are rooted in the ideologies and beliefs of the natives.

In addition to a Zoroastrian fire temple relating to the Sassanian empire, there are also three castles in the Village i.e. a pilgrimage site, a restaurant, and three mosques. There is an inscription on upper part of the entrance that shows the mosques dates back to the early Safavid era , there is also an amazing nocturnal hall with wooden pillars inside the mosque that was mentioned above and is used for prayers. There are some evidence and elements that are heritage of different empires such as Safavid, Seljuk and Ghajar era.

Abyaneh's Mosque is one of the most important buildings. It has been renovated on several occasions. Its large sanctuary is made of walnut wooden logs, which are carved which has been constructed in 1056 AD.

The Porzaleh Mosque, belonging to Ilkhanid era, and the Hajatgah Mosque, belonging to Safavid era, are the other mosques of Abyaneh Village. The ceilings of these mosques are covered with paintings and beautiful geometrical frameworks.

Local residents of the village still continue religious ceremonies such as mourning ceremonies, annually on martyrdom of Imam Hossein (AS), the third Imam of Shiites, and many people come from bordering and nearby cities to join in these mourning ceremonies.

The native dress code for instance is very traditional and the garments have been the same for a long time. The women's traditional costume usually forms of a white long scarf that usually has a colorful pattern, sometimes with flowers sewn on, covering the shoulders and also upper torso, Tanban (black pants similar to skirts) hand-made cotton shoes, long thick tights and blouses, pleated pants and a skirt that covers their legs down underneath the knees (figure 3.34).

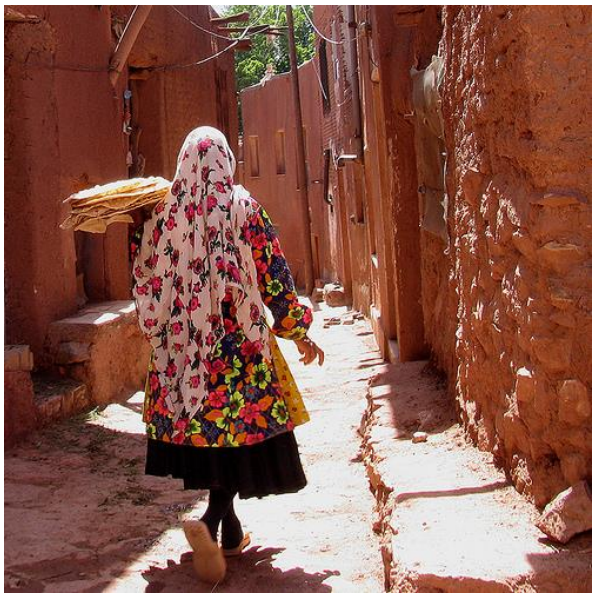


Figure 3.34 : Women dress in Abyaneh

Dress code for men usually consists of black loose pants which are designed by geometrical patterns in bottom parts. The pattern used in elder's pants are just simple

lines, but for youth the pattern is like diamonds. Men mostly wear a special dress instead of coat, which is long and called “Sardari” (Qorbani-Zadeh, Abyaneh, 2008). Meanwhile, their clothes are quite similar to those of Bakhtiari nomads, which is considered to date from Sassanid era. As can be observed, their ethnical and conventional customs such as, their traditional language and clothes from the past have been sustained.

Abyaneh has a well-defined ownership system and most people confirm that land reform did not have much effect on Abyaneh village and the way families utilize the lands. According to locals, people was in competition with each other to get land and garden ownership in the past. Hence, not only they own the most of lands in Abyaneh but also they own many real estate in the villages of Tara, Hajn and Kamijan. In Abyaneh it can be said that land use has not changed. Except in a few cases, the land has been converted into a garden because of low profit. The reason for this can be summarized in three cases:

1- Not selling land by Abyaneh people to non-Abyaneh people

2- The limited space of the village and the specific character of Abyaneh people who do not have close and warm relationships with non-Abyaneh people. Therefore, people from other villages are reluctant to buy property in Abyaneh.

3. Abyaneh Village Council and Natanz Agricultural Administration and Natanz Cultural Heritage have prevented alteration of land use due to Abyaneh has been selected as a target for tourism in Isfahan province.

3.2.2 Economy and family type in Abyaneh

It is of importance to state that the natives of Abyaneh do not have any special selling or trade center, and all their activities are done in an important building of the village.

In addition to farming and animal husbandry, families were also engaged in doing some services or making handcrafts or was settled to gardening in their gardens. garden products were also important factor in affording their needs and also earning money.

They use to keep gardening tools in the storeroom, and some items, such as a shovel and a picket, were often next to a stall or in warehouses close to home.

The major crops that are produced in the region are wheat, barley, potatoes and some fruit i.e. pears, apples and apricots. More recently, making hand-woven carpets have become popular between the residents. Women do a lot of chores individually to help with home finance such as making handicrafts and also partake in traditional industries such as carpet-weaving, making decorative items from Esphand (wild rue seeds) and production of sneakers and silver ornaments alongside with helping men in farms and animal husbandry.

In the past, bread, the most important food, was made by the family themselves and some houses had ovens. Those who did not have an oven would go to the public bakeries outside the home, which was often appropriative. In each district, someone would dedicate a land or building to create a bakery and repaired it when is needed.

Moreover, prior to establishment of the water pipe network in Abyaneh, most houses did not have direct access to water and went to the main water stream in the middle of the village for their daily needs and to wash their dishes and clothes. This meant that some of the daily activities were done away from home and beside the water. In fact, it could be said that the watercourse was also part of the living space, but used mutually by locals (figure 3.35).

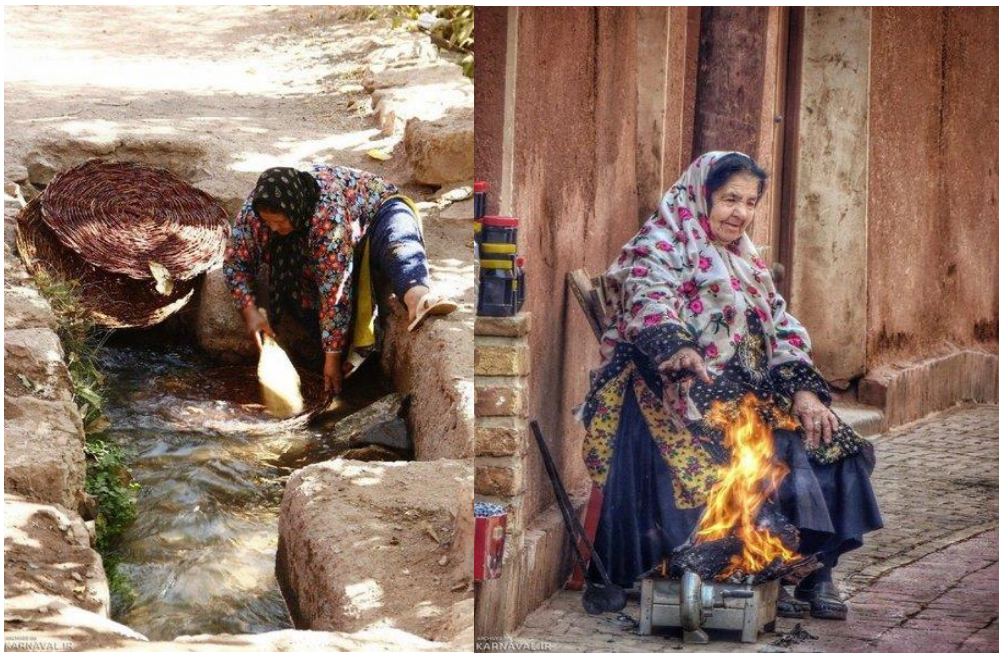


Figure 3.35 : Women in Abyaneh cook and wash their clothes outside the house

3.2.3 Environmental aspects in Abyaneh

3.2.3.1 Natural environment

Climatic characteristics: As Ghobadian Stated, Abyane village is situated in central plateau between two different climate, one with hot and dry climate and the other with cold mountainous climate. Because of geographical situation the winters are so cold with lots of snow and on the other hand, extremely hot summers. As a result, housing units are constructed according to natural atribuites of the region by means of adaptation to climatic condition (Shaterian, 2008). Also, local people had no choice unless to develop their dwellings on the slope of mountain and parallel with the river and contour lines of region.

Topography and geology: Formation of the village was commenced by erosion of Burzrood River. besides, the village could not have been developed toward the north direction as a result of the existence of the steep slopes of mountains. Also, Abyaneh has been restricted from the south side too, which is due to the agricultural and planted lands.

Approximately 400 meters after the Natanz-Kashan road toward Abyaneh Valley, the first geomorphological unit that attracts any viewer is the Alluvial Cone of the region. This alluvial is the largest alluvial in the Karkas mountains area at the mouth of the Barzrood River and the Chimeh River (Hengen River) that starting at 1500 m height and ends at 1100 m height.

Moreover, houses have developed on a foundation of green sedimentary rock in north part of the valley (Shaterian, 2008). Additionally this village has been situated in parallel with the main roud direction between Kashan and Natanz, which is extended east to west and also parallel with the ridge line of the Ghale kooh mountains which is located behind the village (figure 3.36).

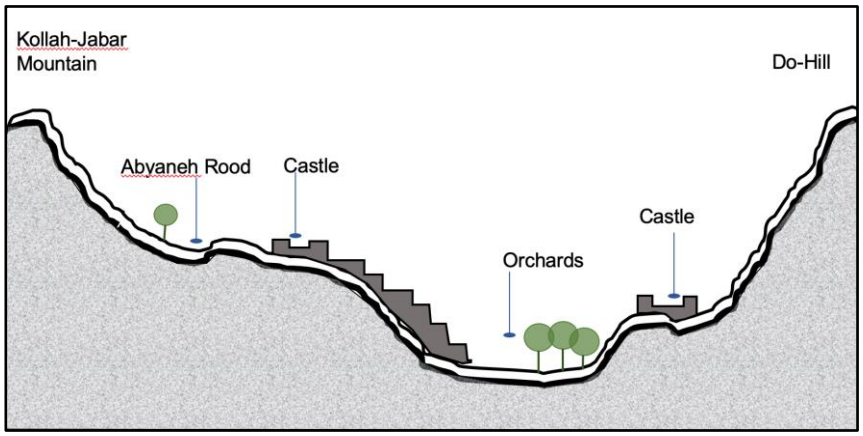


Figure 3.36 : Location of Abyaneh village among mountaions (by author)

Water resources: Abyaneh Village water needs are provided by "Do'Abi" spring, which possesses water all the time. There is another river by names of "khoshk" river that is in parallel with the ridges line of the region, but has no water all year long, due to hot weather of the village. Therefore, local people change the direction of "Do'Abi" spring to conduct it to khoshk river, so they can use water for irrigation of their farm lands and orchards. Also they benefit from some underground subterranean water resources (Memarian, 1997). In addition to these cases, the Kendro River, meaning day and night, is one of the sources of water supply.

The mentioned spring's water is additionally used for irrigation of different parts of Abyaneh such as orchards and farm-lands. likewise, with an innovative design, this spring has provided a pleasing sound, caused by water current, for people who walk through the paths of the village.

The water needed for the water is supplied by springs and subterranean. There are five subterranean, which are supplied from the North, West and Southwestern of Abyaneh. The fountain also comes from the White Mountain Fountain. The water passes through the village in definite routs:

▪ Pass through sacred sites like the Mosque of Porzaleh, the Mosque of Cement and the Hosseiniyeh

▪ Passing under the houses without access to the interior.

▪ Water passage is a direct reflection of internal architecture, usually associated with the installation of a door, such as the Khanate House and the Jame Mosque.

▪ Passing into reservoir space under the buildings such as Imamzadeh.

Generally the amount of village water is 150 liters per second. Accordingly, water is allocated to fields every 15 days and gardens once every 24 days. A sophisticated system is used to manage the water in the village, in order to prevent water loss and also increase the speed of water to make a faster irrigation.

Vegetation (Flora): plants in the region have economic, health and social value. Vegetation in the rangelands of Abyaneh is predominantly comprised of Artemisia, Astragalus, Gaz, Pruritus, Borage, Termata, Carnation, and Euphorbia. It is more abundant in western highlands, Astragalus and Blackberry, and in the northern highlands of Artemisia (figure 3.37).

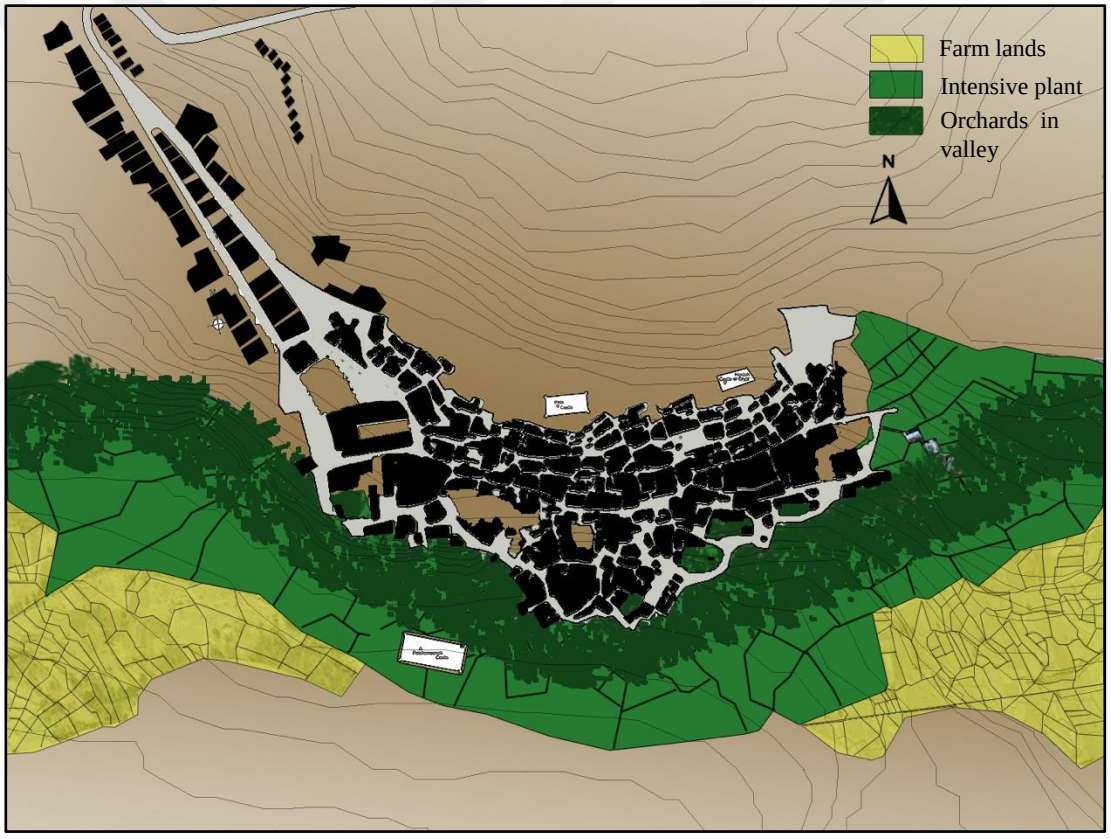


Figure 3.37 : Plant coverage in Abyabeh village

The use of these herbal remedies has been taken individually, except in the case of cranberries and spices, which collected by a group of people.

1) Peganum harmala: At the time of the spandex, rural girls and women massively went around the rangelands and after harvesting, they separated the seeds and used small sticks to prune the gardens, usually hanging them and selling them. Locals used

“Spand” seeds in agriculture as fertilizer.

2) Berberis: In May and June, women and girls go to meadowlands around the village and collect it in groups. In addition to its nutritional benefits, it has medicinal uses. People in Abyaneh believe that spring water passing through the cranberry bushes can prolong life. In addition, the dried bushes serve as a fence on the walls and walls of the gardens. In the past, barberry was not pleasant product in wheat fields because it made wheat red.

3) Astraglus gossypinus: Summer is the harvest season of this plant which is used for hair styling, glue making, compounding and coloring

Animals (Fauna): Some of the rangelands of Karkas mountains around Abyaneh village are protected area. Therefore, hunting is prohibited in this area and only in summer, the Natanz Environmental Protection Agency issues hunting licenses. However, only a limited number of residents in Natanz, Kashan or Isfahan are eager to obtain this permit. There is also a forester who was given a hunting gun by Natanz Department of Environmental.

Animals in the area include ewes (Bromus sterilis), whole (Capra aegagrus), wolves (Canis lupus), and pigs (Sus scrofa domestica)

3.2.3.2 Man-made environment

Urban layout

Rural pattern and spatial relation in Abyaneh: Moreover, Abyaneh village possesses mild mountainous climate, located in the interconnection between some mountains and has restricted borders, hence the village and the river have obliged the inhabitants to transfer their agricultural lands, as far as possible from their houses. therefore, these

fields are placed in the east and west side of the valley and the orchards sited in the south of the village (figure 3.38).

Figure 3.38 : Location of Abyaneh village in valley

Additionally, houses has been built by soil and the famous Nezatoon castle is built in the east part of the village. According to the historical evidence, the primary developments were commenced around the castle but after a while because of an earthquake, the rocky wall has gradually collapsed and the inhabitants have been forced to move to the west, where spring exists. As can be seen, local population have chosen the location for building this village based on the natural characteristics of the territory; Security concerns have been cautiously contemplated as well as the social aspects of life. consequently, three castles were created to help the people in need during dangerous situations and emergencies (Memarian, 1997).

Abyaneh has three castles:

1- Pal Hamoon or Takht Haman, located southwest of Abyaneh village, belonging to the upper neighborhood of Yosemun. The castle was built about 200 years ago. And there's a document to prove it. This document indicates the contribution of the people in the construction of the castle.

2- Heradah castle, located northeast of Abyaneh village and belongs to Haradah neighborhood.

3- Palahmoon castle, located in northwest of Abyaneh village and belongs to the Palahmoon neighborhood. These castles date back to periods of rebellion when people built these buildings to protect themselves, and used to watch it in turn (figure 3.39).

Figure 3.39 : Palahmoon castel in Abyaneh village

As it discussed before, Abyaneh is a compact village with high density due to the special characteristics of the region and the climatic factors. Hence, the natural and environmental factors obliged locals to build their dwellings on slope and on top of each other in rectangular shape to benefit from sun and to defeat the cold weather in winter. Dwellings are built in parallel direction with both river and contour lines of the region. They have created staircase houses which the roof of a house is the passageway for the house in upper level.

The most important features of the vernacular architecture of the arid climate of Abyaneh village are briefly described and categorized as follows: firstly, design of the domes and safes in mud-brick which leads to creation of noticeably functional buildings. secondly, the Persian creativity and innovation, which has proved to be absolutely a great way to use of water in a dry climate.

Dwellings are all constructed by level differentiation from the ground underneath, to avoid humidity in earth level. Houses are enclosed from most sides because of existence of other houses. Balconies can be seen in front of the dwellings which behaves as a natural ventilation and creates a transmission area between the indoor and

outdoor space which is quite amazing. One of the sophisticated solutions that applied in Abyaneh pathways is to make them zigzag, so the wind can flow through the allies to make ventilation and mild weather. “Sabat” is a roofing structure in allies have been created by locals in order to create shadow in passage ways and scape from burning sun radiation in summer, is another sophisticated solution to cope with environmental factors (Figure 3.40).

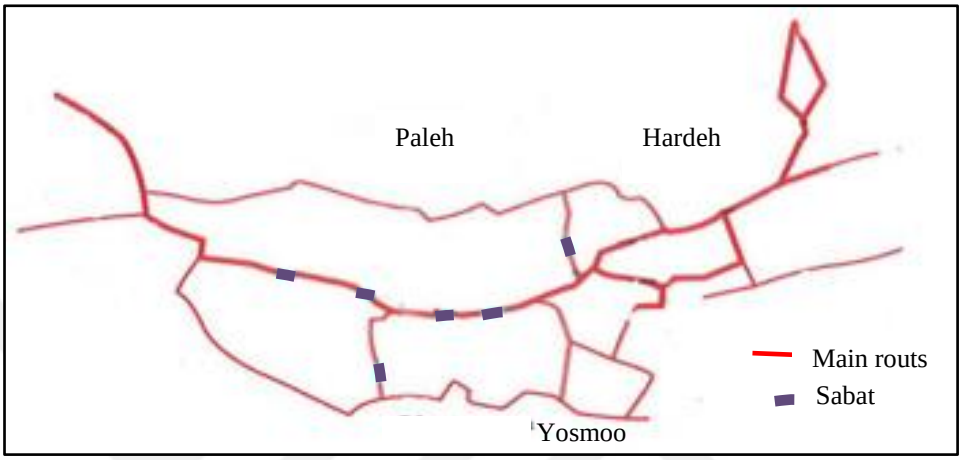


Figure 3.40 : Location of “Sabat” and districts in Abyaneh, (Ghorbanzadeh, p:76)

Abyaneh districts: The increase in population led to the expansion of the village, which led to the formation of different neighborhoods. There are three main districts in the village called, Heradah, Pal and Yosmoon whose locations are shown in the figure below. The current Abyaneh consists of three main neighborhoods (Figure 3.40):

1- Heradah (the oldest neighborhood in the east of the village)

2- pal (located to the north of the main village)

3-Yosmoon (adjacent to the gardens)

At the west entrance of the village, two new "pilgrimage" and "Panj Ali" neighborhoods have been created.

The people of Abyaneh draw a precise boundary between these three neighborhoods, and despite the brief differences that exist between them, they are unified and in harmony with each other.

In the past, most of the facilities and public areas of the village were located in Heradah and Yosmoon districts, but recently they have been built in Pal neighborhood. (Center

for Health, Bank, Anthropological Museum and Cultural Heritage Site) The village is generally developing toward the west and north-west direction.

Passways in Abyaneh which are parallel with contour lines, expanded organically and joined each other by perpendicular sloppy pass ways or mostly with staircases (Figure 3.41, 3.42).

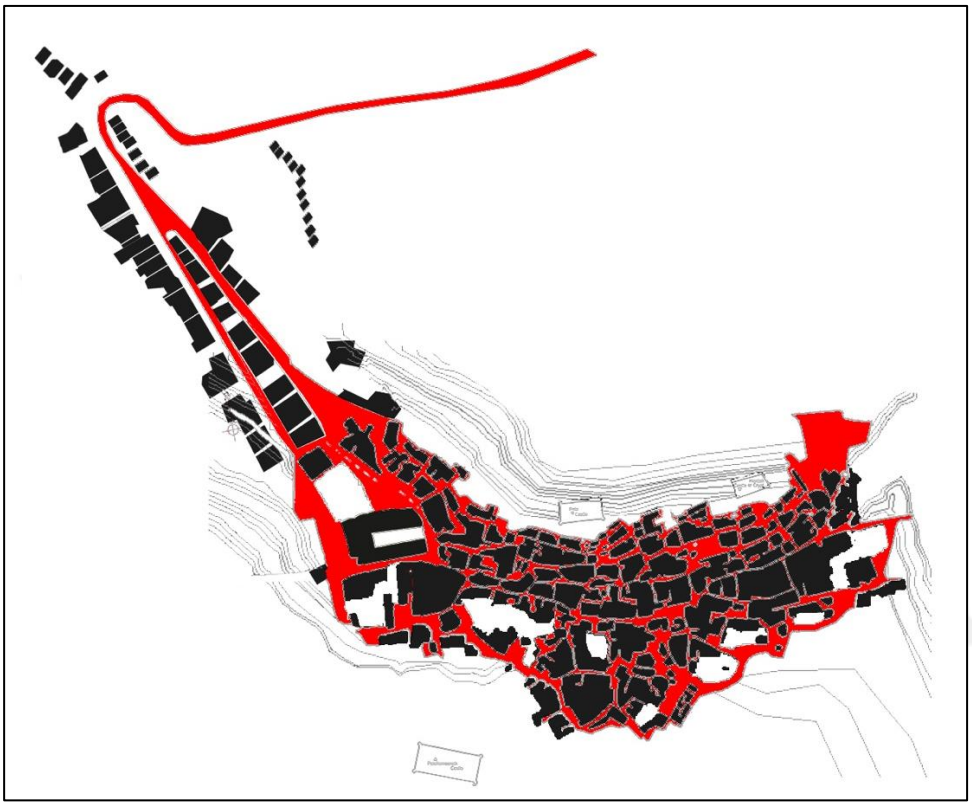


Figure 3.41 : Abyaneh route map

Figure 3.42 : Photo of passageways in Abyaneh

Thus, Abyaneh is a village with multiple story houses with the maximum of four-story buildings (Figure 3.43). There are small windows (Jumba) in outer walls of houses which opens to narrow streets of the village (Abdali, 2008).

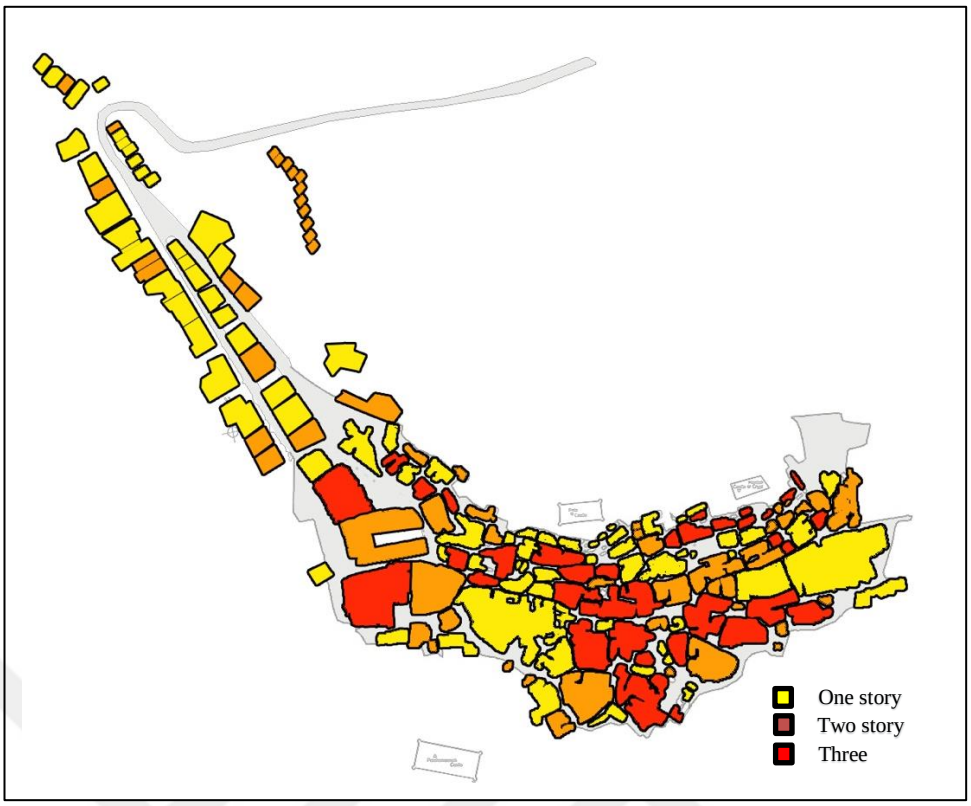


Figure 3.43 : Showing the number of stories in the village

In general, Abyana is divided into three parts in terms of land use; Rural housing, plain (80 hectares, including high and low plains) and gardens (70 hectares, including up to and including ten). Land use and important buildings has been shown in the map below which is prepared by the municipality (Figure 3.44).

Figure 3.44 : Land use map of Abyaneh village

Some features have given a specific identity to this village, to name a few, the outer thick walls were built using sun-dried mud bricks, roofs and walls were covered up with substances like mud and straw, and also the ceilings, doors and windows of the units are all created and constructed using wood.

Open spaces: Local gatherings: The gatherings, conversations, and leisure time of the villagers, especially the men, often took place at the village alleys. Small handicrafts such as cotton shoes, knitting, and tailoring, mostly done by women in the late fall and winter, caused women to come together in passages (Figure 3.45).

Figure 3.45 : Women gathering in pass ways of Abyaneh village

Housing layout

The height-differentiation of the buildings displays some of the passive environmental modulation strategies and solutions that have been considered during the development of the village (Figure 3.46).

Using dense clay adobe walls and applying quite long setbacks on the ground level to create the needed shadow on the small windows located in this floor, shaded by a wide overhanging roof and having curtain walls to protect the interior from visual observation and also to create natural air ventilation at the openings of all the buildings are some examples of the mentioned strategies, just to name a few.

The use of skylights is very common in this village. Because the openings are often located only on one side of the building, a skylight is essential to provide vertical lighting and ventilation.

For moderating the climate condition in warm days of summer balconies has been used in upper floors and nettwd windows applied in facades for creating shadow inside and also prevent direct harsh winds to come inside the house. Narrow alleys between buildings help the wind to move with less velocity, so people can cope with cold winds in winters and pass through it conviniently. Use of winter space and summer space is another sophisticated method to create comfort zone inside the buildings. Generally winter room is in the back part and summer room is in front where the wind always flow (Figure 3.47).

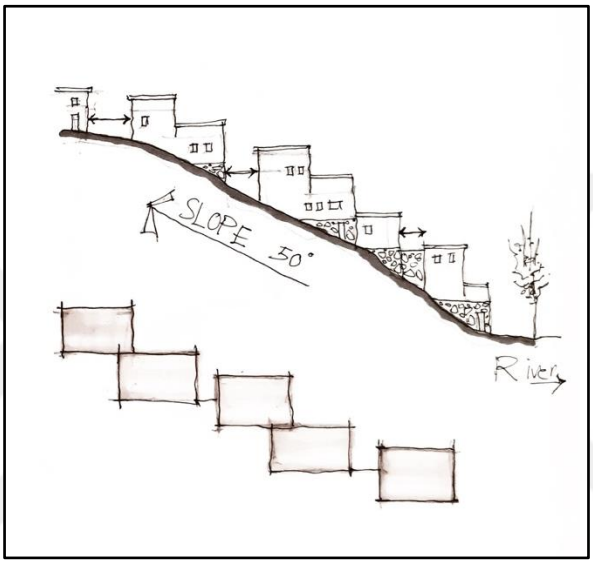


Figure 3.46 : Combination of the shapes and public areas

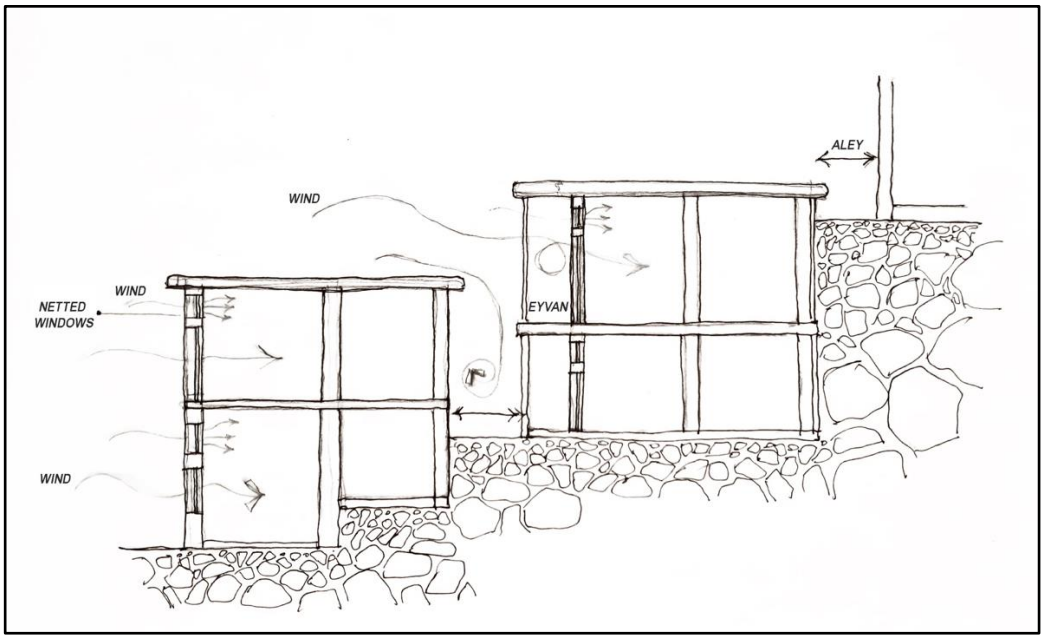


Figure 3.47 : Wind flow strategies in Abyaneh village

Plan organization in Abyaneh architecture: Rarely, it is possible to observe the existence of courtyard in some of the houses. In some cases, the entrance has direct relation with courtyards or after passing from whole building the courtyards will appear. The other units have courtyard after passing the porch (Hashti). Some units have central courtyard and built in two stories. (Memarian, 1997). Daily activities such as resting and sleeping, eating, guest accommodations, clothing storage, food storage and dairy supply preparation have been provided in different spaces in Abyaneh houses.

Room: The most important component of the home is room which is called "Yurt" in local language, and most of the activities take place in this space to meet inhabitant's needs.

Living room: In general, there is no separate space for guests in Abyaneh homes. However, the cleaner and better room is dedicated to hosting guests, in terms of the quality of the walls and the type of flooring. In some cases, in bigger houses where the owner of the house is rich, a separate room which is called "Mahmukh" allocated for guests. This room that is a summer and winter space, sometimes used for gathering space by villagers for consulting or decision making in emergency situation.

Store: For years, every house in Abyaneh has a storage space or "Silu" to store grain and keep it safe from moisture, bites, insects and thieves. Other food supplies and groceries have been kept in containers, in a cool place of barn or porch. In general, the storage space for raw materials and grains is very important for locals of Abyaneh and less attention is paid to the cooking space (Figure 3.48).

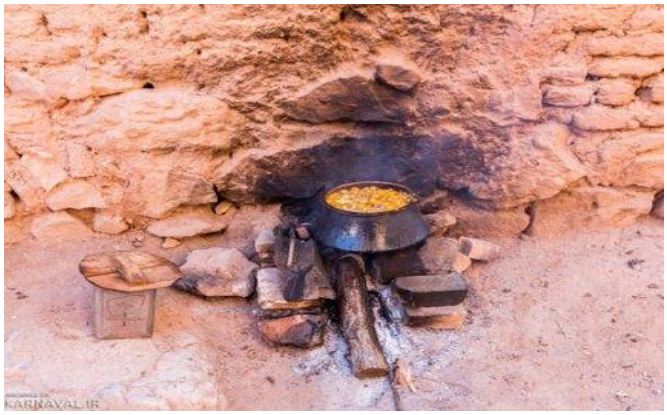


Figure 3.48 : Cooking space in Abyaneh village

Stairs: There are two different method in building stairs in Abyaneh buildings: First type, stairs built on the first floor of two and three story buildings and second type stairs that separate from the house (for those villagers who have one-story building or those who have gathered after building the house).

Toilet: The toilet is one of the essential parts of homes nowadays, but it was not possible to create it inside the Abyaneh houses, because of stone bed of the village which did not allow the construction of sewage. Also, due to the steep slope, the sewage water of upper houses penetrated the lower houses. Moreover the compact form of building and lack of enough space prevented to build toilets inside the house. For these reasons, Abyaneh houses rarely had toilets and needed services that were built in other places to meet their needs. This village has shared toilet in between the group of small houses and has private one in the big units which is located in the ground floor (Qorbani-Zadeh, 2008). In public toilets, only the owner had the right to use the fertilizer. Their wastewater was maintained and collected in the best possible manner and with less pollution to the environment. In this way, this urgent need of the inhabitants was also fulfilled in the peripheral spaces outside the house.

workplaces in the village: Part of the required areas, especially those related to household livelihoods such as stables, logs, sheds, forage storage, agricultural and husbandry staffs, firewood and other equipment and workshops are distributed in different places in the village. For example, “Hass” is an enclosed area with branches and leaves of trees but a soldier for keeping livestock (often large livestock).

Craftsmanship spaces: Industries such as carving, spoons, carpentry, carpentry, forging, and gold plating have taken place in separate places that are often in distance from the houses (Figure 3.49).

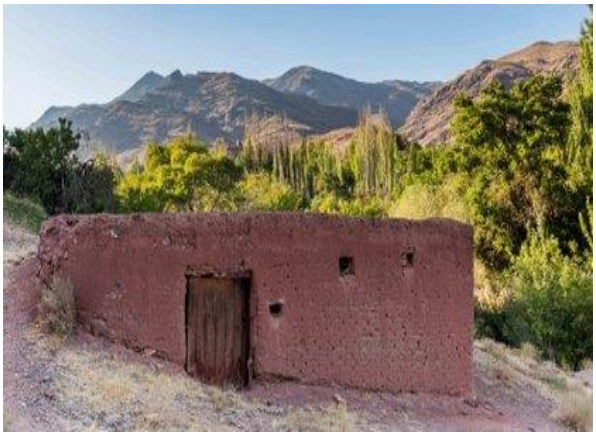


Figure 3.49 : Craftsmanship building in Abyaneh

Moreover, there is a building named “Kandah”, which area shelters built not far from the village, in the heart of the mountains and hills.

There is a sample of two story building that shows different spaces in plan organization (Figure 3.50). There are different kinds of plan organization in Abyaneh but all of them follow the same pattern as it can be seen here, winter room and summer room has been designed to provide comfort condition for inhabitants in different seasons.

Figure 3.50 : Samples of two-story buildings in Abyaneh

Accordingly, one of the heritages continue to be exist is three story building of “Harpark fire temple” that counts as the most ancient sample of public gathering places, which date back to Sasanid era and is positioned in the central part of the village (Figure 3.51). There is a space in third floor which has a dome shaped ceiling, is called “Chartaghi”, is supported by four pillars around it. The main story of Harpark has been transformed into pathway nowadays. Actually, the main alley crosses from middle

floor. Moreover, a few stairs exist in northern part of pathway, which continues until the entrance of a house. Above mentioned staircases creats a step area which is the base of the staircase in left side, the intersection creates a shared space between the fire place and the building. Thus, this holy landmark is considered the public gatherings center, however, this building has been deserted and is not of any use any longer. (Qorbani-Zadeh, 2008, p. 50)

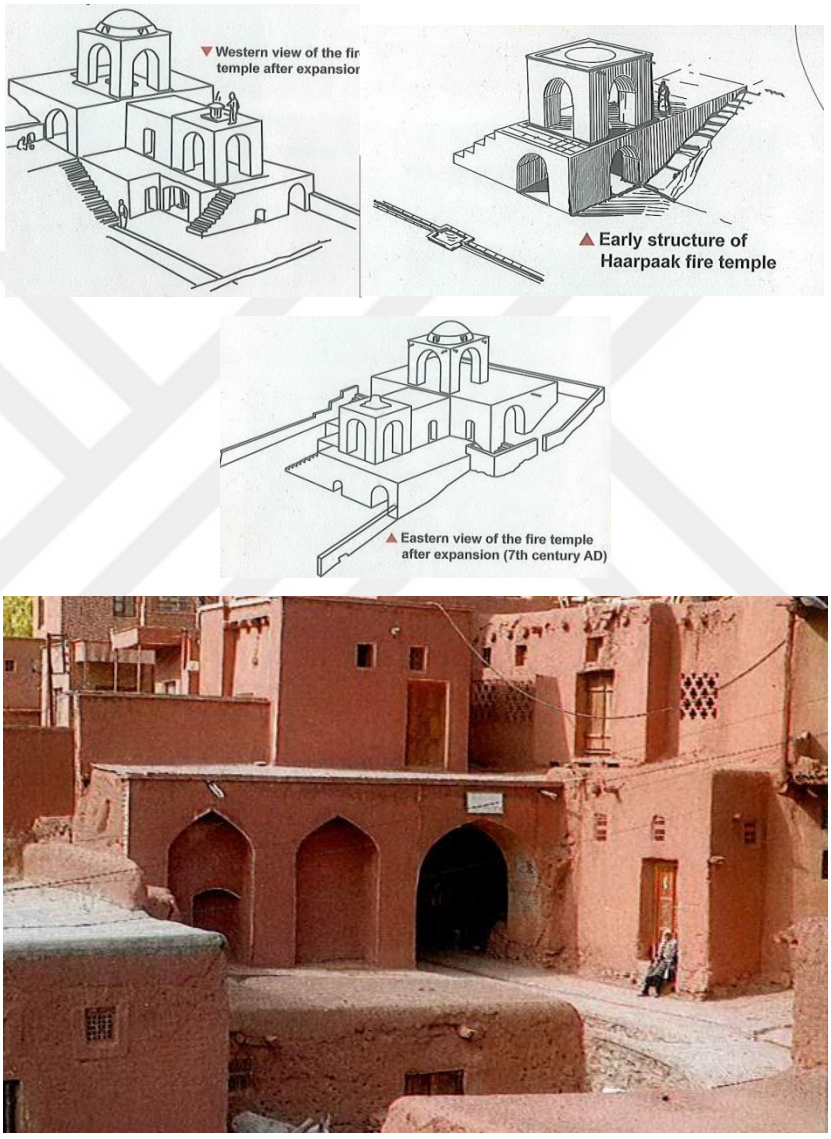


Figure 3.51 : Harpark fire temple in Abyaneh

Façade design: Most of the dwellings in Abyaneh village used red clay in elevation of houses, which is available everywhere around, so the unique scenery has been created. Other materials such as adobe, stone, white and yellow soil can be seen in façade of the houses either (Figure 3.52).

Figure 3.52 : Wooden door and windows in Abyaneh

Facades with balconies that have handrails made up of wood, looming towards the passageways, have added some beauty to village as well. Small windows or bay windows can be seen in the elevation of the most buildings which are decorated by wooden netted structures or clay brick, which conduct the light partially inside the house (Figure 3.53). To respond to hot weather in summer netted windows decrease the amount of sun coming inside and also conduct the wind inside to cool down the weather. Balconies not only gives more beauty to the buildings but also behaves as a buffer zone that create more desirable ventilation and also create a semipublic space.

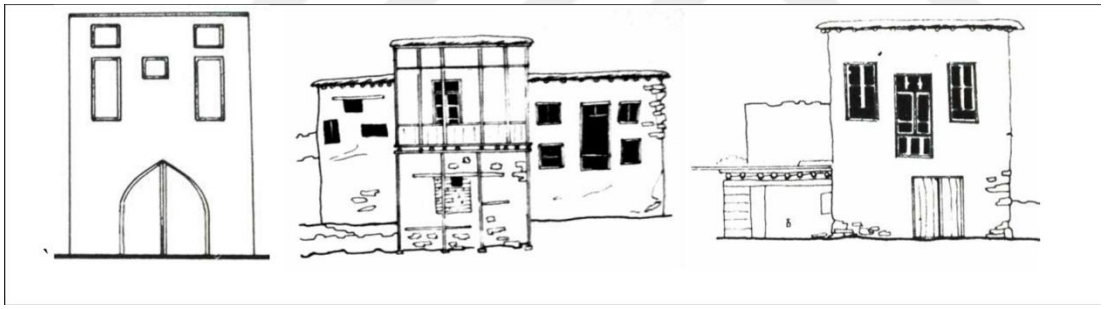


Figure 3.53 : Façade with bay windows

Materials: Having easy access to construction material in this mountainous region has conducted the local people to make the dwellings conveniently. As it can be seen, the walls of the buildings on the first floor are built using rubble, which has a high resistance and enough comparison capacity against the rising moisture. while the floors above are made up of lighter construction material such as adobe (Figure 3.54). The material used for rooftops also are made up of light objects like branches and timber and for coating the combination of mud and chaff which are plentiful in the area, climatically suitable, very efficient to use economical wise, environment friendly and are also easily maintainable. The final roofing cover is made of straw. The people of

the village take the straw from the farmers, mix it with flowers, and use the most common crops in construction. They also used it in facades and carpentry.

The red sand mine is on the north side and the yellow mine is on the southwest side of the village and is used for chamber and porch structure and sometimes on the exterior and interior walls of some buildings.

The white-soil source is located in southwest of the village and is mostly used for coating the surface of the rooms in white. Doors, window sills, barbecues and fences are all made of wood (generally timber and walnut) that grow in the gardens and the surrounding area. The straw is produced from red soil in Abyaneh. This soil is greasy, durable and impedes moisture penetration because it is greasy. Thus, the village buildings are uniform and red in color. The walls of the interior covered by stained-glass and white soil, which they call "huk zera" and "huk espi".

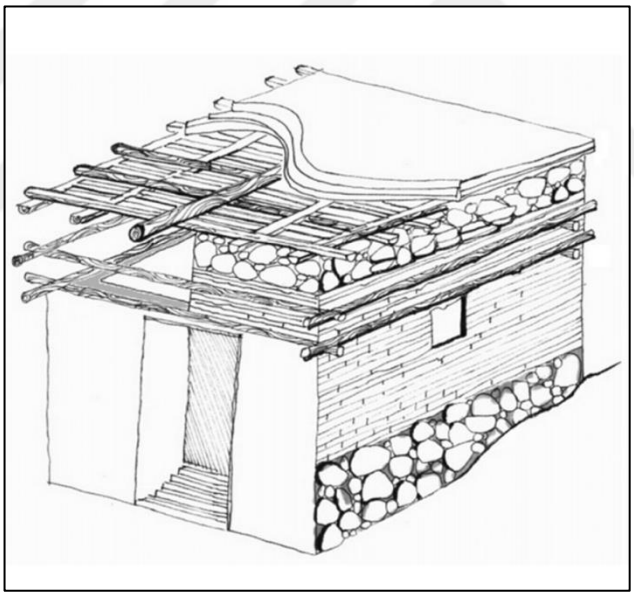


Figure 3.54 : Wooden structure and roof covering method in Abyaneh

Table 3.5 : Table of environmental features of Abyaneh village

Architectural Aspect of Abyaneh	Sustainable characteristic	The Obtained Result
Climate	mild mountainous climate. winters are so cold with lots of snow and hot summers.	
Village Texture	Condensed and compressed texture, cube form	Decrease of the total exposure surface area. Decrease of heat exchange between inside and outside of units.
Location of Village	Located on a slope of the northern terrain of a valley	To get more light and sunshine
Building Form	village has extrovert building form	Abyaneh is placed in direction of river and surrounding hills So from climatic view point, Abyaneh is in good position therefor there is no need for central courtyard and the buildings are extrovert
Village Alleys	Narrow and covered alleys which called Sabaat	During the days, this structure create shade and prevent sunlight and also protect residents from the cold wind in the winter
Light and Ventilation	Skylight	Openings built just on one side of building, they use skylight for vertical and bidirectional ventilation
Materials	Local and self-sufficient materials such as:clay, mud, brick, stone and wood	They are close to the site and so need less energy costs to transport and environmentally friendly and more applicable for aims of sustainability because they have no pollution
Roof	Flat roofs	because wood is local material and available in the site they use wooden structure that is flat
Façade	mostly red bricks	Works like insulation against rain and humidity
Walls	Very thick ,60-80 cm	Thick walls absorbing heat during every day and discharging it during night

4. COMPARISON AND DISCUSSION

In this section, information will be given about how citations, quotings and footnotes should be. In previous sections, two case studies analyzed and explained based on the social, physical and environmental context. The Studies makes it clear that both cases which have been chosen from rural areas, were built according to principle of sustainability and this is the reason that they could survive through the time with the least changes. Physical structures and the pattern of the dwellings which are built based on trial and error during the centuries are good samples of vernacular architecture. What makes these vernacular settlements worth to study, is the compatibility of settlements with environment, , sophisticated use of local materials adaptation and resistance of dwellings in harsh climatically conditions which are only a few great features of these villages. Although case studies have been introduced and investigated in different contexts, but to make a good comparison between the case studies, the principles of sustainability which mentioned above have been considered, such as; harmony with physical features of region, the dwellings layout based on ecological attributes , methods applied to use natural resources such as water, wind and sun, materials used in either building and reparation. The major characteristics of both cases have been shown in Table 4.1, which also include the map of each case beside it, gives a better chance for comparing and discussing in terms of sustainability principles.

Although the chosen case studies share some similarities in responding to the sustainable principles, differences are noticeable because the villages possess various climate conditions, topography and cultural features. Nevertheless, both villages are located at the skirt of mountains and also have been shaped and expanded according to topography attributes and parallel with the contour lines of the regions, but they possess different **village patterns** due to the differentiation of their natural environment. As it can be seen in Masouleh village, the staircase houses with a very compact form restricted by natural barriers. consequently, because of lack of appropriate land for farming and also for building, each units has laid on the roof of

the other house in below. Moreover, Abyaneh village also has condensed pattern but not as much as Masouleh village. Units in Abyaneh are separated by narrow streets and they have developed in linear form which the former expanded along the main street and the latter expanded along the river which split the village into two pieces. Nowadays, using compact form is one of the solutions as energy saving strategies and ecologically sustainable methods, which has many advocators.

In mountainous villages, extravert architecture is more common , while houses in plain region are mostly consist of two or more room located next to each other with a simple arrangement, considers as introvert architecture. Accordingly, in case of Masouleh, dwellings and their structures are visible to both inhabitants and strangers. On the other hand, due to the slight slope in Abyaneh, dwellings shows some of the characteristic of plain regions architecture.

Moreover, according to the principles that are compatible with sustainable design, walkability has always been one of the most significant subjects in architecture disciplines and also vernacular architecture. The definition of **Walkability** here is to afford a convenient accessibility for pedestrian to walk and spend time, not access of motorized vehicles. According to the meaning of walkability and with regard to street pattern which is discussed before for each case, it is obviously clear that pathways in all villages has been built in a way to respond to climatic condition and also to encourage inhabitants to move through the alleys. Use of Sabat in narrow streets of Abyaneh with arid climate, wide and flat pedestrian pathways on rooftops of the staircase houses of Masouleh are the examples of sustainability in vernacular settlements. Use of stony stairs in places with sharp slope which afford a convenient access to the street in upper level can be seen in all the case studies. The sharper the slope is, the more the role of stairs come clear. For example in Masoule village, stairs play a crucial role to provide accessibility between alleys, otherwise it is almost impossible to move through the streets which are extended in different levels. As it mentioned before, use of compact form not only minimize the energy consumption, but also minimize the distances between streets to ease the access which is specially more required in hard climatic conditions.

Furthermore, **location and orientation** of the dwellings according to climatic and topography of the region, which determines to what extent units can absorb sun rays

to natural lighting and heating in cold weather, also how they conduct wind into house as natural ventilation in warm weather, are just a few benefits of building units based on the environment features. Consequently, the rate of natural energy consumption decreases to optimal level by respecting to nature (Imani Emadi, 2013)

As it discussed before, both case studies have been built in a way to expose enough sun radiation and also the place for developing the village has been chosen wisely. For example in Masouleh, the village has been formed in middle part of foothill to stay away from direct sun radiation and also from risk of flood in lower parts. The orientation is eat-west direction with big windows to get the most benefit of sun. Ground level has been built just to keep the upper floor from penetration of water and humidity. Use of balconies and large windows is a good solution for affording a good ventilation, which is in contrast to small bay windows used in Abyaneh village.

As a result, it can be said that both of the case studies with step-form pattern and extrovert architecture, afford comfort and desired ventilation in hot summer days and requires less natural energy resources during cold weather for heating, due to the compact form of the villages. both examples are constructed according to unique characteristics of the nature with natural materials in whole process of construction such as skeleton, spatial arrangement of different areas, providing ventilation and also sub-materials for more detailed elements.

However, some natural and unnatural factors threatens the life of these villages and inhabitants as it referred in previous chapter.

The depreciation of essence and spirit of Masouleh during these 50 years is noticeable. After Manjil earthquake in 1990, 400 units of Masouleh houses were reduced to 100 residential building which 90% of these 100 houses suffered from serious destructions. Also, after 1990, 15% of traditional doors and windows were remained. In reconstruction done by the government, 250 new houses with modern technology and building materials were made during the last 10 years. In fact, the main reason of devaluation of Masouleh historical value is the use of modern technology and changing the staircase style of Masouleh structure in new construction

Construction system of buildings in staircase villages starts from lower part of hillside to the top. Terracing system has been applied in constructions where the soil

is strong enough to ear the load of buildings. However use of rubble stone in foundation which are rigid and breakable, act like a roller during earthquake and cause so much damages to inhabitants and buildings. **Earthquake** behaviour of random rubble stone masonry is of the worst type among the rural building structure types (Korkmaz et al., 2010). Specifically in case of Masouleh which is located in region with high risk of earthquake, the issue is more serious.

Another weakness of the buildings is bearing walls with the weak performance of corner connections as these experience higher stresses during earthquake. Due to the ground motion, different parts of the structure vibrate with different characteristics. The stiff structure of the load bearing walls and roof, and the flexible characteristics of the non-load bearing walls vibrate in perpendicular directions and the corners of the walls, being the junction between them, are the areas facing the highest stress (Coburn, 1986).

Researchers have identified that in most traditional stone masonry constructions, one-way floor spans suffer from lack of in-plane shear strength. This lack of structural integrity is the greatest source of weakness. Collapse of walls happens usually due to the failure of connections between wall and wall, wall and roof, and wall and foundations. Failure of the stone walls is followed by the falling of the heavy roof (Weldelibanos, 1993).

Moreover, both case studies counts as touristic places of the country which attracts thousands of tourists every year. However, endeavors to employ tourism as a catalyst for rural economic development have not always been welcomed or proved as beneficial as anticipated. Following the identification of villages, authorities and private sector tour operators and travel agents commenced advertising without ensuring that a satisfactory infrastructure was in place. Communities were rarely consulted and concerns were raised amongst residents and non-governmental organizations about the implications of increased tourism. The consultancy firms which drew up the plans were more accustomed to dealing with urban planning and conclusions and recommendations were sometimes derived from desk research alone. Valuable and finite natural and cultural resources have been damaged and villagers gained little financially in return. Inadequate planning has thus threatened the sustainability of rural tourism, challenging arguments that tourism has the capacity to

make a significant positive contribution to local societies and economies (Ghaderi, 2009). These issues are illustrated by the case of a particular village which is discussed below.

Furthermore, one of the most important features of mountain areas is the lack of stability nowadays as they are destroying the vegetation including jungles and plains are in a sever danger. Therefore, we should pay attention to ecological aspects and establishing the stability in these areas (Majnounian, 1995).

The development of mountain areas should be simultaneous with **tourism** and sustainable exploitation can provide both conservation and proper function of ecosystem in mountain (Bonine, 1980). Establishing between conservation and usage is a difficult task because destroying the natural stability in mountain regardless its size, impact on adjacent neighborhood. For example, in case of Masouleh, overcultivation of native medicinal plants in upper part of hillside can trigger avalanches. Moreover, planting the wrong species of plants, leads to soil erosion, especially in river side and floods would be inevitable . Likewise in Abyaneh village, people cut down the trees in west entrance of the village in order to make new buildings which are not constructed in accordance to regional settings, whereas the plant coverage need to be preserved to guarantee the life of flora and fauna in the region.

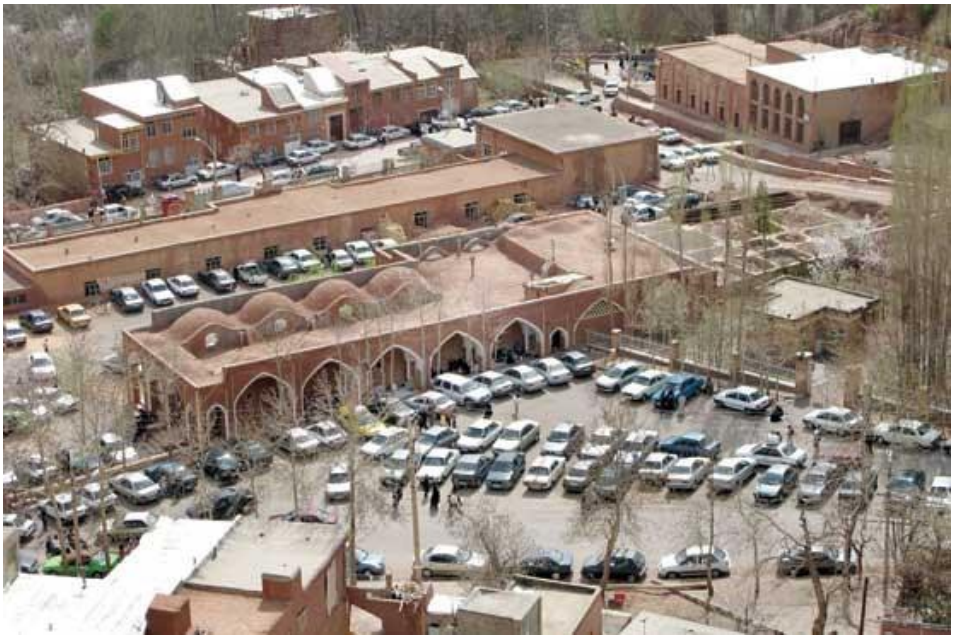


Figure 4.1 : Over populated parking area in Abyaneh

Url: https://www.radiozamaneh.com/277485

In terms of social affects, Contact between tourists and local people may precipitate changes in the everyday life, traditions, values, norms and identities of destination residents. Survey respondents pointed unfavourable positive socio-cultural impacts of tourism in the village as they were profiting financially from tourists. The rapid growth demand for art and crafts market by tourist was welcomed by the local residence when the importance of preserving rural heritage is the matter which had been in danger of vanishing a decade ago.

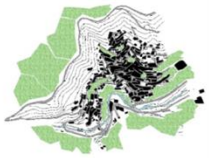
In case of Masouleh economic rewards for locals were, however, comparatively small and it was calculated that less than 10% of village residents depended on tourism for their livelihoods. Similarly, Abyaneh village is more dependent on farming and the income from selling handcrafts in not considerable. Tourists mostly do not tend to stay in the villages due to lack of facilities and infrastructures, so that the profit is not considerable from short accommodations.

However by considering the shortages in maintenance and the proper way of controlling natural disasters, there is still some instructions that can be presented to be applied in the new constructions in the villages of Masouleh and Abyaneh and also other staircase villages, that is listed below:

- Selecting the proper orientation for buildings which is mostly south or south-east direction
- Use of windows in the south facades to get desirable sun radiation
- Selecting the size of openings based on the climate of the region
- Use of cross-ventilation by putting windows on the opposite wall (in regions with less than 50% slope
- Use of semi open spaces like balcony or Eyvan for natural ventilation and indirect access to outer space
- Use of local and natural materials such as: abode, stone and wood
- Considering the plant coverage patches to conserve various native species of the region
- Use of natural resources such as water (use of pond to supply water for residents), soil and vegetation properly to meet daily needs
- Considering natural topography to build swage system

- Enhancement of economic condition by considering the history and potential of the region in terms of natural resources
- Socio-cultural values influence daily lives, and they have a great impact on traditional plan layout of houses
- The stepped structure of the city, high density and the expansion of house with limited area in height are in harmony with natural slope of land.
- Designing sloped ceiling for driving rain and humidity to determined areas.
- Using the narrow ways for defecating the waste water.

Table 4.1 : Result of comparison of Masoule and Abyaneh village in terms of environmental factors

COUNTRY	VILLAGE	PATTERN OF SETTELMENT	CLIMATE	GEOGRAPHY	HISTORY & CULTURE	CONSTRUCTION & MATERIAL	BULDING FORM	URBAN TEXTURE
IRAN	MASOULE		Temperate And Cold winter with heavy snow fall and moderate but sun burn Summer.	Harsh Slope in mountains	1300 Years ago Zoroastrianism & Islam	Mud brick, Stone, Wood. Load bearing wall	2 or 3 stories buildings. Faced towards the south direction Stretched East To west	Very Dense housing Development with direct Accessibility of Indoors & Outdoors facilities.
	ABYANE		Hot and dry very cold and long winter with heavy snow - very hot and sun burnt summer	Steeply slope	1300 years ago created Muslim For 1000 years	Adobe, Wood, Load bearing wall	Faced towards the south Direction --- Stretched East to west	Dense housing development With indirect accessibility Of indoors & outdoors facilities.

5. CONCLUSION

Without any doubt Iran is a country with deep roots in the history representing vast variety of old fashions and styles in architectural context. Vernacular settlements counts as a good sample of cultural heritage with specific architectural patterns and characteristics, especially in mountainous region. According to the findings of this research, the importance of vernacular architecture and design with nature gets clear which need to be taken under consideration by architects and urban designers in order to solve the current difficulties in staircase housing. Immigration of the new generation of locals to the city centers is one of the important problems, which are directly related to their expectations from their lives. What makes these vernacular settlements worth to study, is the compatibility of settlements with environment, , sophisticated use of local materials adaptation and resistance of dwellings in harsh climatically conditions which are only a few great features of these villages. Although case studies have been introduced and investigated in different contexts, but to make a good comparison between the case studies, the principles of sustainability which mentioned above have been considered, such as; harmony with physical features of region, the dwellings layout based on ecological attributes , methods applied to use natural resources such as water, wind and sun, materials used in either building and reparation.

Low income, inappropriate maintenance, lack of facilities encourage native people to leave the village. Moreover, natural disasters like earthquake, avalanches and floods damage the villages and threatens the life of inhabitants. Overcultivation and afforestation are the other activities done by humans that increase the risk of damages from natural disasters. The essential need to discover the patterns and instructions embedded in vernacular settlements applied by ancient inhabitants come clear throughout the study in order to solve the current construction problems. Also study of environmental elements such as soil, water, vegetation coverage (flora) and fauna and the way inhabitants use them in their behalf with less damage and alteration in ecological system is really fruitful in order to conduct better strategies in order to prevent more pressure to nature.

Moreover, due to the fact that houses built according to the culture and social context of the society, the spaces are more functional, so it can be a good sample for contemporary construction from this point of view. Modern houses are suffering from lack of identity and paying less attention to environmental issues. In modern houses, it has been tried to solve the ventilation and creating comfort zone only by artificial resources, so the loss of great amount of energy is inevitable. The purpose is not to imitate the method used in traditional buildings, but the main aim is to consider the principles and lessons which are achieved from vernacular settlements investigations. For example, new methods of construction, new materials and new approaches in architecture can be developed according to sustainable principles from vernacular settlements. The combination of vernacular and modern methods together seems to be a better solution in response to sustainable design.

The purpose of vernacular architecture is to have the least interference in nature, while providing the comfort and convenient condition for human with the least use of natural energy resources. Strategies derived from vernacular architecture in analyzed case studies, affects the orientation, unit patterns, material selection, are essential to be applied in rural areas which has almost the same weather and nature. Furthermore, study of conventional settlements and vernacular architecture in combination with sustainable design, gives valuable information in terms of ecological context. Eventually, there is some suggestions here:

- Paying attention to physical features of the region such as sun and wind direction as well as the topography
- Use of local material for old and new constructions
- The need for the development of a suitable earthquake protection policy and design criteria for unreinforced masonry and adobe low-cost housing is a must, and should be considered by governments.
- High environmental standards can help generate a successful vernacular architecture.
- Sensitivity to context and protecting the natural environment, parallel with preserving the cultural values, and the use of traditional materials are binding with contemporary architecture and functional relationships.
- Conservation and revitalization of social, natural and bio values in mountain areas for sustainable development.

- Promoting the quality of urban spaces and life
- The development of facilities
- Presenting solutions for conservation and expansion the touristic area in the texture.
- The determination of recreational areas and predict the future development with

  respect to marinating the historical texture.

- Establishing the spatial-physical system along with development the interaction between Human with environment and human with human with respect to environmental, functional and aesthetic consideration.
- Action plan for designing touristic and residential place in natural and historical areas and optimization of the environment.
- Set planning for recreational and leisure activities.
- The development of the environmental resources through optimization, renovation along with reducing the natural disasters and increasing the ecological capacity.
- Protection strategies of forests and green patches which contribute to maintaining ecosystems and anthropogenic infrastructures – through the protection of river systems (the hydrological balance) and against erosion or damage caused by floods, avalanche, mudslides and wind; microclimatic and environmental protection and safety, notably by contributing to carbon sequestration.

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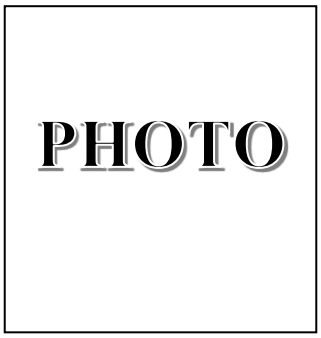

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